FINAL
Site Inspection Report
Army Aviation Support Facility
Windsor Locks, Connecticut

Perfluorooctanesulfonic Acid (PFOS) and
Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

January 2022

Prepared for:

Army National Guard Bureau
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

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Acronyms and Abbreviations

6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
µg/kg	micrograms per kilogram
°C	degrees Celsius
°F	degrees Fahrenheit
%	percent
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
AST	above-ground storage tank
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
CTANG	Connecticut Air National Guard
CTARNG	Connecticut Army National Guard
CTDEEP	Connecticut Department of Energy and Environmental Protection
DA	Department of the Army
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct push technology
DQI	data quality indicator
DQO	data quality objective
DUA	data usability assessment
EDR™	Environmental Data Resources, Inc.™
EIS	extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
FedEx	Federal Express
ERB	equipment rinsate blank
FRB	field reagent blank
FTA	Fire Training Area
HA	Health Advisory
HDPE	high-density polyethylene
IDW	investigation-derived waste
IIS	Injection internal standards
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
LOD	limit of detection
LOQ	limit of quantitation

MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NOAA	National Oceanic and Atmospheric Administration
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
ORP	oxidation-reduction potential
OSD	Office of the Secretary of Defense
OWS	oil-water separator
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFCs	perfluorinated compounds
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic acid
PID	photoionization detector
PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCRA	Time Critical Removal Action
TOC	total organic carbon
TPP	Technical Project Planning
UCMR 3	Third Unregulated Contaminant Monitoring Rule
UFP	Uniform Federal Policy

US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WLRC	Windsor Locks Readiness Center

Executive Summary

The Army National Guard (ARNG) G9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs). An SI was completed at Windsor Locks Army Aviation Support Facility (AASF; also referred to as the "facility") in Windsor Locks, Connecticut.

The Windsor Locks AASF occupies 37.9 acres along Route 75, adjacent to Bradley International Airport, in Windsor Locks, Connecticut. The facility primarily operates as a helicopter operations center and fuel station where minor helicopter repairs and servicing are performed (Legette, Brashears & Graham, Inc., 2015). The facility includes two maintenance hangars with attached office space, the Windsor Locks Readiness Center (WLRC) building, two storage buildings, a maintenance shop, and a fenced-in motor pool that includes bermed parking areas for trucks used to refuel helicopters.

During the PA for PFAS, two potential PFAS release areas were identified: the Wash Rack and Building 152 (south hangar) (AECOM, 2020). PFAS-containing aqueous film-forming foam (AFFF) may have been released during fire training activities at the Wash Rack or from the discharge of mobile fire extinguishers to floor drains in Building 152. The potential PFAS release areas were grouped into one AOI, AOI 1, which was investigated during the SI. Building 152 and the adjacent Building 200 (north hangar) are both equipped with fire suppression systems that utilize AFFF. One additional area, the Hazardous Waste Storage Area, was observed during the PA because two 5-gallon buckets of AFFF were stored there. No known PFAS releases have occurred at Building 200 or the Hazardous Waste Storage Area; therefore, they were not identified as part of the AOI during the PA or the SI. However, the SI sampling program covered the majority of the facility's footprint and borings were located downgradient of these storage and use areas as a conservative measure. The SI field activities were conducted from 26 to 29 April 2021 and included the collection of soil and groundwater samples.

To fulfill the project Data Quality Objectives (DQOs) set forth in the approved SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of 18 PFAS by liquid chromatography with tandem mass spectrometry compliant with Quality Systems Manual 5.3 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.9** of this Report.

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, and there is a potential release that is likely attributable to ARNG activities, the AOI will proceed to a Remedial Investigation (RI), the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOA, PFOS, and PFBS, for both soil and groundwater. The SLs were calculated using the United States Environmental Protection Agency (USEPA) Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

Additionally, the USEPA issued drinking water lifetime Health Advisories (HAs) for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs

for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient; the SLs are presented on **Table ES-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain the 18 PFAS analyzed within the boundaries of the facility.

Sample chemical analytical concentrations were compared against the project SLs, as described in **Table ES-1**. A summary of the results of the SI data relative to the SLs is as follows:

- PFOA and PFOS in groundwater at AOI 1 exceeded the individual SLs of 40 nanograms per liter (ng/L) at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04), and in groundwater at upgradient and downgradient locations at the facility. The maximum concentrations of PFOA and PFOS were 298 ng/L (at location AOI01-03) and 581 ng/L (at location AOI01-08), respectively. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- PFOA, PFOS, and PFBS were detected in soil at AOI 1, indicating a release of PFAS-containing materials occurred; however, the detected concentrations were several orders of magnitude lower than the soil SLs.

Table ES-2 summarizes the SI results for soil and groundwater. Based on the conceptual site models (CSMs) developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors at the facility; however, it is unclear if DoD activities at the facility have contributed to PFOA, PFOS, and PFBS concentrations in groundwater.

Table ES-3 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1.

Table ES-1: Screening Levels (Soil and Groundwater)

Analyte	Residential (Soil) (µg/kg)[a,b] 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b] 2-15 feet bgs	Tap Water (Groundwater) (ng/L)[a,b]	USEPA HA (Groundwater representative of Drinking Water) (ng/L)[c,d]
PFOA	130	1,600	40	70
PFOS	130	1,600	40	70
PFBS	1,900	25,000	600	-

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 October 2019.

b.) USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ = 0.1. 8 April 2021.

c.) USEPA. 2016a. Drinking Water Health Advisory (HA) for Perfluorooctanoic Acid (PFOA). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-005. May 2016. / USEPA. 2016b. Drinking Water HA for Perfluorooctane Sulfonic Acid (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

d.) USEPA HAs apply to the PFOA and PFOS concentrations individually or combined.

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Wash Rack	◐	●	●
1	Building 152	◐	●	●

Legend:
N/A = Not applicable
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table ES-3: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Wash Rack, Building 152	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI

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1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites, ARNG Installations, Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at the Windsor Locks Army Aviation Support Facility (AASF) in Windsor Locks, Connecticut. The Windsor Locks AASF is also referred to as the "facility" throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; US Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and polyfluoroalkyl substances (PFAS). The term PFAS is used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

A PA was performed at Windsor Locks AASF (AECOM, 2020) that identified two potential PFAS release areas at the facility, which were grouped into one Area of Interest (AOI). The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

As stated in the *Federal Facilities Remedial Site Inspection Summary Guide* (USEPA, 2005), an SI has five goals:

1. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment;
2. Determine the potential need for a removal action;
3. Collect or develop data to evaluate potential release;
4. Collect data to better characterize the release for more effective and rapid initiation of a Remedial Investigation (RI), if determined necessary; and
5. Collect data to determine whether the release is more than likely the result of activities associated with the Department of Defense (DoD).

In addition to the USEPA-identified goals of an SI, the ARNG SI also identifies whether there are potential off-facility PFAS sources.

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2. Facility Background

2.1 Facility Location and Description

The Windsor Locks AASF occupies 37.9 acres that consist primarily of two maintenance hangars with attached office space, the Windsor Locks Readiness Center (WLRC) building, two storage buildings, a maintenance shop, and a fenced-in motor pool that includes bermed parking areas for trucks used to refuel helicopters. The facility also contains a hazardous waste storage area, above-ground storage tanks (ASTs), a pump house, water tower, emergency diesel generators, and a civilian parking lot. The facility is located on Route 75, adjacent to Bradley International Airport, in Windsor Locks, Connecticut (**Figure 2-1**). The facility primarily operates as a helicopter operations center and fuel station where minor helicopter repairs and servicing are performed (Legette, Brashears & Graham, Inc., 2015).

Bradley International Airport was acquired by the Federal government in the 1940s as a military reservation and deeded to the State of Connecticut in 1948 as surplus property. Between 1949 and 1955, various legal agreements were executed to provide for use of the field by reserve components of the Armed Forces, primarily the US Air Force and Connecticut Air National Guard (CTANG). In September 1986, the parcel was transferred from the CTANG to the Connecticut ARNG (CTARNG). The transfer of the property from CTANG to CTARNG included numerous buildings as well as the wash rack, airport apron, taxiway, and boundary fence. The title to land and buildings operated by the CTARNG was listed in the name of the State of Connecticut, Department of Aeronautics, and was leased to the US Government until 2002 (Engineering Technologies Associates, Inc., 1994). The Secretary of the Army granted the State of Connecticut a license to use and occupy for training and support of the CTARNG, effective 1 September 2010 (under License # DACA33-3-11-032). The lease remains on a year to year basis up to 31 October 2055.

2.2 Facility Environmental Setting

Windsor Locks AASF is located within the Connecticut Valley Lowlands physiographic region of the state (Engineering Technologies Associates, Inc., 1994). The topography of the facility is generally level, sloping slightly to the northwest (**Figure 2-2**). A drainage swale originates along the northwestern edge of the facility and continues northwest, off-facility, to an intermittent stream called Spencer Brook.

2.2.1 Geology

Windsor Locks AASF lies within the Connecticut Valley Lowlands and is underlain by gently sloping sand, silt, and gravel. Fine sand and silt are located beneath the ground surface. Surficial material at the facility is mapped as stratified drift and deltaic deposits overlying till with clay (Colton, 1960). Historical excavation reports noted a clay layer at depths ranging from 3 to 10 feet below ground surface (bgs). Bedrock beneath the facility is mapped as the Portland Arkose (**Figure 2-3**), which is described as a reddish-brown siltstone and sandstone (Schnabel and Eric, 1964). Depth to bedrock is estimated to be 100 to 150 feet bgs (Handman, 1973). Approximately 70 percent (%) of the soil underlying the facility is classified as made land, i.e., fill material. The underlying soil consists of Ninegrat Fine Sandy Loam, Poquonock Loamy Sand, Windsor Loamy Fine Sand, Agawan Fine Sand, Scantic Silt Loam, and Whatley Loam. These soils range from sand to silty clay loams with moderate to rapid permeability (SCS, 1962).

Soil borings completed during the SI found poorly graded and well-graded sand as the dominant lithology of the unconsolidated sediments below the Windsor Locks AASF; the borings were completed at depths between 10 and 15 feet bgs. Isolated layers of clay to silty sand were also

observed in the boring logs, at thicknesses ranging from a few inches to 3.5 feet. Many of the logs also reported varying percentages of gravel included in the sand packages. These observations are consistent with the understood fill material and glaciofluvial depositional environment.

2.2.2 Hydrogeology

The groundwater beneath the site is classified by the Connecticut Department of Energy and Environmental Protection (CTDEEP) as “GA”. Groundwater classified as GA is defined as groundwater with the area existing of private water-supply wells or an area with the potential to provide water to public or private water supply wells. The CTDEEP presumes that groundwater in such an area is, at a minimum, suitable for drinking or other domestic uses without treatment. The designated uses for Class GA groundwater are as existing private and potential public or private supplies of water suitable for drinking without treatment and as base flow for hydraulically connected surface water bodies (CTDEEP, 2002). Groundwater features at the facility are shown on **Figure 2-3**. There are currently no potable water wells on the facility.

A 2018 Environmental Data Resources, Inc.™ (EDR™) Report indicated that no drinking water supply wells are present within a 1-mile radius of the facility (AECOM, 2019). Using additional online resources, wells were researched to a 4-mile radius of the facility. The state of Connecticut does not have an online well database. According to the US Geological Survey (USGS) National Water Information System Mapper, no active wells exist within a 4-mile radius of the facility; however, 93 inactive USGS monitoring wells were identified within a 4-mile radius of the facility (USGS, 2019). Although no other active wells were listed within 4 miles of the facility, agricultural areas exist to the north/northwest, and it is possible that unlisted groundwater wells may exist in this area.

Windsor Locks AASF receives its potable water from the Connecticut Water Company. The Connecticut Water Company serves East Granby and Windsor Locks in addition to numerous other Connecticut towns and cities (Amec Foster Wheeler Environment & Infrastructure, Inc., 2018). According to the 2017 Water Quality Report for the Connecticut Water Northern Western Water System (serving Windsor Locks), the water supply source for Windsor Locks is the Metropolitan District (MDC), a non-profit municipal corporation that provides potable water and sewerage services (MDC, 2019). The MDC water supply source consists of a system of reservoirs that includes the Barkhamsted Reservoir and the Nepaug Reservoir (MDC, 2019). The two reservoirs are approximately 14 miles and 16 miles west of the Windsor Locks AASF, respectively. Available Third Unregulated Contaminant Monitoring Rule (UCMR 3) data for Connecticut does not indicate that PFAS have been detected in either of the aforementioned MDC surface water reservoirs (USEPA, 2017a).

Depths to water measured in April 2021 during the SI ranged from 3.37 to 8.11 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-5** and indicate groundwater flow direction is towards the drainage swale on both the western and eastern portions of the facility. West of the drainage swale, groundwater flow is generally to the northeast across the facility towards the drainage swale, while east of the drainage swale, groundwater flow is to the west-southwest back toward the drainage swale. Hydraulic conductivity values measured during a 2008 Phase III Investigation ranged from 0.5 to 33 feet per day (Fuss & O’Neil, 2008).

2.2.3 Hydrology

The nearest surface water body to the facility is Spencer Brook, which is located approximately 300 feet northwest of the facility at its closest point (**Figure 2-4**). Spencer Brook is not classified by the State of Connecticut, and it is therefore assumed to be a Class A surface water body. Class A surface water bodies support the following designated uses: potential drinking water supply, fish and wildlife habitat, recreational use, agricultural, industrial supply and other legitimate uses, including navigation (CTDEEP, 2002).

Windsor Locks AASF is drained by Spencer Brook, an intermittent stream that discharges to Stoney Brook, a perennial stream 6,300 feet downstream of the facility. Stoney Brook discharges into the Connecticut River 5.3 miles further downstream. The average flow of the Connecticut River measured at State Route 190 is 16,640 cubic feet per second. The average flow rate of Stoney Brook is 20.4 cubic feet per second, based on the period 1981 to 1992 at the South Grand Street stream gage.

The western portion of the facility is drained by a stormwater detention system and a surface swale to the west of the parking apron. This system drains the tank farm area and the parking apron, as well as areas off-facility. The eastern portion of the facility is drained by a separate stormwater detention system and a drainage swale to the east of Building 200. The stormwater detention system east of Building 152 originates on State of Connecticut property. The western and eastern drainage features converge in the northern portion of the facility, from where the drainage is routed into a concrete swale to the north of the facility and subsequently to Spencer Brook.

The Windsor Locks AASF facilities discharge stormwater runoff associated with industrial activities into surface waters under state permits. The facility is also permitted to discharge water associated with the wash rack's grit separator and the AASF oil-water separator (OWS) and floor drain system into sanitary sewers.

