FINAL
Site Inspection Report
Quonset Point Army Aviation Support Facility
North Kingstown, Rhode Island

Site Inspections for Perfluorooctanoic Acid (PFOA), Perfluorooctanesulfonic Acid (PFOS), Perfluorohexanesulfonic Acid (PFHxS), Perfluorononanoic Acid (PFNA), Hexafluoropropylene oxide dimer Acid (HFPO-DA) and Perfluorobutanesulfonic Acid (PFBS)
ARNG Installations, Nationwide

December 2023

Prepared for:

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

UNCLASSIFIED

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
°F	Degrees Fahrenheit
%	Percent
µg/kg	Microgram(s) per kilogram
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous film-forming foam
Amec	Amec Foster Wheeler
amsl	Above mean seal level
ANGB	Air National Guard Base
AOI	Area of Interest
ARNG	Army National Guard
bgs	Below ground surface
btoc	Below top of casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	Conceptual site model
DoD	Department of Defense
DPT	Direct-push technology
DQO	Data Quality Objectives
DUA	Data Usability Assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
EB	Equipment blank
EDR	Environmental Data Resources
ELAP	Environmental Laboratory Accreditation Program
ELLE	Eurofins Lancaster Laboratories Env, LLC
EM	Engineer Manual
ft	Foot (feet)
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
IDW	Investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	Liquid Chromatography Tandem Mass Spectrometry
LPH	Landing Plane Hangar
MS	Matrix spike
MSD	Matrix spike duplicate

NAS	Naval Air Station
NCBC	Naval Construction Battalion Center
ng/L	Nanogram(s) per liter
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PID	Photoionization detector
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QSM	Quality Systems Manual
RI	Remedial Investigation
RIANG	Rhode Island Air National Guard
RIARNG	Rhode Island Army National Guard
RIDEM	Rhode Island Department of Environmental Management
SI	Site Inspection
SL	Screening level
TOC	Total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
USACE	U.S. Army of Corps of Engineers
USEPA	U.S. Environmental Protection Agency

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EXECUTIVE SUMMARY

The Army National Guard (ARNG) G9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) (Assistant Secretary of Defense) dated 6 July 2022. The six compounds listed in the OSD memorandum include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA)[1]. These compounds are collectively referred to as "relevant compounds" throughout the document and the applicable Screening Levels (SLs) are provided below in **Table ES-1**.

The PA identified two Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on a comparison of SI results to SLs for the relevant compounds. This SI was completed at the Quonset Point Army Aviation Support Facility (AASF) in North Kingstown, Rhode Island and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1 North and South Hangar Fire Suppression System and AOI 2 Former Plating Building. The potential release at AOI 1 is associated with DoD related activities; the potential release at AOI 2 may have been from a non-DoD private entity prior to Rhode Island ARNG acquisition of the land. Quonset Point AASF will be referred to as the "Facility" throughout this document.

The Facility, operated by Rhode Island ARNG, encompasses approximately 27.9 acres in Washington County, Rhode Island, approximately 15 miles south of Providence, Rhode Island. The Facility is bounded to the north by the Rhode Island Air National Guard facility, to the east by the Quonset State Airport operated flight line, to the south by a municipal airport hangar, and to the west by private industries associated with the Quonset Business Park (AECOM Technical Services, Inc. [AECOM] 2020). The focus of this SI Report is the Rhode Island ARNG property which is under the jurisdiction of the U.S. Army. The facility associated with the Rhode Island Air National Guard to the north is under the jurisdiction of the U.S. Air Force, and it is subject to a separate investigation conducted by the U.S. Air Force. The Quonset Point AASF consists of an office/training building, two hangars, various support buildings, and a helicopter landing apron.

[1] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

The PA identified two AOIs for investigation during the SI phase. SI sampling results from the AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOIs. Based on the results of this SI, and following the CERCLA process, a remedial investigation (RI) is warranted for AOI 1 North and South Hangar Fire Suppression System, and AOI 2 Former Plating Building.

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

Analyte[2]	Residential (Soil) (µg/kg)[1]	Industrial / Commercial Composite Worker (Soil) (µg/kg)[1]	Tap Water (Groundwater) (ng/L)[1]
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:

1. Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the conceptual site model (CSM) developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of military specification (MIL-SPEC) aqueous film forming foam (AFFF) and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

Table ES-2. Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil AOI	Groundwater AOI	Groundwater Facility Boundary	Future Action
1	North and South Hangar Fire Suppression System	◐	●	●	Proceed to RI
2	Former Plating Facility	◐	●	●	Proceed to RI

Legend:
● = Detected; exceedance of screening levels
◐ = Detected; no exceedance of screening levels
○ = Not detected

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) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense 2022). The six compounds listed in the OSD memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide-dimer acid (HFPO-DA)[2] at ARNG facilities nationwide. The ARNG performed this SI at the Quonset Point Army Aviation Support Facility (AASF) in North Kingstown, Rhode Island. The Quonset Point AASF will be referred to as the "Facility" throughout this report.

The SI project elements were performed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (U.S. 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 Army requirements and guidance for field investigations.

1.2 SITE INSPECTION PURPOSE

A PA[3] was performed at the AASF (AECOM Technical Services, Inc. [AECOM] 2020) that identified two Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

[2] Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

[3] The Preliminary Assessment Report can be found at the following link: https://www.nationalguard.mil/Leadership/Joint-Staff/Personal-Staff/Public-Affairs/Community-Engagement/Environmental/PFAS-Library/Rhode-Island/

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2. FACILITY BACKGROUND

2.1 FACILITY LOCATION AND DESCRIPTION

The Quonset Point AASF is an active Rhode Island ARNG (RIARNG) support facility located on approximately 27.9 acres in Washington County, Rhode Island, approximately 15 miles south of Providence, Rhode Island. The Facility is bounded to the north by the Rhode Island Air National Guard (RIANG) facility, to the east by the Quonset State Airport operated flight line, to the south by a municipal airport hangar, and to the west by private industries associated with the Quonset Business Park (AECOM 2020). The focus of this SI Report is the RIARNG property which is under the jurisdiction of the U.S. Army. The facility associated with the RIANG to the north is under the jurisdiction of the U.S. Air Force, and it is subject to a separate investigation conducted by the U.S. Air Force. The location and the facility boundary is outlined in green on **Figure 2-1**.

The Quonset Point AASF is constructed on several parcels of land that are owned by the U.S. Air Force and leased to the RIARNG since 1981. In 1939, Quonset Point was acquired by the U.S. Navy, and construction of an air station and pier began in 1940. From 1940 to 1973, the existing Facility boundaries were part of the Navy facility, which included Naval Air Station (NAS) Quonset Point and the Naval Construction Battalion Center (NCBC) Davisville. The primary mission of NAS Quonset Point was to provide mobilization support to the active Naval Construction Force at NCBC Davisville and to act as a mobilization base for the rapid assembly outfitting and readying of Reserve Construction Battalions (AECOM 2020).

In 1973, NAS Quonset Point and the associated air support facilities were closed, and ownership was transferred to the State of Rhode Island. Simultaneous with this ownership transaction, the State of Rhode Island began leasing the existing AASF parcel to the U.S. Air Force for the RIANG. In 1981, the U.S. Air Force licensed a portion of the existing facility boundary to the RIARNG for a period of 50 years. Several other parcels were added to the existing Facility boundary since that time (AECOM 2020). This includes the western half of the facility which was acquired by RIARNG in 2008 from the Rhode Island Department of Transportation and is currently use for vehicle parking, maintenance, and administrative buildings.

Currently, the Facility is comprised of two hangars (one for cold storage and one for active maintenance) which were built on the footprints of former Navy Landing Plane Hangar (LPH) #2 and #4. The original AASF occupied the former LPHs beginning in 1981. According to RIARNG personnel, the former LPHs had wet sprinkler systems that were not capable of using aqueous film-forming foam (AFFF). However, it is not clear if the Navy otherwise stored or used AFFF in the former LPHs. LPH #4 was demolished in the early-2000s, and LPH #2 was demolished in 2010. Construction of the new AASF was phased. The north hangar was constructed after demolition of LPH #4 and was completed in approximately 2009–2010. The south hangar was constructed after demolition of LPH #2 and was completed in approximately 2011–2012 (AECOM 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

The Facility is located on the Seaboard Lowland coastal belt of the New England physiographic province, within Narragansett Bay. The topography across Quonset Point is generally flat and is only a few feet above sea level. The vast majority of the Facility is located within a 100-year flood zone. Most of the natural swamps and marshes found within this region were filled during construction of NAS Quonset Point. Farther to the west, the land surface exhibits over 150 feet (ft) of relief in a series of north-south trending valleys, and ridges formed during the last glaciation (AECOM 2020).

The following sections include information on geology, hydrogeology, hydrology, climate, and current and future land use. The topography at Quonset Point AASF is shown on **Figure 2-2**. The regional geology and groundwater features are shown on **Figure 2-3**. The regional surface water features and drainage basins are shown on **Figure 2-4**. Groundwater elevations and contours are presented on **Figure 2-5**.

2.2.1 Geology

The Facility and surrounding area are located within the Narragansett Basin, a complex north-south trending syncline approximately 12 miles wide and up to 12,000 ft deep. The principal bedrock unit where the Facility is located is the Pennsylvanian aged (323 to 298 million years ago) Rhode Island Formation. The original sedimentary bedrock of the formation was primarily marine fine- to coarse-grained sandstone and shale, which was subsequently metamorphosed into various types of meta-sandstone (quartzite), meta-conglomerates, meta-argillites, phyllite, gneiss, and schist. The Rhode Island Formation is further characterized by cross-bedding and irregular, discontinuous beds. No mapped faults exist within at least 2 miles of the Facility. Bedrock investigations in the surrounding area have observed the depth to competent bedrock ranges approximately 38 to 66 ft below ground surface (bgs) (AECOM 2020).

The unconsolidated Inary (2.6 million years to present) soil overlying the bedrock was deposited by glacial activity during the Pleistocene Epoch. The final deposition of glacial material occurred during the Wisconsin glacial stage (10,000–20,000 years ago). As the glacial front melted and receded, unconsolidated glacial till and glacio-lacustrine sediments were deposited. A dense, non-stratified, heterogeneous mixture of sand, silt, clay, and gravel was emplaced on top of the bedrock. Within the area of the Facility, the thickness of the glacial deposits ranges from 10 to 100 ft in thickness. While these deposits are present at the Facility, the majority of the area is covered with structures and asphalt or concrete pavement (AECOM 2020).

During the SI, the soil underlying the Facility was found to be generally composed of brown to gray brown sand, consistent with the glacial deposits described above. The borings were completed at depths between 10 and 15 feet below ground surface (bgs).

Samples for grain size analyses were collected at two locations, QPAASF-02 (10-12 ft bgs) and QPAASF-04 (7-7.75 ft bgs) and analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil samples are comprised primarily of

sand (63% to 86%), silt (12% to 35%), and clay (2%). Boring logs are presented in **Appendix E** and grain size results are presented in **Appendix F**.

2.2.2 Hydrogeology

The Narragansett Bay is the largest body of water near the Facility and surrounds Quonset Point on three sides. The surficial aquifer (Potowomut-Wickford Aquifer System) is unconfined and located within the glacial deposits below the Facility. Depth to groundwater measured during the SI field activities in July 2021 ranged from 3.56 to 9.2 ft bgs. A deep overburden hydrologic zone exists between the surficial fill and glacial deposits and underlying bedrock. This zone consists of silty, gravelly sand to sandy, gravelly silt. Below this middle unit is the competent bedrock, which in places has shown to be partially confined (AECOM 2020).

Groundwater flow in the surficial aquifer is generally east towards Narragansett Bay (**Figures 2-3 and 2-5**) (AECOM 2020). Based on a survey conducted in 2003, the groundwater underlying the Facility is not tidally influenced (EA Engineering, Science, and Technology, Inc., PBC [EA] 2003).

There are no known drinking water wells located on or near the Facility. Groundwater in the Quonset Point area is not within a Groundwater Reservoir, Groundwater Recharge, or Sole Source Aquifer, as designated by the Rhode Island Department of Environmental Management (RIDEM). Additionally, the groundwater beneath the Facility and in the surrounding area is not within a designated Community or Non-Community Wellhead Protection Area. The nearest public drinking water well is located approximately 2 miles upgradient of the Facility. In addition, the groundwater at the Facility (and Quonset Point as a whole) is designated as "GB" by RIDEM, which applies to groundwater sources that may not be suitable for public or private drinking water without treatment due to known or presumed degradation of groundwater quality (AECOM 2020). Based on correspondence with RIDEM personnel, a groundwater designation of GB does not prohibit the use of groundwater as a potable source and there are no regulations prohibiting that from occurring.

The Rhode Island Department of Health, in conjunction with municipal water suppliers, has performed PFAS sampling within the areas surrounding the Facility. Results found that several upgradient public drinking water supplies had detectable concentrations of PFAS, but they were all below USEPA Health Advisory levels at the time of the study[4] (AECOM 2020).

2.2.3 Hydrology

There are no surface water features within the Facility boundary. The closest surface water feature is Frys Pond, which is approximately 3,000 ft north of the Facility. According to RIARNG personnel, any precipitation that falls on the Facility is captured in storm drain catch basins that flow away from the hangar and eventually into Narragansett Bay via Frys Pond (**Figure 2-4**). During large storm events, water typically pools in the grassy area along the runway to the east of the Facility (AECOM 2020).

[4] At the time of the study, the Health Advisory level was 70 ppt for PFOS and PFOA, individually or combined.

2.2.4 Climate

The climate at the Facility consists of four clearly separated seasons, with predominant weather movement from west to east. Temperatures vary from an average high of 60.3 degrees Fahrenheit (°F) to an average low of 39.4°F. Average precipitation is 51.41 inches of rain and 37 inches of snowfall during winter months (AECOM 2020).

2.2.5 Current and Future Land Use

The Quonset Point AASF is a controlled access Facility adjacent to the RIANG. The anticipated future land use is not expected to change from the current land use; however, future infrastructure improvements, land acquisitions, and land use controls are unknown (AECOM 2020). The RIANG base which surrounds the AASF on all sides is fenced, though the AASF boundary is unfenced.

2.2.6 Sensitive Habitat and Threatened/Endangered Species

A wildlife survey has not occurred at the Facility, and the Facility does not have any significant areas of habitat. The following species have not been identified at the Facility but may be present in the surrounding area.

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in North Kingstown, Rhode Island (U.S. Fish and Wildlife Service 2021):

- Birds: Roseate Tern, *Sterna dougallii* (Endangered)
- Mammals: Northern Long-eared Bat, *Myotis septentrionalis* (Threatened)

2.3 HISTORY OF PFAS USE

AFFF, a firefighting agent, was commonly used by the U.S. military to extinguish petroleum fires, for firefighting training, and for the suppression of fires in uncontained areas. Military use of AFFF began in the 1970s and was most widely used at Department of Defense (DoD) installations with airfields. Two potential PFAS release areas were identified at the Quonset Point AASF. Interviews and records obtained during the PA indicate that the hangar fire suppression system potentially contains AFFF. Additionally, a former industrial plating building is located on-Facility, but was demolished in approximately 2009 and only the concrete pad of the building remains. PFAS has been known to be used as a surfactant to prevent exposure of hazardous solutions to workers, but there are no records indicating that PFAS were used in the operations conducted at the former plating building. Due to the unknown nature of PFAS use by non-DoD entities, the former plating building is included as a potential release area. A description of each AOI at Quonset Point AASF is presented in **Section 3**.

Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 2-1
Facility Location

Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 2-2
Topography

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Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

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Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 2-3
Groundwater Features

Facility Data
- Facility Boundary

Hydrology/Hydrogeology
- Groundwater Flow Direction
- Perennial Creek/Stream
- Waterbody
- Wetlands

Data Sources:
ESRI 2020
AECOM 2020
NWI 2021

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

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Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 2-4
Surface Water Features

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Facility Data
- Facility Boundary

Utilities
- Catch Basin
- Stormwater Manhole
- Trench Drains
- Stormwater Line

Hydrology
- Surface Water Flow Direction
- Perennial Creek/Stream
- Waterbody
- Wetlands

- Watershed Boundary

Data Sources:
ESRI 2020
AECOM 2020
NWI 2021

Date:..... December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

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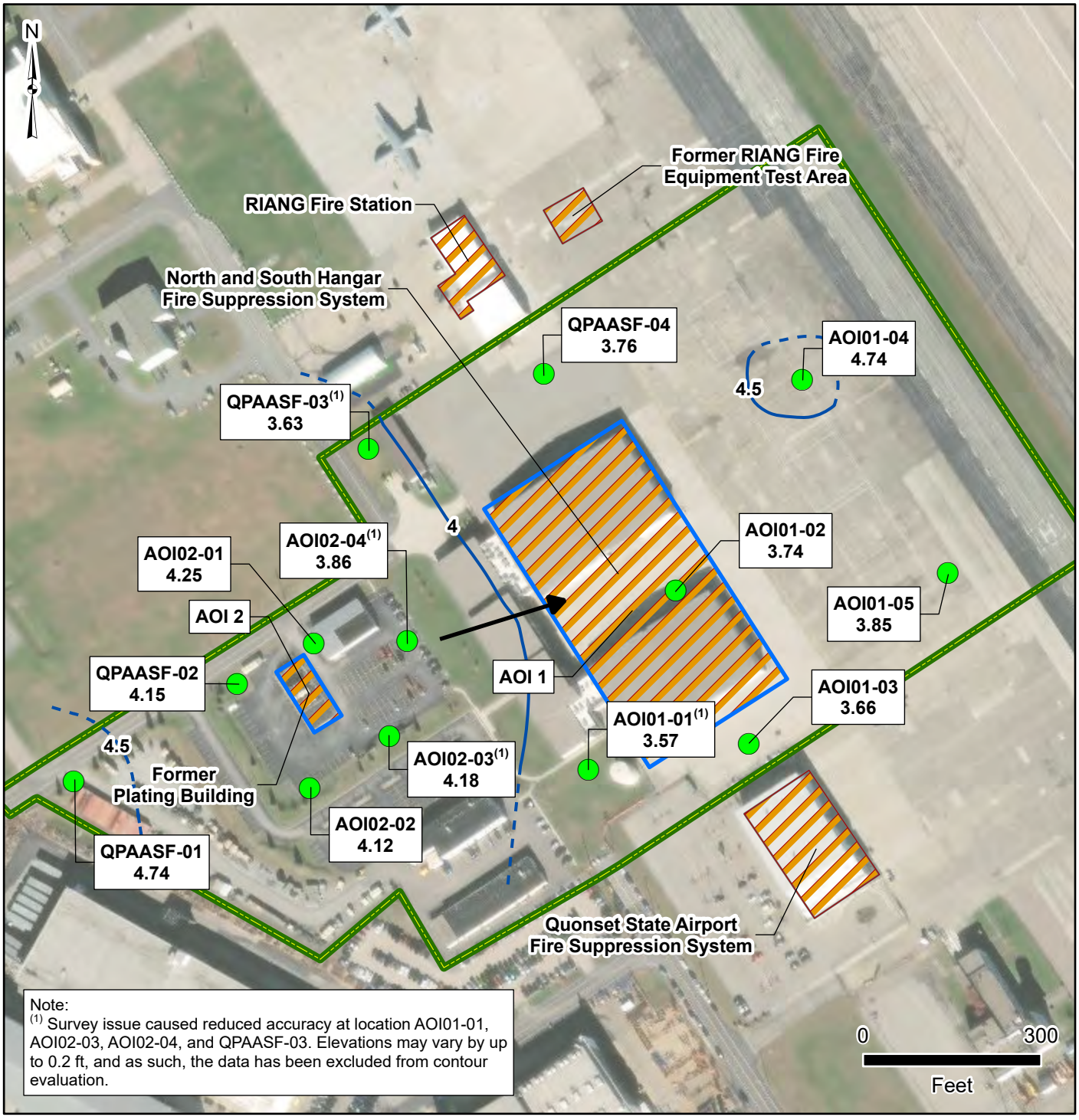
Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 2-5
Groundwater Elevations (July 2021)



Note:
(1) Survey issue caused reduced accuracy at location AOI01-01, AOI02-03, AOI02-04, and QPAASF-03. Elevations may vary by up to 0.2 ft, and as such, the data has been excluded from contour evaluation.

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Sample Locations
- DPT

Hydrology/Hydrogeology
- Groundwater Flow Direction
- Groundwater Elevation Contour Interval (0.5 foot)
- Dashed where Inferred

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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3. SUMMARY OF AREAS OF INTEREST

The PA[5] evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, two potential release areas were identified at the AASF and grouped into two AOIs identified as: AOI 1 North and South Hangar Fire Suppression System, and AOI 2 Former Plating Building. Additionally, there are off-Facility potential source areas as detailed in **Section 3.3**. The potential AOIs are shown on **Figure 3-1** and described in subsequent sections**.**

3.1 AOI 1 – NORTH AND SOUTH HANGAR FIRE SUPPRESSION SYSTEM

The AASF comprises administrative offices, two hangars, and supporting maintenance space. As previously mentioned, one of the current hangars is used for cold storage (South Hangar) and the other is actively used for helicopter maintenance (North Hangar). Construction of the AASF was completed in approximately 2012 on the footprints of LPH #2 and #4. The original AASF occupied the former LPHs beginning in 1981. According to RIARNG personnel, the former LPHs had wet sprinkler systems that were not capable of using AFFF (See interview Records in Appendix B of the PA) (AECOM 2020)[6].

The current AASF is equipped with an AFFF fire suppression system. The existing fire suppression system is housed in a maintenance room within the South Hangar and contains a 700-gallon tank of Chemguard 3 percent (%) AFFF C-301MS. This fire suppression system services both the North and South Hangars (AECOM 2020).

According to RIARNG personnel and contractors who were working at the Facility at that time, the fire suppression system was initially tested in the North Hangar after construction completion in 2009–2010. During the test, a by-pass line was connected to the end of the header line, and the test foam was released directly on the concrete in the courtyard (area between the two hangars). Accounts from RIARNG personnel and contractors indicated that dish soap, not AFFF, was used during the initial test; however, no documentation has been found to confirm this information. After completion of the test, the soap entered the storm drain and discharged into Narragansett Bay via Frys Pond (AECOM 2020).

Since this time, testing of the fire suppression system has occurred on a semi-annual basis. The design of the fire suppression system dictates the method in which testing is performed. The Quonset Point AASF fire suppression system is a wet-line system where the piping is primed with a 3% AFFF solution. Testing is performed by opening the header at the end of each section of piping and collecting the AFFF solution in a 55-gallon drum. A vacuum truck then vacuums the AFFF from the drum into the tank for off-Facility transport and disposal. Typically, 30–60 gallons of AFFF solution are generated from multiple header lines tested within both hangars.

[5] The Preliminary Assessment Report can be found at the following link: https://www.nationalguard.mil/Leadership/Joint-Staff/Personal-Staff/Public-Affairs/Community-Engagement/Environmental/PFAS-Library/Rhode-Island/

[6] According to PA records search (see Figure 2 within the EA Engineering, 2005. Site Investigation Report included in Appendix A of the 2020 PA report [AECOM 2020]) and the PA interviews with RIARNG personnel, the former LPHs had wet sprinkler systems that were not capable of using AFFF (AECOM 2020).

According to RIARNG personnel, the only release to the environment from these tests was drips from vacuum truck hoses and header lines after completion of the test. No other documented releases were found during the PA, and RIARNG personnel could not recall any accidental spills or releases occurring within the last 20 years (AECOM 2020).

3.2 AOI 2 – FORMER PLATING BUILDING

An industrial plating building was identified at an adjacent property, which was later part of a parcel transfer to the RIARNG and is now part of the Facility. Historically, the property was owned by the Navy and used for aviation equipment assembly and maintenance until it was transferred to the State of Rhode Island in 1973. From that time until it was acquired by the RIARNG in 2008, the property was leased to private owners for industrial uses. Historical records found during the PA only went back as far as 1989, when the property was listed as Noble Industries. Later documentation listed the property as Annex Industries (AECOM 2020). There was no information found regarding the use of PFAS as a surfactant to prevent exposure of hazardous materials to workers at this former facility.

Information obtained from the Environmental Data Resources (EDR) report confirmed that Noble and Annex Industries were generators of wastewater and sludges produced from electroplating operations. Documentation within the EDR report specifically listed waste generated from aluminum anodizing; chemical etching and milling; and tin, zinc, and aluminum electroplating. The EDR report did not mention any waste generated as a result of chrome electroplating. The last dated piece of information included in the EDR report was a manifest dated April 2008. A review of aerial photography indicates that the building was demolished in 2009, likely in conjunction with the start of the new AASF construction. The concrete pad of the building still exists and is currently used by the RIARNG for Heavy Expanded Mobility Tactical Trucks parking (AECOM 2020).

3.3 ADJACENT SOURCES

Several potential off-Facility sources of PFAS are located adjacent to the Facility and are not under the control of the RIARNG. The off-Facility sources are shown on **Figure 3-1.**

3.3.1 Quonset State Airport Fire Suppression System

Information obtained during interviews with RIARNG personnel indicated that the Quonset State Airport hangar, located directly south of the Quonset Point AASF, had a non-emergency release from the AFFF fire suppression system within the hangar. The exact date of the release was not known; several RIARNG personnel recall the event occurring within the last 20 years. Specific details regarding the type, quantity, or clean-up were not known (AECOM 2020). This potential source area is located cross-gradient and immediately adjacent to the Facility.

3.3.2 Quonset Air National Guard Base

The PFAS PA for the Facility (AECOM 2020) documented a RIANG PFAS PA and subsequent 2018 PFAS SI conducted at the surrounding/adjacent RIANG 143rd Airlift Wing Quonset Air National Guard Base (ANGB). Soil and groundwater samples were collected at portions of the

ANGB abutting the AASF. The PA identified RIANG's nearby source areas including the Vehicle Maintenance Shop (0.3 miles northwest of the Facility), Fire Station (100 feet north of the facility), and Fire Equipment Testing Area (100 feet north of the facility) as potential off-Facility sources of PFAS. Details regarding AFFF use and sampling results are included below. Of these three potential off-Facility sources of PFAS, the RIANG Vehicle Maintenance Shop is located upgradient of AOI 1 and AOI 2, and the RIANG Fire Station and Fire Equipment Test Area are located cross-gradient and adjacent to the northwestern AASF boundary. The sampling locations discussed below are presented in **Figure 3-1a**.

- **RIANG Vehicle Maintenance Shop:** As documented in a PFAS SI conducted by the RIANG and the PA, an undetermined amount of 3% AFFF was released during maintenance on one of the crash trucks in 2005. The AFFF drained into the floor drains and subsequently to the sanitary sewer. Foaming was noted at the local, publicly operated treatment works as a result of the AFFF release. As a result of these RIANG PA findings, two soil borings were advanced, and one groundwater sample was collected from the area surrounding the Vehicle Maintenance Shop. Two surface soil samples were collected at 0–2 ft bgs, one subsurface sample from 6–8 ft bgs, and another subsurface sample from 5–6.5 ft bgs. Analytical results indicated several PFAS compounds were detected above the laboratory reporting limit in each boring, but no PFAS compounds exceeded the screening levels used. At the time of the study, under the Air Force guidance for soils and sediments[7], the SLs for PFOA and PFOS were both 1,260 micrograms per kilogram (µg/kg) (Amec Foster Wheeler [Amec] 2018). Groundwater results from the temporary monitoring well detected PFOS with a concentration of 139 nanograms per liter (ng/L). These results exceeded the USEPA Health Advisory and RIDEM groundwater quality standards at the time of the study of 70 ng/L. However, RIDEM determined that the groundwater underlying the area may not be suitable for public or private drinking water without treatment due to known or presumed degradation of quality. Based on this groundwater classification, the report indicated no further action or additional investigation was planned (Amec 2018). However, subsequent to the finalization of the report, it was determined that additional investigation is warranted, and an additional study is planned by RIANG (time frame unknown) at this location.

- **RIANG Fire Station:** The RIANG Fire Station is the storage location for the airport crash trucks which hold 3% AFFF. No known releases have occurred. As a result of the RIANG PA findings, three soil borings were advanced, and one groundwater sample was collected from the area surrounding Building 11. Two surface soil samples were collected at 0–2 ft bgs and two subsurface soil samples at 5–6 ft bgs. Analytical results indicated several PFAS compounds were detected above the laboratory reporting limit in each boring, but no PFAS compounds exceeded the screening levels used. At the time of the study, under the Air Force guidance for soils and sediments[8], the SLs for PFOA and

[7] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgibin/chemicals/csl_search]. The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 milligrams per kilogram per day (mg/kg/day) derived by USEPA in their Drinking Water Health Advisories for both PFOS and PFOA (AMEC 2018).

[8] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgibin/chemicals/csl_search]. The toxicity value input for the calculator is the Tier 3 value reference dose of

PFOS were both 1,260 µg/kg. Groundwater results from the temporary monitoring well detected PFOS and PFOA concentrations of 2,680 ng/L and 185 ng/L, respectively. These results were above the USEPA Health Advisory, and RIDEM groundwater quality standards at the time of the study of 70 ng/L. Based on the previously described groundwater classification, no further action was recommended at Building 11 (Amec 2018). However, subsequent to the finalization of the report, it was determined that additional investigation is warranted, and an additional study is planned by RIANG (time frame unknown) at this location.

- **Former RIANG Fire Equipment Test Area:** The RIANG fire department performed fire equipment tests where AFFF was sprayed onto the concrete apron and ramp area adjacent to the Fire Station. Interviews performed with fire department employees indicated the testing occurred approximately between 2010 and 2015. The exact frequency of testing varied but was thought to have occurred at least annually. The quantity of AFFF utilized during testing is unknown. In addition to this fire equipment testing, a jet fuel spill occurred in 1993 which resulted in the release of approximately 20 gallons of jet fuel on to the aircraft apron. The area was sprayed with an undetermined amount of AFFF and washed into the stormwater drain system. As a result of these PA findings, two soil borings were advanced, and one groundwater sample was collected from the approximate location of the fire equipment testing. Two surface soil samples were collected at 0–2 ft bgs and two subsurface soil samples at 5–6 ft bgs. Analytical results indicated several PFAS compounds were detected above the laboratory reporting limit in each boring, but no PFAS compounds exceeded the screening levels used (Air Force calculated soil values)[9]. At the time of the study, under the Air Force guidance for soils and sediments, the SLs for PFOA and PFOS were both 1,260 µg/kg. Groundwater results from the temporary monitoring well detected PFOS and PFOA concentrations of 956 ng/L and 1,110 ng/L, respectively. These results were above the USEPA Health Advisory, and RIDEM groundwater quality standards at the time of the study of 70 ng/L. Based on the previously described groundwater classification, no further action was recommended in front of Building 11 (Amec 2018). However, subsequent to the finalization of the report, it was determined that additional investigation is warranted, and an additional study is planned by RIANG (time frame unknown) at this location.

0.00002 milligrams per kilogram per day (mg/kg/day) derived by USEPA in their Drinking Water Health Advisories for both PFOS and PFOA (AMEC 2018).

