FINAL
Site Inspection Report Brooksville Readiness Center, Spring Hill, Florida

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

September 2023

Prepared for:

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

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Table of Contents

Appendices

Figures

Tables

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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DO	dissolved oxygen
DoD	Department of Defense
DOT	Department of Transportation
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
FLARNG	Florida Army National Guard
FTA	Fire Training Area
GPRS	Ground Penetrating Radar Services
GPS	global positioning system
HDPE	high-density polyethylene
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms 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
PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RC	Readiness Center
RI	Remedial Investigation
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Executive Summary

The Army National Guard (ARNG) G-9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) 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) dated 6 July 2022 (Assistant Secretary of Defense, 2022). The six compounds listed in the OSD memorandum include perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS). These compounds are collectively referred to as "relevant compounds" throughout the document.

The PA identified 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 relevant compounds. This SI was completed at the Brooksville Readiness Center (RC)/Army Aviation Support Facility (AASF) #2 (Brooksville RC) in Spring Hill, Florida and determined further investigation is warranted for AOI 1: Wash Rack and AOI 2: AFFF Spill Area. The Brooksville RC will also be referred to as the "facility" throughout this document.

The Brooksville RC is located in Spring Hill, Florida in Hernando County and borders the Tampa Bay Regional Airport to the south. The facility primarily operates as an aviation maintenance center for helicopters. The facility includes two hangars, a wash rack, equipment storage areas, and cantonment areas with dining facilities.

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs calculated by the OSD for soil and groundwater (Assistant Secretary of Defense, 2022). The ARNG program under which this SI was performed follows this DoD policy. The SLs are presented on **Table ES-1** below.

The PA identified two AOIs for investigation during the SI phase. SI sampling results from the two AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation for AOI 1: Wash Rack and AOI 2: AFFF Spill Area.

[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, 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.

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

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

Notes:
bgs = below ground surface; µg/kg = micrograms per kilogram; ng/L = nanograms per liter

a.) 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.

b.) Screening values for HFPO-DA were established after SI planning and execution and thus not included as an analyte. Future CERCLA phases will include HFPO-DA if warranted.

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Wash Rack			N/A	Proceed to RI
2	AFFF Spill Area			N/A	Proceed to RI

Legend:
N/A = not applicable

 = detected; exceedance of the screening levels

 = detected; no exceedance of the screening levels

 = not detected

1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) 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) 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 perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS) at ARNG facilities nationwide. The ARNG performed this SI at the Brooksville Readiness Center (RC)/ Army Aviation Support Facility (AASF) #2 (also referred to as Brooksville RC and the "facility" throughout this document) in Spring Hill, Florida.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; United States [US] Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations.

1.2 SI Purpose

A PA was performed at Brooksville RC (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.

[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, 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.

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2. Facility Background

2.1 Facility Location and Description

Brooksville RC is located at 16386 Spring Hill Drive, Spring Hill, Florida, in Hernando County, western central Florida, and borders the Brooksville – Tampa Bay Regional Airport to the south. (**Figure 2-1**).

Brooksville RC is a Florida ARNG (FLARNG) aviation maintenance facility for helicopters. Impervious surfaces consist of roadways, parking lots, helipads, and taxi lanes. Physical structures include two hangars, a wash rack, equipment storage areas, and cantonment areas with dining facilities. Based on interviewee knowledge dating back to 2001, the hangar facility was constructed March 2001. Aerial photos from the Environmental Data Resources, Inc.™ Report show only an armory within the property boundaries from 1995 to 1998. Prior to 1995, the property was undeveloped.

2.2 Facility Environmental Setting

Brooksville RC is located in Hernando County. Hernando County can be divided into four general parts based on physiography: the coastal swamps, the Gulf Coastal Lowlands, Brooksville Ridge, and Tsala Apopka Plain. Brooksville RC is within the Gulf Coastal Lowlands, southwest of the Brooksville Ridge and situated between the Weeki Wachi and Withlacoochee Rivers. This area is not continuous throughout the length of the county and ranges from less than 1 mile to about 2 miles in width. The topography of the facility is generally level, with isolated depressions in the southern portion and at the western boundary of the facility (**Figure 2-2**). Elevations range between approximate 10 to 50 feet above mean sea level. The area consists mostly of pine and palmetto flatwoods with numerous small ponds in smaller areas of broad, grassy sloughs. The soils are predominantly nearly level, wet, and sandy. The sandy subsoil is weakly cemented with organic matter (Hyde, 1975).

2.2.1 Geology

Pasco and Hernando Counties are underlain by several thousand feet of sedimentary rocks, primarily limestones. The geological formations ages include Eocene, Oligocene, Miocene, and Pleistocene Series.

The Eocene age formations include Lake City Limestone, Avon Park Limestone, Inglis Formation, Williston Formation, and the Crystal River Formation. The Lake City and Avon Park Limestone lithology consists of soft to hard, fossiliferous, brown limestone with dark brown beds of dolomitic limestone at irregular intervals. Thickness of the Avon Park Limestone in the area ranges from about 50 to 500 feet. The dolomitic zone occurs about 100 feet below the top of the formation and is highly permeable yielding large quantities of water to surrounding wells. The Inglis Formation lithology consists of brown to gray, fossiliferous, hard dolomitic limestone, overlies the Avon Park Limestone, and has a thickness of 40 to 60 feet. The formation is highly permeable over the area and yields large quantities of water to wells. Wells that produce more than 1,000 gallons per minute generally penetrate the Inglis Formation. The Inglis Formation is overlain by the Williston Formation, which is overlain by the Crystal River Formation. The Crystal River and Williston Formations exhibit similar lithologic and hydrologic formations. The formations are generally white to tan, soft, chalky, coquinoid limestones. The formations have a thickness of 100 to 150 feet and are not an important source of water in the area.

The Oligocene Series Formation include the Suwannee Limestone, which overlies the Crystal River Formation. Lithology in this formation is generally white to yellow, fine-grained, fossiliferous

limestone. Lower parts of the formation are harder, denser, and less fossiliferous than the upper part. The Suwannee Limestone is a very permeable, productive aquifer. Most domestic and many irrigation wells produce from the lower part of the Suwannee Limestone.

The Miocene Series Formation include the Hawthorn Group and Tampa Limestone, which overlies the Suwannee Limestone. The Hawthorn Group is displayed at the facility (**Figure 2-3**). Lithology in this formation is a white to gray, sandy, fossiliferous limestone. Thickness of the formation in the area is erratic due to irregular erosional surfaces. The Tampa Limestone is not a major source of water in Pasco and Hernando counties. (Wetterhall, 1964). The Hawthorn Group is thin and discontinuous in the south, and generally absent toward the north, except for a few erosional remnants associated with the ridges. The limestone units beneath the clastic deposits of the Cypress head Formation and the Hawthorn Group in this region can include the Suwannee Limestone of Oligocene age and Ocala Limestone and Avon Park Formation of Eocene age (Trommer, 2009).

The Pleistocene Series formation include undifferentiated deposits of sand and clay that overlie the Tampa Limestone. These sediments consist of interbedded sands and clays that reach a maximum thickness of 250 feet. A few domestic wells produce water from the sand. The water generally contains iron and are likely to be highly colored (Wetterhall, 1964).

During the SI, six soil borings were completed to depths between 34 and 45 feet below ground surface (bgs). The lithology encountered was primarily silty sand and clayey sands that transitioned to limestone at depths between 23 and 40 feet bgs. A sample for grain size analysis was collected from location AOI02-02 and analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil sample was comprised primarily sand (fine 55.95 percent [%], medium 2.45%), clay (24.04%), and silt (17.55%). These results and facility observations are consistent with the understood depositional environment. Boring logs are presented in **Appendix E**, and grain size results are presented in **Appendix F**.

2.2.2 Hydrogeology

The principal hydrogeologic units within the watershed from shallow to deep are the surficial aquifer, the intermediate confining unit, the Upper Floridan aquifer, middle confining unit, and the Lower Floridan aquifer. The discussion below focuses on the uppermost aquifer, as it is the most likely to be affected by releases.

The surficial aquifer consists of unconsolidated clastic sediments of sand, clayey sand, and organic debris. This unit is referred to as the surficial aquifer system where more than one permeable unit is present or where these units are interbedded. The thickness of the aquifer is variable generally, surficial deposits are thinnest near the river and thickest toward the ridges. Where low permeability clays of the Hawthorn Group separate the limestone and sand, a water table may develop within the sands. Along the Withlacoochee River, the surficial aquifer is generally thin to nonexistent, and the Upper Floridan aquifer is exposed along much of the river channel. The surficial aquifer is not a substantial source of water supply in the Withlacoochee River watershed. However, where present, the surficial aquifer does provide a source of water that flows to streams and recharges the Upper Floridan aquifer either by downward vertical leakage through the confining unit (Miocene siliclastic sediments of interbedded sand, clay, limestone, sandy phosphatic limestone, and marl), or directly through breaches in the confining unit (Trommer, 2009).

Recharge to the surficial aquifer is through infiltration of streamflow, precipitation, and leakage from Withlacoochee River. . Four public water supply wells exist within a 1-mile radius of the facility, two downgradient (one to the northwest and one to the southeast of the facility) and two side-gradient (one to the north and one to the northeast), based on groundwater flow indicated during the SI (**Figure 2-3**). Several other public supply and private wells exist approximately 2.5

miles downgradient of the facility; however, these wells are installed approximately 100 feet bgs into the Floridan Aquifer. Drinking water for the facility is provided by Hernando County Utilities.