2.2.4 Climate

Data from Hartford Bradley International Airport, Connecticut indicate that the annual average temperature between 1981 and 2010 was 50.6 degrees Fahrenheit (°F) (National Oceanic and Atmospheric Administration [NOAA], 2018). The warmest months are July and August, with normal daily average temperatures of 73.6 °F and 71.9 °F, respectively. January is the coldest month, with an average temperature of 26.1 °F. Average annual precipitation measured from 1981 to 2010 at the airport was 45.85 inches. Rainfall is heaviest during the months of May through July, averaging approximately 4.3 inches per month; January and February are the driest months. Average monthly precipitation ranges from 2.89 inches in February to 4.37 inches in October (NOAA, 2018).

2.2.5 Current and Future Land Use

Windsor Locks AASF is an operations center used by the CTARNG for the routine maintenance and minor repair on military helicopters and fixed-wing aircraft. A bulk fuel facility has been operating at the Windsor Locks AASF since the early 1970s. The facility includes two maintenance hangars with attached office space, the WLRC building, two storage buildings, a maintenance shop, a fenced-in motor pool that includes bermed parking areas fuel trucks, a hazardous waste storage area, ASTs, a pump house, water tower, emergency diesel generators, and a civilian parking lot. Future use of the Windsor Locks AASF is anticipated to remain the same.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

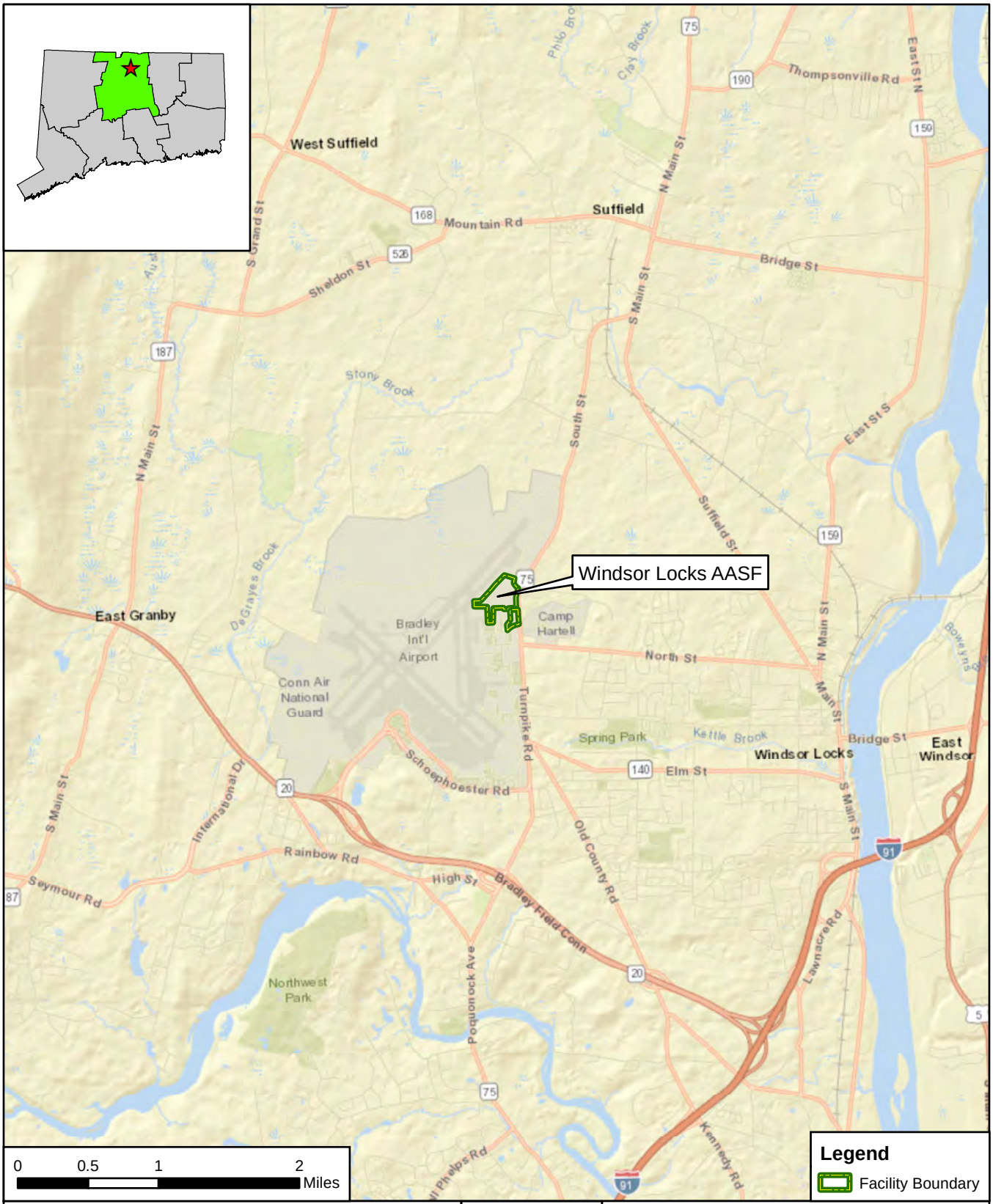
The following birds, plants, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Hartford County, Connecticut (US Fish and Wildlife Service [USFWS], 2021).

- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate); Cobblestone tiger beetle, *Cicindela marginipennis* (resolved taxon)
- **Mammals**: Northern long-eared bat, *Myotis septentrionalis* (threatened)
- **Clams:** Dwarf wedgemussel, *Alasmidonta heterodon* (endangered)

- **Flowering plants:** Small whorled pogonia, *Isotria medeoloides* (threatened)

2.3 History of PFAS Use

Two potential PFAS release areas were identified during the PA at the Windsor Locks AASF, where aqueous film forming foam (AFFF) may have been used or released historically (AECOM, 2020). Windsor Locks AASF includes two maintenance hangars: Building 200 (north hangar) and Building 152 (south hangar). Both hangars are equipped with fire suppression systems that utilize AFFF. Although there are no documented releases from the fire suppression systems, AFFF may have been released at the facility during fire training activities. Notably, between 2003 and 2015, AFFF was used to extinguish controlled burns at the Wash Rack during fire training, and mobile fire extinguishers containing AFFF were discharged to the floor drains in Building 152. These two potential PFAS release areas were grouped into one AOI based on proximity to one another and presumed groundwater flow. One additional area, the Hazardous Waste Storage Area, was observed during the PA because two 5-gallon buckets of AFFF were stored there. No known PFAS releases have occurred at Building 200 or the Hazardous Waste Storage Area; therefore, they were not identified as part of the AOI during the PA or the SI. However, the SI sampling program covered the majority of the facility's footprint and borings were located downgradient of these storage and use areas as a conservative measure. A description of AOI 1 is presented in **Section 3**.



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Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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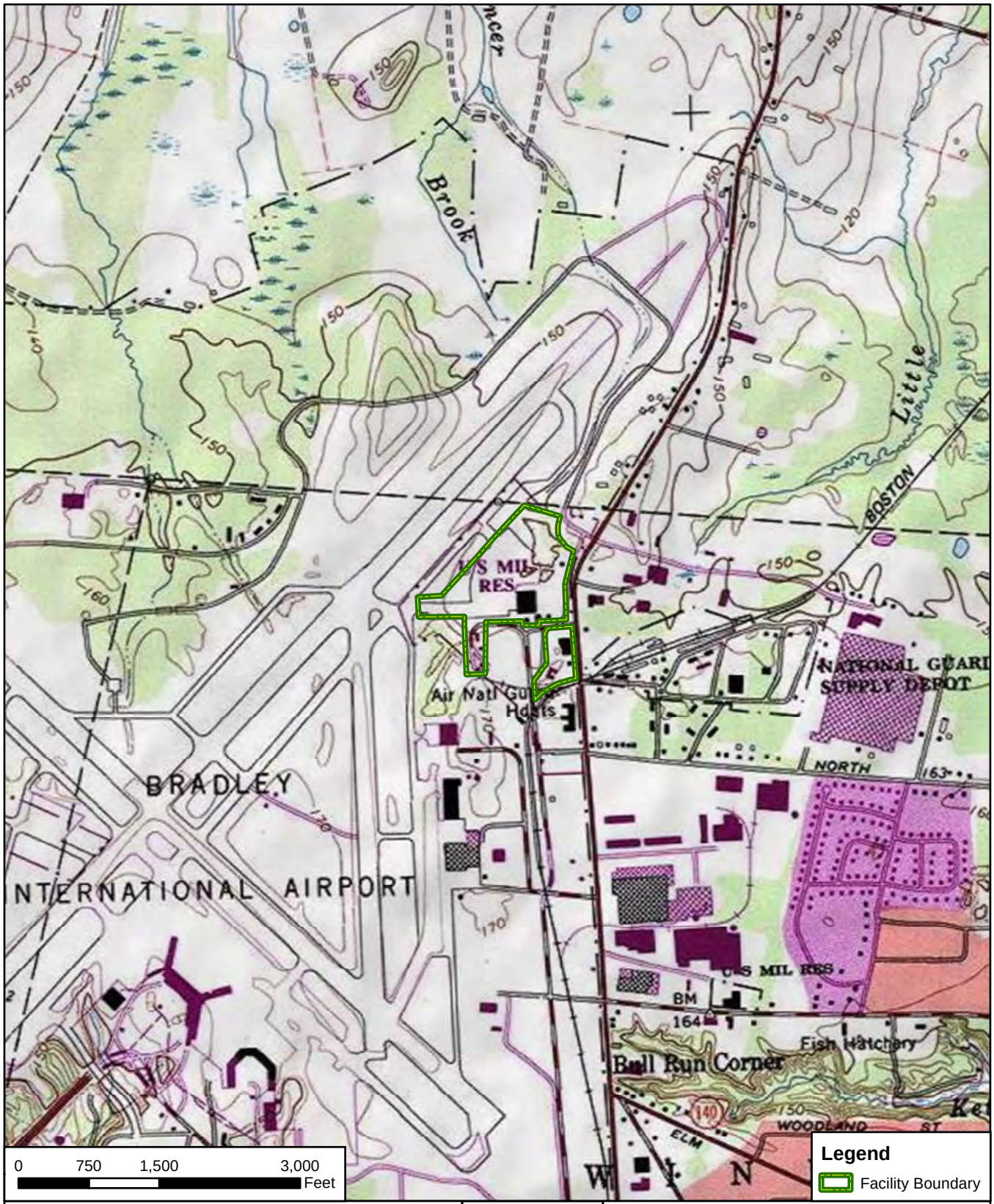

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Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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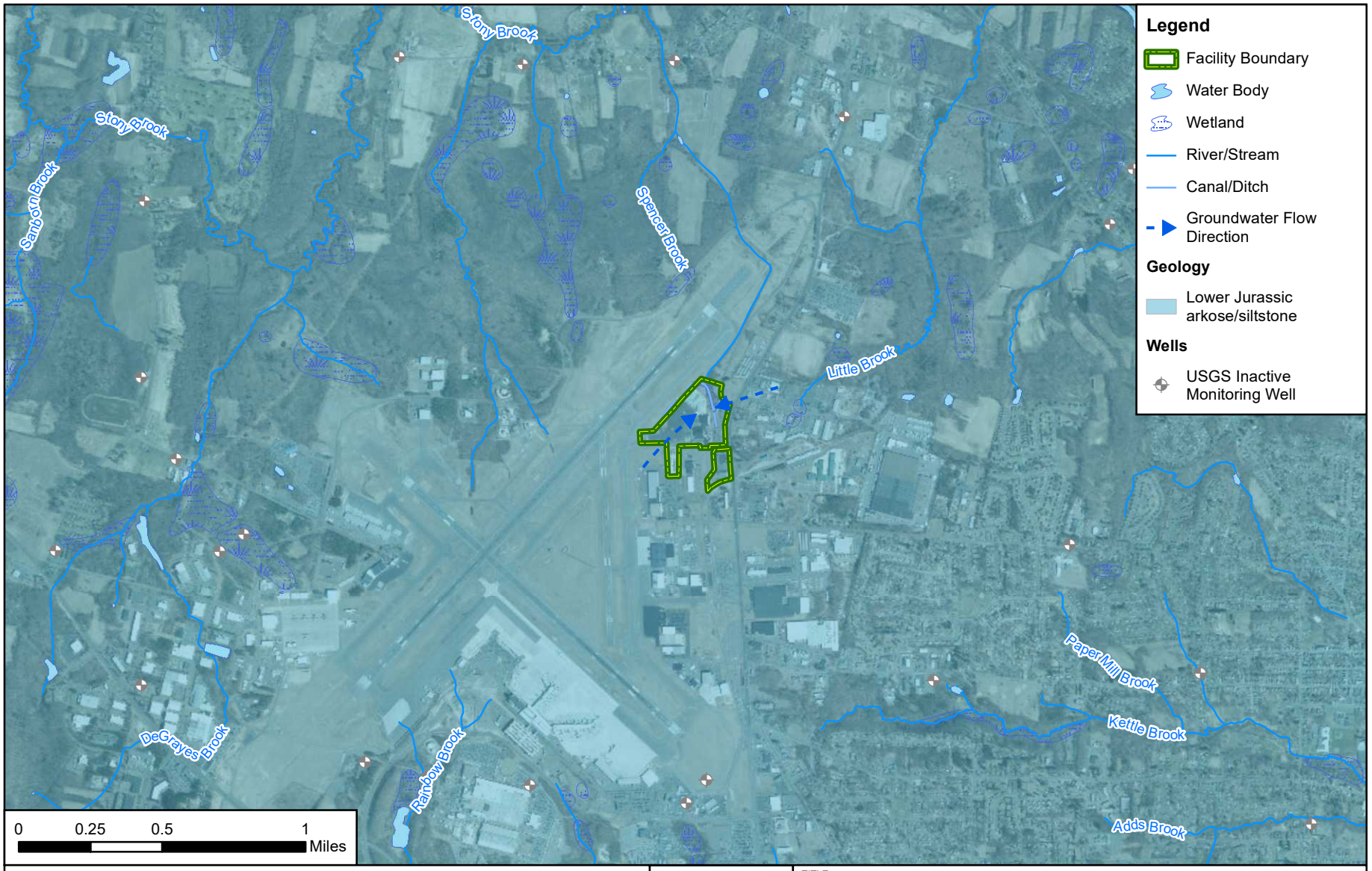

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TITLE

Groundwater Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

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Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