[9] Screening levels calculated using the USEPA Regional Screening Level calculator [https://epa-prgs.ornl.gov/cgibin/chemicals/csl_search]. The toxicity value input for the calculator is the Tier 3 value reference dose of 0.00002 milligrams per kilogram per day (mg/kg/day) derived by USEPA in their Drinking Water Health Advisories for both PFOS and PFOA (AMEC 2018).

Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 3-1
Areas of Interest

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_6342503383\PROJECTS\SIReport\Quonset\Quonset.aprx

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrology/Hydrogeology
- Surface Water Flow Direction
- Groundwater Flow Direction
- Perennial Creek/Stream
- Waterbody
- Wetlands

Data Sources:
ESRI 2020
AECOM 2020
NWI 2021

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 3-1a
Potential PFAS Release
RIANG SI Sampling Locations

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Air National Guard 2018 SI Sample Locations
- Temporary Monitoring Well
- Soil
- Soil with Temporary Monitoring Well
- Storm Drain/Stormwater

Hydrogeology
- Groundwater Flow Direction

Data Sources:
ESRI 2020
AECOM 2020

*Note: Sample locations and ANG release areas derived from FY16 Phase 1 Regional Site Inspections Report

Date:.....November 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

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4. PROJECT DATA QUALITY OBJECTIVES

As identified during the data quality objective (DQO) process and outlined in the SI Uniform Federal Policy (UFP)–Quality Assurance Project Plan (QAPP) Addendum (EA 2021a), the objective of the SI is to identify whether there has been a release to the environment at the AOIs identified in the PA. For each AOI, ARNG determines if further investigation is warranted, a removal action is required to address immediate threats, or whether no further action is warranted. This SI evaluated groundwater and soil for presence or absence of relevant compounds at each of the sampled AOIs.

4.1 PROBLEM STATEMENT

ARNG will recommend an AOI for Remedial Investigation (RI) if related soil and groundwater samples have concentrations of the relevant compounds above the OSD risk-based SLs. The SLs are presented in **Section 6.1** of this report.

4.2 INFORMATION INPUTS

Primary information inputs for the SI include the following:

- The PA Report for the Quonset Point AASF (AECOM 2020)
- Analytical data collected during environmental sampling efforts at the adjacent RIANG Base
- Groundwater and soil sample data collected as part of this SI in accordance with the site specific UFP-QAPP Addendum (EA 2021a)
- Field data collected including groundwater elevation and water quality parameters measured at the time of sampling.

4.3 STUDY BOUNDARIES

The scope of the SI was bounded horizontally 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). The scope of the SI was vertically bounded as follows: groundwater (10–15 ft bgs), soil from hand auger borings (0–5 ft bgs), and soil from direct-push technology (DPT) borings (15 ft bgs).

4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins Lancaster Laboratories Env, LLC (ELLE), accredited under the DoD Environmental Laboratory Accreditation Program (ELAP) (Accreditation Number 1.01) and the Rhode Island Department of Health (Certification Number 021). PFAS data underwent 100% Stage 2B validation in accordance with the DoD General Data Validation Guidelines

(2019b) and DoD Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual (QSM) Table B-15 (2020).

Data were compared to applicable SLs within this document and decision rules as defined in the UFP-QAPP Addendum (EA 2021a).

4.5 DATA USABILITY ASSESSMENT

The Data Usability Assessment (DUA), which is provided in **Appendix A**, 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 installation-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, 2019b; USEPA 2017).

Based on the DUA, the environmental data collected during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUA and its associated data validation reports. These data are of sufficient quality to meet the objectives and requirements of the UFP-QAPP Addendum (EA 2021a).

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 was implemented in accordance with the following approved documents:

- *Final Preliminary Assessment Report*[10]*, Quonset Point Army Aviation Support Facility, North Kingstown, Rhode Island*, dated February 2020 (AECOM 2020)
- *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*, dated December 2020 (EA 2020a)
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Quonset Point Army Aviation Support Facility, North Kingstown, Rhode Island,* dated July 2021 (EA 2021a)
- *Programmatic Accident Prevention Plan, Revision 1, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*, dated November 2020 (EA 2020b)
- *Final Accident Prevention Plan/Site Safety and Health Plan Addendum, Quonset Point Army Aviation Support Facility, Rhode Island, Revision 0,* dated March 2021 (EA 2021b).

The SI field activities were conducted from 27 to 30 July 2021 and consisted of hand auger coring and surface soil sample collection, DPT boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection, surveying, and site restoration activities. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as noted in **Section 5.9**.

The following samples were collected during the SI and analyzed for a subset of 24 compounds via Liquid Chromatography Tandem Mass Spectrometry (LC/MS/MS) compliant with QSM 5.3 Table B-15 to fulfill the project DQOs:

- Thirty-three (33) surface and subsurface soil samples from thirteen (13) boring locations
- Thirteen (13) grab groundwater samples from thirteen (13) temporary well locations.
- Thirteen (13) quality assurance (QA)/ quality control (QC) samples.

[10]The Preliminary Assessment Report can be found at the following link: https://www.nationalguard.mil/Leadership/Joint-Staff/Personal-Staff/Public-Affairs/Community-Engagement/Environmental/PFAS-Library/Rhode-Island/

Figure 5-1 provides the sample locations for all media across the Facility. **Table 5-1** presents the list of samples collected for each medium. 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**. 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 of these activities are presented below.

5.1.1 Technical Project Planning

The U.S. Army of Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (Department of the Army 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 DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 28 April 2021, 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 ARNG, RIARNG, USACE, and RIDEM 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 UFP-QAPP Addendum (EA 2021a).

A TPP Meeting 3 was held on 21 June 2023 to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report.

5.1.2 Utility Clearance

EA contacted Dig Safe System, Inc. to notify them of intrusive work at the Facility on 21 July 2021 and was assigned Ticket No. 20212909027. This is a free service that marks utility lines on public property. Dig Safe representatives also marked out communications lines on the AASF property during the Facility walk on 27 July 2021. Additional utility reconnaissance was conducted during the Facility walk where EA and Facility representatives visually verified utility features such as catch basins, manholes, shutoff gates, overhead lines, etc. to infer utility locations in relation to the boring locations. Additionally, the first 5 ft of each boring were pre-cleared by EA's drilling subcontractor, Cascade Remediation, using a hand auger to verify utility clearance in the shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

A sample from a deionized water source at the EA Ecotoxicological Laboratory was collected on 31 March 2021, prior to mobilization. Results of the sample confirmed this source to be

acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the DI water source used during the SI are provided in Appendix F. A discussion of the results is presented in the DUA (Appendix A).

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 appendix (Appendix A) to the Programmatic UFP-QAPP (EA 2020a).

5.2 HAND AUGER SOIL SAMPLING

The first 5 ft of each boring were pre-cleared by EA's drilling subcontractor, Cascade Remediation, using a hand auger to verify utility clearance in the shallow subsurface where utilities would typically be encountered. No borings were advanced exclusively by hand auger based on terminal depth. Soil samples collected from depths shallower than 5 ft bgs were collected using the hand auger. All soil sample locations are shown on **Figure 5-1** and described in the subsequent section. Non-dedicated sampling equipment (i.e., hand auger) was decontaminated between sampling locations.

5.3 SOIL BORINGS AND SOIL SAMPLING

Beyond 5 ft depth, soil samples were collected via DPT drilling methods in accordance with Standard Operating Procedure 047 *Direct-Push Technology Sampling* (EA 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 ft of the boring in compliance with utility clearance procedures (**Section 5.2**).

Three discrete soil samples were planned to be collected for chemical analysis from each soil boring: one surface soil sample (0 to 2 ft bgs) and two subsurface soil samples. One subsurface soil sample was to be collected approximately 1 ft above the groundwater table and one was to be collected at the mid-point between the surface and the groundwater table (not to exceed 15 ft bgs). Groundwater was encountered at depths ranging from approximately 3.5 to 9 ft bgs during drilling. Therefore, the mid-point sample was not collected at locations with a water table elevation less than 5 ft below grade. Additionally, the "surface" sample was converted to a subsurface sample when pavement (concrete) thickness exceeded 1.5–2 ft. Total boring completion depths ranged from 10 to 15 ft bgs to accommodate temporary well installation.

The soil boring locations are shown on **Figure 5-1**, and boring and sample depths are provided in **Table 5-1**. The soil boring locations were selected based on the AOI information provided in the PA (AECOM 2020) and as agreed upon during the TPP and review of the UFP-QAPP Addendum (EA 2021a).

During the drilling, the soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System. A photoionization detector (PID) was used to screen the breathing zone during boring activities as a part of personal safety

requirements. Observations and measurements were recorded on sampling forms (**Appendix B2**) and in a non-treated field logbook. Depth interval, recovery thickness, photoionization detector concentrations, moisture, relative density, Munsell color, and Unified Soil Classification System texture were recorded. The boring logs are provided in **Appendix E**.

The hand auger, post-hole digger, throw bar (where applicable), and cutting shoe were decontaminated between locations use using a six-step, PFAS-free decontamination procedure with Liquinox, PFAS-free deionization water, and methyl alcohol (methanol). The drill casing was also rinsed with PFAS-free deionization water between locations, though the casing did not come in contact with soil samples due to the use of the acetate core liner.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free pen or pencil. Samples were immediately placed on ice after collection. The samples were transported daily to Eurofins Environment Testing New England of North Kingstown, Rhode Island, who packaged and shipped the coolers via FedEx under standard chain-of-custody procedures to ELLE. Sample were analyzed for PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15), total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM D422) in accordance with the UFP-QAPP Addendum (EA 2021a). Additionally, ELLE requested additional volume to pre-screen each location for high PFAS concentrations necessitating dilution prior to analysis. The PFAS pre-screen was conducted using a "local method" of analysis.

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/Matrix Spike Duplicates (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, equipment blanks (EBs) were collected at a rate of one per day and analyzed for PFAS. 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 UFP-QAPP Addendum (EA 2021a) using bentonite chips, sand, and surface completion material (asphalt patch/concrete) at completion of sampling activities.

5.4 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, a temporary well was constructed of a 5-ft section of 1-inch Schedule 40 polyvinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected using a peristaltic pump with PFAS-free HDPE tubing. Samples were collected after a period of time following well installation to allow groundwater to infiltrate and recharge the temporary well intervals. The temporary wells were purged at a rate

determined in the field to reduce turbidity and draw down prior to sampling, generally between 100 and 200 milliliters per minute. Water quality parameters (turbidity, temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) during purging at 3 to 5 minute intervals. Upon stabilization of field parameters as listed in the UFP-QAPP Addendum or 1 hour of purging, the groundwater grab samples were collected. A shaker test was performed at each location to identify any foaming of the groundwater. Each sample was collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free pen or pencil. Samples were immediately placed on ice after collection. The samples were transported daily to Eurofins Environment Testing New England of North Kingstown, Rhode Island, who packaged and shipped the coolers via FedEx under standard chain-of-custody procedures to ELLE. Samples were analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA 2021a). Additionally, ELLE requested additional volume to pre-screen each location for high PFAS concentrations necessitating dilution prior to analysis. The PFAS pre-screen was conducted using a "local method" of analysis.

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 field reagent blank was collected per day in accordance with the UFP-QAPP Addendum (EA 2021a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment. The water-level meter was decontaminated between locations using a six-step, PFAS-free decontamination procedure.

Temporary wells were abandoned in accordance with the UFP-QAPP Addendum (EA 2021a) by removing the PVC and backfilling the hole with bentonite chips. Surfaces were completed with clean sand, quick-set concrete, or asphalt patch to match the surrounding material.

5.5 SYNOPTIC WATER LEVEL MEASUREMENTS

Groundwater levels were used to monitor Facility-wide groundwater elevations and assess groundwater flow. Synoptic water level elevation measurements were collected from the newly installed temporary monitoring wells, taken from the survey mark. Survey marks were placed on the highest point of the well casing by a state licensed Professional Land Surveyor. Groundwater elevation data are provided in **Table 5-3**. Water levels were allowed to equilibrate for at least an hour after temporary monitoring well installation prior to gauging. Infiltration into boreholes was immediate due to sand in the shallow aquifer. Groundwater elevations and contours are presented on **Figure 2-5**.

5.6 SURVEYING

The highest PVC top of casing for each new temporary well casing was surveyed by EA's Professional Land Surveyor Subcontractor Alpha using a Trimble R10 real-time kinematic differential global positioning system connected to Keystone Precision Solutions Virtual Reference Station network. Two benchmarks set by Rhode Island Economic Development

Corporation were located and used within the survey. Positions were collected in the applicable Rhode Island State Plane North American Datum of 1983 datum (horizontal) and North American Vertical Datum 1988 (vertical). Surveying data were collected on 30 July 2021 and are provided in **Appendix F** and within **Table 5-3**.

Elevation data for four of the monitoring wells experienced a survey data error that was not realized until monitoring wells were already abandoned and could not be corrected. A full discussion of these error's effect on data usability and accuracy is found in the DUA in **Appendix A**.

5.7 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA 2021a).

Soil IDW (i.e., soil cuttings) was collected and accumulated in two 55-gallon drums and one 5-gallon bucket[11]. Liquid IDW (i.e., purge water and decontamination fluids) generated during the SI activities was containerized in one 55-gallon drum. The soil and liquid IDW have been characterized and were transported off-site to the U.S. Ecology Subtitle C Landfill in Belleville, Michigan[12] for disposal. More details on the handling of IDW are included in the Technical Memorandum for Investigation Derived Waste Management and Disposal (**Appendix H**).

Other solids such as spent personal protective equipment, plastic sheeting, tubing, and monitoring well construction materials generated during the field activities were disposed of at a licensed solid waste landfill.

5.8 LABORATORY ANALYTICAL METHODS

Samples were analyzed for a subset of 24 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 at ELLE, a DoD ELAP and National Environmental Laboratory Accreditation Program-certified laboratory.

Soil samples were also analyzed for TOC using USEPA Method 9060A, pH by USEPA Method 9045D, and grain size by ASTM D422.

5.9 DEVIATIONS FROM UFP-QAPP ADDENDUM

Deviations from the UFP-QAPP Addendum occurred based on conditions encountered during the field investigation activities. The deviations were discussed between EA, ARNG, USACE, and RIDEM. One deviation from the UFP-QAPP Addendum is noted below:

[11] The soil contained in the 5-gallon bucket was added to one of the 55-gallon drums prior to characterization by EA and no longer requires separate disposal.
[12] The U.S. Ecology Subtitle C Landfill in Belleville, MI is comprised of two different facilities: Michigan Disposal Waste Treatment Plant, and Wayne Disposal Inc. For the purposes of this Memorandum, all disposal location companies are referred to as the "U.S. Ecology Subtitle C Landfill" in Belleville, MI.

- The existing AASF monitoring well, MW-1, was unable to be opened due to pavement covering a portion of the road box cover. At ARNG's request, a temporary monitoring well was added to the scope adjacent to MW-1. This boring/temporary monitoring well was identified as AOI02-04.