Depths to water measured in January 2022 during the SI ranged from 31.20 to 34.85 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-4** and suggest a groundwater flow divide at the facility, with groundwater in the northwestern portion of the facility flowing to the northwest and groundwater in the southeastern half of the facility flowing to the southeast.

2.2.3 Hydrology

Stormwater runoff from the facility is collected into a storm sewer system and flows to a stormwater retention pond located at the northern facility boundary. Brooksville RC sits within the Crews Lake Watershed, with Weeki Wachi Drain Watershed to the northwest and the Hancock Lake Watershed to the southeast (**Figure 2-5**). The Crews Lake Outlet (Pithlachascotee River) Watershed is located in western Florida, in southern Hernando and Pasco counties. The combined watershed covers an area of approximately 171 square miles. The Weeki Wachi Prairie Watershed is approximately 11.2 square miles and is located in southwest Hernando County. A majority of the watershed lies within the unincorporated area of Hernando County. A small portion of the watershed projects south into Pasco County. The watershed is predominantly developed, consisting of mostly residential and some commercial and vacant lands. The area at the south end of the watershed, near Quality Drive, is rapidly developing with predominantly commercial land uses (Federal Emergency Management Agency, 2012). Few unnamed ponds and wetlands exist to the northeast, east, and south of the facility; however, no major surface water bodies located nearby the facility.

2.2.4 Climate

Brooksville Florida has highest average temperatures in July and August, at 91 degrees Fahrenheit (°F) and 90°F, respectively. The greatest mean monthly precipitation occurs in August. The average annual precipitation is 52.52 inches (US Climate Data, 2022).

The climate of west-central Florida is characterized as humid southern temperate to subtropical, with frost and freezing temperatures occurring at least once a year. Local weather patterns are strongly influenced by the Gulf of Mexico, which moderates winter and summer temperatures. Based on data available from long-term rainfall gaging stations in Pasco and Hernando counties, rainfall was typically highest during the months of June through September, likely associated with convective and tropical storms that occur during the wet season months. Evapotranspiration for the area has been reported at approximately 39 inches per year, and annual evaporation rates of 47 to 59 inches are reported for shallow, central Florida lakes (Southwest Florida Water Management District, 2016).

2.2.5 Current and Future Land Use

Brooksville RC serves as an FLARNG aviation maintenance facility for helicopters; FLARNG has operated the readiness center since 2001. Lease documents were requested but not available. The facility includes maintenance hangars, various storage buildings, and related infrastructure including parking lots, aircraft parking areas, wash rack. The facility is categorized as a conditionally exempt small-quantity hazardous waste generator, because it manages a variety of hazardous materials. Reasonably anticipated future land use it not expected to change from the current land use described above. Land use near the facility consists of rural, residential, recreational, and commercial.

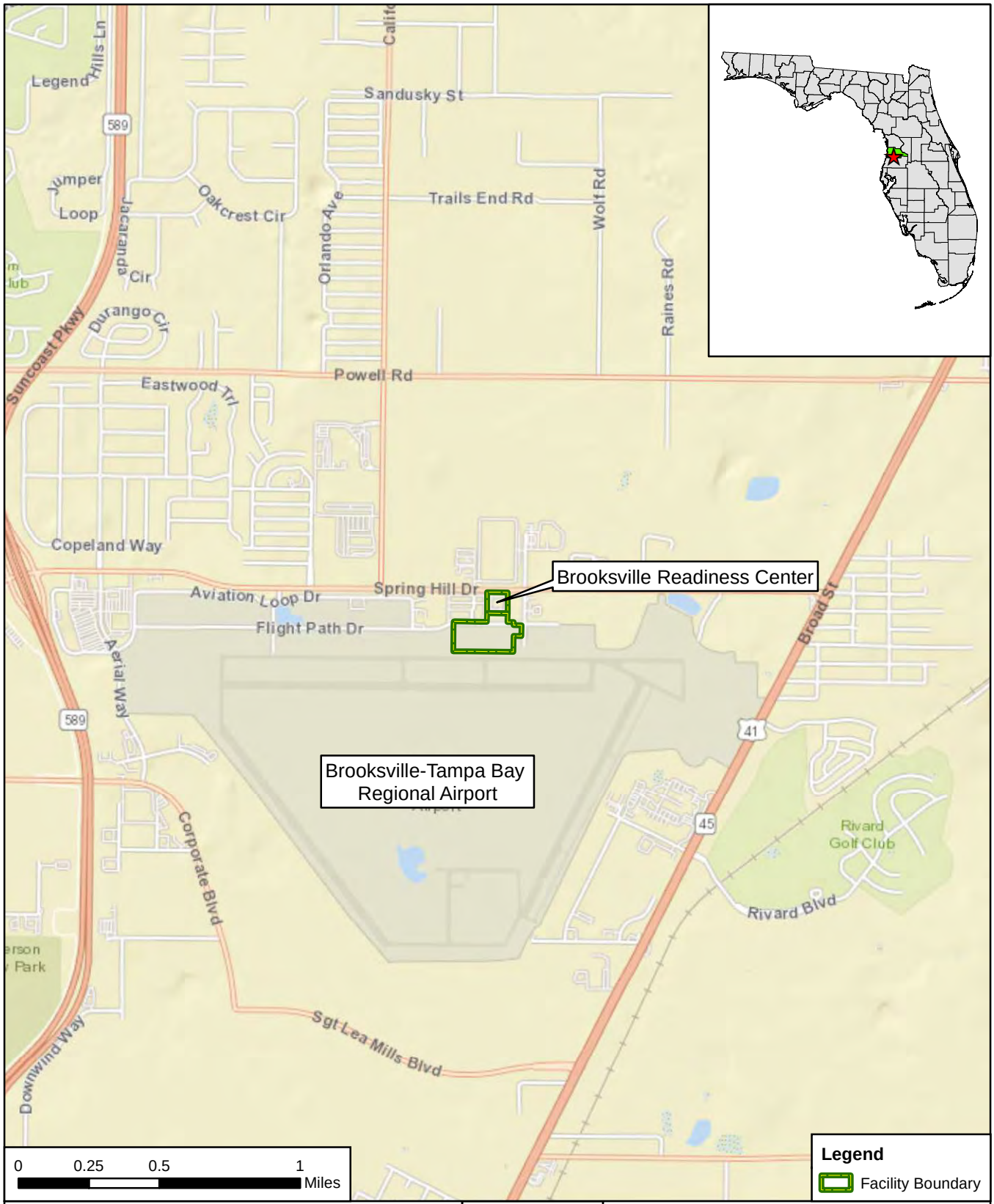
2.2.6 Sensitive Habitat and Threatened/ Endangered Species

The following birds, clams, crustaceans, plants, insects, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Hernando County, Florida (US Fish and Wildlife Service [USFWS], 2022).

- **Birds:** Eastern black rail, *Laterallus jamaicensis ssp. Jamaicensis* (threatened); Wood stork, *Mycteria americana* (threatened); Red knot, *Calidris canutus rufa* (threatened); Red-cockaded woodpecker, *Picoides borealis* (endangered); Florida scrub-jay, *Aphelocoma coerulescens* (threatened)
- **Clams:** Rayed creekshell, *Anodontoides radiatus* (under review); Southern elktoe, *Alasmidonta triangulate* (under review)
- **Crustaceans:** Coastal Flatwoods crayfish, *Procambarus apalachicolae* (under review); Cypress crayfish, *Cambarellus blacki* (under review)
- **Flowering plants:** Brooksville bellflower, *Campanula robinsiae* (endangered); Cooley's water willow, *Justicia cooleyi* (endangered); Blackbract pipewort, *Eriocaulon nigrobracteatum* (under review)
- **Insects:** Yellow-sided clubtail, *Stylurus potulentus* (under review); Calvert's emerald, *Somatochlora calverti* (under review); Southern snaketail, *Ophiogomphus australis* (under review); Sykora's Hydroptila caddisfly, *Hydroptila sykorai* (under review); Morse's Little Plain Brown sedge, *Lepidostoma morsei* (under review); Westfall's clubtail, *Gomphus westfalli* (under review); Logan's Agarodes caddisfly, *Agarodes logani* (under review)
- **Mammals**: Tricolored bat, *Perimyotis subflavus* (under review); West Indian manatee, *Trichechus manatus* (threatened)
- **Reptiles:** Eastern diamondback rattlesnake, *Crotalus adamanteus* (under review); Eastern indigo snake, *Drymarchon corais couperi* (threatened); Gopher tortoise, *Gopherus polyphemus* (candidate); Loggerhead sea turtle, *Caretta caretta* (threatened)

2.3 History of PFAS Use

Two AOIs where aqueous film-forming foam (AFFF) may have been used, stored, disposed, or released historically at the Brooksville RC were identified in the PA (AECOM, 2020). In 2007 and 2008, AFFF was released during annual testing of Tri-Max™ units. Between 2002 and 2003, AFFF was accidentally released during installation of the fire suppression system at AASF #2 Hangar. The potential release areas were designated as two AOIs based on proximity to one another and presumed groundwater flow. A description of each AOI is presented in **Section 3**.