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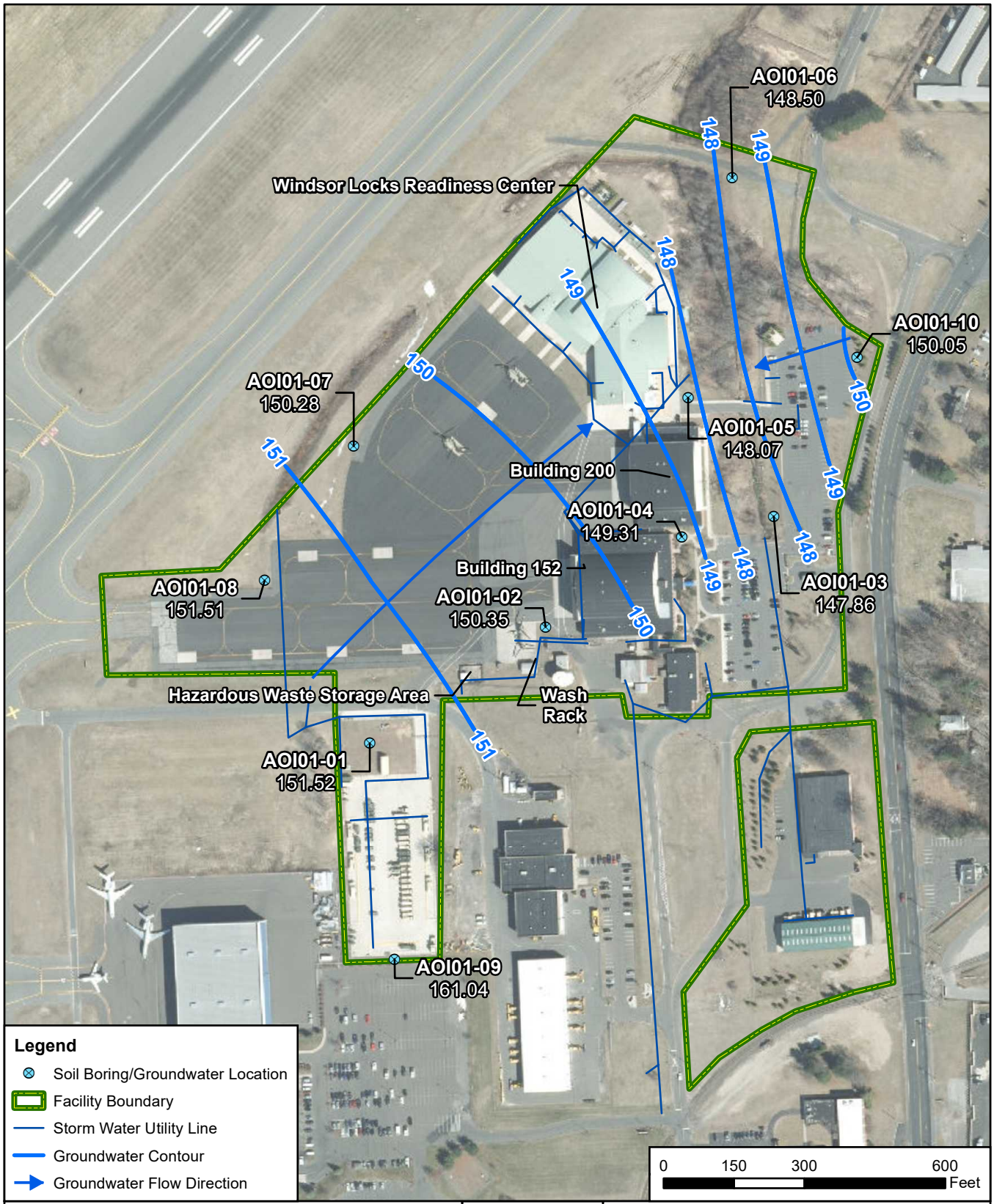

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REVISED	9/28/2021	GIS BY	MS	9/28/2021
SCALE	1:3,600	CHK BY	AM	9/28/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	9/28/2021

Groundwater Elevations, April 2021

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

Based on the PA findings, two potential PFAS release areas, the Wash Rack and Building 152, were identified at Windsor Locks AASF and grouped into one AOI (AECOM, 2020). The potential PFAS release areas are shown on **Figure 3-1**, and a summary of the AOI is presented below.

3.1 AOI 1

AOI 1 consists of two potential PFAS release areas, as described below.

3.1.1 Wash Rack

The Wash Rack at Windsor Locks AASF is located west of Building 152 (south hangar), near the southern boundary of the CTARNG Windsor Locks AASF property. The geographic coordinates of the Wash Rack are approximately 41°56'38.5"N and 72°40'26.7"W. During fire training events at the Wash Rack, a pan containing flammable liquid was ignited in the center of the Wash Rack, and mobile fire extinguishers containing AFFF were discharged to put out the flames. Between six and ten mobile extinguishers containing 30 gallons of an AFFF/water dilution would be used per training exercise. Formal training records were not kept. The AFFF product used during training events is unknown; however, Tri-Max™ -40 ºF AFFF solution and 3M AFFF Type 3 (3%) have been stored at the facility in 5-gallon buckets and are believed to have been used during exercises. Training exercises at the Wash Rack that resulted in the discharge of AFFF are expected to have occurred once per year between 2003 and 2015, according to personnel interviews. Additionally, the facility Avionics Small Shops Chief stated that a fire training demonstration performed by the Connecticut Fire Academy (or their vendor/supplier) occurred at the Wash Rack within the last 5 years. No other information regarding this event was available during the PA. The Windsor Locks AASF Fire Marshall confirmed via correspondence after the site visit that fire training exercises since August 2015 have been conducted solely at the nearby off-facility Connecticut Fire Academy (AECOM, 2020).

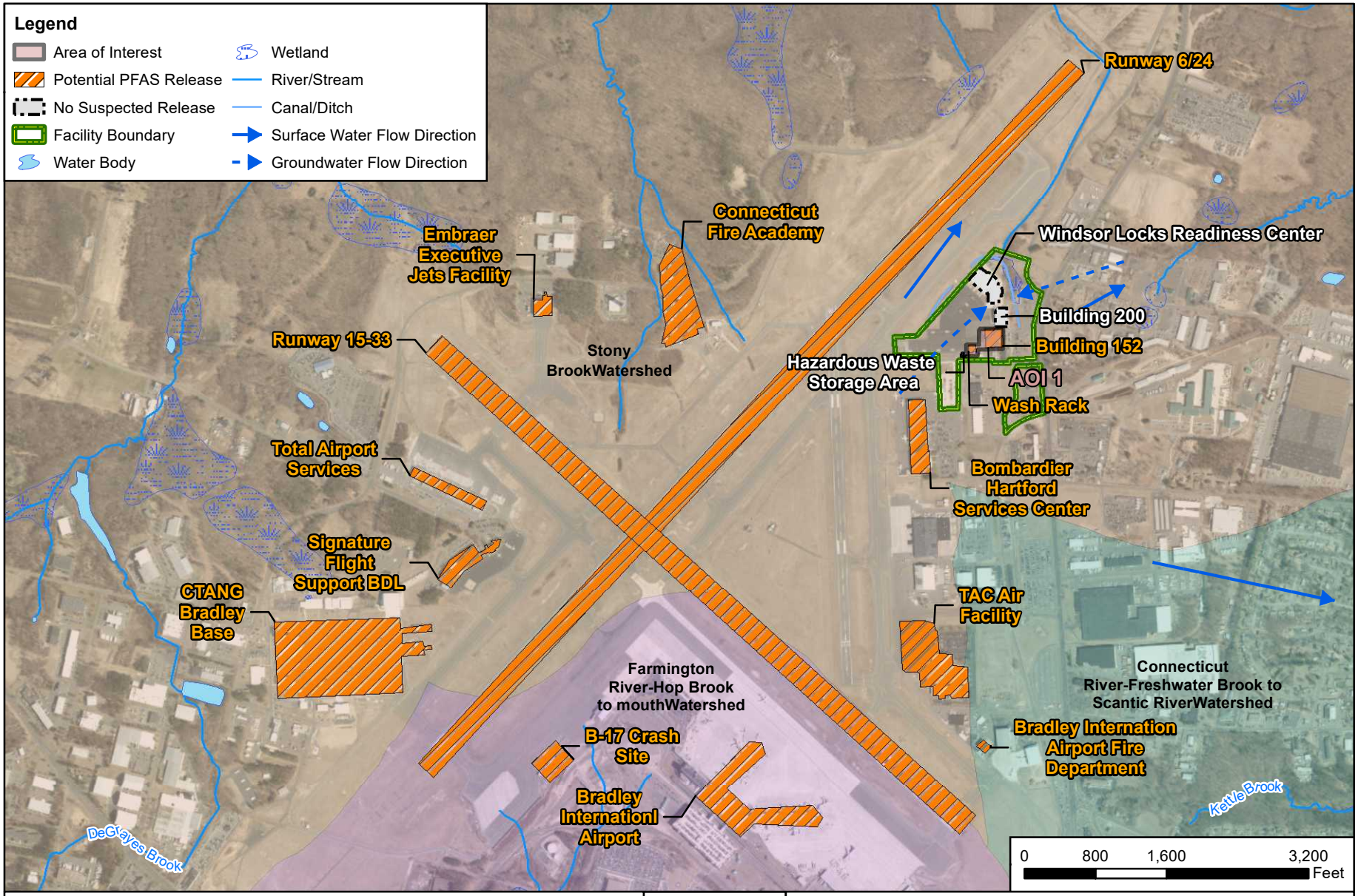
The Wash Rack is a slightly depressed concrete platform approximately 80 feet long by 80 feet wide with a catch basin at the center of the depression. Discharge from the catch basin currently flows to a below-grade stormwater detention system when the Wash Rack is not in use. If the Wash Rack is being used to wash aircrafts, then discharge is diverted via a valve to an underground 2,500-gallon OWS and then to municipal sanitary sewers. AFFF released during known fire training events at the Wash Rack would have been discharged to the sanitary sewer system via the Wash Rack; however, the recent installation of a valve to divert stormwater runoff through the Wash Rack to the stormwater detention system may result in residual PFAS reaching stormwater outfalls. The stormwater detention system discharges to wetlands in the northeastern portion of the facility, and water eventually flows to Spencer Brook.

3.1.2 Building 152

Building 152, the south hangar at Windsor Locks AASF, is located on the south side of and adjacent to Building 200, the north hangar. The approximate geographic coordinates of Building 152 are 41°56'39.6"N and 72°40'23.6"W. Building 152 is equipped with a fire suppression system that uses National Foam Aer-o-lite 3% AFFF. The AFFF that supplies the fire suppression system is stored in a 900-gallon tank in the AFFF Tank Storage Room located between the north and south hangars. The fire suppression system was installed in 1997 and is serviced quarterly by the contractor Fire Protection Team. The fire suppression system is also sampled annually to assure the appropriate AFFF product concentration is adequate. Annual suppression system testing uses only water, and CTARNG staff indicated that an AFFF release has never occurred as a result of suppression system testing. No incidents resulting in an AFFF release have occurred in the AFFF Tank Storage Room, and no known releases of PFAS have occurred from the fire suppression

system. Handheld dry chemical fire extinguishers are also stored in the room for use in the event of an emergency.

Mobile fire extinguishers that contained AFFF were discharged to the floor drains in Building 152 between 2003 and 2015, though less frequently than fire training events at the Wash Rack. Information sources conflicted on whether AFFF discharges occurred to floor drains in Building 152; however, discharge events have been conservatively presumed to have occurred, based on the statements of some personnel. Discharges of AFFF to the Building 152 floor drains were not documented. Based on information gathered during the PA, between six and ten mobile extinguishers containing 30 gallons of an AFFF/water dilution would be used per training exercise. The AFFF product used during training events is unknown; however, Tri-Max™ -40ºF AFFF solution and 3M AFFF Type 3 (3%) have been stored at the facility in 5-gallon buckets and are believed to have been used during exercises. Floor drains in Building 152 connect underground to a 2,500-gallon OWS south of the hangar, which discharges to municipal sanitary sewers (AECOM, 2020).



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	12/13/2021	GIS BY	MS	12/13/2021
SCALE	1:19,200	CHK BY	AM	12/13/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/13/2021

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Areas of Interest

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Figure 3-1

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4. Project Data Quality Objectives

Project Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data and define the level of certainty required to support project decision-making process. The specific DQOs established for this facility are described below. These DQOs were developed in accordance with the USEPA's seven-step iterative process (USEPA, 2006).

4.1 Problem Statement

The following problem statement was developed during project planning:

The presence of PFAS, which may pose a risk to human health or the environment, in environmental media at the facility is currently unknown. PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. The regulatory framework for managing PFAS at both the federal and state level continues to evolve.

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs were calculated using the USEPA Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

Additionally, the USEPA issued drinking water lifetime Health Advisories (HAs) for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient. The SLs are presented in **Section 6.1** of this Report.

The following quotes from the DA policy documents form the basis for this project (DA, 2016; DA, 2018):

- "The Army will research and identify locations where PFOS- and/or PFOA-containing products, such as AFFF, are known or suspected to have been used. Installations shall coordinate with installation/facility fire response or training offices to identify AFFF use or storage locations. The Army will consider FTAs, AFFF storage locations, hangars/buildings with AFFF suppression systems, fire equipment maintenance areas, and areas where emergency response operations required AFFF use as possible source areas. In addition, metal plating operations, which used certain PFOS-containing mist suppressants, shall be considered possible source areas."
- "Based on a review of site records…determine whether a CERCLA PA is appropriate for identifying PFOS/PFOA release sites. If the PA determines a PFOS/PFOA release may have occurred, a CERCLA SI shall be conducted to determine presence/absence of contamination."
- "Identify sites where perfluorinated compounds are known or suspected to have been released, with the priority being those sites within 20 miles of the public systems that tested above USEPA HA levels." (USEPA, 2016a; USEPA, 2016b).

4.2 Goals of the Study

The following goals were established for this SI:

1. Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.
2. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
3. Determine the potential need for a Time Critical Removal Action (TCRA) (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.
4. Collect data to better characterize the release areas for more effective and rapid initiation of a RI (if determined necessary).
5. If PFOA, PFOS, and PFBS are determined to be present, aim to evaluate whether the concentrations can be attributed to on-facility or off-facility sources that were identified within 4 miles of the installation as part of the PA (e.g., fire stations, major manufacturers, other DoD facilities).
6. Determine whether a potentially complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.

4.3 Information Inputs

Primary information inputs included:

- The PA for Windsor Locks AASF (AECOM, 2020);
- Analytical data from soil and groundwater samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021a); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s).

4.5 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the DoD Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs and decision rules as defined in the SI QAPP Addendum (AECOM, 2021a). These rules governed response actions based on the results of the SI sampling effort.