Table 5-1. Samples by Media
Quonset Point Army Aviation Support Facility, Rhode Island
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS	TOC	pH	Grain Size	Comments
Soil Samples							
QPAASF-01-0-2	07/28/2021	0-2	X				
QPAASF-DUP-SB-01	07/28/2021		X				Field Duplicate
QPAASF-01-3-5	07/28/2021	3-5	X				
QPAASF-01-7.5-9	07/28/2021	7.5-9	X				
QPAASF-02-0-2	07/28/2021	0-2	X				MS/MSD
QPAASF-02-3-5	07/28/2021	3-5	X				
QPAASF-02-7.5-9	07/28/2021	7.5-9	X				
QPAASF-02-10-12	07/28/2021	10-12				X	
AOI02-01-0-2	07/28/2021	0-2	X	X	X		
AOI02-01-3-5	07/28/2021	3-5	X				
AOI02-01-6-8	07/28/2021	6-8	X				
AOI02-03-0-2	07/28/2021	0-2	X				
QPAASF-DUP-SB-02	07/28/2021						Field Duplicate
AOI02-03-3-5	07/28/2021	3-5	X				
AOI02-03-7-9	07/28/2021	7-9	X				
AOI02-02-0-2	07/28/2021	0-2	X				
AOI02-02-3-5	07/28/2021	3-5	X				
AOI02-02-8-10	07/28/2021	8-10	X				
AOI02-04-0-2	7/29/2021	0-2	X				
AOI02-04-3-5	7/29/2021	3-5	X				
AOI02-04-7-9	7/29/2021	7-9	X				
QPAASF-03-0-2	7/29/2021	0-2	X				
QPAASF-03-3-5	7/29/2021	3-5	X				MS/MSD
AOI01-01-0-2	7/29/2021	0-2	X				
AOI01-01-3-5	7/29/2021	3-5	X				
QPAASF-DUP-SB-03	7/29/2021		X				Field Duplicate
AOI01-03-2-2.5	7/29/2021	2-2.5	X	X	X		
AOI01-03-3-5	7/29/2021	3-5	X				
AOI01-02-2-3	7/29/2021	2-3	X				
AOI01-02-4-5	7/29/2021	4-5	X				
QPAASF-04-1.5-2.5	7/29/2021	1.5-2.5	X				
QPAASF-04-5-6	7/29/2021	5-6	X				
QPAASF-04-7-7.5	7/29/2021	7-7.5				X	
AOI01-05-2-2.5	7/30/2021	2-2.5	X				
AOI01-05-4-5	7/30/2021	4-5	X				
QPAASF-DUP-SB-04	7/30/2021		X				Field Duplicate
AOI01-04-1.5-2	7/30/2021	1.5-2	X				
AOI01-04-3-4	7/30/2021	3-4	X				

Table 5-1. Samples by Media
Quonset Point Army Aviation Support Facility, Rhode Island
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS	TOC	pH	Grain Size	Comments
Groundwater Samples							
QPAASF-01-GW	7/28/2021	-	X				
QPAASF-02-GW	7/28/2021	-	X				
AOI02-01-GW	7/28/2021	-	X				
AOI02-03-GW	7/29/2021	-	X				
AOI02-02-GW	7/29/2021	-	X				MS/MSD
QPAASF-DUP-GW-01	7/29/2021	-	X				Field Duplicate of AOI02-02-GW
AOI02-04-GW	7/29/2021	-	X				
QPAASF-03-GW	7/29/2021	-	X				
AOI01-01-GW	7/29/2021	-	X				
AOI01-03-GW	7/29/2021	-	X				
QPAASP-04-GW	7/29/2021	-	X				
QPAASF-DUP-GW-02	7/29/2021	-	X				Field Duplicate of AOI01-03-GW
AOI01-02-GW	7/29/2021	-	X				
AOI01-05-GW	7/30/2021	-	X				
AOI01-04-GW	7/30/2021	-	X				
Blank Samples							
QPAASF-FRB-01	7/28/2021	-	X				Field Reagent Blank
QPAASF-FRB-02	7/29/2021	-	X				Field Reagent Blank
QPAASF-FRB-03	7/30/2021	-	X				Field Reagent Blank
QPAASF-EB-01	7/28/2021	-	X				Equipment Blank collected from post-hole digger
QPAASF-EB-02	7/29/2021		X				Equipment Blank collected from throw bar
QPAASF-EB-03	7/30/2021	-	X				Equipment Blank collected from water-level meter

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
Quonset Point Army Aviation Support Facility, Rhode Island
Site Inspection Report

Area of Interest	Boring ID	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)
AOI 1	AOI01-01	10	5-10
	AOI01-02	10	5-10
	AOI01-03	10	5-10
	AOI01-04	10	5-10
	AOI01-05	10	5-10
AOI 2	AOI02-01	15	10-15
	AOI02-02	15	10-15
	AOI02-03	15	10-15
	AOI02-04	15	10-15
AASF Boundary	QPAASF-01	15	10-15
	QPAASF-02	15	10-15
	QPAASF-03	10	5-10
	QPAASF-04	10	5-10

Table 5-3. Groundwater Elevation
Quonset Point Army Aviation Support Facility, Rhode Island
Site Inspection Report

Monitoring Well ID	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)
AOI01-01	8.87[(a)]	5.30	3.57[(a)]
AOI01-02	9.36	5.62	3.74
AOI01-03	9.11	5.45	3.66
AOI01-04	8.34	3.60	4.74
AOI01-05	7.41	3.56	3.85
AOI02-01	12.15	7.90	4.25
AOI02-02	13.32	9.20	4.12
AOI02-03	12.67[(a)]	8.49	4.18[(a)]
AOI02-04	11.51[(a)]	7.65	3.86[(a)]
QPAASF-01	13.74	9.00	4.74
QPAASF-02	13.25	9.10	4.15
QPAASF-03	9.13[(a)]	5.50	3.63[(a)]
QPAASF-04	10.36	6.60	3.76

Notes:
(a) Survey issue caused reduced accuracy at these elevations. Elevations may vary by up to 0.2 ft.
amsl = Above mean sea level.
btoc = Below top of casing.

Army National Guard Site Inspections
Site Inspection Report
Quonset Point, Rhode Island

Figure 5-1
Site Inspection Sample Locations

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_6342503383\PROJECTS\SIReport\Quonset\Quonset.aprx

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Sample Locations
- DPT

Utilities
- Catch Basin
- Stormwater Manhole
- Trench Drains
- Stormwater Line

Hydrogeology
- Groundwater Flow Direction

Data Sources:
ESRI 2020
AECOM 2020

Date:..... December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

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6. SITE INSPECTION RESULTS

This section presents the analytical results of the SI for each AOI. The analytical results are reported and evaluated in the subsequent sections. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Sections 6.3 and 6.4**. **Tables 6-2 through 6-5** present PFAS results for the relevant compounds in soil and groundwater. Analytical Summary 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 6 July 2022 (Assistant Secretary of Defense 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to a RI, the next phase under CERCLA. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1**.

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

Analyte[2]	Residential 0 to 2 ft bgs (Soil) (µg/kg)[1]	Industrial/Commercial Composite Worker 2 to 15 ft bgs (Soil) (µg/kg)[1]	Tap Water (Groundwater) (ng/L)[1]
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
1. Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI, as screening values were established after SI planning and execution. However, ARNG will add HFPO-DA to the list of constituents sampled during the next phase of CERCLA if warranted.

µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

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 ft bgs) and the industrial/commercial worker scenario is applied to shallow and deep subsurface soil results (2 to 15 ft bgs).

6.2 SOIL PHYSICOCHEMICAL ANALYSES

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

Soil pH was measured as 8.9 in the sample collected from AOI 1. Soil pH was measured as 7.4 in the sample collected from AOI 2. TOC ranged from 2,000 mg/kg in the sample collected from AOI 2 to 3,300 mg/kg in the sample collected from AOI 1. Grain size analysis was conducted on soils where a possible confining layer was identified. The grain size analysis of sample QPAASF-02-10-12’ indicated the sample was comprised of approximately 80 percent sand and 16 percent fines; therefore, it was classified as “loamy sand”. The grain size analysis of sample QPAASF-04-7-7.5’ indicated the sample was comprised of approximately 54 percent sand and 44 percent silt; therefore, it was classified as “sandy loam”.

6.3 AOI 1 – NORTH AND SOUTH HANGAR FIRE SUPPRESSION SYSTEM

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes the Current Hangar AFFF System. The soil and groundwater results are summarized on **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.3.1 AOI 1 – Soil Analytical Results

Tables 6-2 through **6-4** summarize the detected compounds in soil. **Figures 6-1 through 6-5** present the ranges of detections in soil.

Soil was sampled at five boring locations associated with the potential release area at AOI 1. Soil was sampled from two intervals at each of the boring locations due to shallow water-table elevations and thick pavement at the majority of locations. Only AOI01-01 and AOI01-04 had surface interval sample collection (samples less than 2 ft depth bgs).

Of the two surface soil samples from AOI 1, sample AOI01-01-0-2' was the only one with detections of any of the five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS). PFOS was detected in the surface interval at AOI01-01-0-2', with a concentration of

1.1 J+ µg/kg, below the SL of 13 µg/kg. PFOA was detected in the surface interval at AOI01-01-0-2', at a concentration of 0.19 J µg/kg, below the SL of 19 µg/kg. PFBS, PFNA, and PFHxS were not detected in the surface soil samples in AOI 1.

As all shallow and deep subsurface soil samples were collected at depths less than 15 ft, they were evaluated together. A total of eight subsurface soil samples were collected within AOI 1 – five shallow subsurface and three deep subsurface samples. Three of the five relevant compounds were detected within subsurface soil in AOI 1. PFOS was detected in three of the eight subsurface soil samples within AOI 1 with concentrations ranging from 1.3 J+ µg/kg (AOI01-03-3-5') to 6.2 J+ µg/kg (AOI01-02-4-5'); all detections were below the SL of 160 µg/kg. PFOA was detected in five of the eight subsurface soil samples in AOI 1, with concentrations ranging from 0.23 J µg/kg (AOI01-01-3-5') to 0.45 J µg/kg (AOI01-02-2-3'); all PFOA detections were below the SL of 250 µg/kg. PFHxS was detected in only one subsurface sample, AOI-01-02-2-3', at a concentration of 0.92 µg/kg, below the SL of 1,600 µg/kg. PFBS and PFNA were not detected in the subsurface soil samples in AOI 1.

6.3.2 AOI 1 – Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater samples were collected from five temporary wells associated with the potential release area at AOI 1. All five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS) were detected in groundwater at AOI 1, though only concentrations of PFOA, PFOS, and PFHxS exceeded their respective SLs. PFOS was detected in each of the five groundwater samples and exceeded the SL of 4 ng/L at each location; the highest concentration of 1,300 ng/L was observed in the sample collected from AOI01-02, located between the two current hangars where foam was released to the ground surface. PFOA was also detected at each of the five samples and exceeded the SL of 6 ng/L in all five samples. The highest PFOA concentration of 180 ng/L was observed in the sample from AOI01-01, located southwest of the southern hangar. PFHxS was detected in each of the five groundwater samples and it exceeded the SL of 39 ng/L at four of the locations (all except AOI01-02). The maximum PFHxS concentration of 160 ng/L occurred at AOI01-03, located south of the southern hangar.

PFBS was detected in each of the five samples with concentrations ranging from 1.4 J ng/L (AOI01-02) to 34 ng/L (AOI01-03), below the SL of 601 ng/L. PFNA was detected in four of the five samples at concentrations ranging from 1.3 J ng/L (AOI01-05) to 5 ng/L (AOI01-02), below the SL of 6 ng/L.

6.3.3 AOI 1 – Conclusions

Based on the results of the SI, three relevant compounds (PFOS, PFOA, and PFHxS) were detected in one or more soil samples below the applicable SLs. All five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS) were detected in groundwater at AOI 1. PFOS, PFOA, and PFHxS were detected in groundwater at concentrations exceeding the individual SLs

in one or more temporary well locations associated with AOI 1. Based on the exceedances of the SLs for groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2 – FORMER PLATING BUILDING

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2, which includes the former plating facility. The detected compounds are summarized in **Tables 6-2 through 6-4**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.4.1 AOI 2 – Soil Analytical Results

Tables 6-2 through **6-4** summarize the detected compounds in soil. **Figures 6-1 through 6-5** present the ranges of detections in soil.

Soil was sampled at four boring locations associated with the potential release area at AOI 2. Soil was sampled from three intervals at each of the boring locations including one surface interval and two subsurface intervals. Of the five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS), only two were detected at a single surface sample location. PFOS was detected in the surface interval (0–2 ft bgs) at location AOI02-01-0-2' with a concentration of 11 µg/kg, below the SL of 13 µg/kg. PFHxS was also detected in the surface interval (0–2 ft bgs) at location AOI02-01-0-2' with a concentration of 0.23J µg/kg, below the SL of 130 ug/kg. There were no detections of PFOA, PFNA, or PFBS in the surface soil samples from AOI 2.

PFOA, PFOS, and PFHxS were detected in subsurface soils in AOI 2, with no concentrations exceeding respective SLs. The samples from AOI02-01 had the majority of the detections. The sample AOI02-01-3-5' had detections of PFOA, PFOS, and PFHxS at concentrations of 0.22 J, 3.5, and 0.21 J µg/kg, respectively, below their SLs of 250, 160, and 1,600 µg/kg. The deeper sample from the same boring, sample AOI02-01-6-8' had detections of PFOA, PFOS, and PFHxS at concentrations of 0.45 J, 10, and 0.53 J µg/kg, respectively, below their SLs of 250, 160, and 1,600 µg/kg. The only other subsurface soil detections in AOI 2 were of PFOS in the shallow subsurface samples at borings AOI02-03 and -04. The concentration at both locations was 0.64 J+ µg/kg, below the SL of 160 µg/kg. PFBS and PFNA were not detected in the subsurface soil samples within AOI 2.

6.4.2 AOI 2 – Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater samples were collected from the four temporary wells associated with the potential release area at AOI 2. All five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS) were detected in groundwater at AOI 2, though only concentrations of PFOA, PFOS, and PFHxS exceeded their respective SLs. PFOS was detected in each of the four groundwater samples exceeding the SL of 4 ng/L at each location. The highest concentration of 4,000 ng/L of PFOS was observed in the sample collected from AOI02-01, located adjacent to the northeastern corner and downgradient of the former plating building. PFOA was also detected at each of the four

samples exceeding the SL of 6 ng/L at each location. The highest PFOA concentration of 220 ng/L was observed in the sample collected from AOI02-01. PFHxS was detected in each of the four groundwater samples at concentrations ranging from 28 to 770 ng/L. PFHxS concentrations exceeded the SL of 39 ng/L at three of the locations (all except AOI02-02). The maximum PFHxS concentration of 770 ng/L occurred at AOI02-01. PFBS and PFNA were detected in each of the four samples with concentrations below their respective SLs of 601 and 6 ng/L.

6.4.3 AOI 2 – Conclusions

Based on the results of the SI, three relevant compounds (PFOS, PFOA, and PFHxS) were detected in one or more soil samples below the applicable SLs. All five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS) were detected in groundwater at AOI 2. PFOS, PFOA, and PFHxS were detected in groundwater at concentrations exceeding the individual SLs in one or more temporary well locations associated with AOI 2. Based on the exceedances of the SLs for groundwater, further evaluation at AOI 2 is warranted.

6.5 BOUNDARY SAMPLE LOCATIONS

This section presents the analytical results for soil and groundwater in comparison to SLs for samples collected at the Facility boundary. The detected compounds are summarized in **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.5.1 Boundary Sample Locations – Soil Analytical Results

Tables 6-2 through **6-4** summarize the detected compounds in soil. **Figures 6-1 through 6-5** present the ranges of detections in soil.

Soil boundary sample locations were comprised of four soil boring locations QPAASF-01 through QPAASF-04 along the northwestern/upgradient boundary of the Facility. Soil was sampled from two to three intervals in the four boring locations along the boundary. Surficial soil was sampled at three of the four locations; thick pavement (1.5–2 ft thick) prevented surficial soil sample collection at QPAASF-04.