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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	7/29/2022

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Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

CLIENT	ARNG			
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Base Map: Copyright:© 2013 National Geographic Society, i-cubed		PM	CM	7/29/2022

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Facility Topography

AECOM
12420 Milestone Center Drive
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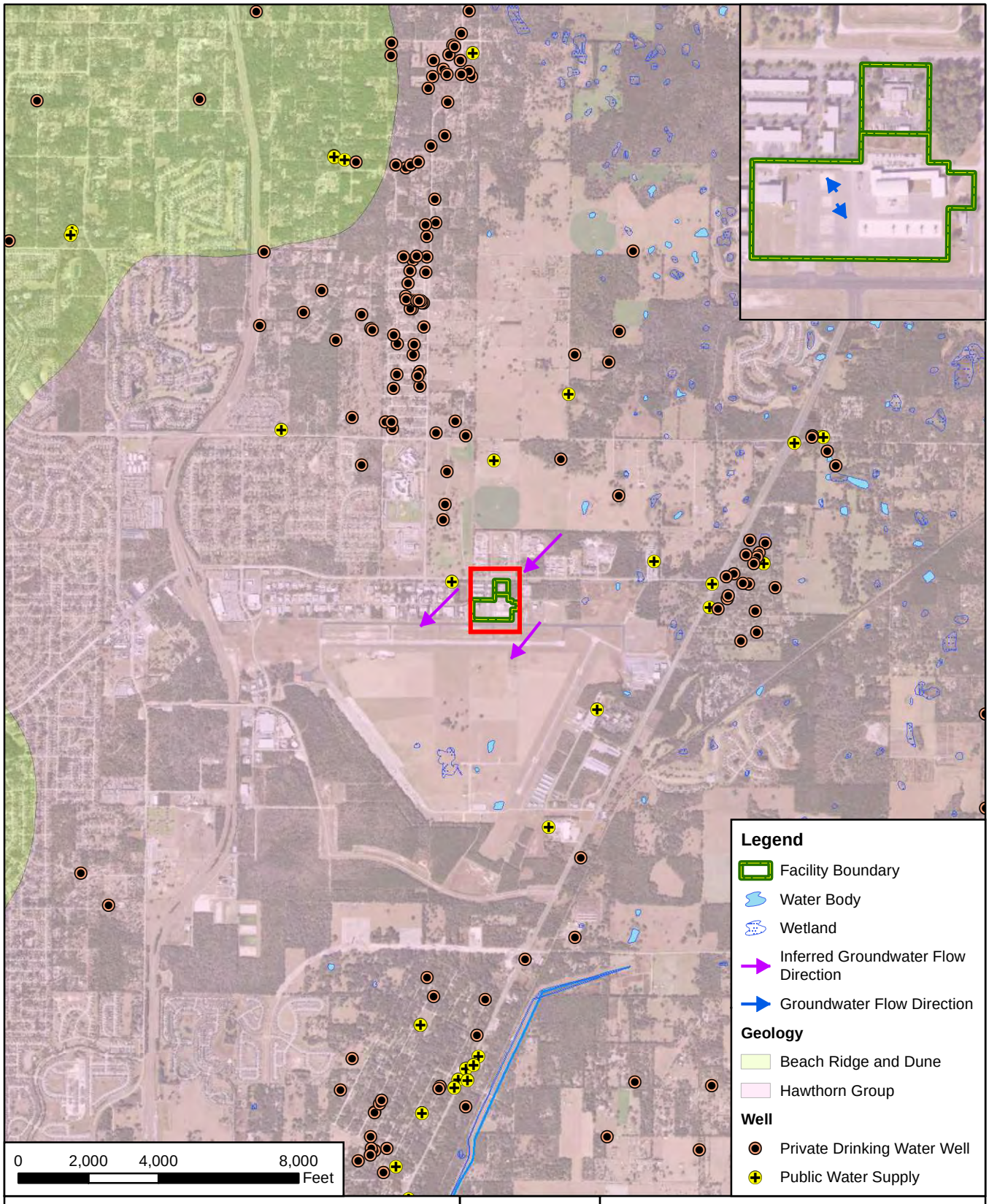
Figure 2-2



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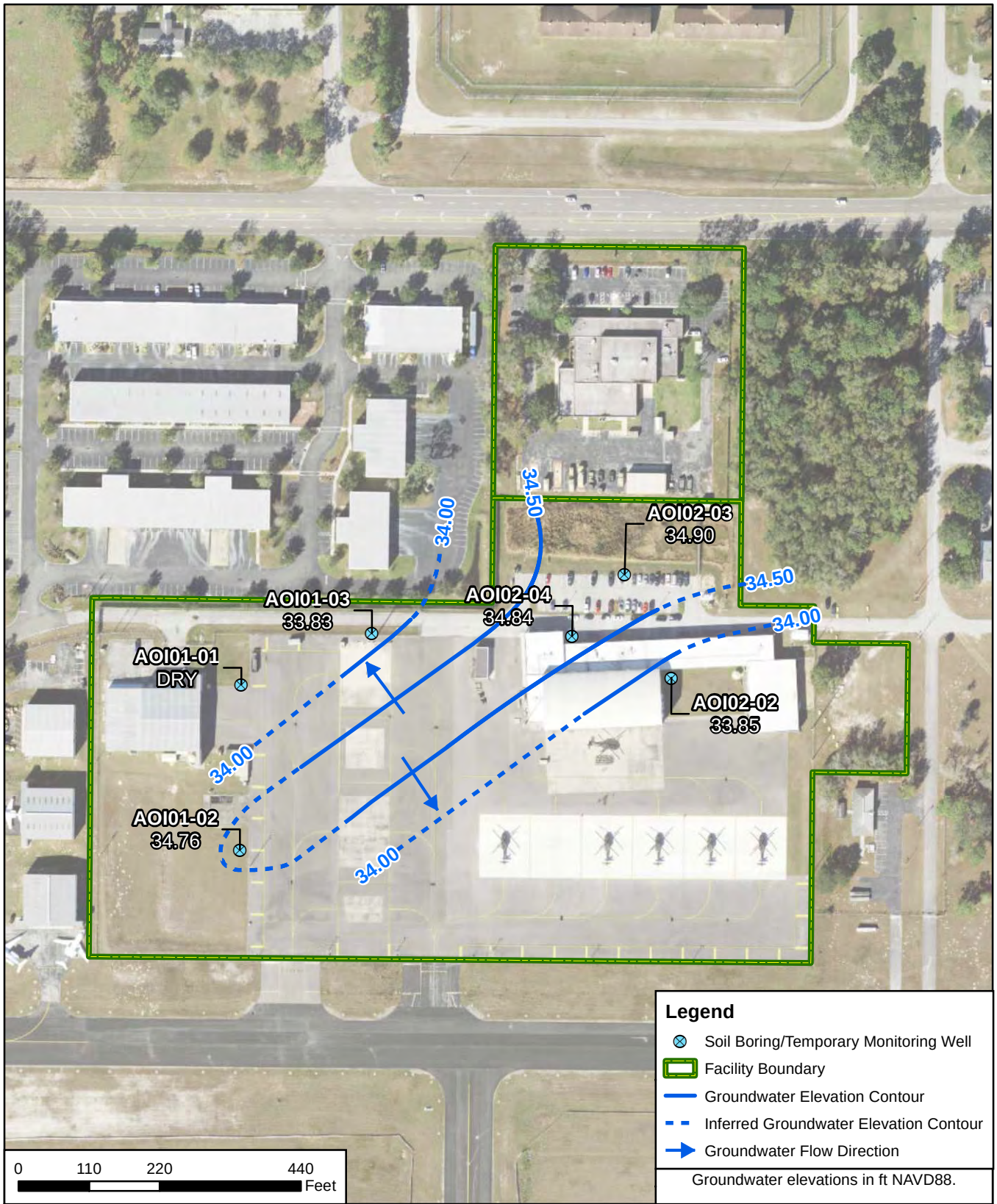
Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3



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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/20/2022

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Groundwater Elevations, January 2022

AECOM
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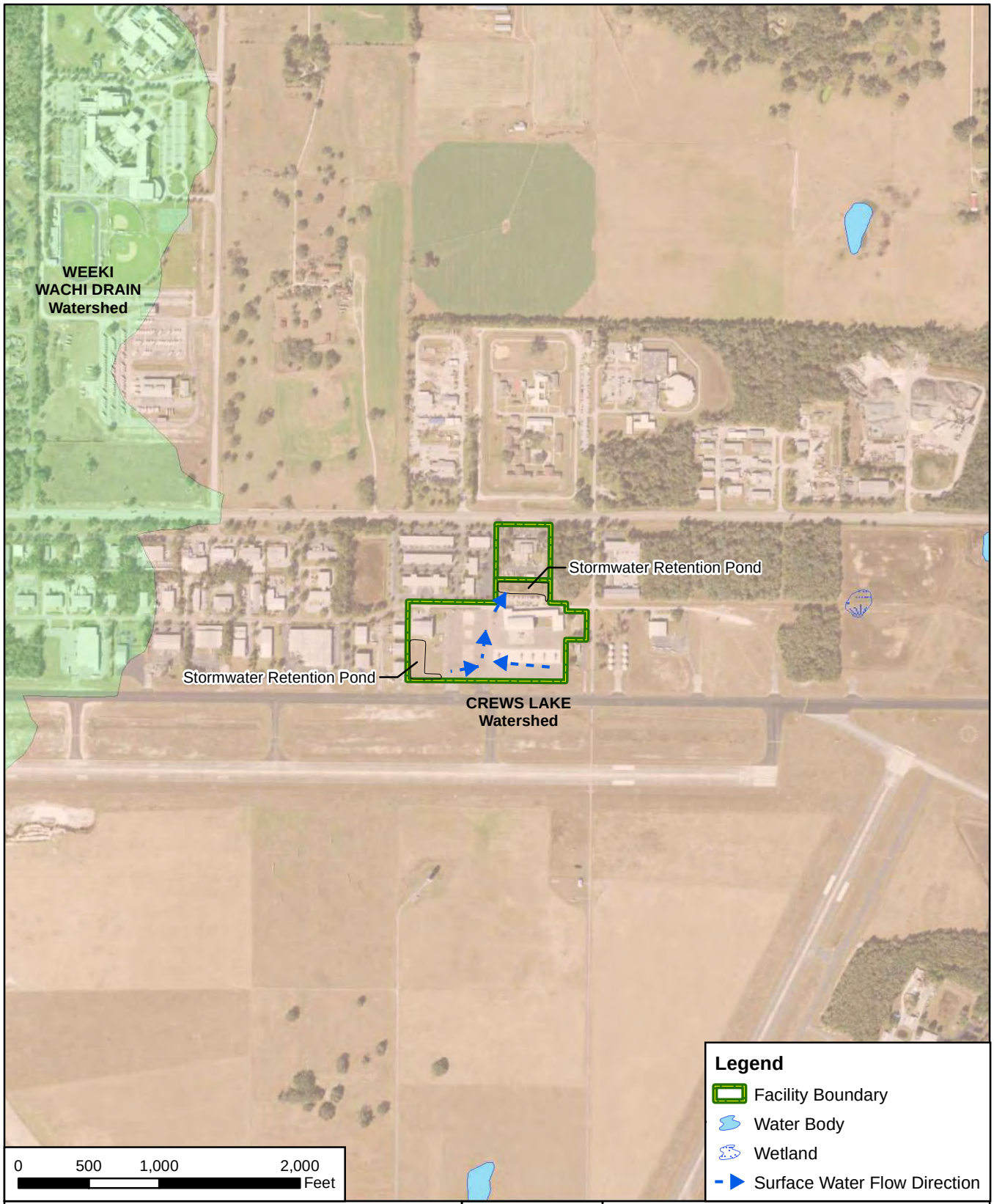
Germantown, MD 20876