The decision rules described in the **Worksheet #11** of the SI QAPP Addendum identify actions based on the following:

Groundwater:

- Is there a human receptor within 4 miles of the facility?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release areas?
- What is the concentration of PFOA, PFOS, and PFBS at the facility boundary upgradient and downgradient of the potential release areas?
- What does the conceptual site model (CSM) suggest in terms of source, pathway and receptor?

Soil:

- What is the concentration of PFOA, PFOS, and PFBS in shallow surface soil (0 to 2 feet bgs)?
- What is the concentration of PFOA, PFOS, and PFBS in deep soil (i.e., capillary fringe)?
- What does the CSM suggest in terms of source, pathway, and receptor?

Soil and groundwater samples were collected from each of the potential release areas. Groundwater was encountered at approximately 3.37 to 8.11 feet bgs.

4.6 Data Usability Assessment

The Data Usability Assessment (DUA) is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met the facility-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2019a; DoD, 2019b; USEPA, 2017b).

Data Quality Indicators (DQIs) (Precision, Accuracy, Representativeness, Comparability, Completeness, and Sensitivity) are important components in assessing data usability. These DQIs were evaluated in the subsequent sections and demonstrate that the data presented in this SI report are of high quality. Although the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (**Appendix A**) presents explanations for all qualified data in greater detail.

4.6.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD); laboratory precision is measured with calibration verification, internal standard recoveries, and laboratory control spike (LCS) and matrix spike (MS) duplicate RPD.

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several EIS area counts were outside of quality control (QC) limits. The associated field sample results were qualified due to low recoveries and were qualified as estimated with a high bias while non-detects

were qualified “UJ”. The field sample results are considered usable as qualified as estimated values.

Injection internal standards (IIS) were added by the laboratory after sample extraction and prior to analysis as a requirement of DoD QSM 5.3 to measure relative responses of target analytes. Even though not required, the IIS are still added to the sample after extraction as an additional QC measure. The IIS percent recoveries were within the established precision limits presented in the SI QAPP Addendum (AECOM, 2021a).

LCS/LCS duplicate (LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. The LCS/LCSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2021a).

MS/MS duplicate (MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with one exception. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. The MS/MSD samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021a).

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021a), with limited exceptions. One field duplicate pair displayed a positive result for perfluoroheptanoic acid (PFHpA) and a non-detect result for perfluorononanoic acid (PFNA) in the parent sample, while the associated field duplicate displayed a non-detect result for PFHpA and a positive result for PFNA. The field duplicate pair results were qualified as estimated and are considered usable as qualified.

4.6.2 Accuracy

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy is measured through percent recoveries in the LCS/LCSD, MS/MSD, and surrogates.

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis. The LCS/LCSD samples were within the project established accuracy limits presented in the QAPP Addendum (AECOM, 2021a).

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with several exceptions. Parent samples AOI01-10-SB-03-05 and AOI01-08-00-02 displayed MS/MSD percent recoveries outside the QC limits for several analytes. The field sample results associated with the high recoveries were qualified as estimated with a potential high bias and are considered usable as qualified.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. The calibration verifications performed during the laboratory analyses were within the project established precision limits presented in the QAPP Addendum (AECOM, 2021a).

4.6.3 Representativeness

Representativeness qualitatively expresses the degree to which data accurately reflect site conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences.

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15, including the specific preparation requirements (i.e., ENVI-Carb or equivalent used), mass calibration, and spectra. Additionally, the ion transitions identified in Table B-15 were monitored, standards that contained both branch and linear isomers were used, when available, and isotopically labeled standards were used for quantitation.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory. The laboratory used approved standard methods in accordance with the QAPP Addendum (AECOM, 2021a) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Several laboratory and method blanks displayed concentrations for target analytes greater than the detection limits including PFBA, PFBS, PFOS, and perfluorohexanesulfonic acid (PFHxS). The associated investigative field samples that displayed positive results at levels approximate to the blank detections were qualified as likely false positives and are considered usable as qualified.

One field reagent blank (FRB) was collected during the SI. Additionally, multiple equipment rinsate blanks (ERBs) were collected for soil samples. Several ERBs displayed detections for PFOS greater than the detection limit. The associated investigative field samples were either non-detect or were positive and displayed concentrations significantly greater than the blank detections. After review of the field documentation, it was determined that an ERB was not collected for the surface soil samples collected via hand auger. A conservative approach was taken to treat detections in the surface soil samples collected via hand auger as true positives because the field investigation had concluded and collecting an ERB retroactively would not have measured the decontamination efficiency as experienced a the project site. Additionally, this approach was taken because the potential of false positives at low concentrations was relatively low (no soil sample was qualified due to any aqueous blank during this investigation). This deviation from the SI QAPP Addendum is noted in **Section 5.8** of this report and is also documented in a Nonconformance and Corrective Action Report (**Appendix B3**).

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The drill rig decontamination sample displayed detections for PFBA, perfluorohexanoic acid (PFHxA), PFOS, and PFOA. The associated investigative field samples were either non-detect or were positive and displayed concentrations significantly greater than the blank detections.

Field samples were extracted and analyzed within the appropriate holding time in order to qualitatively express the degree to which data accurately reflect site conditions with no exceptions. Overall, the data are usable for evaluating the presence or absence of PFAS at the facility. Sufficient usable data were obtained to meet the objectives of the SI.

4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows and reflects the exclusion of "X" flagged data, if applicable:

- PFAS in groundwater by LC/MS/MS compliant with QSM 5.3 Table B-15 at 100%
- PFAS in soil by LC/MS/MS compliant with QSM 5.3 Table B-15 at 100%
- pH in soil by USEPA Method 9045D at 100%
- Total organic carbon (TOC) by USEPA Method 9060 at 100%

At some boring locations, only two soil samples could be collected due to the shallow depth to groundwater. This is described further in **Section 5.2**.

4.6.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit (MDL) study, and calibration standards at the limit of quantitation (LOQ). In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the QAPP Addendum (AECOM, 2021a). Although two instrument sensitivity checks displayed high percent recoveries for perfluorotridecanoic acid (PFTrDA) and perfluorooctanesulfonamidoacetic acid (NEtFOSAA), no field sample results were associated with the PFTrDA exceedance, and the field sample results associated with the NEtFOSAA exceedance were all non-detect; therefore, these anomalies had no impact on the data. The laboratory provided the requested MDL studies and provided applicable calibration standards at the LOQ. In order to achieve the DQOs for sensitivity outlined in the QAPP Addendum (AECOM, 2021a), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the MDL were reported and qualified "J" as estimated values by the laboratory.

5. Site Inspection Activities

This section describes the environmental investigation and sampling activities that occurred as part of the SI. The SI sampling approach was based on the findings of the PA and implemented in accordance with the following approved documents:

- *Final Preliminary Assessment Report, Windsor Locks Army Aviation Support Facility, Connecticut* dated February 2020 (AECOM, 2020);
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Army Aviation Support Facility, Windsor Locks, Connecticut* dated March 2021 (AECOM, 2021a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b); and
- *Final Site Safety and Health Plan, Army Aviation Support Facility, Windsor Locks, Connecticut* dated April 2021 (AECOM, 2021b).

The SI field activities were conducted from 26 to 29 April 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as noted in **Section 5.8**.

The following samples were collected during the SI and analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 to fulfill the project DQOs:

- 26 soil samples from 10 boring locations;
- 10 grab groundwater samples from 10 temporary well locations; and
- 18 quality assurance (QA) samples.

Figure 5-1 provides the sample locations for all media across the facility. **Table 5-1** presents the list of samples collected for each media. Field documentation is provided in **Appendix B**. A Log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**, a Nonconformance and Corrective Action Report is provided in **Appendix B3**, land survey data are provided in **Appendix B4**, and investigation-derived waste (IDW) polygons are provided in **Appendix B5**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

In preparation for the SI field activities, project team members participated in Technical Project Planning (TPP) meetings, performed utility clearance, and sampled decontamination source water. Details for each of these activities are presented below.

5.1.1 Technical Project Planning

The USACE TPP Process, Engineer Manual (EM) 200-1-2 (USACE, 2016) defines four phases to project planning: 1.) defining the project phase; 2.) determining data needs; 3.) developing data collection strategies; and 4.) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including quantitative and qualitative DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 21 December 2020, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, CTARNG, USACE, CTDEEP, and representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021a), and meeting minutes are included in **Appendix D**.

A TPP Meeting 3 will be held after the field event to discuss the results of the SI. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the "Call Before You Dig" Connecticut utility clearance provider to notify them of intrusive work on 16 April 2021. However, because the AASF is a private facility, the participating "Call Before You Dig" locators did not clear utilities at the entire facility. Therefore, AECOM contracted Underground Surveying, LLC., a private utility location service, to perform utility clearance. Underground Surveying, LLC. performed utility clearance of the proposed boring locations on 26 April 2021 with input from the AECOM field team and Windsor Locks AASF facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be acceptable for use in a PFAS investigation prior to the start of field activities. A sample from a potable water source at Windsor Locks AASF was collected on 26 March 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample are provided in **Appendix F**. A discussion of the results is presented in **Section 4.6.3**.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the SI QAPP Addendum (AECOM, 2021a). Prior to the start of field work each day, a PFAS Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021a). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top 5 feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-1**.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table. In borings where groundwater was encountered at 6 feet bgs or shallower, only two soil samples were collected per boring, in

accordance with the QAPP Addendum (AECOM, 2021a). Specifically, only two soil samples were collected at locations AOI01-01, AOI01-02, AOI01-04, and AOI01-06 for this reason.

The soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS). A photoionization detector (PID) was used to screen the breathing zone during boring activities as part of personal safety requirements. Observations and measurements were recorded on sampling forms (**Appendix B2**) and in a non-treated field logbook (i.e., composition notebook). Depth interval, recovery thickness, PID concentrations, moisture, relative density, color (using a Munsell soil color chart), and texture (using the USCS) were recorded. The boring logs are provided in **Appendix E**.

Soil borings completed during the SI found poorly graded and well-graded sand as the dominant lithology of the unconsolidated sediments below the Windsor Locks AASF. The borings were completed at depths between 10 and 15 feet bgs. Isolated layers of clay to silty sand were also observed in the boring logs, at thicknesses ranging from a few inches to 3.5 feet. Many of the logs also reported varying percentages of gravel included in the sand packages. These observations are consistent with the understood fill material and glaciofluvial depositional environment.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15), TOC (USEPA Method 9060A), and pH (USEPA Method 9045D), in accordance with the SI QAPP Addendum (AECOM, 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, ERBs were collected at a rate of 5% and analyzed for the same parameters as the soil samples. As stated previously, after review of the field documentation, it was determined that an ERB was not collected for the surface soil samples collected via hand auger. This deviation from the SI QAPP Addendum is noted in **Section 5.8** of this report and is also documented in a Nonconformance and Corrective Action Report (**Appendix B3**). ERBs were collected from the DPT shoe in accordance with the QAPP. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) using bentonite chips at completion of sampling activities. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Once the borehole was advanced to the desired depth, wherever conditions allowed, a temporary well was constructed of a 5-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

The temporary wells were allowed to recharge after installation before collection of groundwater samples. After the recharge period, groundwater samples were collected using a peristaltic pump with PFAS-free HDPE tubing. Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality

parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) after each grab sample was collected. Additionally, a subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there was any foaming. No foaming was noted in any of the groundwater samples.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. One FRB was collected in accordance with the PQAPP (AECOM, 2018a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

Temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with bentonite chips. Temporary wells were installed in grass areas to avoid disturbing concrete or asphalt.

5.4 Synoptic Water Level Measurements

Groundwater gauging was performed prior to temporary well sampling. Groundwater elevation measurements were collected from the 10 new temporary monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-5**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Connecticut-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed wells on the facility were collected on 29 April 2021, in the applicable Universal Transverse Mercator zone projection, with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B4**.

5.6 Investigation-Derived Waste

As of the date of this report, the disposal of PFAS IDW is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (AECOM, 2021a) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Soil IDW (i.e., soil cuttings) generated during the SI activities were left in place at the point of the source. The soil cuttings were distributed on the ground surface on the downgradient side of the boring, with the exception of the IDW from AOI01-05, which was placed on the downgradient side of AOI01-10 at the request of the facility. Additionally, IDW from AOI01-04 was placed approximately 80 feet east of the boring at the request of the facility. The soil IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location.

Liquid IDW generated during SI activities (i.e. purge water, development water, and decontamination fluids) were discharged directly to the ground surface slightly downgradient of

the source. The liquid IDW was not sampled and assumes the PFAS characteristics of the associated groundwater samples collected from that source location.

Geographic coordinates were collected using a global positioning system around each location where IDW was placed (i.e., an IDW polygon). The IDW polygons are displayed on the figure in **Appendix B5**. Other solids such as spent personal protective equipment, plastic sheeting, tubing, rope, unused monitoring well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

5.7 Laboratory Analytical Methods

Samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 at Pace Analytical Gulf Coast in Baton Rouge, Louisiana, a DoD ELAP and NELAP certified laboratory. The 18 PFAS analyzed as part of the ARNG SI program include the following:

- 6:2 fluorotelomer sulfonic acid (6:2 FTS)
- 8:2 fluorotelomer sulfonic acid (8:2 FTS)
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutyrate (PFBA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanoic acid (PFHxA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluoropentanoic acid (PFPeA)
- Perfluorotetradecanoic acid (PFTeDA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUdA)

Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by USEPA Method 9045D.