Of the five relevant compounds, three (PFOS, PFOA, and PFNA) were detected in surface soil in the boundary sample locations; however, no soil concentrations exceeded the applicable SLs. PFOS was detected in the three samples from the surface interval (0–2 ft bgs) with concentrations ranging from 1.1 J+ µg/kg (QPAASF-01-0-2') to 5.6 µg/kg (QPAASF-02-0-2'), below the SL of 13 µg/kg. PFOA was detected in two of the three surface soil samples taken from the Facility boundary locations (QPAASF-02-0-2' and the duplicate sample from QPAASF-01-0-2') at concentrations of 0.52 J µg/kg and 0.27 J µg/kg, respectively, below the associated SL of 19 µg/kg. PFNA was detected in one of the three surface samples (QPAASF-02-0-2') at a concentration 0.38 J µg/kg, below the SL of 19 µg/kg. PFBS and PFHxS were not detected in surface soil at the boundary sample locations.

A total of seven subsurface soil samples were collected from the boundary locations, four shallow subsurface and three deep. There were no detections of relevant compounds in the three deep subsurface soil samples from the boundary sample locations. All detections occurred in the four shallow subsurface samples. Three of the five relevant compounds were detected in the four shallow subsurface samples; no soil concentrations exceeded the applicable SLs. PFOS was detected in three of the four shallow subsurface soil samples within the boundary boring locations, all with a concentration of 1.2 J+ µg/kg (QPAASF-01-3-5', QPAASF-03-3-5', and QPAASF-04-1.5-2.5'), below the SL of 160 µg/kg. PFOA was detected in three of the four shallow subsurface soil samples within the boundary boring locations, with concentrations ranging from 0.30 J µg/kg (QPAASF-01-3-5') to 0.95 J+ µg/kg (QPAASF-02-3-5'); all PFOA detections were below the SL of 250 µg/kg. PFHxS was detected in two of the four shallow subsurface soil samples within the boundary boring locations, with detected concentrations of 0.27 J+ µg/kg and 0.26 J µg/kg at QPAASF-02-3-5' and QPAASF-04-1.5-2.5', respectively, both below the SL of 1,600 µg/kg. PFBS and PFNA were not detected in the subsurface soil samples.

6.5.2 Boundary Sample Locations – Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

Groundwater samples were collected from four temporary well locations along the Facility's northwestern boundary (QPAASF-01 through QPAASF-04). All five relevant compounds (PFOA, PFOS, PFHxS, PFNA, and PFBS) were detected in groundwater at the boundary sample locations, though only concentrations of PFOA, PFOS, and PFHxS exceeded their respective SLs. PFOS was detected in each of the four groundwater samples at concentrations which exceeded the SL of 4 ng/L. The highest concentration of 98 ng/L was observed in the sample from QPAASF-03, located northwest of the northern hangar. PFOA was also detected at each of the four samples at concentrations which exceeded the SL of 6 ng/L. The highest PFOA concentration of 48 ng/L was also observed in the sample from QPAASF-03. PFHxS was detected in each of the four groundwater samples at concentrations which exceeded the SL of 39 ng/L. The maximum PFHxS concentration of 160 ng/L occurred at QPAASF-04.

PFBS was detected in each of the four samples with reported concentrations that were below the SL of 601 ng/L. PFNA was detected in three of the four samples with reported concentrations that were below the SL of 6 ng/L.

6.5.3 Boundary Sample Locations – Conclusions

Based on the results of the SI, four relevant compounds (PFOS, PFOA, PFNA, and PFHxS) were detected in one or more soil samples from the boundary at concentrations below the applicable SLs. PFOS, PFOA, and PFHxS were detected in groundwater at concentrations exceeding the individual SLs in one or more temporary well location associated with the boundary samples. Based on the exceedances of the SLs for groundwater, further evaluation to determine contribution from potential upgradient sources is warranted.

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil, Site Inspection Report, Quonset Point AASF

Location ID		AOI01-01		AOI01-04		AOI02-01		AOI02-02		AOI02-03		AOI02-03	
Sample Name		AOI01-01-0-2'		AOI01-04-1.5-2'		AOI02-01-0-2'		AOI02-02-0-2'		AOI02-03-0-2'		QPAASF-DUP-SB-02	
Parent Sample ID												AOI02-03-0-2'	
Depth (ft bgs)		0-2		1.5-2		0-2		0-2		0-2		0-2	
Sample Date		7/29/2021		7/30/2021		7/28/2021		7/28/2021		7/28/2021		7/28/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)													
Perfluorobutanesulfonic acid (PFBS)	1,900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	ND	U	0.23	J	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	1.1	J+	ND	U	11		ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	0.19	J	ND	U	ND	U	ND	U	ND	U	ND	U

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.

2. The Screening Levels for soil are based on a residential scenario for direct incidental ingestion of contaminated soil.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.

UJ = Analyte was not detected and was reported less than LOD. Associated numerical value is approximate.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-2. PFOA, PFOS, PFBS, PFNA, AND PFHxS Results in Surface Soil, Site Inspection Report, Quonset Point AASF

	Location ID	AOI02-04		QPAASF-01		QPAASF-01		QPAASF-02		QPAASF-03	
	Sample Name	AOI02-04-0-2'		QPAASF-01-0-2'		QPAASF-DUP-SB-01		QPAASF-02-0-2'		QPAASF-03-0-2'	
	Parent Sample ID					QPAASF-01-0-2'					
	Depth (ft bgs)	0-2		0-2		0-2		0-2		0-2	
	Sample Date	7/29/2021		7/28/2021		7/28/2021		7/28/2021		7/29/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)											
Perfluorobutanesulfonic acid (PFBS)	1,900	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	0.38	J	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	ND	U	1.1	J+	1.2	J+	5.6		1.6	J+
Perfluorooctanoic acid (PFOA)	19	ND	U	ND	U	0.27	J	0.52	J	ND	U

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.

2. The Screening Levels for soil are based on a residential scenario for direct incidental ingestion of contaminated soil.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.

UJ = Analyte was not detected and was reported less than LOD. Associated numerical value is approximate.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil, Site Inspection Report, Quonset Point AASF

	Location ID	AOI01-01		AOI01-01		AOI01-02		AOI01-03		AOI01-04		AOI01-05		AOI02-01	
	Sample Name	AOI01-01-3-5'		QPAASF-DUP-SB-03		AOI01-02-2-3'		AOI01-03-2-2.5'		AOI01-04-3-4'		AOI01-05-2-2.5'		AOI02-01-3-5'	
	Parent Sample ID			AOI01-01-3-5'											
	Depth (ft bgs)	3-5		3-5		2-3		2-2.5		3-4		2-2.5		3-5	
	Sample Date	7/29/2021		7/29/2021		7/29/2021		7/29/2021		7/30/2021		7/30/2021		7/28/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	0.92		ND	U	ND	U	ND	U	0.21	J
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	5.8	J+	ND	U	ND	U	ND	U	3.5	
Perfluorooctanoic acid (PFOA)	250	0.23	J	0.26	J	0.45	J	0.24	J	ND	U	ND	U	0.22	J

Notes:

1. Assistant Secretary of efense. 2022. Risk ased Screening Le els in Groundwater and Soil using EPA s Regional Screening Le el Calculator. a ard uotient ( ) 0.1. uly 2022.
2. The Screening Le els for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
UJ = Analyte was not detected and was reported less than LOD. Associated numerical value is approximate.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil, Site Inspection Report, Quonset Point AASF

	Location ID	AOI02-02		AOI02-03		AOI02-04		QPAASF-01		QPAASF-02		QPAASF-03		QPAASF-04	
	Sample Name	AOI02-02-3-5'		AOI02-03-3-5'		AOI02-04-3-5'		QPAASF-01-3-5'		QPAASF-02-3-5'		QPAASF-03-3-5'		QPAASF-04-1.5-2.5'	
	Parent Sample ID														
	Depth (ft bgs)	3-5		3-5		3-5		3-5		3-5		3-5		1.5-2.5	
	Sample Date	7/28/2021		7/28/2021		7/29/2021		7/28/2021		7/28/2021		7/29/2021		7/29/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	UJ	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	0.27	J+	ND	U	0.26	J
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	UJ	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	0.64	J+	0.64	J+	1.2	J+	ND	UJ	1.2	J+	1.2	J+
Perfluorooctanoic acid (PFOA)	250	ND	U	ND	U	ND	U	0.3	J	0.95	J+	0.36	J	ND	U

Notes:

1. Assistant Secretary of efense. 2022. Risk ased Screening Le els in Groundwater and Soil using EPA s Regional Screening Le el Calculator. a ard uotient ( ) 0.1. uly 2022.
2. The Screening Le els for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
UJ = Analyte was not detected and was reported less than LOD. Associated numerical value is approximate.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil, Site Inspection Report, Quonset Point AASF

	Location ID	AOI01-02		AOI01-03		AOI01-05		AOI01-05		AOI02-01		AOI02-02	
	Sample Name	AOI01-02-4-5'		AOI01-03-3-5'		AOI01-05-4-5'		QPAASF_DUP-SB-04		AOI02-01-6-8'		AOI02-02-8-10'	
	Parent Sample ID							AOI01-05-4-5'					
	Depth (ft bgs)	4-5		3-5		4-5		4-5		6-8		8-10	
	Sample Date	7/29/2021		7/29/2021		7/30/2021		7/30/2021		7/28/2021		7/28/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)													
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	0.53	J	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	6.2	J+	1.3	J+	ND	U	ND	U	10		ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	0.24	J	ND	U	ND	U	0.45	J	ND	U

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.

2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil, Site Inspection Report, Quonset Point AASF

Location ID		AOI02-03		AOI02-04		QPAASF-01		QPAASF-02		QPAASF-04	
Sample Name		AOI02-03-7-9'		AOI02-04-7-9'		QPAASF-01-7.5-9'		QPAASF-02-7.5-9'		QPAASF-04-5-6'	
Parent Sample ID											
Depth (ft bgs)		7-9		7-9		7.5-9		7.5-9		5-6	
Sample Date		7/28/2021		7/29/2021		7/28/2021		7/28/2021		7/29/2021	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)											
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	ND	U	ND	U	ND	U	ND	U

Notes:

1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. July 2022.

2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater, Site Inspection Report, Quonset Point AASF

	Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-03		AOI01-04		AOI01-05		AOI02-01		AOI02-02	
	Sample Name	AOI01-01-GW		AOI01-02-GW		AOI01-03-GW		QPAASF-DUP-GW-02		AOI01-04-GW		AOI01-05-GW		AOI02-01-GW		AOI02-02-GW	
	Parent Sample ID							AOI01-03-GW									
	Sample Date	7/29/2021		7/29/2021		7/29/2021		7/29/2021		7/30/2021		7/30/2021		7/28/2021		7/29/2021	
Analyte	**Screening Level[1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)																	
Perfluorobutanesulfonic acid (PFBS)	601	4.4		1.4	J	34		31		1.8		10		18		1.6	J
Perfluorohexanesulfonic acid (PFHxS)	39	70		17		160		160		51		70		770		28	
Perfluorononanoic acid (PFNA)	6	ND	U	5		1.4	J	1.4	J	1.9		1.3	J	4.9		2.9	
Perfluorooctanesulfonic acid (PFOS)	4	7.4	J+	1300		160		170		220		91		4000		14	
Perfluorooctanoic acid (PFOA)	6	180		11		56		59		13		130		220		35	

Notes:
1.Assistant Secretary of efense. 2022. Risk ased Screening Le els in Groundwater and Soil using EPA s Regional Screening Le el Calculator. a ard uotient ( ) 0.1. uly 2022.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
ng/L = Nanogram(s) per liter.
ND = Not detected above the LOD.
Qual = Qualifier.

Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater, Site Inspection Report, Quonset Point AASF

	Location ID	AOI02-02		AOI02-03		AOI02-04		QPAASF-01		QPAASF-02		QPAASF-03		QPAASF-04	
	Sample Name	QPAASF-DUP-GW-01		AOI02-03-GW		AOI02-04-GW		QPAASF-01-GW		QPAASF-02-GW		QPAASF-03-GW		QPAASF-04-GW	
	Parent Sample ID	AOI02-02-GW													
	Sample Date	7/29/2021		7/29/2021		7/29/2021		7/28/2021		7/28/2021		7/29/2021		7/29/2021	
Analyte	**Screening Level[1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)															
Perfluorobutanesulfonic acid (PFBS)	601	1.9	J	8.5		11		4.1		5		18		29	
Perfluorohexanesulfonic acid (PFHxS)	39	30		76		300		53		120		120		160	
Perfluorononanoic acid (PFNA)	6	3.4		1.4	J	5.8		ND	U	ND	U	3.3		ND	U
Perfluorooctanesulfonic acid (PFOS)	4	15		330		330		35		16		98		43	
Perfluorooctanoic acid (PFOA)	6	38		26		88		35		15		48		15	

Notes:
1.Assistant Secretary of efense. 2022. Risk ased Screening Le els in Groundwater and Soil using EPA s Regional Screening Le el Calculator. a ard uotient ( ) 0.1. uly 2022.

Values exceeding the Screening Level are shaded gray.
J = Estimated concentration.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit.
ng/L = Nanogram(s) per liter.
ND = Not detected above the LOD.
Qual = Qualifier.

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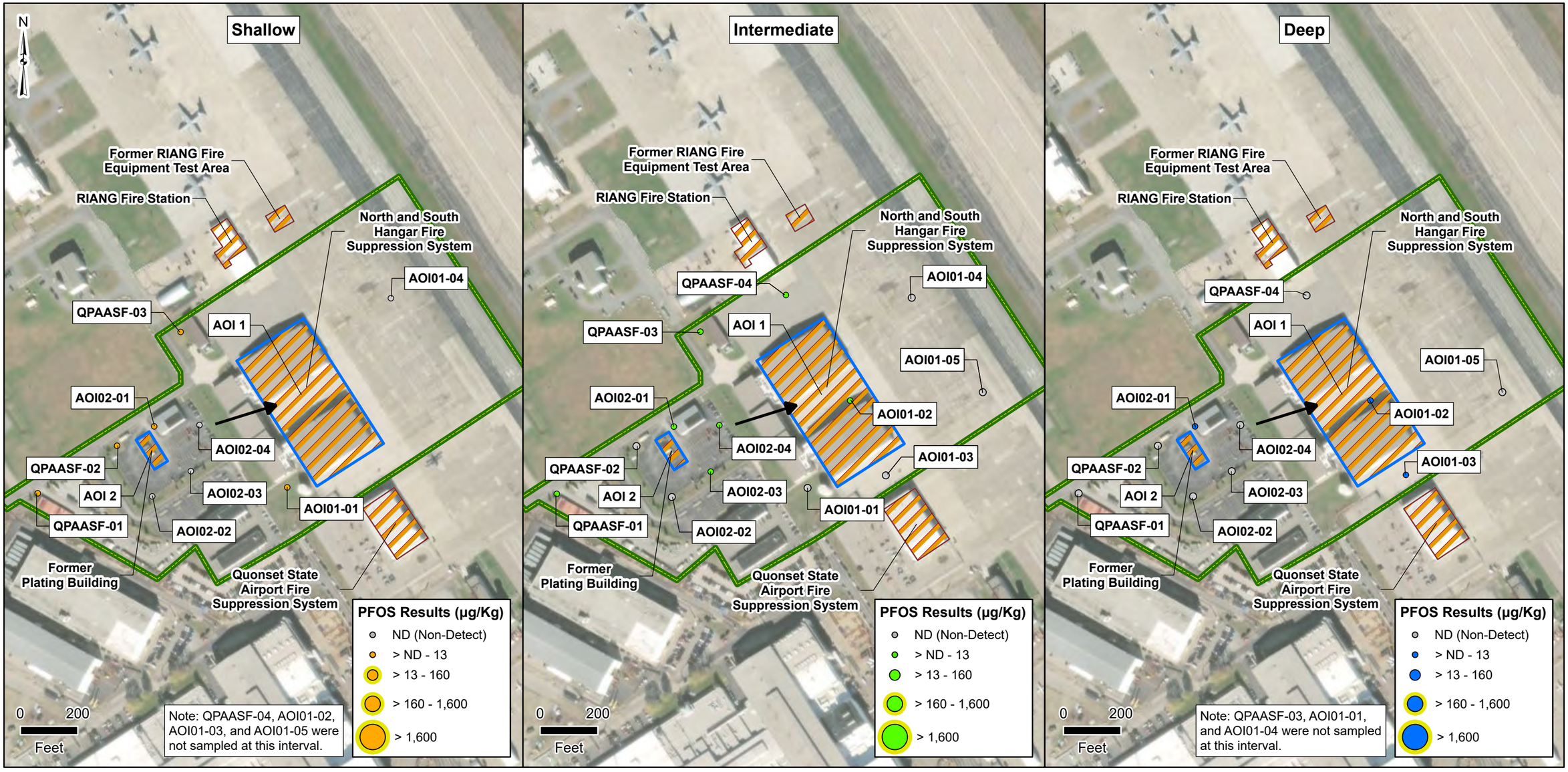
Figure 6-1
PFOS Results in Soil