Figure 2-4



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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	7/29/2022

Surface Water Features

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Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. These locations may include fire training areas (FTAs), buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Based on the PA findings, two potential release areas were identified at Brooksville RC and identified as separate AOIs (AECOM, 2020). The potential release areas are shown on **Figure 3-1**.

3.1 AOI 1 Wash Rack

AOI 1 is the wash rack area. Potential releases to soil occurred during annual testing of the FLARNG's Tri-Max™ units in January 2007 and February 2008. The units were discharged on the concrete wash rack area that drains to an oil/water separator, which then discharges to the sanitary sewer. It is possible that AFFF foam may have reached the area of soil to the north of the concrete wash rack during testing.

3.2 AOI 2 AFFF Spill Area

AOI 2 is the accidental release of AFFF during the installation of the fire suppression system at AASF #2 hangar, between 2002 and 2003. About 5 gallons of AFFF was spilled outside of the fire suppression system tank room, flowing from the pavement behind the building across the road into the grass area adjacently south of the parking lot. Drains located in the fire suppression system tank room drain to the city sewer.

3.3 Adjacent Sources

One potential off-facility source of contamination was identified during the PA. The off-facility source is shown on **Figure 3-1**.

3.3.1 Brooksville – Tampa Bay Regional Airport

The Brooksville – Tampa Bay Regional Airport is adjacent to the south of Brooksville RC; the geographic coordinates are 28°28'12.09"N; 82°27'25.57"W. Hernando County Fire Chief of Station No. 14 stated annual training with Brooksville RC personnel is conducted in the airport airfield. Dish washing foams are used for the simulations and training purposes. No AFFF has been used on emergency responses at the airport to the interviewee's knowledge dating back to 2001. Hernando County Fire Chief stated AFFF is stored at Fire Station No. 14. Information of AFFF storage at Brooksville – Tampa Bay Regional Airport is unknown, and information of AFFF use prior to 2001 at Brooksville – Tampa Bay Regional Airport is unknown. Because it is outside the boundary of Brooksville RC, the Brooksville – Tampa Bay Regional Airport is considered an adjacent potential source.

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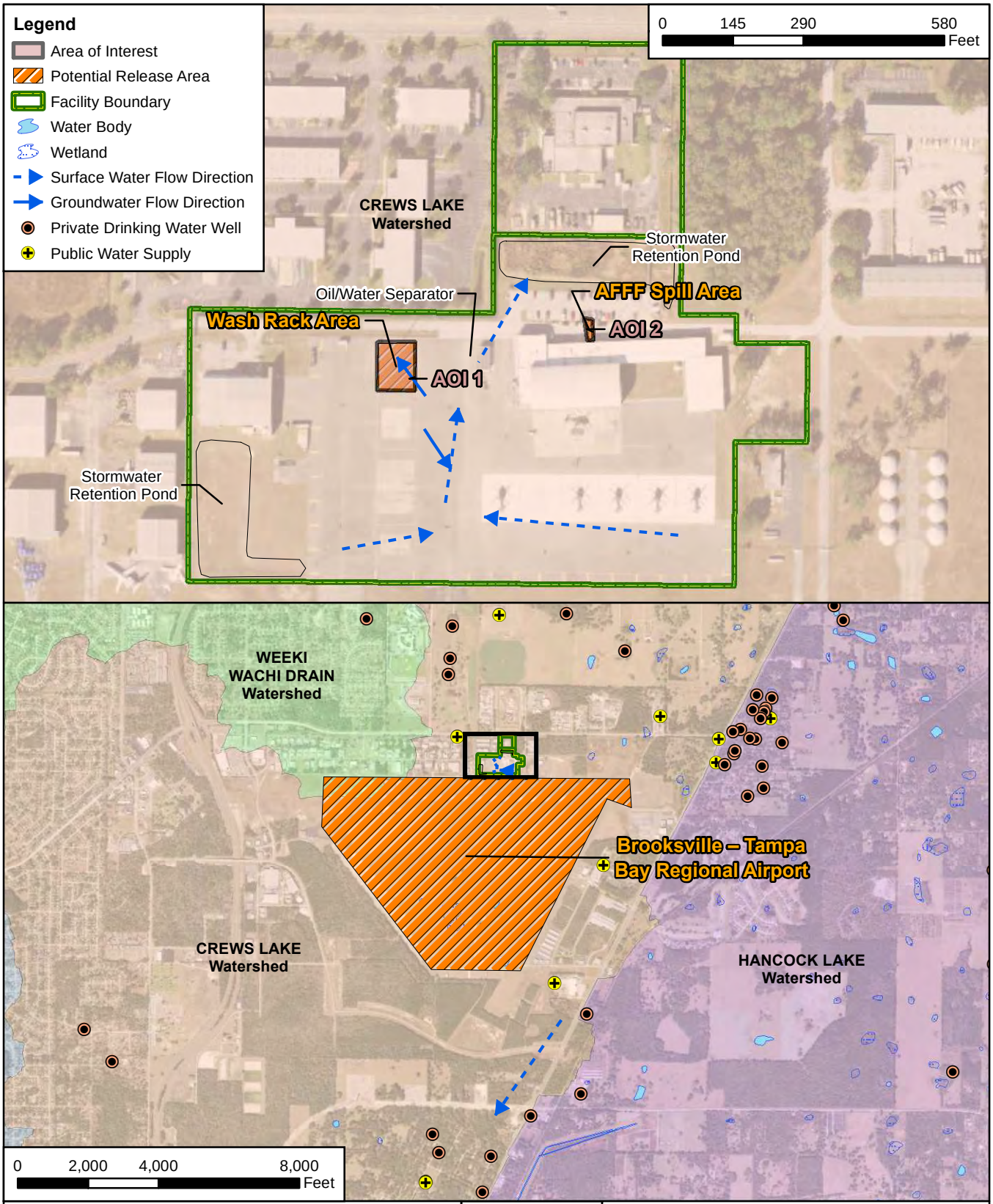

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Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

As identified during the Data Quality Objective (DQO) process and outlined in the SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 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

The Department of Defense (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 site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs are presented in **Section 6.1** of this report.

4.2 Information Inputs

Primary information inputs included:

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

4.3 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). Temporal boundaries were limited to the winter season, which was the earliest available time field resources were available to complete the study.

4.4 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the DoD Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs within this document and decision rules as defined in the SI QAPP Addendum (AECOM, 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

facility-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2019a; DoD, 2019b; USEPA, 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 SI QAPP Addendum (AECOM, 2021).

5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Brooksville Readiness Center/AASF #2, Spring Hill, Florida dated August 2020 (AECOM, 2020);*
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Brooksville Readiness Center/AASF #2, Spring Hill, Florida dated October 2021 (AECOM, 2021)*; and
- *Final Site Safety and Health Plan, Brooksville Readiness Center/AASF #2, Spring Hill, Florida dated January 2022 (AECOM, 2022).*

The SI field activities were conducted from 13 to 27 January 2022 and consisted of utility clearance, hand augering, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as noted in **Section 5.8**.

The following samples were collected during the SI and analyzed for a subset of 18 compounds by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15 to fulfill the project DQOs:

- One soil sample from one hand auger location;
- Thirteen (13) soil samples from six DPT boring locations;
- Five grab groundwater samples from five temporary well locations;
- Fourteen (14) quality assurance (QA)/quality control (QC) samples.

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

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

The US Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (USACE, 2016) defines four phases to project planning: 1.) defining the project phase; 2.)

determining data needs; 3.) developing data collection strategies; and 4.) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 7 September 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 the ARNG, FLARNG, USACE, Florida Department of Environmental Protection, and representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021).