5.8 Deviations from SI QAPP Addendum

One deviation from the SI QAPP Addendum was identified during review of the field documentation. The deviation is noted below and is documented in a Nonconformance and Corrective Action Report (**Appendix B3**):

- Upon review of field documentation, it was discovered that an ERB was not collected from the hand auger used to collect the surface soil samples (0 to 2 feet below ground surface) during the field effort. As a result, the data validation took conservative approach when considering the hand auger samples by assuming all results are true positives. Additional details are provided in the DUA presented in **Section 4.6** of this SI Report.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Windsor Locks AASF, Connecticut

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-00-02	4/27/2021 12:45	0 - 2	x				
AOI01-01-SB-05-07	4/27/2021 12:50	5 - 7	x				
AOI01-02-SB-00-02	4/27/2021 10:35	0 - 2	x				
AOI01-02-SB-04-06	4/27/2021 11:00	4 - 6	x				
AOI01-03-SB-00-02	4/29/2021 8:00	0 - 2	x				
AOI01-03-SB-03-05	4/29/2021 8:05	3 - 5	x				
AOI01-03-SB-05-07	4/29/2021 8:10	5 - 7	x				
AOI01-04-SB-00-02	4/29/2021 8:55	0 - 2	x				
AOI01-04-SB-03-05	4/29/2021 9:00	3 - 5	x				
AOI01-05-SB-00-02	4/28/2021 12:20	0 - 2	x	x	x		
AOI01-05-SB-00-02-D	4/28/2021 12:20	0 - 2		x	x		FD
AOI01-05-SB-02-04	4/28/2021 12:23	2 - 4	x				
AOI01-05-SB-04-06	4/28/2021 12:25	4 - 6	x				
AOI01-06-SB-00-02	4/28/2021 9:40	0 - 2	x				
AOI01-06-SB-03-05	4/28/2021 10:00	3 - 5	x				
AOI01-07-SB-00-02	4/28/2021 8:45	0 - 2	x				
AOI01-07-SB-00-02-D	4/28/2021 8:45	0 - 2	x				FD
AOI01-07-SB-02-04	4/28/2021 8:50	2 - 4	x				
AOI01-07-SB-04-06	4/28/2021 8:55	4 - 6	x				
AOI01-08-SB-00-02	4/28/2021 7:50	0 - 2	x				
AOI01-08-SB-00-02-MS	4/28/2021 7:50	0 - 2	x				MS
AOI01-08-SB-00-02-MSD	4/28/2021 7:50	0 - 2	x				MSD
AOI01-08-SB-02-04	4/28/2021 7:55	2 - 4	x				
AOI01-08-SB-04-06	4/28/2021 8:00	4 - 6	x				
AOI01-09-SB-00-02	4/27/2021 14:00	0 - 2	x				
AOI01-09-SB-00-02-D	4/27/2021 14:00	0 - 2	x				FD
AOI01-09-SB-05-07	4/27/2021 14:10	5 - 7	x				
AOI01-09-SB-08-10	4/27/2021 14:11	8 - 10	x				
AOI01-10-SB-00-02	4/28/2021 14:05	0 - 2	x	x	x		
AOI01-10-SB-00-02-D	4/28/2021 14:05	0 - 2	x				FD
AOI01-10-SB-00-02-MS	4/28/2021 14:05	0 - 2		x	x		MS
AOI01-10-SB-00-02-MSD	4/28/2021 14:05	0 - 2		x	x		MSD
AOI01-10-SB-03-05	4/28/2021 14:10	3 - 5	x				
AOI01-10-SB-03-05-MS	4/28/2021 14:10	3 - 5	x				MS
AOI01-10-SB-03-05-MSD	4/28/2021 14:10	3 - 5	x				MSD
Groundwater Samples							
AOI01-01-GW	4/27/2021 15:25	NA	x				
AOI01-02-GW	4/28/2021 8:50	NA	x				
AOI01-03-GW	4/29/2021 10:05	NA	x				
AOI01-03-GW-D	4/29/2021 10:05	NA	x				FD
AOI01-04-GW	4/29/2021 11:30	NA	x				
AOI01-05-GW	4/28/2021 14:35	NA	x				
AOI01-06-GW	4/28/2021 12:45	NA	x				
AOI01-07-GW	4/28/2021 11:40	NA	x				
AOI01-08-GW	4/28/2021 10:10	NA	x				
AOI01-09-GW	4/27/2021 16:20	NA	x				
AOI01-10-GW	4/29/2021 8:20	NA	x				
AOI01-10-GW-MS	4/29/2021 8:20	NA	x				MS
AOI01-10-GW-MSD	4/29/2021 8:20	NA	x				MSD

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Windsor Locks AASF, Connecticut

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Quality Control Samples							
WL-FRB-01	4/29/2021 7:50	NA	x				
WL-ERB-01	4/28/2021 13:25	NA	x				from DPT shoe
WL-ERB-02	4/28/2021 14:30	NA	x				from DPT shoe
WL-ERB-03	4/29/2021 9:00	NA	x				from DPT shoe
WL-ERB-04	4/29/2021 10:00	NA	x				from DPT shoe

Notes:
ASTM = American Society for Testing and Materials
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Windsor Locks AASF, Connecticut

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	12	7 - 12	161.21	158.06	9.69	6.54	151.52
	AOI01-02	15	6.5 - 11.5 [1]	157.95	153.72	7.60	3.37	150.35
	AOI01-03	15	7 - 12 [1]	153.58	152.95	5.72	5.09	147.86
	AOI01-04	10	5 - 10	153.60	153.11	4.29	3.80	149.31
	AOI01-05	15	6 - 11 [1]	152.80	152.20	4.73	4.13	148.07
	AOI01-06	10	5 - 10	152.55	152.05	4.05	3.55	148.50
	AOI01-07	12	6 - 11 [1]	160.71	156.20	10.43	5.92	150.28
	AOI01-08	15	6 - 11 [1]	161.85	157.32	10.34	5.81	151.51
	AOI01-09	15	10 - 15	171.38	169.15	10.34	8.11	161.04
	AOI01-10	10	5 - 10	155.55	155.05	5.50	5.00	150.05

Notes:

[1] Temporary well screen set above total depth to capture groundwater interface

bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

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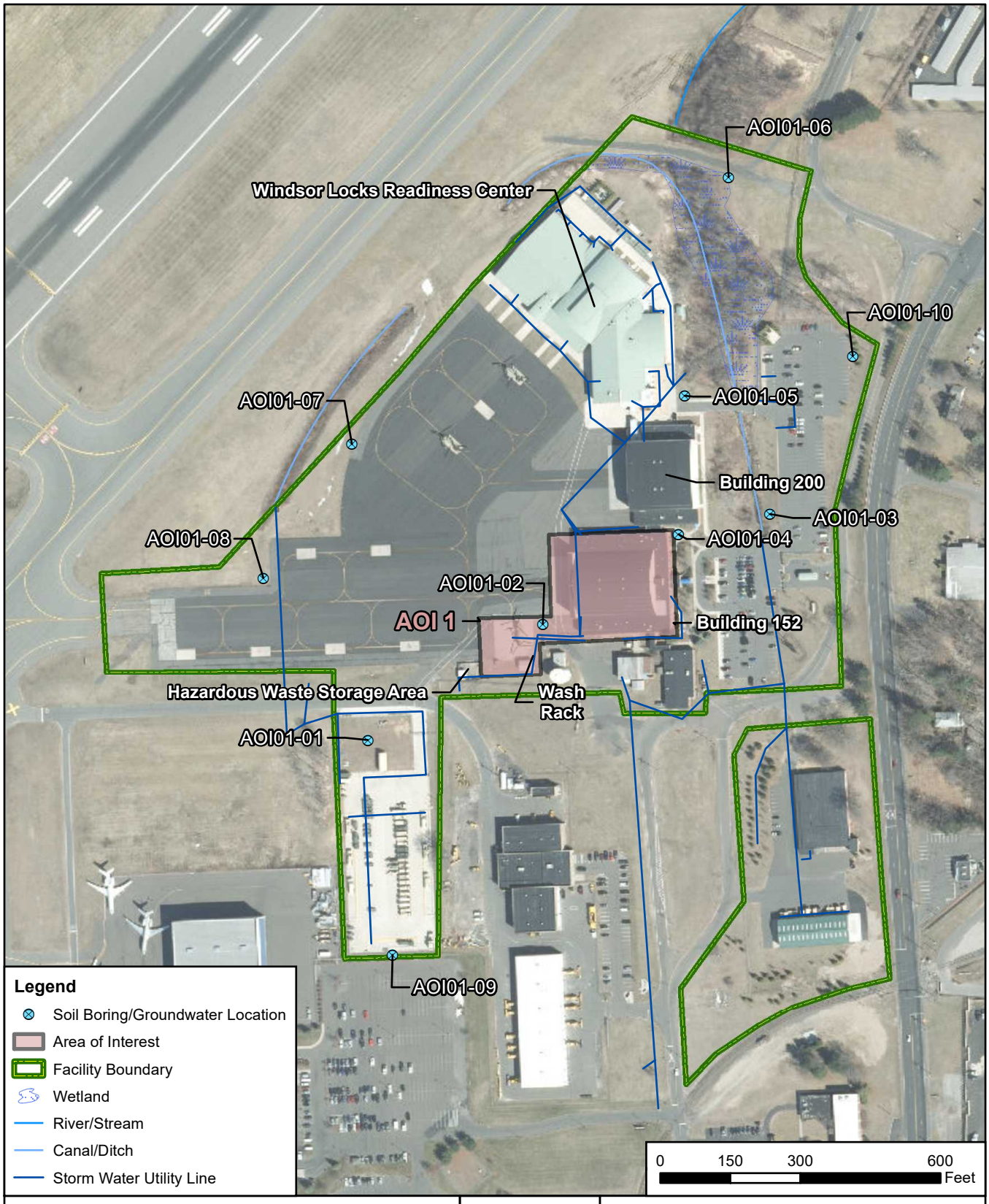

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	7/28/2021	GIS BY	MS	7/28/2021
SCALE	1:3,600	CHK BY	AM	7/28/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	7/28/2021

N

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for AOI 1 is provided in **Section 6.3**. **Table 6-2** through **Table 6-5** present PFAS results for samples with detections in soil and groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs were calculated using the USEPA Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

Additionally, the USEPA issued drinking water lifetime HAs for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient. The SLs are presented on **Table 6-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain PFAS within the boundaries of the facility.

Table 6-1: Screening Levels (Soil and Groundwater)

Analyte	Residential (Soil) (µg/kg)[a,b] 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b] 2-15 feet bgs	Tap Water (Groundwater) (ng/L)[a,b]	USEPA HA (Groundwater representative of Drinking Water) (ng/L)[c,d]
PFOA	130	1,600	40	70
PFOS	130	1,600	40	70
PFBS	1,900	25,000	600	-

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 October 2019.

b.) USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ = 0.1. 8 April 2021.

c.) USEPA. 2016a. Drinking Water HA for Perfluorooctanoic Acid (PFOA). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-005. May 2016. / USEPA. 2016b. Drinking Water HA for Perfluorooctane Sulfonic Acid (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

d.) USEPA HAs apply to the PFOA and PFOS concentrations individually or combined.

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the facility: the residential scenario is applied to surface soil results (0 to 2 feet bgs), and the industrial/commercial worker scenario is applied to shallow subsurface soil

results (2 to 15 feet bgs). The SLs are not applied to deep subsurface soil results (>15 feet bgs) because 15 feet is the anticipated limit of construction activities.

6.2 Soil Physicochemical Analyses

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC and pH sampling.

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions and are therefore relatively mobile in groundwater (Xiao et al., 2015), but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy, 2006; Guelfo and Higgins, 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (K_{oc} values) can help in evaluating transport potential, though other geochemical factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC, 2018).

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes two potential PFAS release areas: the Wash Rack and Building 152. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at any sample locations at the facility. **Figure 6-1** through **Figure 6-3** present detections in soil for PFOA, PFOS, and PFBS. **Table 6-2** through **Table 6-4** summarize the detected compounds in soil.

During the SI, soil samples were collected from the surface soil (0 to 2 feet bgs) and shallow subsurface soil (2 to 10 feet bgs) at depths above the groundwater table. PFOA was detected in surface soil at three of the ten (10) locations, at concentrations ranging from 0.155 J micrograms per kilogram (µg/kg) to 0.200 J µg/kg. The maximum detection of PFOA in surface soil occurred at AOI01-09, which is located along the southern facility boundary and is considered upgradient of the two potential PFAS release areas (Wash Rack and Building 152). PFOA was detected in shallow subsurface soil at four of the ten (10) locations, at concentrations ranging from 0.106 J+ µg/kg to 0.491 J µg/kg. The maximum detection of PFOA in shallow subsurface soil occurred at AOI01-03 (5 to 7 feet bgs), which is located to the east of the drainage swale along the edge of the facility parking lot.

PFOS was detected in surface soil at all 10 locations, at concentrations ranging from 0.445 J µg/kg to 4.28 J+ µg/kg. PFOS was also detected in shallow subsurface soil at nine of the ten (10) locations (in at least one sample), at concentrations ranging from 0.169 J µg/kg to 41.5 µg/kg. The maximum detections of PFOS in both surface soil and shallow subsurface soil (2 to 4 feet bgs) occurred at AOI01-08, which corresponds to the location of the maximum detection of PFOS in groundwater (see **Section 6.3.2**). AOI01-08 is located on the western side of the facility's tarmac. No potential PFAS release areas were identified during the PA in the immediate vicinity of this sample location. It was noted during the TPP 1&2 (21 December 2020) that there were six to ten (10) mobile units periodically parked in various spots on the flight deck beside flight

machines (helicopters/planes); however, there were no documented discharges from mobile units onto the flight deck.

PFBS was detected in surface soil at three of the ten (10) locations, at concentrations ranging from 0.139 J µg/kg to 0.177 J µg/kg. PFBS was detected in shallow subsurface soil at two of the ten (10) locations, at concentrations ranging from 0.117 J µg/kg to 0.162 J µg/kg. The maximum detections of PFBS in both surface soil and shallow subsurface soil occurred at AOI01-01, which is located in the southern portion of the facility upgradient of the identified potential PFAS release areas.

At location AOI01-02, which was located immediately downgradient of the Wash Rack potential PFAS release area, PFOS was detected in surface and shallow subsurface soil (3.82 µg/kg and 1.89 µg/kg, respectively), and PFBS was detected in surface soil (0.163 J µg/kg). At location AOI01-04, which was located immediately downgradient of the Building 152 potential PFAS release area, PFOS was detected in surface and shallow subsurface soil (2.60 µg/kg and 0.310 J+ µg/kg). The detections of PFOS and PFBS at these locations indicate there was likely a release of PFAS-containing materials at both the Wash Rack and Building 152 potential release areas; however, the detections were several orders of magnitude below the SLs.

6.3.2 AOI 1 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the individual SLs of 40 nanograms per liter (ng/L) at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04). Additionally, PFOA and PFOS in groundwater exceeded the SLs at upgradient location AOI01-01, located in the southern portion of the facility, and at location AOI01-03, located to the east of the drainage swale along the edge of the facility parking lot. PFOA in groundwater also exceeded the SL at AOI01-05, located on the northern side of Building 200, near the stormwater outfall that connects to drains from both Building 152 and 200. PFOS in groundwater exceeded the SL at upgradient locations AOI01-07, AOI01-08, and AOI01-09 along the western and southern facility boundaries. PFBS did not exceed the SL at AOI 1. **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

PFOA was detected in groundwater at all 10 locations across AOI 1, at concentrations ranging from 5.45 ng/L to 298 ng/L. The detected concentrations of PFOA exceeded the OSD SL of 40 ng/L at five locations (AOI01-01 through AOI01-05) and the USEPA HA of 70 ng/L at three locations (AOI01-03 through AOI01-05). The maximum detection of PFOA occurred at AOI01-03-GW, which is located to the east of the drainage swale along the edge of the facility parking lot. No potential PFAS release areas were identified during the PA in the immediate vicinity of this sample location. Although a common fire training activity is to discharge mobile fire extinguisher units along the edges of parking lots, there were no documented discharges from mobile units in the facility parking lot during the PA or SI planning phase. Additionally, the stormwater outfall where the stormwater detention system flows into the eastern drainage swale is located approximately 50 feet southwest of AOI01-03.