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOS = Perfluorooctanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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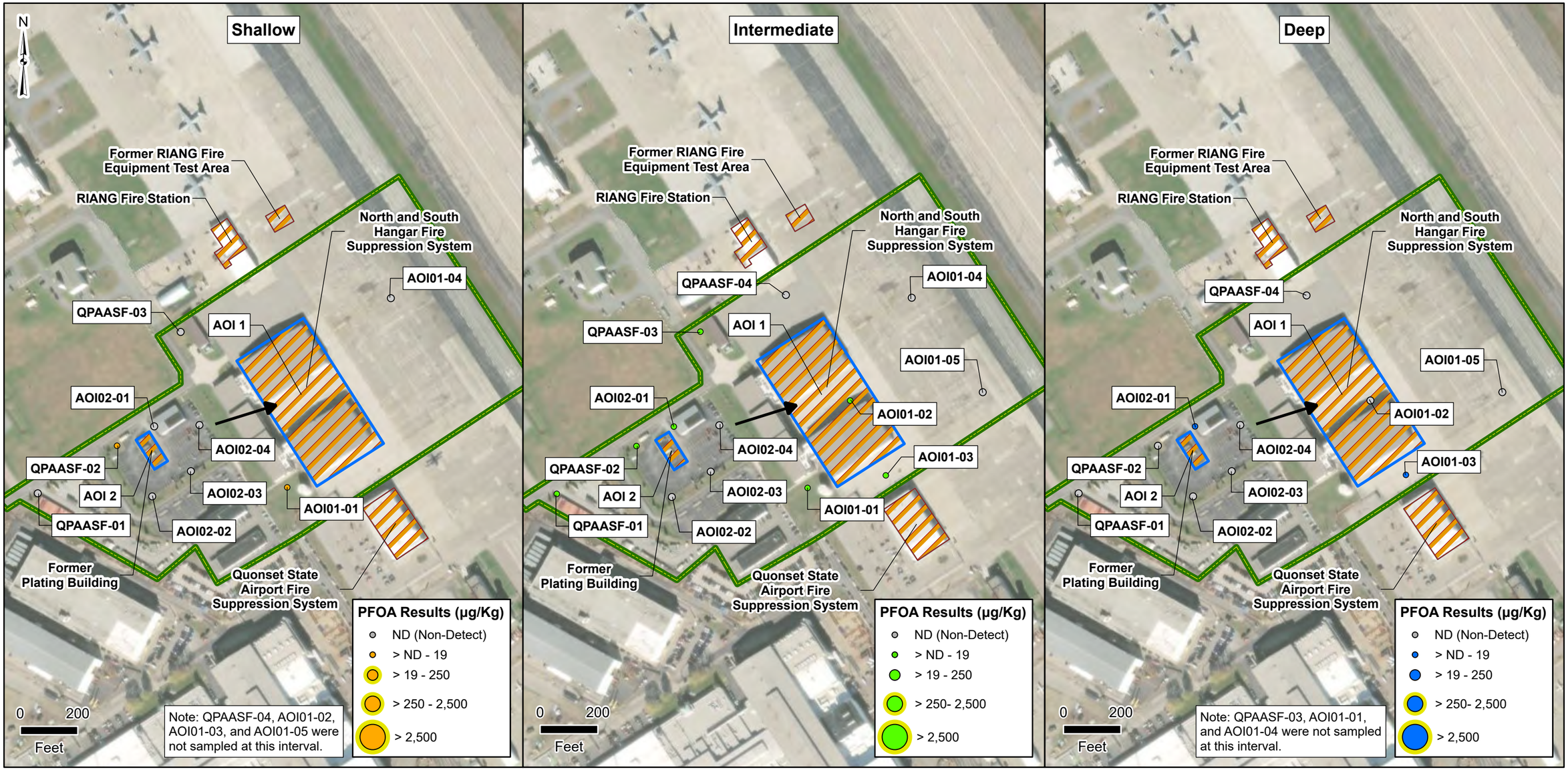
Site Inspection Report
Quonset Point, Rhode Island

Figure 6-2
PFOA Results in Soil



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOA = Perfluorooctanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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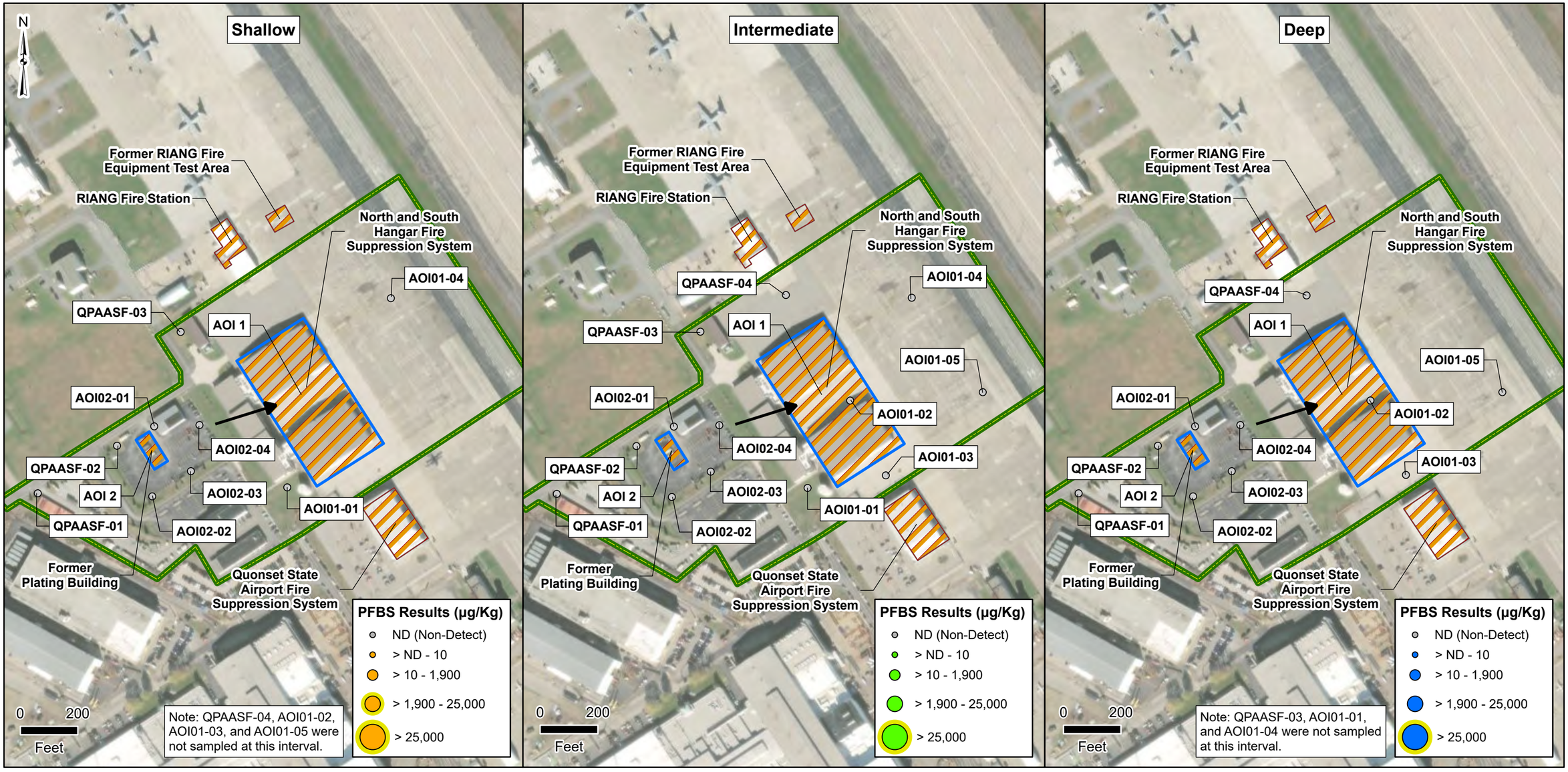
Figure 6-3
PFBS Results in Soil



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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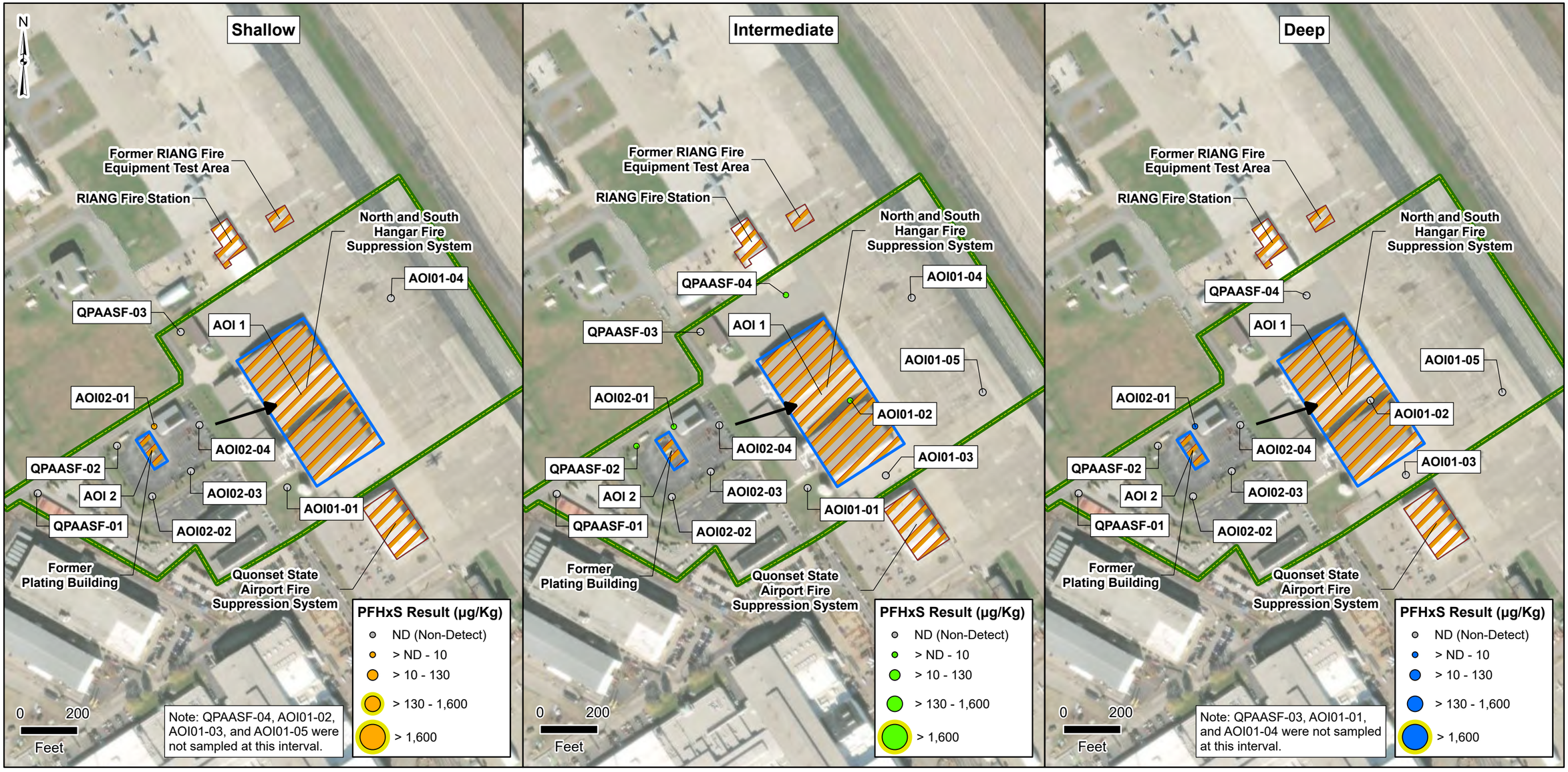
Figure 6-4
PFHxS Results in Soil



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFHxS = Perfluorohexanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetong\s\GIS\data\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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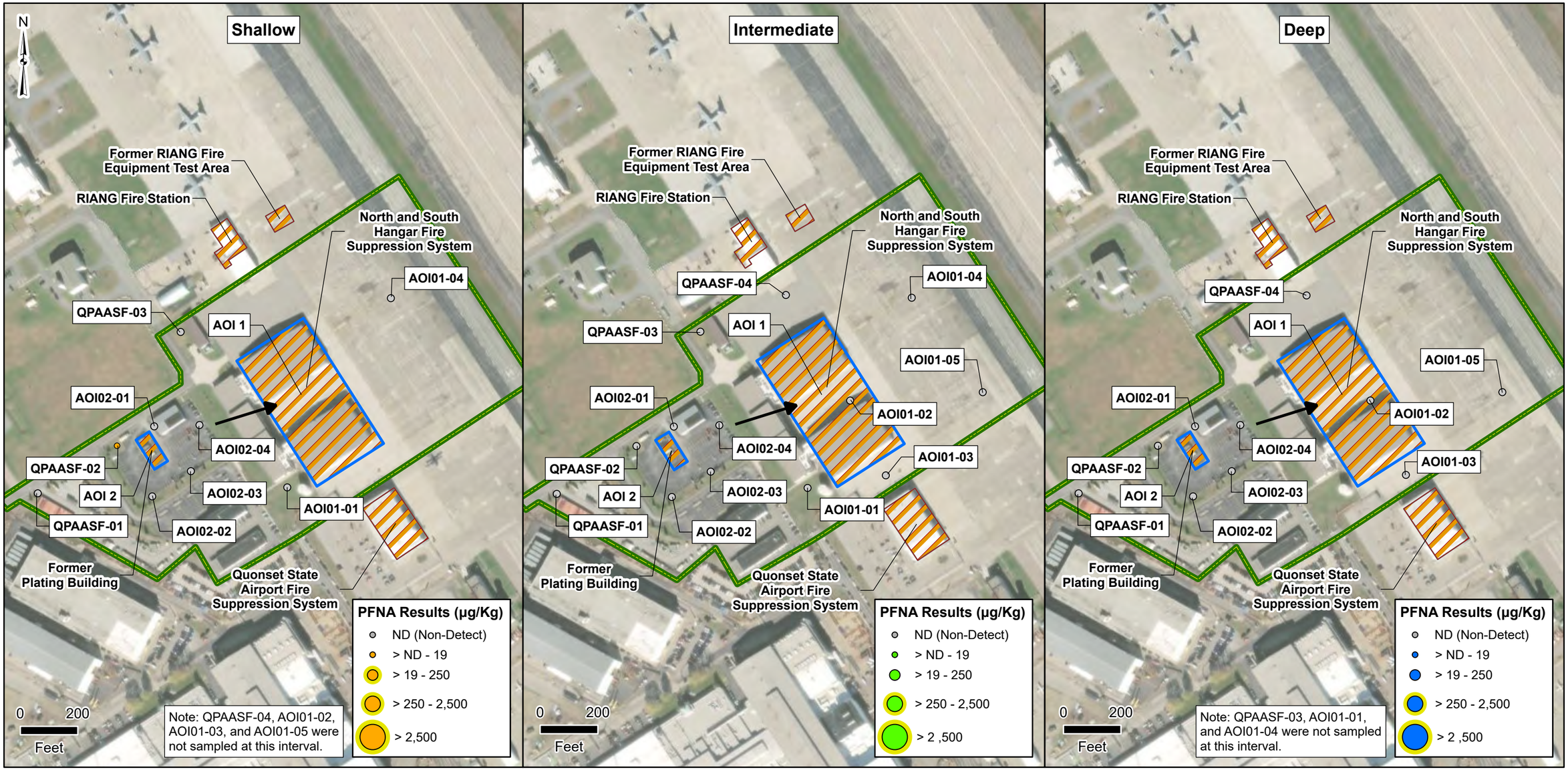
Figure 6-5
PFNA Results in Soil