A TPP Meeting 3 was held [date to be determined] after the field event to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM placed a ticket with Sunshine 811, the local utility clearance provider, to notify them of intrusive work on 13 January 2022. Additionally, AECOM contracted Ground Penetrating Radar Systems (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 13 January 2022 with input from the AECOM field team and Brooksville RC facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

The potable water source at Brooksville RC was sampled on 21 December 2021 to assess usability for decontamination of drilling equipment. Results of the sample collected at the spigot on the south side of the western hangar (BRC-PW-01) confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the sample was analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample associated with the spigot 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 sampling environment. The checklist of acceptable materials for use in the sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the SI QAPP Addendum (AECOM, 2021). Prior to the start of field work each day, a Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

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

5-1. Several boring locations were adjusted within a 50-feet offset for reasons including drill rig access and utility avoidance.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs) and one subsurface soil sample (13 to 15 feet bgs). A third soil sample (18 to 20 feet bgs) was collected from boring location AOI02-02 and submitted for grain size analysis. In accordance with the SI QAPP Addendum (AECOM, 2021), only one surface soil sample (0 to 2 feet bgs) was collected from location AOI02-01 via hand auger due to limited access and high potential for underground utilities.

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

Soil borings completed during the SI found silty sand and clayey sand as the dominant lithology of the unconsolidated sediments below the Brooksville RC. The borings were completed at depths between 34 and 45 feet bgs. Isolated layers of clay and silt were also observed in the boring logs at thicknesses ranging from a few inches to 13 feet. Limestone bedrock was encountered across the site at depths between 23 and 40 feet bgs. These observations are consistent with the understood depositional environment of the region.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by 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 Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2021).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, equipment rinsate blanks were collected at a rate of 5% and analyzed for the same parameters as the soil samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 degrees Celsius (°C) during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021) using bentonite chips at completion of sampling activities. At boring location AOI02-04, asphalt was patched with cold patch asphalt following borehole abandonment.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 10-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected after a period of time following well installation to allow groundwater to infiltrate and recharge the temporary well screen intervals. After the recharge

period, groundwater samples were collected using a bladder pump with PFAS-free HDPE tubing. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected. Additionally, a subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there were any foaming. No foaming was noted in any of the groundwater samples.

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

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 in accordance with the PQAPP (AECOM, 2018a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021) by removing the PVC and backfilling the hole with bentonite chips. Upon completion of well abandonment, the ground surface at each location was patched to match existing surrounding conditions.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 27 January 2022. Groundwater elevation measurements were collected from the six new temporary monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Florida-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021). Survey data from the newly installed wells on the facility were collected on 27 January 2022 in the applicable Universal Transverse Mercator zone projection with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B4**.

5.6 Investigation-Derived Waste

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

Soil IDW (i.e., soil cuttings) generated during the SI activities were contained in labeled, 55-gallon Department of Transportation (DOT)-approved steel drums and left onsite in a designated waste storage area. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location. Based on laboratory results, containerized soil cuttings will be managed and disposed by ARNG, either by offsite disposal or, where PFAS

concentrations are below the Industrial/Commercial Composite Worker OSD SLs, ARNG will distribute the soil on the downgradient side of the associated borehole.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were discharged directly to the ground surface slightly downgradient of the source. The liquid IDW was not sampled and assumes the PFAS characteristics of the associated groundwater samples collected from that source location. Geographic coordinates were collected using a global positioning system (GPS) around each location where liquid IDW was discharged (i.e., an IDW polygon). The IDW polygons are displayed on the figure in **Appendix B5**.

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

5.7 Laboratory Analytical Methods

Samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15 at Pace Analytical Gulf Coast in Baton Rouge, Louisiana, a DoD ELAP and NELAP certified laboratory. Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by USEPA Method 9045D.

5.8 Deviations from SI QAPP Addendum

Two deviations from the SI QAPP Addendum were identified during review of the field documentation. These deviations are noted below and documented in Field Change Request Forms (**Appendix B3**):

- During the installation of temporary monitoring wells, proposed sample location AOI02-04 was unable to be completed at the proposed location or a nearby step out due to shallow refusal at 4.5 feet bgs during hand clearance via hand auger. A high density of subsurface utilities prevented another safe, nearby step-out location. As a result, the location was moved further west in the presumed downgradient direction. The revised sample location continues to allow for the assessment of PFAS in media for the same rationale as the original location. This action was documented in a Field Change Request form provided in **Appendix B3**.
- During the installation of temporary monitoring wells, a groundwater sample was unable to be collected from temporary monitoring well AOI01-01 due to no water being present. The boring was driven to 34 feet bgs, where refusal was met. The well was allowed to sit overnight but remained dry. Because no alternative drilling method was available and the area cleared of utilities was only 10-foot square due to physical limitations, additional attempts were not made to install a well near the AOI01-01 location. The two other groundwater sample locations within the potential source area and downgradient were successfully collected; therefore, the DQOs were met. This action was documented in a Field Change Request form provided in **Appendix B3**.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Brooksville RC/AASF #2, Florida

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-(0-2)	1/26/2022 10:28	0 - 2	x				
AOI01-01-(0-2)-D	1/26/2022 10:28	0 - 2	x				FD
AOI01-01-(13-15)	1/26/2022 11:00	13 - 15	x	x	x		
AOI01-01-(13-15)-D	1/26/2022 11:00	13 - 15		x	x		FD
AOI01-01-(13-15)-MS	1/26/2022 11:00	13 - 15	x				MS
AOI01-01-(13-15)-MSD	1/26/2022 11:00	13 - 15	x				MSD
AOI01-02-(0-2)	1/26/2022 8:15	0 - 2	x				
AOI01-02-(13-15)	1/26/2022 8:42	13 - 15	x				
AOI01-03-(0-2)	1/25/2022 15:50	0 - 2	x				
AOI01-03-(0-2)-MS	1/25/2022 15:50	0 - 2	x				MS
AOI01-03-(0-2)-MSD	1/25/2022 15:50	0 - 2	x				MSD
AOI01-03-(13-15)	1/25/2022 16:05	13 - 15	x				
AOI02-01-(0-2)	1/25/2022 9:17	0 - 2	x	x	x		
AOI02-01-(0-2)-D	1/25/2022 9:17	0 - 2	x				FD
AOI02-02-(0-2)	1/25/2022 10:00	0 - 2	x				
AOI02-02-(13-15)	1/25/2022 11:30	13 - 15	x				
AOI02-02-(18-20)	1/25/2022 11:45	18 - 20				x	
AOI02-03-(0-2)	1/25/2022 8:48	0 - 2	x				
AOI02-03-(13-15)	1/25/2022 12:35	13 - 15	x				
AOI02-04-(0-2)	1/26/2022 14:25	0 - 2	x				
AOI02-04-(13-15)	1/26/2022 14:35	13 - 15	x				
Groundwater Samples							
AOI01-02-GW	1/26/2022 13:40	NA	x				
AOI01-02-GW-D	1/26/2022 13:40	NA	x				FD
AOI01-03-GW	1/26/2022 11:50	NA	x				
AOI02-03-GW	1/26/2022 10:12	NA	x				
AOI02-03-GW-MS	1/26/2022 10:12	NA	x				MS
AOI02-03-GW-MSD	1/26/2022 10:12	NA	x				MSD
AOI02-02-GW	1/27/2022 9:15	NA	x				
AOI02-04-GW	1/27/2022 10:55	NA	x				
Quality Control Samples							
BRC-ERB-01	1/25/2022 17:03	NA	x				DPT rod
BRC-ERB-02	1/26/2022 13:50	NA	x				bladder pump
BRC-FRB-01	1/27/2022 9:10	NA	x				
BRC-PW-01	12/21/2021 13:00	NA	x				decon source water

Notes:

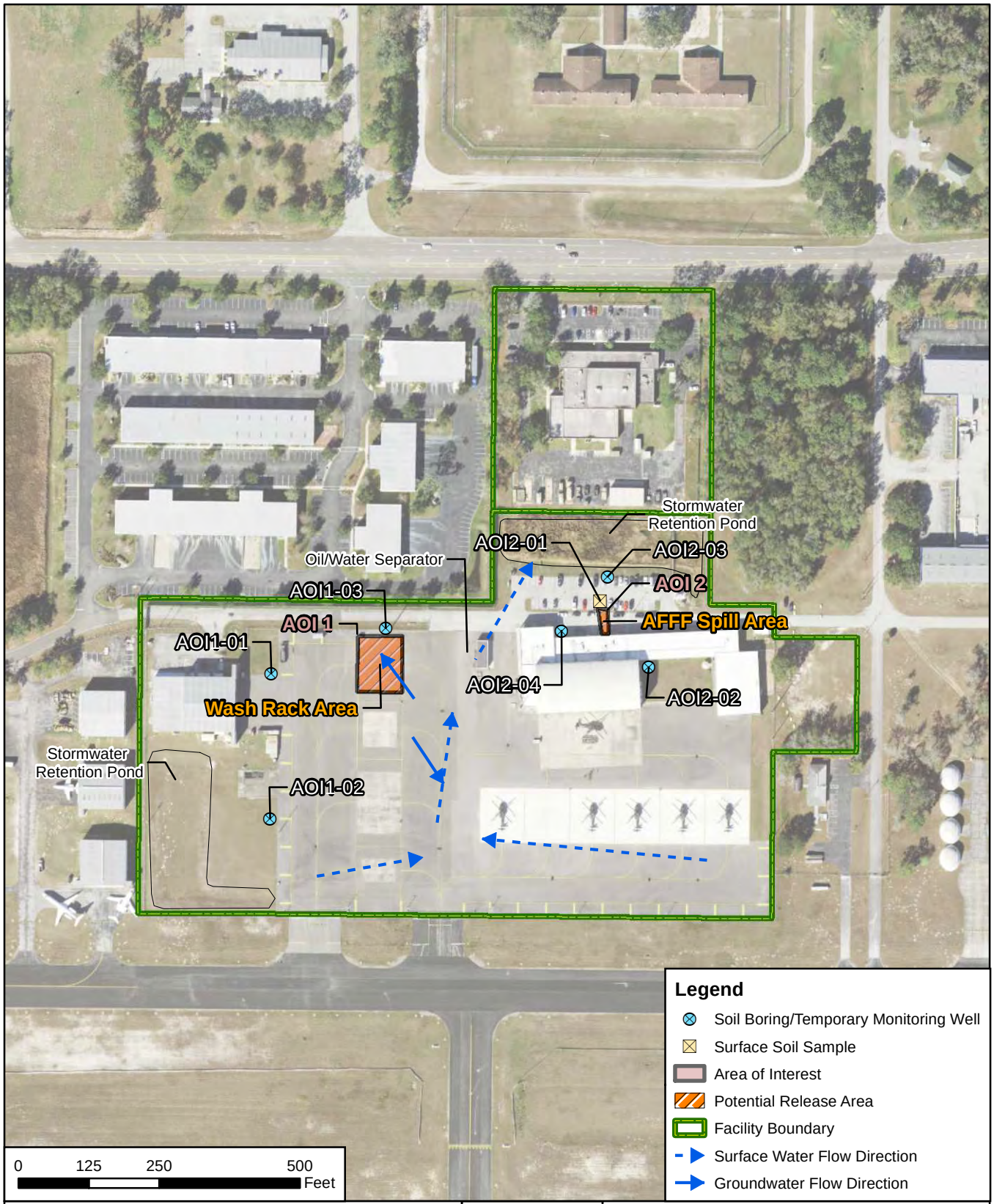
AASF = Army Aviation Support Facility
AOI = area of interest
ASTM = American Society for Testing and Materials
bgs = below ground surface
decon = decontamination
DPT = direct push technology
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
GW = groundwater
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
QSM = Quality Systems Manual
SB = soil boring
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Brooksville RC/AASF #2, Florida

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	34	22.95 - 32.95	69.35	68.30	DRY	NA	NA
	AOI01-02	35	24.84 - 34.84	68.08	67.90	33.32	33.14	34.76
	AOI01-03	42	31.99 - 41.99	70.54	68.10	36.71	34.27	33.83
2	AOI02-02	35	25.38 - 35.38	68.35	68.70	34.50	34.85	33.85
	AOI02-03	38	27.95 - 37.95	67.60	66.10	32.70	31.20	34.90
	AOI02-04	45	33.19 - 43.19	68.86	68.30	34.02	33.46	34.84

Notes:

AASF = Army Aviation Support Facility
AOI = area of interest
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988
RC = Readiness Center



CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	7/29/2022	GIS BY	MS	7/29/2022
SCALE	1:3,000	CHK BY	MG	7/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	7/29/2022

N

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Section 6.3** through **Section 6.4**. **Table 6-2** through **Table 6-4** present results in soil or groundwater for the relevant compounds. 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 site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. 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. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1** below.

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

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

Notes:
bgs = below ground surface; µg/kg = micrograms per kilogram; ng/L = nanograms per liter
a.) 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.
b.) Screening values for HFPO-DA were established after SI planning and execution and thus not included as an analyte. Future CERCLA phases will include HFPO-DA if warranted.

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the facility: the residential scenario is applied to surface soil results (0 to 2 feet bgs) and the industrial/commercial worker scenario is applied to shallow subsurface soil results (2 to 15 feet bgs). The SLs are not applied to deep subsurface soil results (>15 feet bgs) because 15 feet is the anticipated limit of construction activities.

6.2 Soil Physicochemical Analyses

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

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

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1: Wash Rack. The soil and groundwater results are summarized on **Table 6-2** through **Table 6-4**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.3.1 AOI 1 Soil Analytical Results

Figure 6-1 through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** and **Table 6-3** summarize the soil results.

Soil was sampled from surface soil (0 to 2 feet bgs) and shallow subsurface soil (13 to 15 feet bgs) from boring locations AOI01-01 through AOI01-03. PFOS and PFNA were detected in surface soil at concentrations below their respective SLs. PFOS was detected at all three locations with concentrations ranging from 0.188 J micrograms per kilogram (µg/kg) to 0.494 J µg/kg. PFNA was detected at location AOI01-02, with a concentration of 0.030 J µg/kg. PFOA, PFHxS, and PFBS were not detected in surface soil. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil.

6.3.2 AOI 1 Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-4** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring well locations AOI01-02 and AOI01-03. PFOA was detected above the SL of 6 nanograms per liter (ng/L) at location AOI01-03, with a concentration of 7.79 ng/L. PFOS was detected above the SL of 4 ng/L at location AOI01-02, with a concentration of 25.3 ng/L. PFHxS was detected below the SL of 39 ng/L at locations AOI01-02 and AOI01-03, with concentrations of 17.8 ng/L and 4.70 ng/L, respectively. PFBS was detected below the SL of 601 ng/L at locations AOI01-02 and AOI01-03, with concentrations of 1.33 J ng/L and 1.96 J ng/L, respectively. PFNA was not detected in groundwater.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOS and PFNA were detected in soil below their respective SLs. PFOA and PFOS were detected in groundwater at concentrations above their respective SLs. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2: AFFF Spill Area. The results in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.4.1 AOI 2 Soil Analytical Results

Figure 6-1 through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** and **Table 6-3** summarize the soil results.

Soil was sampled from surface soil (0 to 2 feet bgs) and shallow subsurface soil (13 to 15 feet bgs) from boring locations AOI02-02, AOI02-03, and AOI02-04. Soil was sampled from surface soil only at boring location AOI02-01. PFOA, PFOS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs in surface soil. PFOA was detected at locations AOI02-01 and AOI02-03, with concentrations of 0.280 J µg/kg and 1.22 µg/kg, respectively. PFOS was detected at all four locations, with concentrations ranging from 0.074 J µg/kg and 0.671 J µg/kg. PFHxS was detected at location AOI02-01, with a concentration of 0.112 J µg/kg. PFNA was detected at three of the four locations, with concentrations ranging from 0.022 J µg/kg and 0.314 J µg/kg. PFBS was not detected in surface soil. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil.

6.4.2 AOI 2 Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-4** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring well locations AOI02-02 through AOI02-04. PFOA was detected above the SL of 6 ng/L at AOI02-04, with a concentration of 22.9 ng/L. PFOS was detected above the SL of 4 ng/L at location AOI02-03, with a concentration of 5.23 ng/L. PFHxS was detected below the SL of 39 ng/L at locations AOI02-02 and AOI02-04, with concentrations of 1.69 J ng/L and 3.34 J ng/L, respectively. PFNA was detected below the SL of 6 ng/L at location AOI02-03, with a concentration of 1.99 J ng/L. PFBS was detected below the SL of 601 ng/L at locations AOI02-03 and AOI02-04, with concentrations of 1.76 J ng/L and 1.42 J ng/L, respectively.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs. PFOA and PFOS were detected in groundwater at concentrations above their respective SLs. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 2 is warranted.

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Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Brooksville Readiness Center/AASF #2

Area of Interest		AOI01								AOI02									
Sample ID		AOI01-01-(0-2)		AOI01-01-(0-2)-D		AOI01-02-(0-2)		AOI01-03-(0-2)		AOI02-01-(0-2)		AOI02-01-(0-2)-D		AOI02-02-(0-2)		AOI02-03-(0-2)		AOI02-04-(0-2)	
Sample Date		01/26/2022		01/26/2022		01/26/2022		01/25/2022		01/25/2022		01/25/2022		01/25/2022		01/25/2022		01/26/2022	
Depth		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																			
PFBS	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	UJ	ND	U	ND	U	ND	U
PFHxS	130	ND	U	ND	U	ND	U	ND	U	0.112	J	0.079	J	ND	U	ND	U	ND	U
PFNA	19	ND	U	ND	U	0.030	J	ND	U	0.022	J	ND	UJ	ND	U	0.314	J	0.070	J
PFOA	19	ND	U	ND	U	ND	U	ND	U	0.280	J	0.210	J	ND	U	1.22		ND	U
PFOS	13	0.191	J	0.188	J	0.494	J	0.216	J	0.368	J	0.277	J	0.167	J	0.671	J	0.074	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

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

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

Chemical Abbreviations

PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, Brooksville Readiness Center/AASF #2

Area of Interest		AOI01						AOI02					
Sample ID		AOI01-01-(13-15)		AOI01-02-(13-15)		AOI01-03-(13-15)		AOI02-02-(13-15)		AOI02-03-(13-15)		AOI02-04-(13-15)	
Sample Date		01/26/2022		01/26/2022		01/25/2022		01/25/2022		01/25/2022		01/26/2022	
Depth		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)													
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

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

Chemical Abbreviations

PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Brooksville Readiness Center/AASF #2

Area of Interest		AOI01						AOI02					
Sample ID		AOI01-02-GW		AOI01-02-GW-D		AOI01-03-GW		AOI02-02-GW		AOI02-03-GW		AOI02-04-GW	
Sample Date		01/26/2022		01/26/2022		01/26/2022		01/27/2022		01/26/2022		01/27/2022	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)													
PFBS	601	1.08	J	1.33	J	1.96	J	ND	U	1.76	J	1.42	J
PFHxS	39	12.5		17.8		4.70		1.69	J	ND	U	3.34	J
PFNA	6	ND	U	ND	U	ND	U	ND	U	1.99	J	ND	U
PFOA	6	2.42	J	2.98	J	7.79		2.23	J	3.36	J	22.9	
PFOS	4	18.6		25.3		3.44	J	3.64	J	5.23		3.67	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