Alternatively, based on the groundwater elevations collected during the SI (**Figure 2-5**), groundwater flow east of the drainage swale is towards the drainage swale (to the west-southwest); therefore, there is also the potential that the detected concentrations of PFOA, PFOS, and PFBS at AOI01-03 may be flowing onto the facility from an unidentified upgradient, offsite source to the east of the facility. Potential offsite, adjacent sources identified in the PA Report (AECOM, 2020) and SI QAPP Addendum (AECOM, 2021a) are shown on **Figure 3-1**. No potential offsite, adjacent sources have been identified to the east of the facility at the time of this report.

PFOS was detected in groundwater at nine of the ten (10) locations, at concentrations ranging from 8.93 ng/L to 581 ng/L. The detected concentrations of PFOS exceeded the OSD SL of 40 ng/L at seven locations (all locations except AOI01-05, AOI01-06, and AOI01-10) and the USEPA HA of 70 ng/L at six locations (all locations except AOI01-05, AOI01-06, AOI01-07, and AOI01-10). The maximum detection of PFOS in groundwater occurred at AOI01-08-GW, which is located on the western side of the facility's tarmac. As described above in **Section 6.3.1**, no potential PFAS release areas were identified during the PA in the immediate vicinity of this sample location; however, it was noted during the TPP 1&2 (21 December 2020) that there were six to ten (10) mobile units periodically parked in various spots on the flight deck beside flight machines (helicopters/planes). There were no documented discharges from mobile units onto the flight deck. Based on the groundwater elevations collected during the SI (**Figure 2-5**), groundwater flow west of the drainage swale is generally to the northeast towards the drainage swale; therefore, there is also the potential that PFOA, PFOS, and PFBS may be flowing onto the facility from an upgradient, offsite source to the west of the facility (**Figure 3-1**).

PFBS was detected in groundwater at nine of the ten (10) locations, at concentrations below the OSD SL of 600 ng/L. The detected concentrations of PFBS ranged from 1.33 J ng/L to 51.3 ng/L. Similar to the results of PFOA in groundwater, the maximum detection of PFBS occurred at AOI01-03-GW, which is located to the east of the drainage swale, as described above.

At location AOI01-02, which was located immediately downgradient of the Wash Rack potential PFAS release area, PFOA and PFOS were detected at concentrations exceeding the SLs (40.5 ng/L and 94.2 ng/L, respectively). PFBS was detected at a concentration below SLs (4.15 ng/L). At location AOI01-04, which was located immediately downgradient of the Building 152 potential PFAS release area, PFOA and PFOS were detected at concentrations exceeding the SLs (71.8 ng/L and 408 ng/L, respectively). PFBS was detected at a concentration below SLs (19.4 ng/L). Based on the results of the SI for groundwater at these locations, in combination with the detections in soil, it is likely that releases occurred at the Wash Rack and Building 152 release areas. However, based on the exceedances of PFOA and PFOS in groundwater at locations along the facility boundary (AOI01-07, AOI01-08, and AOI01-09), there is also the potential that releases from off-facility, adjacent sources could be migrating onto the facility.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1, indicating there was likely a release of PFAS-containing materials; however, the detected concentrations were several orders of magnitude lower than the soil SLs. PFOA and PFOS in groundwater exceeded the individual SLs of 40 ng/L at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04); at AOI01-01, located in the southern portion of the facility; and at AOI01-03, located east of the drainage swale along the edge of the facility parking lot. PFOA in groundwater also exceeded the SL at AOI01-05, on the north side of Building 200. PFOS in groundwater also exceeded the SL at upgradient locations AOI01-07, AOI01-08, and AOI01-09 along the western and southern facility boundaries. PFBS was detected in groundwater at concentrations below the SL. Based on the results of the SI, it is likely that releases occurred on the facility property. However, based on the exceedances along the upgradient facility boundary, it is also likely that releases from off-facility, adjacent sources are migrating onto the facility. Due to the exceedances of the SLs for PFOA and PFOS in groundwater, further evaluation of AOI 1 is warranted.

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Windsor Locks AASF, Connecticut

Area of Interest		AOI01																			
Sample ID		AOI01-01-SB-00-02		AOI01-02-SB-00-02		AOI01-03-SB-00-02		AOI01-04-SB-00-02		AOI01-05-SB-00-02		AOI01-06-SB-00-02		AOI01-07-SB-00-02		AOI01-07-SB-00-02-D		AOI01-08-SB-00-02		AOI01-09-SB-00-02	
Sample Date		04/27/2021		04/27/2021		04/29/2021		04/29/2021		04/28/2021		04/28/2021		04/28/2021		04/28/2021		04/28/2021		04/27/2021	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level [a,b]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
6:2 FTS	-	ND		0.149	J	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		0.197	J	ND		ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		0.039	J+	ND		ND		ND		ND		ND		ND		ND	
PFBA	-	0.054	J	0.089	J	0.093	J	0.048	J	ND		0.235	J	0.096	J	0.069	J	0.109	J	0.258	J
PFBS	1900	0.177	J	0.163	J	ND		ND		ND		ND		ND		ND		ND		0.139	J
PFDA	-	ND		0.432	J	0.366	J	0.076	J	ND		0.116	J	0.183	J	0.116	J	0.082	J	0.098	J
PFDoA	-	ND		0.561	J	0.134	J	0.029	J	0.092	J	0.023	J	0.023	J	0.022	J	0.046	J	0.038	J
PFHpA	-	ND		0.045	J	0.031	J	ND		ND		0.100	J	0.026	J	0.026	J	0.049	J	0.086	J
PFHxA	-	0.026	J	0.096	J	0.127	J	ND		ND		0.121	J	ND		ND		0.087	J	0.183	J
PFHxS	-	0.127	J	0.576	J	0.856	J	0.412	J	0.110	J	ND		0.068	J	0.059	J	0.217	J	0.318	J
PFNA	-	ND		0.145	J	0.135	J	0.043	J	ND		0.120	J	0.114	J	0.070	J	0.039	J	0.161	J
PFOA	130	ND		ND		ND		ND		ND		0.173	J	ND		ND		0.155	J	0.200	J
PFOS	130	1.01	J	3.82		2.86		2.60		0.515	J	0.445	J	0.970	J	1.18		4.28	J+	2.17	
PFPeA	-	ND		0.124	J	0.087	J	0.047	J	ND		0.189	J	0.031	J	0.031	J	0.098	J	0.180	J
PFTeDA	-	ND		0.211	J	0.054	J	ND		0.063	J	ND		ND		ND		ND		ND	
PFTrDA	-	ND		3.16		1.56		ND		0.313	J	0.082	J	0.035	J	0.035	J	0.067	J	0.147	J
PFUnDA	-	0.032	J	5.05		1.51		0.053	J	0.451	J	0.051	J	0.076	J	0.055	J	0.282	J	0.170	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	duplicate
ft	feet
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram
-	not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Windsor Locks AASF, Connecticut

	Area of Interest	AOI01					
	Sample ID	AOI01-09-SB-00-02-D		AOI01-10-SB-00-02		AOI01-10-SB-00-02-D	
	Sample Date	04/27/2021		04/28/2021		04/28/2021	
	Depth	0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level [a,b]	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)							
6:2 FTS	-	ND		ND		ND	
8:2 FTS	-	ND		ND		ND	
NEtFOSAA	-	ND		ND		ND	
PFBA	-	0.149	J	0.065	J	0.058	J
PFBS	1900	0.137	J	ND		ND	
PFDA	-	0.070	J	0.324	J	0.290	J
PFDoA	-	0.027	J	0.099	J	0.102	J
PFHpA	-	0.056	J	0.023	J	ND	UJ
PFHxA	-	0.108	J	0.080	J	0.068	J
PFHxS	-	0.261	J	0.377	J	0.311	J
PFNA	-	0.111	J	ND	UJ	0.053	J
PFOA	130	0.139	J	ND		ND	
PFOS	130	1.77		2.00		1.79	
PFPeA	-	0.107	J	0.044	J	0.035	J
PFTeDA	-	ND		0.039	J	0.032	J
PFTrDA	-	0.124	J	0.475	J	0.509	J
PFUnDA	-	0.120	J	1.27		1.30	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	duplicate
ft	feet
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram
-	not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Windsor Locks AASF, Connecticut

Area of Interest		AOI01																			
Sample ID		AOI01-01-SB-05-07		AOI01-02-SB-04-06		AOI01-03-SB-03-05		AOI01-03-SB-05-07		AOI01-04-SB-03-05		AOI01-05-SB-02-04		AOI01-05-SB-04-06		AOI01-06-SB-03-05		AOI01-07-SB-02-04		AOI01-07-SB-04-06	
Sample Date		04/27/2021		04/27/2021		04/29/2021		04/29/2021		04/29/2021		04/28/2021		04/28/2021		04/28/2021		04/28/2021		04/28/2021	
Depth		5 - 7 ft		4 - 6 ft		3 - 5 ft		5 - 7 ft		3 - 5 ft		2 - 4 ft		4 - 6 ft		3 - 5 ft		2 - 4 ft		4 - 6 ft	
Analyte	OSD Screening Level [a,b]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		0.070	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	0.045	J	0.061	J	0.055	J	0.141	J	ND		ND		ND		ND		ND		ND	
PFBS	25000	0.162	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFDA	-	ND		0.675	J	0.346	J	0.230	J	ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		0.115	J	0.047	J	ND		0.032	J	ND		ND		ND		ND	
PFHpA	-	ND		0.064	J	0.181	J	0.093	J	ND		ND		ND		ND		ND		ND	
PFHxA	-	ND		0.077	J	0.316	J	0.530	J	ND		ND		ND		0.039	J	ND		ND	
PFHxS	-	ND		0.148	J	4.86		7.56		0.129	J	0.058	J	ND		ND		ND		ND	
PFNA	-	ND		0.150	J	0.169	J	0.170	J	ND		0.023	J	ND		ND		ND		ND	
PFOA	1600	ND		ND		0.278	J	0.491	J	ND		ND		ND		ND		ND		ND	
PFOS	1600	0.582	J	1.89		5.07		6.19		0.310	J+	0.196	J	0.300	J	ND		0.169	J	0.299	J
PFPeA	-	ND		0.066	J	0.055	J	0.096	J	ND		0.023	J	ND		ND		ND		ND	
PFTeDA	-	ND		ND	UJ	0.034	J	ND		ND		0.022	J	ND		ND		ND		ND	
PFTrDA	-	ND		ND	UJ	1.42		0.539	J	ND		0.098	J	ND		ND		ND		ND	
PFUnDA	-	ND		1.35		8.02		3.31		ND		0.162	J	ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
ft	feet
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram
-	not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Windsor Locks AASF, Connecticut

Area of Interest		AOI01									
Sample ID		AOI01-08-SB-02-04		AOI01-08-SB-04-06		AOI01-09-SB-05-07		AOI01-09-SB-08-10		AOI01-10-SB-03-05	
Sample Date		04/28/2021		04/28/2021		04/27/2021		04/27/2021		04/28/2021	
Depth		2 - 4 ft		4 - 6 ft		5 - 7 ft		8 - 10 ft		3 - 5 ft	
Analyte	**OSD Screening Level [a,b]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)											
6:2 FTS	-	ND		0.214	J	ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		0.066	J
PFBS	25000	ND		ND		0.117	J	0.145	J	ND	
PFDA	-	0.057	J	ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND	
PFHpA	-	0.030	J	ND		ND		ND		0.033	J
PFHxA	-	ND		0.119	J	0.035	J	ND		0.089	J
PFHxS	-	0.061	J	ND		0.039	J	0.081	J	0.297	J+
PFNA	-	0.164	J	ND		0.026	J	ND		0.141	J
PFOA	1600	0.285	J	ND		ND		ND		0.106	J+
PFOS	1600	41.5		ND		0.441	J	ND		0.795	J
PFPeA	-	0.027	J	ND		ND		ND		0.043	J
PFTeDA	-	ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
ft	feet
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram
-	not applicable

Table 6-4
PFAS Detections in Groundwater
Site Inspection Report, Windsor Locks AASF, Connecticut

		Area of Interest	AOI01																	
		Sample ID	AOI01-01-GW		AOI01-02-GW		AOI01-03-GW		AOI01-03-GW-D		AOI01-04-GW		AOI01-05-GW		AOI01-06-GW		AOI01-07-GW		AOI01-08-GW	
		Sample Date	04/27/2021		04/28/2021		04/29/2021		04/29/2021		04/29/2021		04/28/2021		04/28/2021		04/28/2021		04/28/2021	
Analyte	OSD Screening Level [a,b]	USEPA HA [c]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/L)																				
6:2 FTS	-	-	9.38		534		6.77		6.06		64.4		4.46		ND		ND		ND	
8:2 FTS	-	-	10.4		16.9		12.6		10.7		48.2		ND		ND		ND		ND	
NMeFOSAA	-	-	ND		ND		2.69	J	2.17	J	1.000	J	ND		ND		ND		ND	
PFBA	-	-	29.6		58.1		21.9		22.0		24.6		ND		ND		ND		ND	
PFBS	600	-	8.75		4.15		51.3		46.5		19.4		15.4		1.65	J	ND		1.33	J
PFDA	-	-	7.66		1.78	J	3.81	J	3.26	J	3.42	J	1.12	J	ND		ND		ND	
PFHpA	-	-	55.4		57.0		16.3		15.0		35.9		9.78		4.74		2.65	J	5.64	
PFHxA	-	-	92.3		169		345		320		95.2		70.9		7.58		3.09		12.9	
PFHxS	-	-	252		127		1830		1350		306		169		13.1		7.07		66.8	
PFNA	-	-	290		32.3		49.7		45.1		97.5		14.7		2.03	J	3.61	J	4.42	
PFOA	40	70	57.3		40.5		**298**		**275**		**71.8**		**87.2**		7.85		5.45		10.8	
PFOS	40	70	**138**		**94.2**		**125**		**115**		**408**		ND		**8.93**		52.6		**581**	
PFPeA	-	-	88.5		263		45.0		41.8		82.6		23.0		4.72		2.52	J	9.87	
PFUnDA	-	-	223		ND		52.3		44.7		9.74		ND		ND		ND		ND	
Total PFOA+PFOS	-	70	**195.3**		**134.7**		**423**		**390**		**479.8**		**87.2**		16.78		58.05		**591.8**	