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo. Depth intervals shown represent respective sampling position within a given soil boring location.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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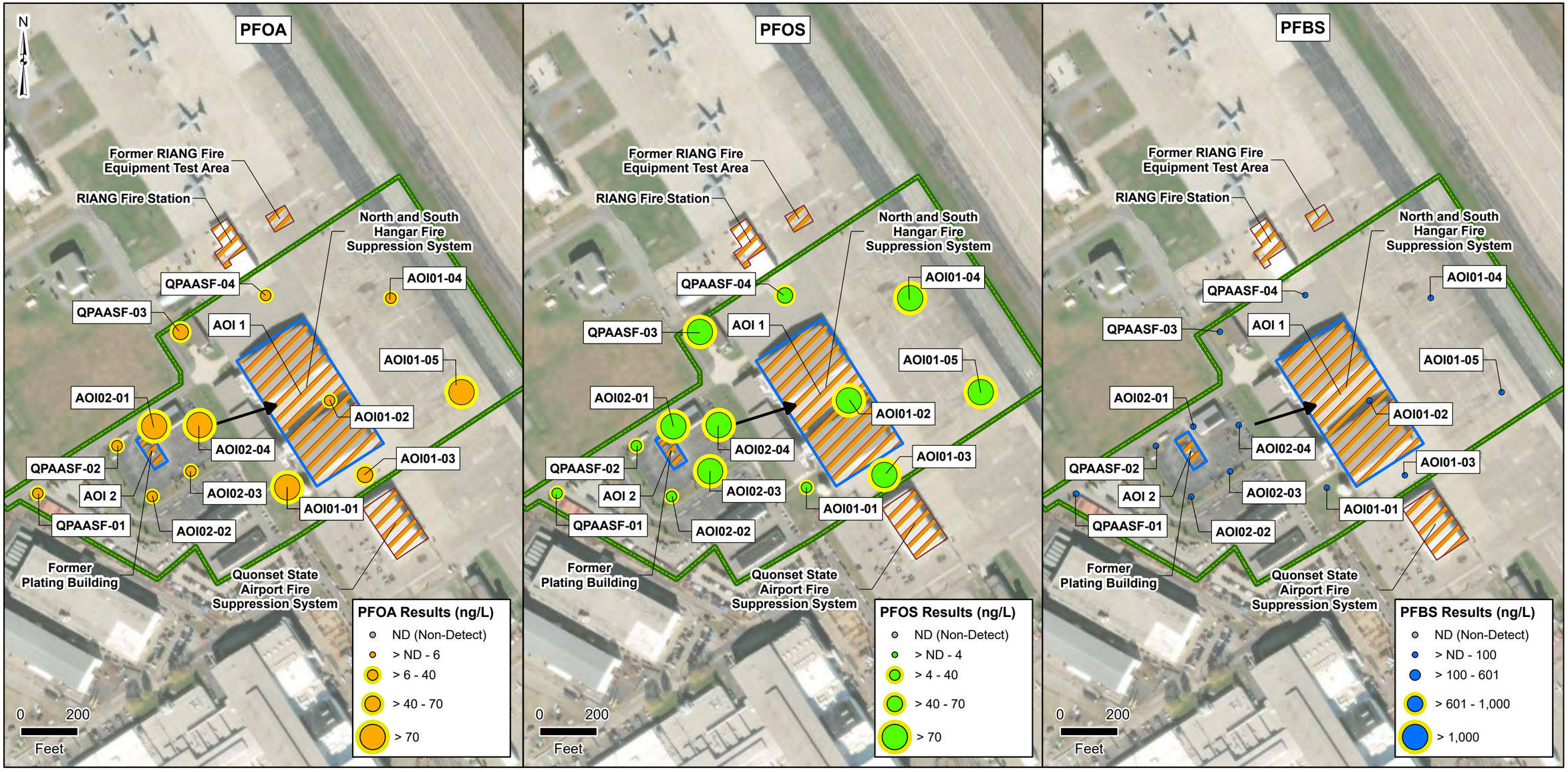
Quonset Point, Rhode Island

Figure 6-6
PFOA, PFOS and PFBS Results in Groundwater



Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFOA = Perfluorooctanesulfonic acid
PFOS = Perfluorooctanoic acid
PFBS = Perfluorobutanesulfonic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAE5_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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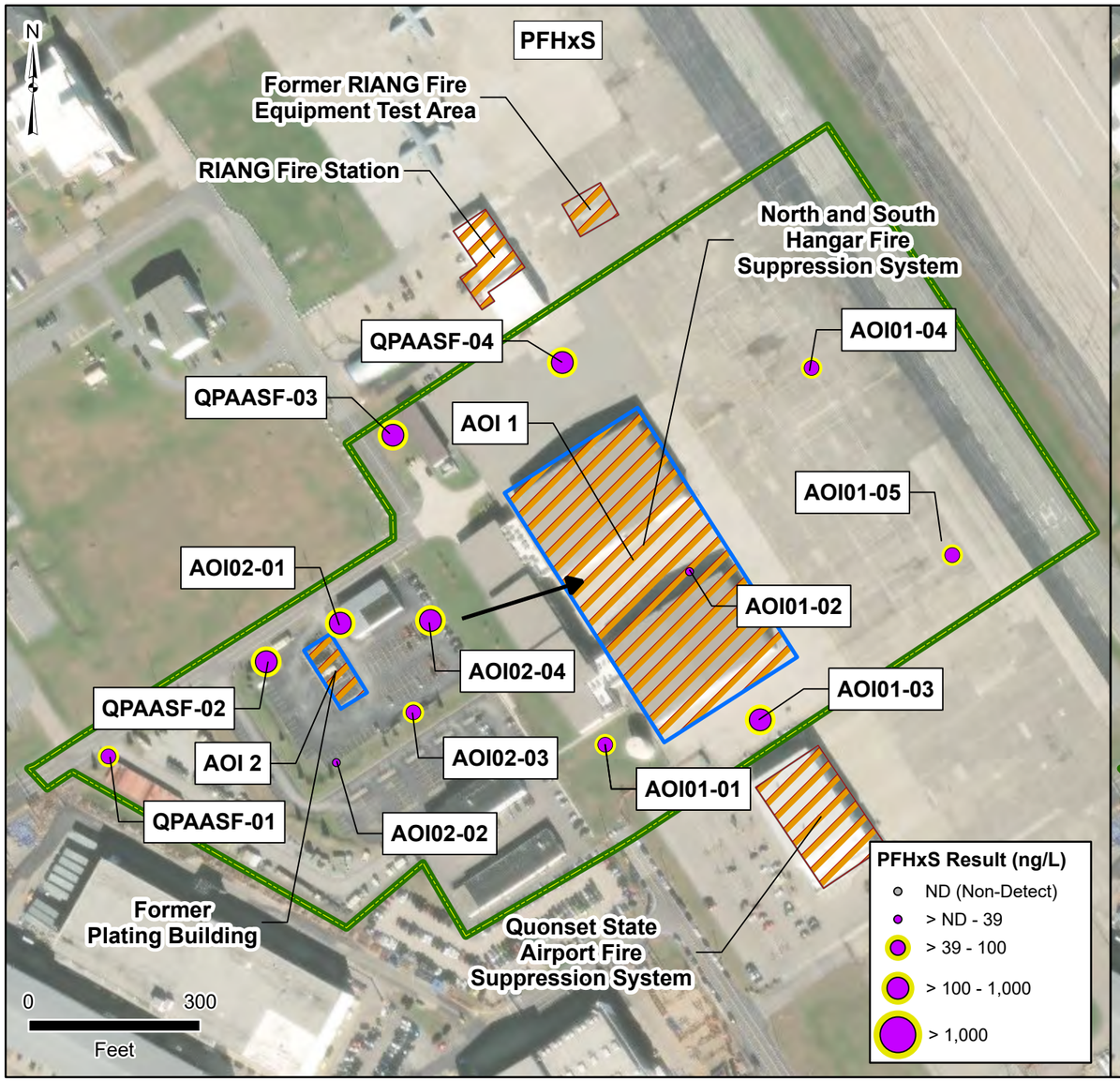
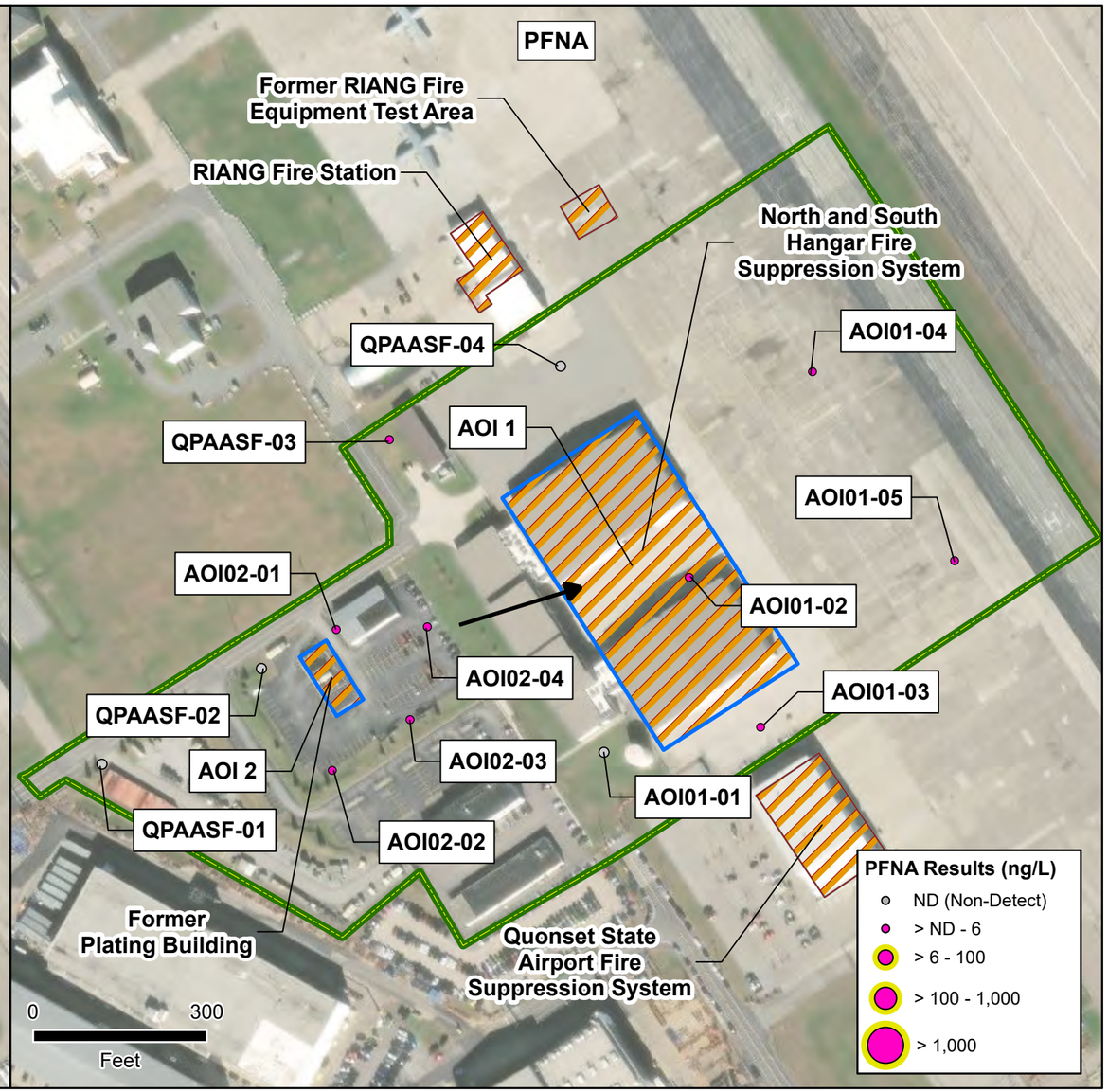
Figure 6-7
PFHxS and PFNA Detections in Groundwater





Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release

Hydrogeology
- Groundwater Flow Direction

Notes:
PFHxS = Perfluorohexanesulfonic acid
PFNA = Perfluorononanoic acid
Exceedances of the OSD SL are depicted with a yellow halo.

Data Sources:
ESRI 2020
AECOM 2020

Date:.....December 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 19N

Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Quonset\Quonset.aprx

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7. EXPOSURE PATHWAYS

The Conceptual Site Models (CSMs) for the AOIs, revised based on the SI findings, is presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the Facility 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
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds 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 relevant compounds above the SLs. Areas with an identified potentially complete pathway that have detections of the relevant compounds above the SLs may warrant further investigation. Although the CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in an RI or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

In general, the potential PFAS exposure pathways 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 Facility workers (e.g., AASF staff and visiting soldiers), construction workers, off-Facility recreational users, and trespassers (though unlikely due to restricted Facility access). The CSM for AOIs 1 and 2, revised based on the SI findings, are presented on **Figures 7-1 and 7-2**.

7.1 SOIL EXPOSURE PATHWAY

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

7.1.1 AOI 1 – North and South Hangar Fire Suppression System

AOI 1 encompasses the current AASF hangar complex which is equipped with an AFFF fire suppression system. The existing fire suppression system is housed in a maintenance room

within the South Hangar and contains a 700-gallon tank of Chemguard 3% AFFF C-301MS. This fire suppression system services both the North and South Hangars (AECOM 2020).

According to RIARNG personnel and contractors who were working at the Facility at that time, the fire suppression system was initially tested in the North Hangar after construction completion in 2009–2010 using dish soap, though there is no documentation of the type of foam/soap used. The test liquid was released directly on the concrete in the courtyard (area between the two hangars) and reportedly flowed into the storm drain (AECOM 2020). Since this time, testing of the fire suppression system has occurred on a semi-annual basis with testing material reportedly being contained and disposed of properly off- Facility.

AOI 1 is primarily paved with asphalt and/or thick concrete except for small, landscaped areas surrounding the AASF building (west of the hangars). Surface soil samples were not able to be obtained in areas where pavement was thicker than 1.5–2 ft.

Although PFOA and PFOS were detected in surface soil, detections were below associated SLs. Additionally, more than 90% of the facility is covered by buildings, concrete or asphalt including AOI 1. The areas that are not covered by buildings, concrete or asphalt are covered by grass making it less likely that direct exposure to soil will occur. Consequently, facility workers and construction workers are not likely to contact constituents in surface soil via incidental ingestion and inhalation of dust and the surface soil exposure pathway for Facility workers and construction workers is incomplete. Additionally, PFOA, PFOS, and PFHxS were detected in subsurface soil at concentrations below the SLs. Ground-disturbing activities to subsurface soil could result in construction worker exposure to detected constituents via incidental ingestion. Therefore, the exposure pathway for subsurface soil is potentially complete for the construction worker. The CSM for these AOIs is presented in **Figure 7-1**.