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

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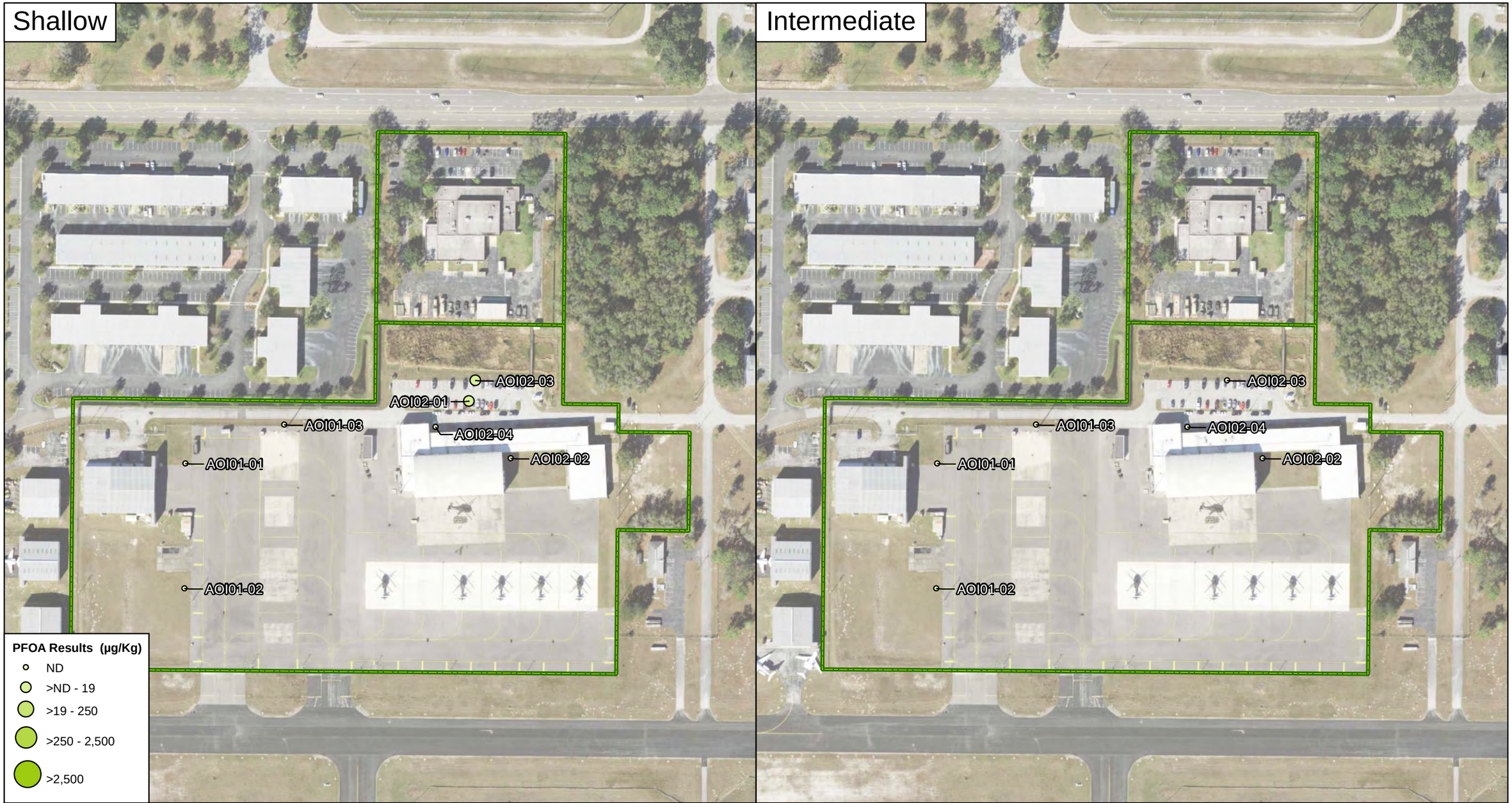


CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

Facility Boundary

0 100 200 400 Feet

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

N

PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

Shallow

Intermediate

AOI02-03
AOI02-01
AOI01-03
AOI02-04
AOI01-01
AOI02-02
AOI01-02

PFOS Results (µg/Kg)

- ND
- >ND - 13
- >13 - 160
- >160 - 1,600
- >1,600

CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

Facility Boundary

0 100 200 400 Feet

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

N

PFOS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-2

Shallow

Intermediate

AOI02-03
AOI02-01
AOI01-03
AOI02-04
AOI02-02
AOI01-01
AOI01-02

PFBS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 1,900
- >1,900 - 25,000
- >25,000

CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

Facility Boundary

0 100 200 400 Feet

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

N

PFBS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-3

Shallow

Intermediate

AOI02-03
AOI02-01
AOI01-03
AOI02-04
AOI02-02
AOI01-01
AOI01-02

PFHxS Results (µg/Kg)

- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

Facility Boundary

0 100 200 400 Feet

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

N

PFHxS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

Shallow

Intermediate

AOI02-03
AOI02-01
AOI01-03
AOI02-04
AOI01-01
AOI02-02
AOI01-02

PFNA Results (µg/Kg)

- ND
- >ND - 19
- >19 - 250
- >250 - 2,500
- >2,500

CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

Facility Boundary

0 100 200 400 Feet

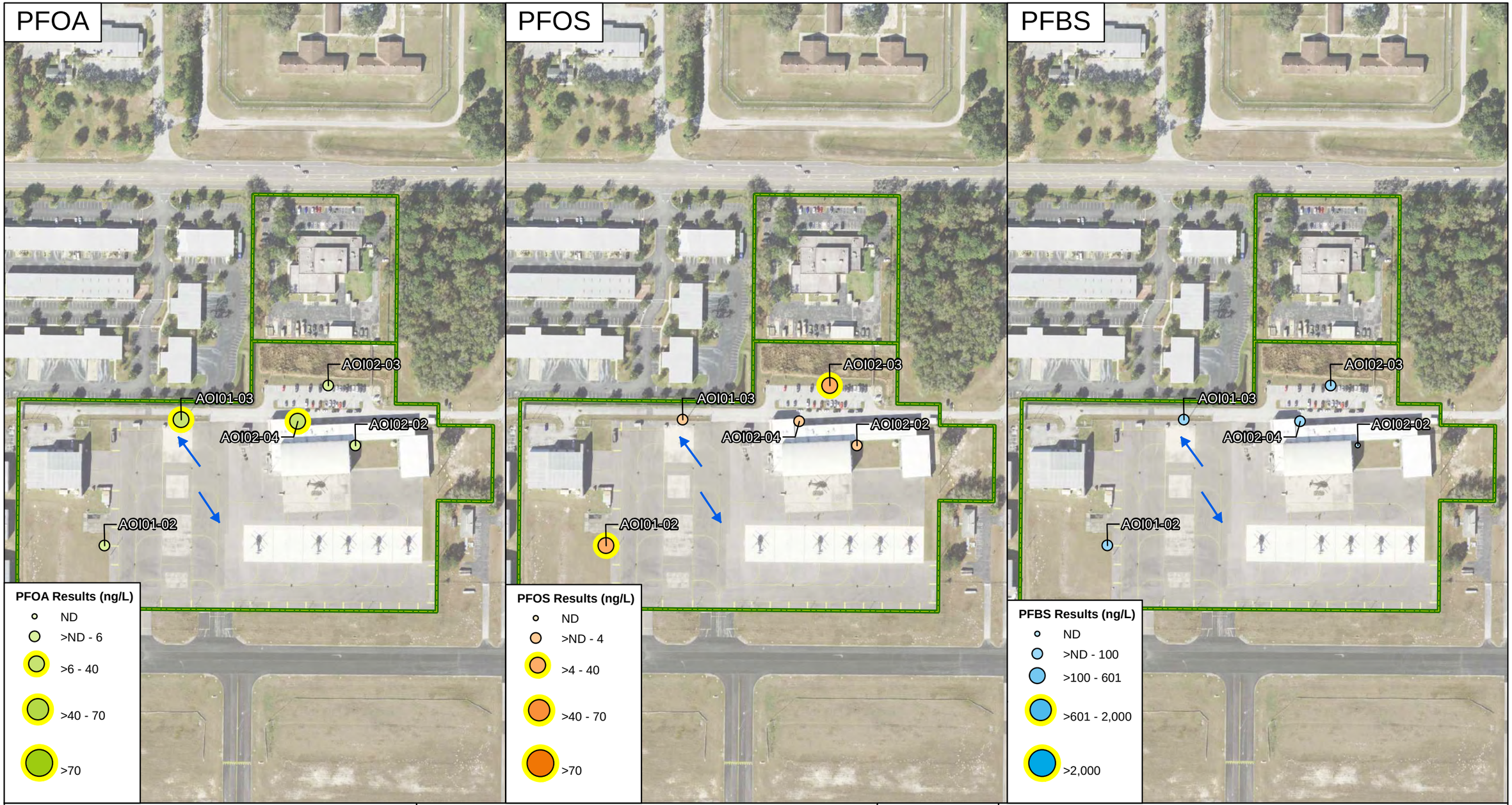
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

PFNA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-5



CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
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SCALE	1:3,120	CHK BY	BW	10/13/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/13/2022

Legend

Facility Boundary

Groundwater Flow Direction

0 130 260 520 Feet

Exceedances of the OSD SL are depicted with a yellow halo.