Grey Fill	Detected concentration exceeded OSD Screening Levels
Bold Font	Detected concentration exceeded USEPA HA Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

c. USEPA, 2016. Drinking Water Health Advisory for PFOA. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for PFOS. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	duplicate
GW	groundwater
HA	health advisory
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	not applicable

Table 6-4
PFAS Detections in Groundwater
Site Inspection Report, Windsor Locks AASF, Connecticut

		Area of Interest	AOI01			
		Sample ID	AOI01-09-GW		AOI01-10-GW	
		Sample Date	04/27/2021		04/29/2021	
Analyte	OSD Screening Level [a,b]	USEPA HA [c]	Result	Qual	Result	Qual
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/L)						
6:2 FTS	-	-	ND		ND	
8:2 FTS	-	-	ND		ND	
NMeFOSAA	-	-	ND		ND	
PFBA	-	-	15.9		ND	
PFBS	600	-	5.16		3.21	J
PFDA	-	-	ND		ND	
PFHpA	-	-	10.5		3.42	J
PFHxA	-	-	39.5		8.28	
PFHxS	-	-	161		60.6	
PFNA	-	-	4.25		ND	
PFOA	40	70	24.6		11.5	
PFOS	40	70	**399**		9.88	
PFPeA	-	-	11.2		3.37	J
PFUnDA	-	-	ND		ND	
Total PFOA+PFOS	-	70	**423.6**		21.38	

Grey Fill	Detected concentration exceeded OSD Screening Levels
Bold Font	Detected concentration exceeded USEPA HA Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

c. USEPA, 2016. Drinking Water Health Advisory for PFOA. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for PFOS. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers

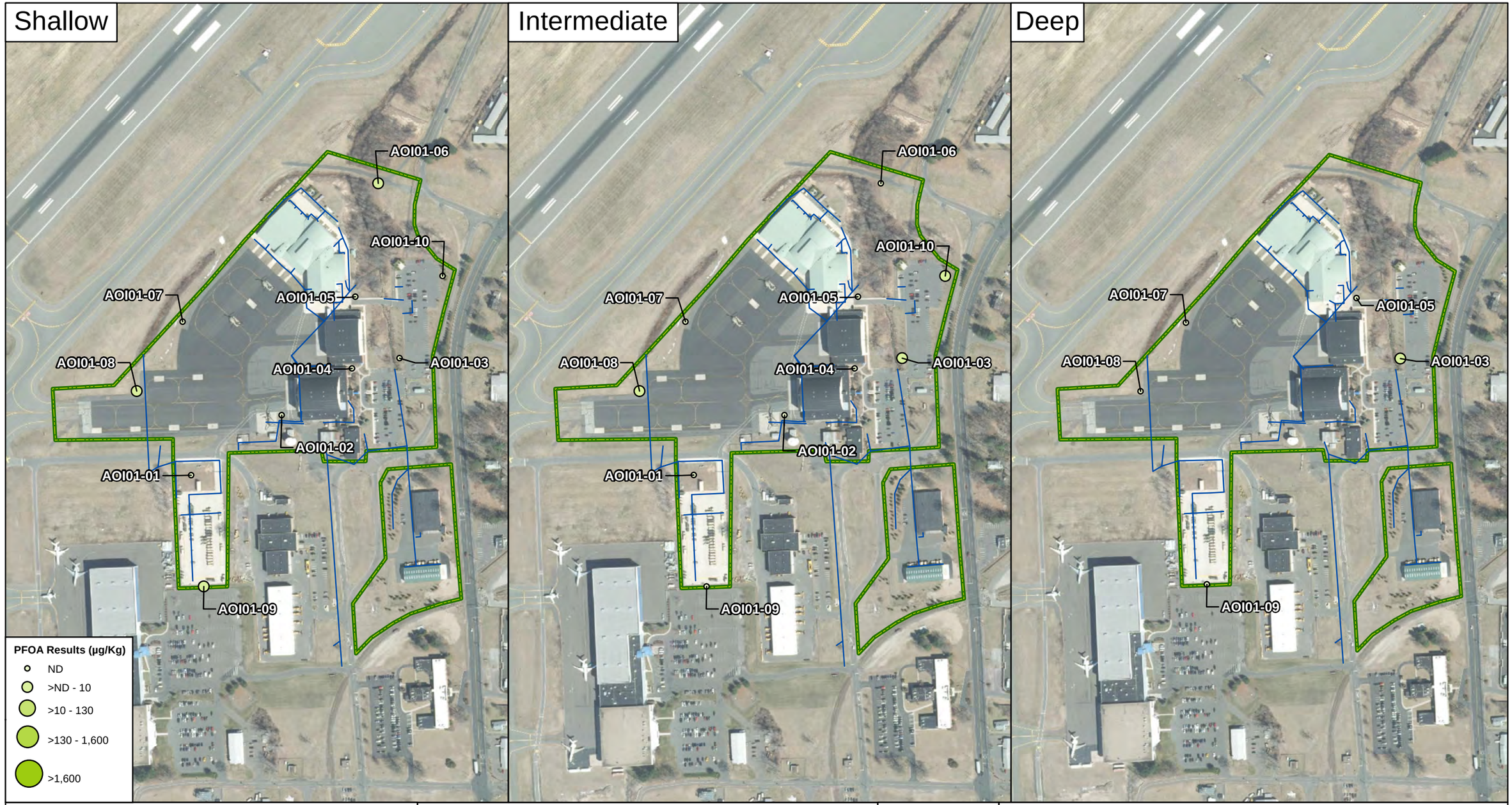
J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	duplicate
GW	groundwater
HA	health advisory
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	not applicable



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	6/24/2021	GIS BY	MS	6/24/2021
SCALE	1:4,859	CHK BY	AM	6/24/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/24/2021

Legend

Facility Boundary

Storm Water Utility Line

0 200 400 800 Feet

Depth intervals shown represent respective sampling position within a given soil boring location.

N

Site Inspection PFOA Soil Results

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

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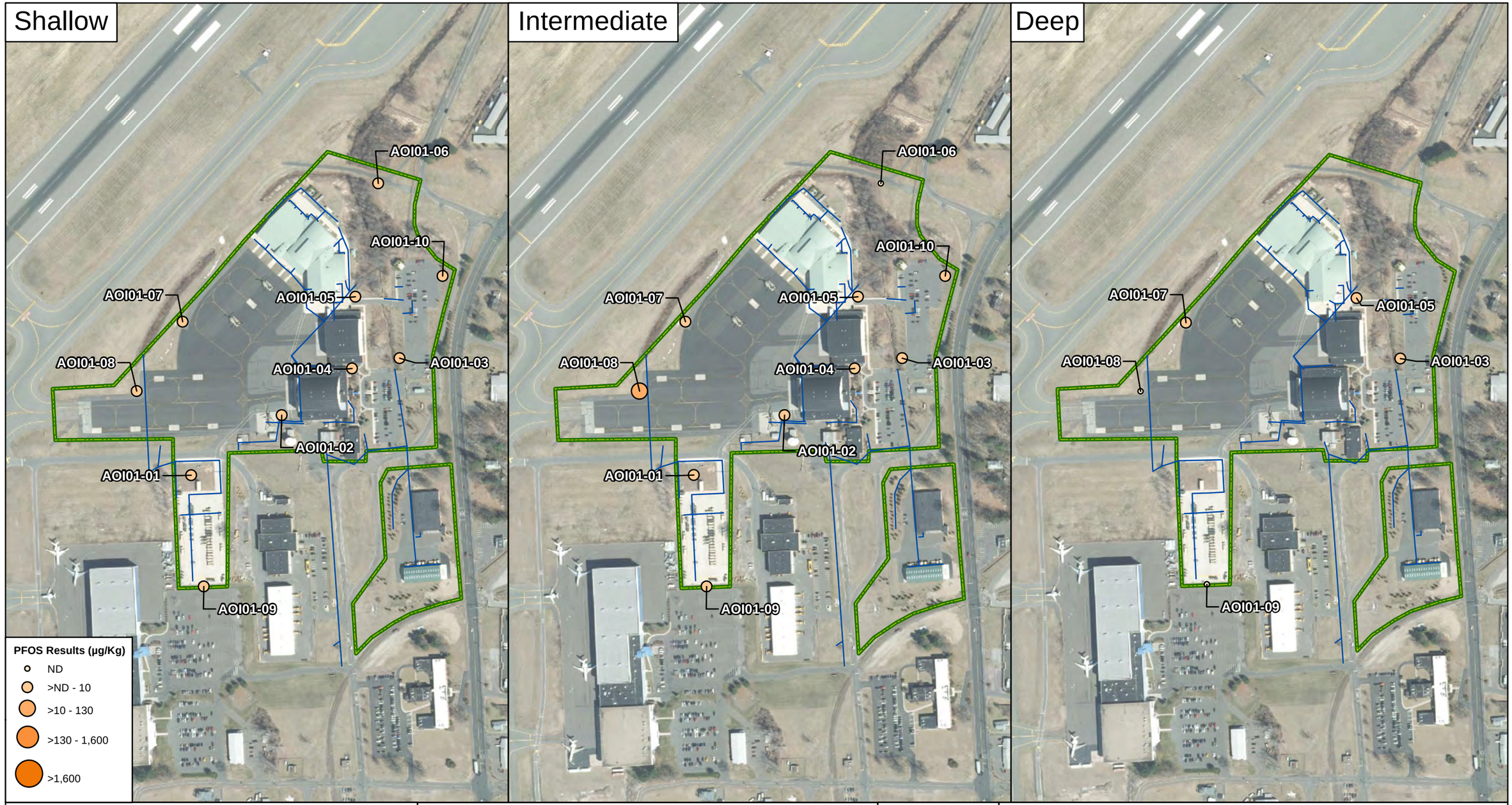

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	6/24/2021	GIS BY	MS	6/24/2021
SCALE	1:4,859	CHK BY	AM	6/24/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/24/2021

Legend

Facility Boundary

Storm Water Utility Line

0 200 400 800 Feet

Depth intervals shown represent respective sampling position within a given soil boring location.

N

Site Inspection PFOS Soil Results

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-2

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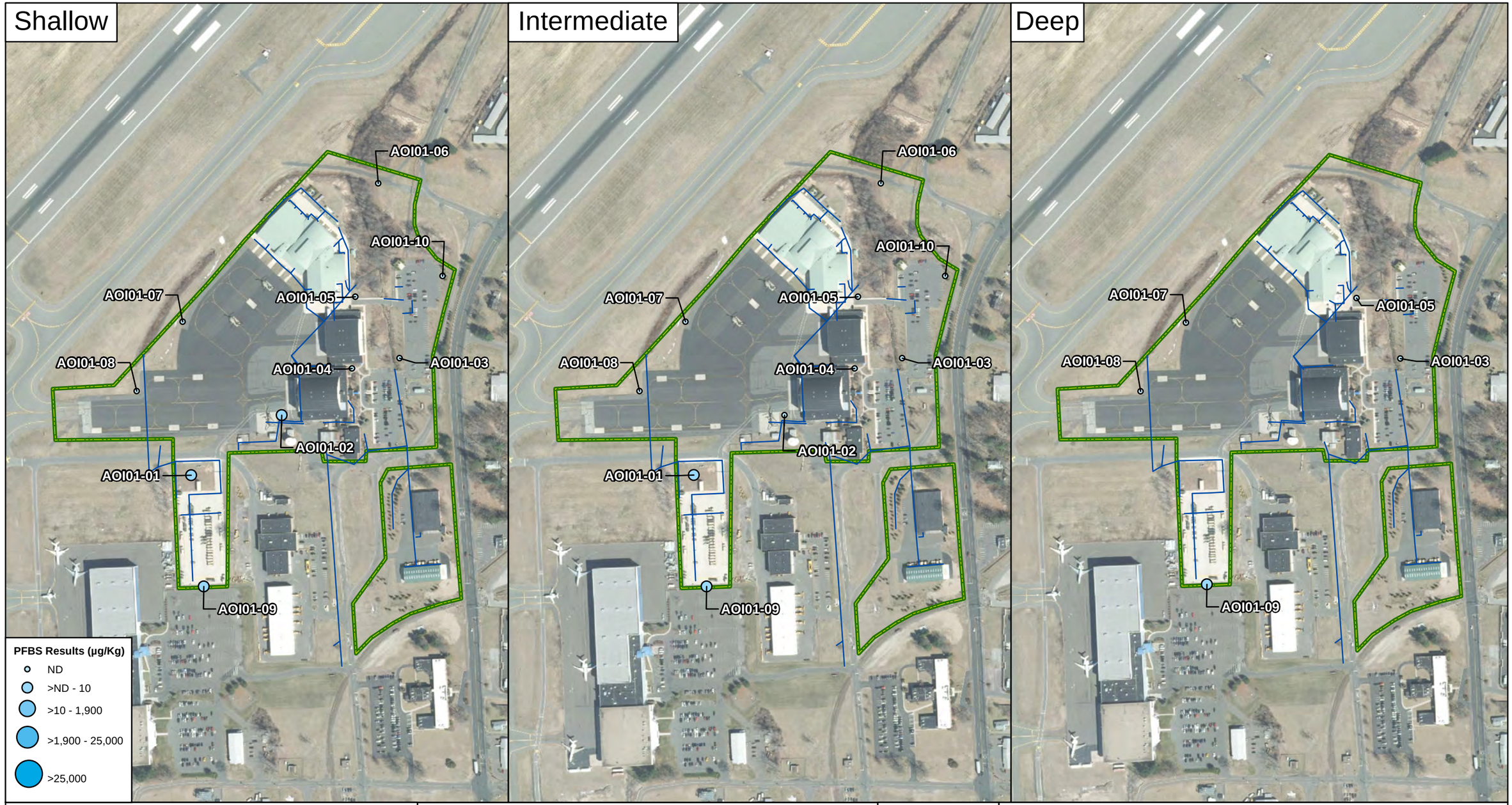

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	6/24/2021	GIS BY	MS	6/24/2021
SCALE	1:4,859	CHK BY	AM	6/24/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/24/2021

Legend

Facility Boundary

Storm Water Utility Line

0 200 400 800 Feet

Depth intervals shown represent respective sampling position within a given soil boring location.