7.1.2 AOI 2 – Former Plating Facility

AOI 2 encompasses the former plating facility area where the remaining concrete pad is currently used by the RIARNG for Heavy Expanded Mobility Tactical Trucks parking. Chemical and waste disposal practices at this historical facility are unknown and a release may have occurred.

Although PFOS and PFHxS were detected in surface soil, detections were below associated SLs. Additionally, more than 90% of the facility is covered by buildings, concrete or asphalt including AOI 2. The areas that are not covered by buildings, concrete or asphalt are covered by grass making it less likely that direct exposure to soil will occur. Consequently, facility workers and construction workers are not likely to contact constituents in surface soil via incidental ingestion and inhalation of dust and the surface soil exposure pathway for Facility workers and construction workers is incomplete. Additionally, PFOA, PFOS, and PFHxS were detected in subsurface soil at concentrations below the SLs. Ground-disturbing activities to subsurface soil could result in construction worker exposure to detected constituents via incidental ingestion. Therefore, the exposure pathway for subsurface soil is potentially complete for the construction worker. The CSM for these AOIs is presented in **Figure 7-2**.

7.2 GROUNDWATER EXPOSURE PATHWAY

The SI results for groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors based on the aforementioned criteria.

7.2.1 AOI 1 – North and South Hangar Fire Suppression System

All of the five relevant compounds were detected in groundwater from the five temporary wells in AOI 1. In addition, PFOA, PFHxS, and PFOS exceeded their SLs at one or more locations. No domestic, private wells are located downgradient of the Facility and groundwater is not used on-Facility for any purposes. However, due to the presence of groundwater at shallow occurrences (less than 5 ft bgs in several locations), the exposure pathway for ingestion of groundwater is potentially complete for construction workers working in subsurface conditions. The exposure pathway for Facility workers, off-Facility residents, and trespassers via the ingestion of groundwater is considered to be incomplete due to the absence of an exposure point or route to those receptors. The CSM is presented in **Figure 7-1**.

7.2.2 AOI 2 – Former Plating Facility

All of the five relevant compounds were detected in groundwater from the four temporary wells in AOI 2. In addition, PFOA, PFHxS, and PFOS exceeded their SLs at one or more locations. No domestic, private wells are located downgradient of the Facility and groundwater is not used on-Facility for any purposes. However, due to the presence of groundwater at shallow occurrences (less than 5 ft bgs in several locations), the exposure pathway for ingestion of groundwater is potentially complete for construction workers working in subsurface conditions. The exposure pathway for Facility workers, off-Facility residents, and trespassers via the ingestion of groundwater is considered to be incomplete due to the absence of an exposure point or route to those receptors. The CSM is presented in **Figure 7-2**.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

PFAS are water soluble and can migrate readily from soil to surface water or groundwater. There are no natural surface water features within the Quonset Point AASF; however, surface flow on-Facility is conveyed to stormwater drains which eventually flow off-Facility to Frys Pond and Narragansett Bay. The ingestion exposure pathway for surface water and sediment is considered potentially complete for users of the Narragansett Bay and Frys Pond based on the groundwater concentrations found at the Facility, and the potential for shallow groundwater to discharge to the nearby surface water bodies. Users of these areas were reasonably estimated to consist of construction workers and recreational users. Off-Facility surface water and sediment were not sampled as part of this SI, as the scope of sampling was limited to the presence or absence of the relevant compounds in soil and groundwater within the Facility boundary.

7.3.1 AOI 1 – North and South Hangar Fire Suppression System

The CSM is presented in **Figure 7-1**.

7.3.2 AOI 2 – Former Plating Facility

The CSM is presented in **Figure 7-2**.

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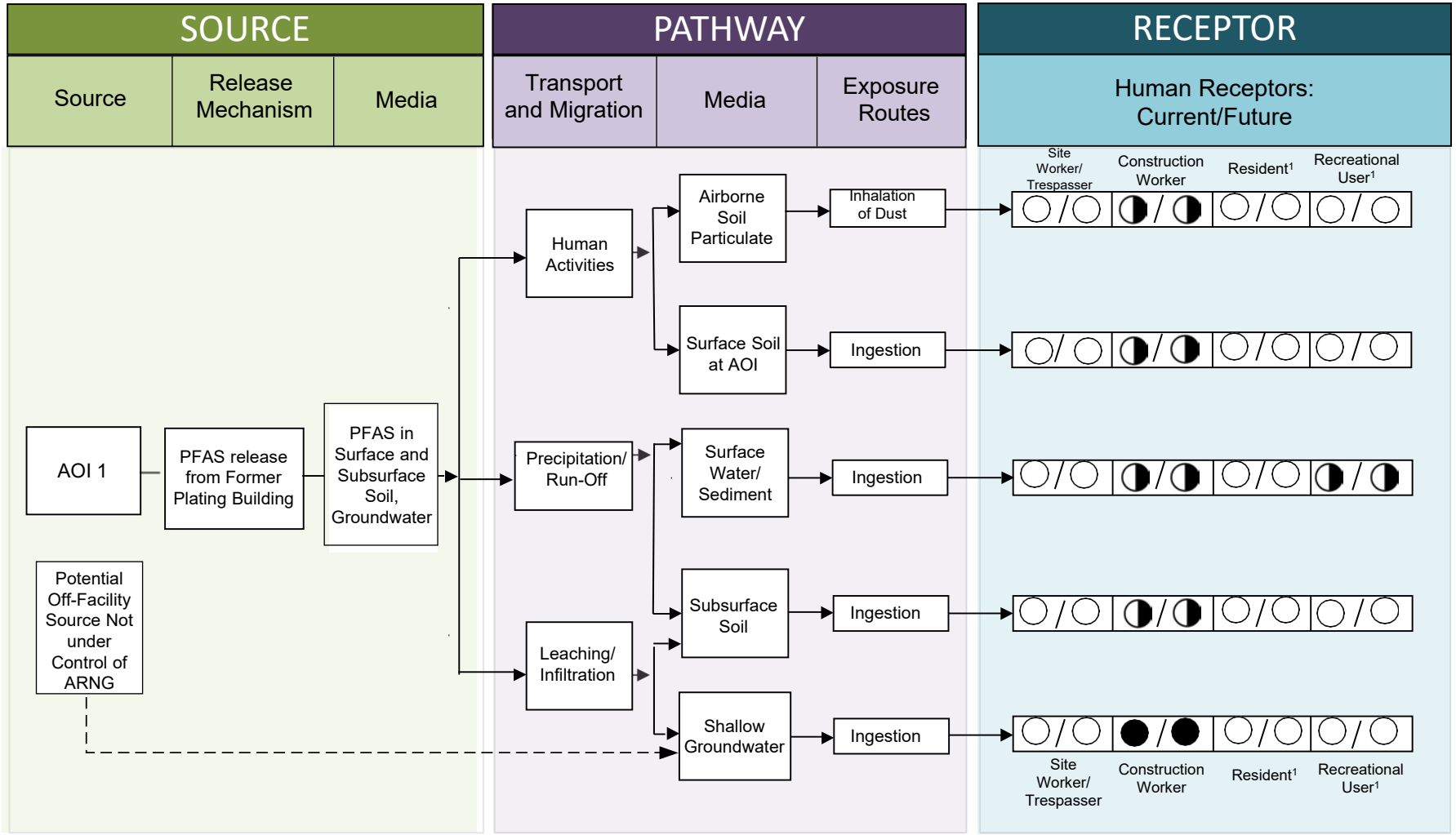

LEGEND

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

Notes:

1. The resident and recreational users refer to off-site receptors.

Figure 7-1
Conceptual Site Model
AOI 1 Quonset Point AASF

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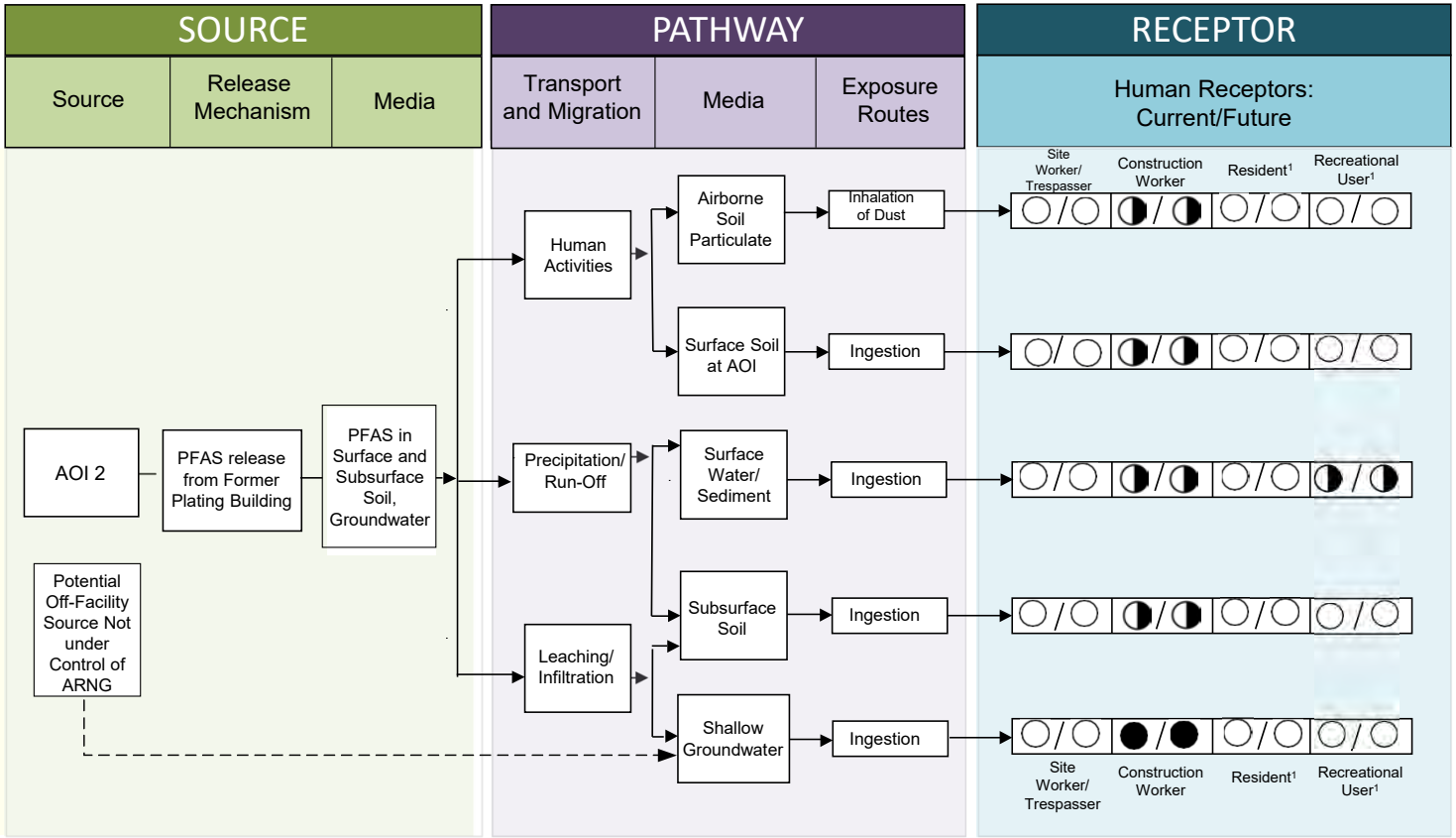

LEGEND

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

Notes:

1. The resident and recreational users refer to off-site receptors.

Figure 7-2
Conceptual Site Model
AOI 2 Quonset Point AASF

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 SITE INSPECTION ACTIVITIES SUMMARY

The SI field activities at the Facility were conducted from 27 through 30 July 2021. The SI field activities included soil and groundwater sampling. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2021a), samples were collected and analyzed for a subset of 24 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows:

- Thirty-three (33) surface and subsurface soil samples from thirteen (13) boring locations
- Thirteen (13) grab groundwater samples from thirteen (13) temporary well locations.
- Thirteen (13) QA/QC samples.

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. Additionally, the CSMs were refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOIs, described in **Section 7**.

8.2 OUTCOME

Based on the results of this SI, further evaluation in the form of a RI is warranted for AOIs 1 and 2. Based on the CSMs developed and revised based on the SI findings, there is potential for exposure to site/construction workers during surface and subsurface soil-disturbing activities Subsurface soil disturbance could also result in infiltration of and contact with shallow groundwater. Additionally, groundwater eventually discharges to Fry's Pond and Narragansett Bay which could result in surface water and/or sediment exposures to off-Facility recreational users and/or construction workers. Sample analytical concentrations collected during this SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to SLs is as follows:

- AOI 1:

- All of the five relevant compounds were detected in groundwater from the five temporary wells in AOI 1. PFOA and PFOS exceeded their SLs (6 ng/L and 4 ng/L) at all five of the temporary well locations with maximum concentrations of 180 ng/L and 1,300 ng/L respectively. It should be noted that the highest concentration of PFOS was detected at AOI01-02, which is located between the hangers, where suspected AFFF foam discharge occurred directly onto the ground surface, indicating a potential release. Concentrations of PFHxS exceeded the SL (39 ng/L) at four temporary well locations with a maximum concentration of 160 ng/L. PFNA and PFBS did not exceed their respective SLs in groundwater at AOI 1. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.

- The detected concentrations of PFOA, PFOS, and PFHxS in soil at AOI 1 were below their respective SLs. PFNA and PFBS were not detected in soil at AOI 1.

- AOI 2:

  - All of the five relevant compounds were detected in groundwater from the four temporary wells in AOI 2. PFOA and PFOS exceeded their SLs (6 ng/L and 4 ng/L) at all four of the temporary well locations with maximum concentrations of 220 ng/L and 4,000 ng/L respectively. Concentrations of PFHxS exceeded the SL (39 ng/L) at three temporary well locations with a maximum concentration of 770 ng/L. PFNA and PFBS did not exceed their respective SLs in groundwater at AOI 2. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.

  - The detected concentrations of PFOA, PFOS, and PFHxS in soil at AOI 2 were below their respective SLs. PFNA and PFBS were not detected in soil at AOI 2.

- The boundary:

  - All of the five relevant compounds were detected in groundwater from the four temporary wells along the northwestern/upgradient Facility boundary. PFOA, PFOS, and PFHxS exceeded their SLs (6 ng/L, 4 ng/L, and 39 ng/L) at all four of the temporary well locations with maximum concentrations of 48 ng/L, 98 ng/L, and 160 ng/L, respectively. PFNA and PFBS did not exceed their respective SLs in groundwater at the Facility boundary. The groundwater SL exceedances along the boundary suggest off-Facility source(s) of PFAS may also be contributing to detected relevant compound concentrations in shallow groundwater at the Facility, but is unlikely to be the primary source based on lower magnitude of concentrations on the boundary than within the Facility.

  - The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at the Facility boundary were below their respective SLs. PFBS was not detected in soil at the boundary sample locations.

Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on

the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

Table 8-1 summarizes the SI results for soil and groundwater use to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI.

Table 8-1. Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil AOI	Groundwater AOI	Groundwater Facility Boundary	Future Action
1	North and South Hangar Fire Suppression System	◐	●	●	Proceed to RI
2	Former Plating Facility	◐	●	●	Proceed to RI

Legend:
● = Detected; exceedance of screening levels
◐ = Detected; no exceedance of screening levels
○ = Not detected

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