N

Site Inspection PFBS Soil Results

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-3

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PFOA

PFOS

PFBS

AOI01-06
AOI01-10
AOI01-07
AOI01-05
AOI01-08
AOI01-04
AOI01-03
AOI01-02
AOI01-01
AOI01-09

PFOA Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOS Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFBS Results (ng/L)
- ND
- >ND - 100
- >100 - 600
- >600 - 1,000
- >1,000 - 6,000
- >6,000

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Windsor Locks AASF, CT			
REVISED	6/24/2021	GIS BY	MS	6/24/2021
SCALE	1:4,859	CHK BY	AM	6/24/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	6/24/2021

Legend
- Facility Boundary
- Storm Water Utility Line

0 200 400 800 Feet

N

Site Inspection Groundwater Results

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

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7. Exposure Pathways

The CSM for AOI 1, revised based on the SI findings, is presented on **Figure 7-1**. The CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

1. Contaminant source;
2. Environmental fate and transport;
3. Exposure point;
4. Exposure route; and
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figure uses an empty circle symbol to represent an incomplete exposure pathway. Areas with an incomplete pathway generally warrant no further action. However, the pathway is considered potentially complete if PFOA, PFOS, or PFBS are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway may warrant further investigation.

In general, the potential routes of exposure to PFAS are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of PFAS toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the facility include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers, residents outside the facility boundary, and recreational users outside of the facility boundary.

7.1 Soil Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 based on the aforementioned criteria.

7.1.1 AOI 1

Between 2003 and 2015, AFFF may have been released at AOI 1 during fire training activities. AFFF was used to extinguish controlled burns at the Wash Rack during fire training. Additionally, mobile fire extinguishers containing AFFF were discharged to the floor drains in Building 152. PFOA, PFOS, and PFBS were detected in soil at AOI 1 and confirm the release of PFAS to soil.

Based on the results of the SI, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust. Additionally, off-facility residents and recreational users may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities. Ground-disturbing activities could also potentially result in site worker, construction worker, or trespasser exposure via ingestion of surface soil. Lasty, ground-disturbing activities could also potentially result in construction worker exposure to PFOA, PFOS, and PFBS in subsurface soil via ingestion.

Construction activities were observed to be occurring near the facility's access control point at the time of the SI field work. The CSM is presented on **Figure 7-1**.

7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 based on the aforementioned criteria.

7.2.1 AOI 1

PFOA and PFOS in groundwater exceeded the individual SLs of 40 ng/L at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04); at AOI01-01, located in the southern portion of the facility upgradient of the identified potential release areas; and at AOI01-03, located east of the drainage swale along the edge of the facility parking lot. Additionally, PFOA in groundwater exceeded the SL at AOI01-05, on the north side of Building 200, and PFOS in groundwater exceeded the SL at upgradient locations AOI01-07, AOI01-08, and AOI01-09 along the western and southern facility boundaries.

It is unknown whether offsite potable wells are located downgradient of AOI 1; therefore, the ingestion exposure pathway for off-facility residents and off-facility recreational users is considered potentially complete. Windsor Locks AASF receives its potable water from the Connecticut Water Company. Therefore, the ingestion exposure pathway for site workers and trespassers is considered incomplete. Depths to water measured in April 2021 during the SI ranged from 3.37 to 8.11 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. Construction activities were observed to be occurring near the facility's access control point at the time of the SI field work. The CSM is presented on **Figure 7-1**.

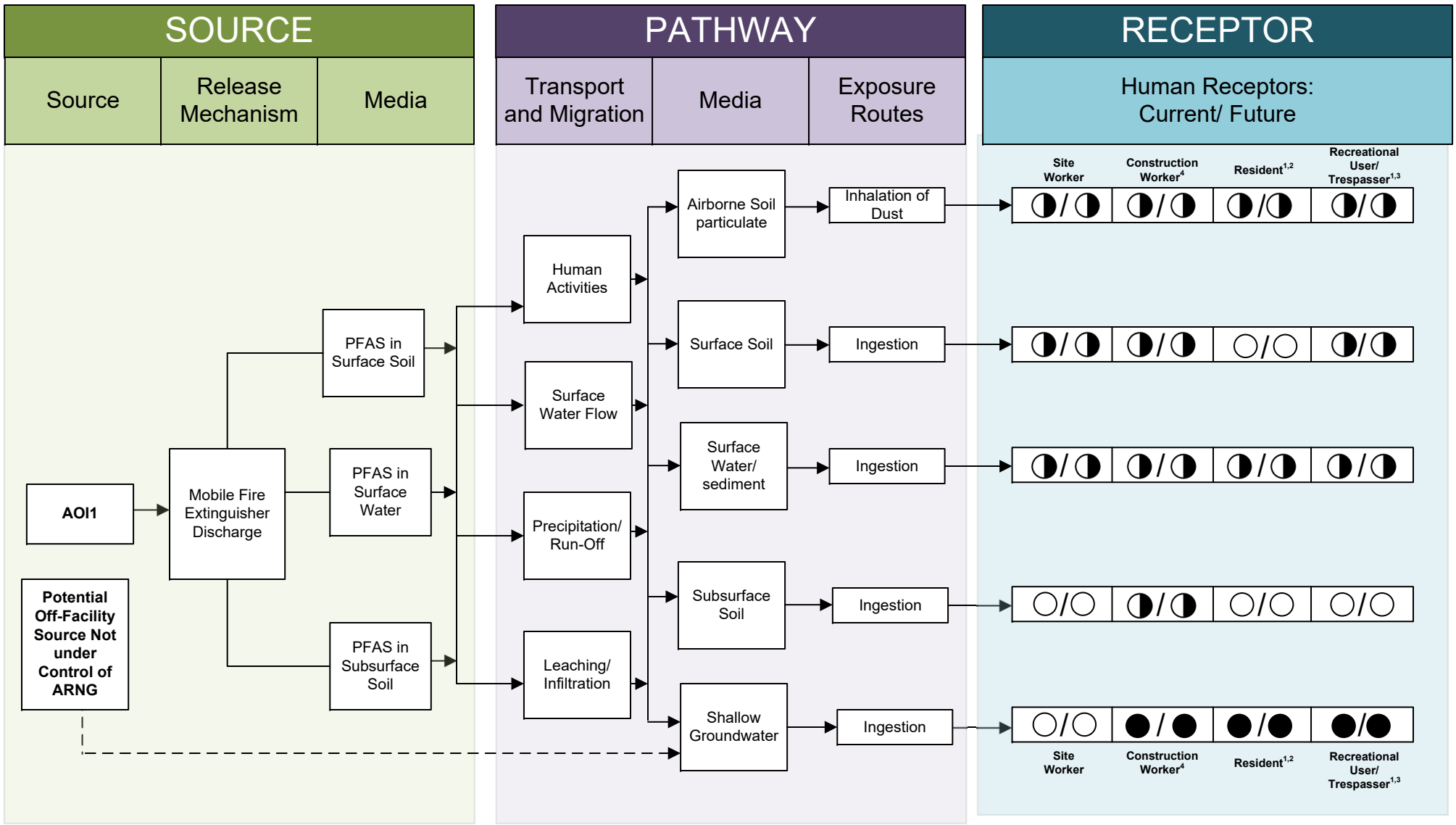
7.3 Surface Water and Sediment Exposure Pathway

Surface water and sediment samples were not collected as part of the SI at AOI 1; therefore, the SI results for PFOA, PFOS, and PFBS in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 AOI 1

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. Because PFOA, PFOS, and PFBS were detected in soil and groundwater at AOI 1, it is possible that those compounds may have migrated from soil and groundwater to the wetlands in the northeast of the facility via groundwater discharge, surface water runoff, or the stormwater detention system that outfalls to the drainage swales on the eastern and western portions of the property. Therefore, the surface water and sediment ingestion exposure pathway for site workers, construction workers, or trespassers is considered potentially complete.

Windsor Locks AASF is drained to drainage swales on the eastern and western portions of the property that are routed via a culvert to Spencer Brook, an intermittent stream that discharges to Stoney Brook. Stoney Brook subsequently discharges into the Connecticut River further downstream. Due to potential recreational use of Spencer Brook, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete.



LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- Partial / Possible Flow
- Incomplete Pathway
- Potentially Complete Pathway
- Potentially Complete Pathway with Exceedance of SL

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.
4. Active construction within AOI 1 was occurring as of the date of SI field work..

Figure 7-1
Conceptual Site Model, AOI 1
Windsor Locks AASF

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8. Summary and Outcome

This section summarizes SI activities and findings. The most significant findings are summarized in this section and are reproduced directly or abstracted from information contained in this report. The outcome provides general and comparative interpretations of the findings relative to the SLs.

8.1 SI Activities

The SI field activities were conducted from 26 to 29 April 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.7** of this Report.

- 26 soil samples from 10 boring locations;
- 10 grab groundwater samples from 10 temporary well locations; and
- 18 QA samples.

The information gathered during this investigation was used to determine if PFOA, PFOS, and/or PFBS were present at or above SLs. Additionally, the CSMs were refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure to PFOA, PFOS, and PFBS at the AOIs, which are described in **Section 7**.

8.2 SI Goals Evaluation

As described in **Section 4.2**, the SI activities were designed to achieve six main goals or DQOs. This section describes the SI goals and the conclusions that can be made for each based on the data collected during this investigation.

1. *Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.*

   PFOA, PFOS, and PFBS were detected at the facility in soil and groundwater. PFOA, PFOS, and PFBS were detected both at the source areas, as well as at the upgradient facility boundary and the downgradient facility boundary, between the potential PFAS release areas and potential drinking water receptors. PFOA and PFOS in groundwater exceeded the individual SLs of 40 ng/L at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04); at AOI01-01, located in the southern portion of the facility upgradient of the identified potential release areas; and at AOI01-03, located east of the drainage swale along the edge of the facility parking lot. Additionally, PFOA in groundwater exceeded the SL at AOI01-05, on the north side of Building 200, and PFOS in groundwater exceeded the SL at upgradient locations AOI01-07, AOI01-08, and AOI01-09 along the western and southern facility boundaries. PFOA, PFOS, and PFBS were detected in soil at AOI 1, indicating there was likely a release of PFAS-containing materials; however, the detected concentrations were several orders of magnitude lower than the soil SLs.

2. *Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.*

No potential PFAS release areas were removed from further consideration based on the groundwater and soil data collected during the SI. PFOA and PFOS were detected in groundwater above the SLs at both of the potential PFAS release areas (Wash Rack and Building 152); therefore, they may pose a threat to human health or the environment.

3. *Determine the potential need for a TCRA (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.*

   Based on the data collected during this SI, there is a potentially complete pathway between the detections of PFOA and PFOS above SLs at Windsor Locks AASF and potential downgradient offsite drinking water receptors. Windsor Locks AASF receives its potable water from the Connecticut Water Company, but it is unknown whether private potable wells exist downgradient of the facility. Using online resources, wells were researched to a 4-mile radius of the facility; however, the state of Connecticut does not have an online well database. Agricultural areas exist to the north-northwest of the facility and it is possible that unlisted groundwater wells may exist in this area. Therefore, the drinking water pathway is considered potentially complete.

4. *Collect data to better characterize the release areas for more effective and rapid initiation of a RI (if determined necessary).*

   The geological data collected as part of the SI indicate a highly permeable and conductive environment, with soils dominated by sand (ranging from well to poorly graded) with thin interbedded lenses of gravel, silt, and clay. These observations are consistent with the glaciofluvial deposits of the surrounding area. Given the shallow depth of the borings, it is difficult to determine how the surficial geology impacts the nature and extent of PFAS. However, the borings confirmed an unconfined shallow aquifer exists approximately 3.37 to 8.11 feet bgs. Groundwater flow direction at the facility is generally towards the drainage swale on the eastern portion of the facility. West of the eastern drainage swale, groundwater flow is generally to the northeast across the facility towards the drainage swale, while east of the drainage swale, groundwater flow is to the west-southwest back toward the drainage swale. Groundwater is potentially in communication with the drainage swale, which ultimately discharges to Spencer Brook. The limited amount of fine-grained material (silt and clay) observed in the shallow borings indicates the shallow aquifer is likely transmissive. These geologic and hydrogeologic observations will inform the development of the technical approach for the RI.

5. *If PFOA, PFOS, and PFBS are determined to be present, aim to evaluate whether the concentrations can be attributed to on-facility or off-facility sources that were identified within 4 miles of the installation as part of the PA (e.g., fire stations, major manufacturers, other DoD facilities)*

   Based upon the evaluation of groundwater and soil results in comparison to SLs, in combination with the groundwater flow direction analysis, the results of the SI indicate that the sources of detected concentrations of PFOA, PFOS, and PFBS at AOI 1 (the Wash Rack and Building 152) are possibly attributable to ARNG activities. However, based on the exceedances of PFOA and PFOS in groundwater along the upgradient facility boundary (both east and west), it is possible that potential releases from off-facility, adjacent sources are migrating onto the facility. Known potential offsite, adjacent sources at the Bradley International Airport were identified in the PA Report (AECOM, 2020) and SI QAPP Addendum (AECOM, 2021a) and are shown on **Figure 3-1**.

6. *Determine whether a potentially complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.*

Detections of PFOA, PFOS, and PFBS in soil at the Wash Rack and Building 152 release areas and at the upgradient and downgradient facility boundaries indicate there is a potentially complete exposure pathway between the source and site workers, construction workers, trespassers, and off-facility recreational users and residents. The SL exceedances of PFOA and PFOS in surficial groundwater indicate there is a potentially complete exposure pathway between the source and construction workers, trespassers, and off-facility recreational users and residents. It is not known at this time whether releases on ARNG property are likely the primary source of the contamination in groundwater.

8.3 Outcome

Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1 from sources on the facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs for PFOA, PFOS, and PFBS in soil and groundwater, as described in **Table 6-1**. The following bullets summarize the SI results:

- PFOA and PFOS in groundwater at AOI 1 exceeded the individual SLs of 40 ng/L at both potential PFAS release areas, Wash Rack (AOI01-02) and Building 152 (AOI01-04), and in groundwater at upgradient and downgradient locations at the facility. The maximum concentrations of PFOA and PFOS were 298 ng/L (at location AOI01-03) and 581 ng/L (at location AOI01-08), respectively. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- PFOA, PFOS, and PFBS were detected in soil at AOI 1, indicating a release of PFAS-containing materials occurred; however, the detected concentrations were several orders of magnitude lower than the soil SLs.

Table 8-1 summarizes the SI results for soil and groundwater. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors caused by DoD activities at the facility.

Table 8-2 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Wash Rack	◐	●	●
1	Building 152	◐	●	●

Legend:
N/A = Not applicable
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table 8-2: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Wash Rack, Building 152	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI

9. References

AECOM. 2018a. *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide Contract No. W912DR-12-D-0014/ W912DR17F0192*. 9 March.

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