N

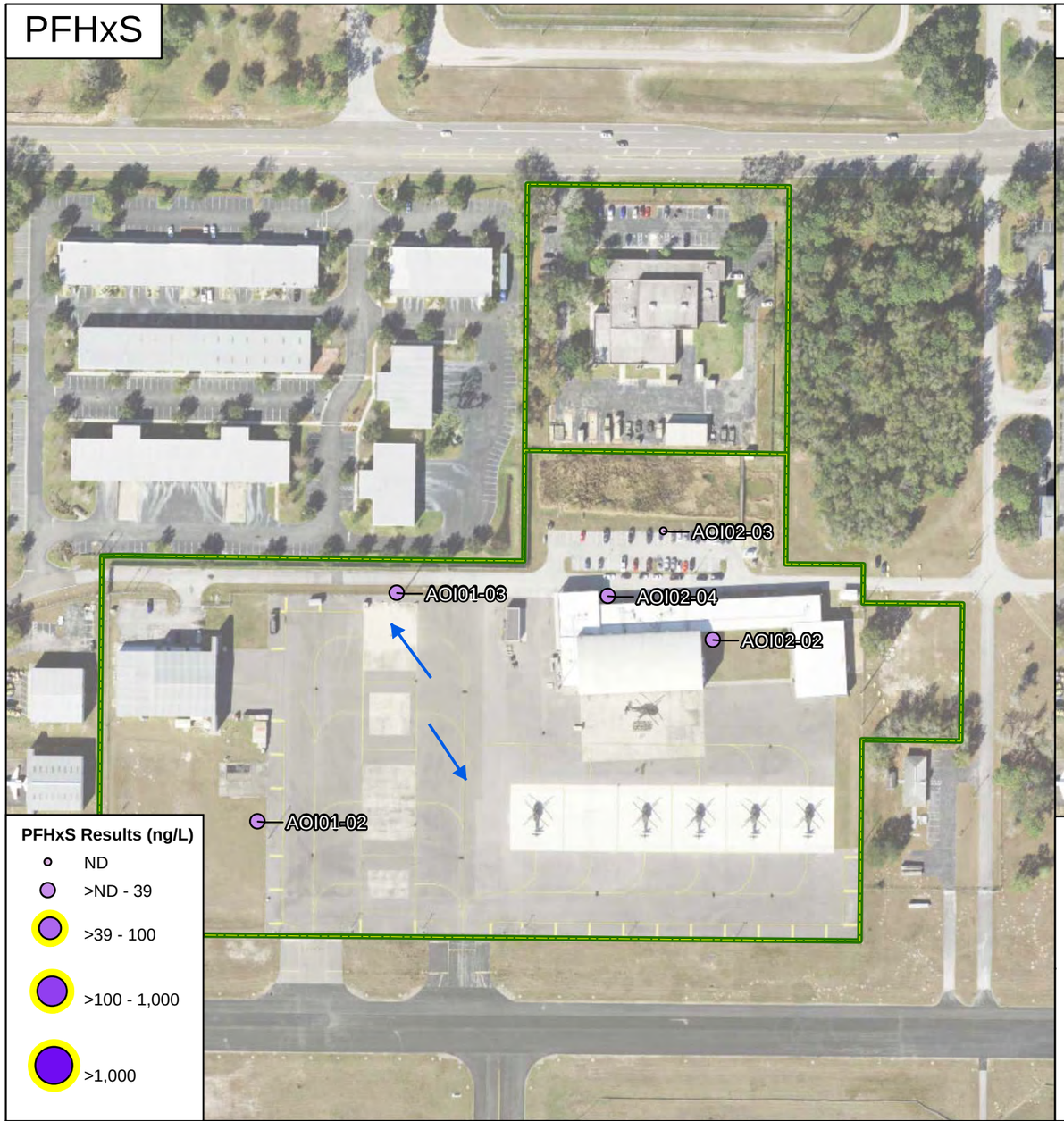
PFOA, PFOS, and PFBS Detections in Groundwater

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-6

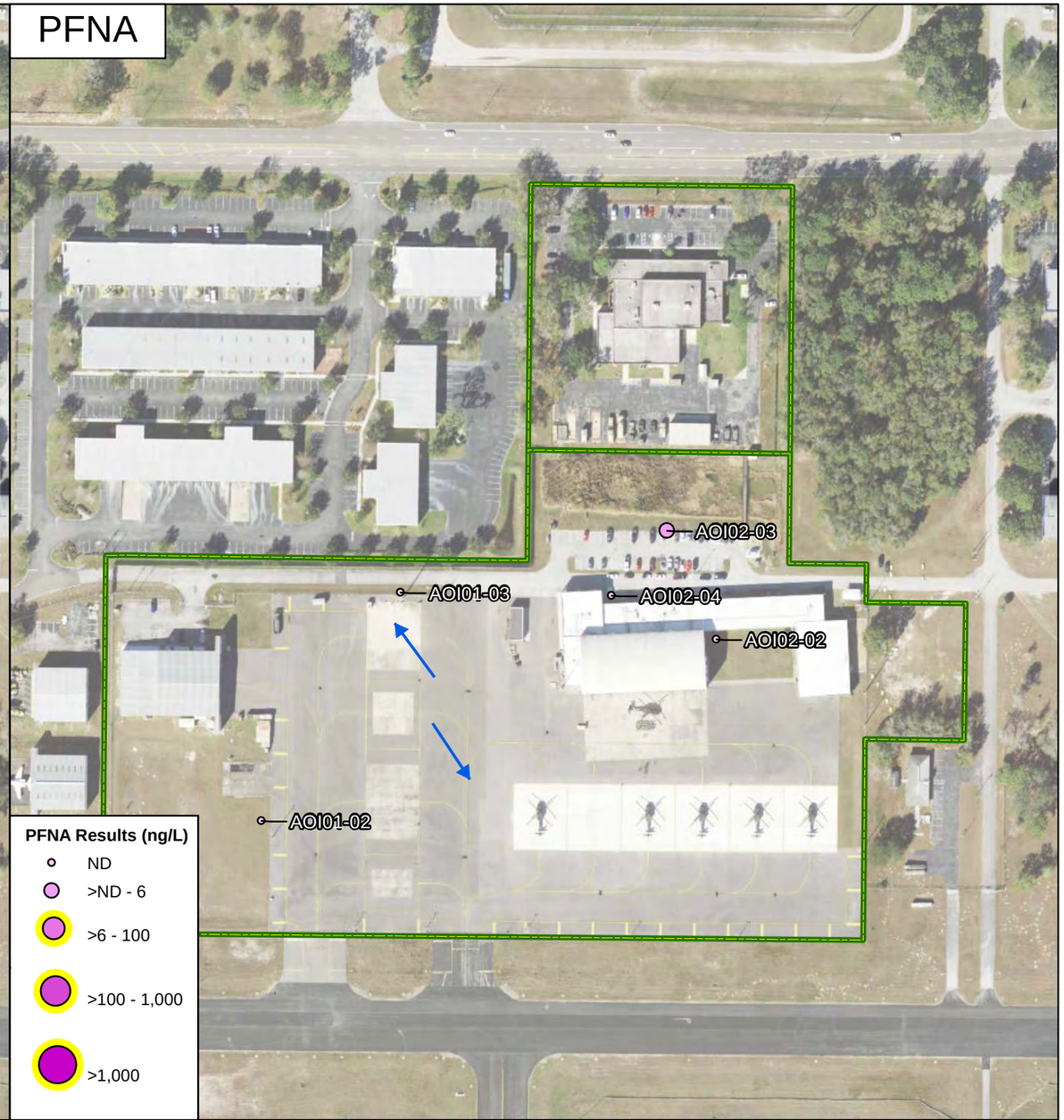
PFHxS



PFHxS Results (ng/L)

- ND
- >ND - 39
- >39 - 100
- >100 - 1,000
- >1,000

PFNA



PFNA Results (ng/L)

- ND
- >ND - 6
- >6 - 100
- >100 - 1,000
- >1,000

CLIENT	ARNG			
PROJECT	Site Inspection at Brooksville Readiness Center, FL			
REVISED	8/9/2022	GIS BY	MS	8/9/2022
SCALE	1:2,400	CHK BY	BW	8/9/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/9/2022

Legend

- Facility Boundary
- Groundwater Flow Direction

0 100 200 400 Feet

Exceedances of the OSD SL are depicted with a yellow halo.

N

PFHxS and PFNA Detections in Groundwater

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-7

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7. Exposure Pathways

The conceptual site model (CSM) for AOI 1 and AOI 2, 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 solely based upon exceedances of the SLs for the relevant compounds. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with an incomplete pathway generally warrant no further action. However, the pathway is considered potentially complete if 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 a 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 routes of exposure to the relevant compounds 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 toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the facility include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers, residents outside the facility boundary, and recreational users outside of the facility boundary.

7.1 Soil Exposure Pathway

The SI results in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 and AOI 2 based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 is the Wash Rack, where AFFF was released during annual testing of Tri-Max™ units in 2007 and 2008. PFOS and PFNA were detected in surface soil at AOI 1. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and construction workers are potentially complete. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in

subsurface soil at AOI 1; therefore, all exposure pathways are considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 is the AFFF Spill Area, where AFFF was accidentally released during installation of the fire suppression system between 2002 and 2003. PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at AOI 2. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and construction workers are potentially complete. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in subsurface soil at AOI 2; therefore, all exposure pathways are considered incomplete. The CSM for AOI 2 is presented on **Figure 7-1**.

7.2 Groundwater Exposure Pathway

The SI results in 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 and AOI 2

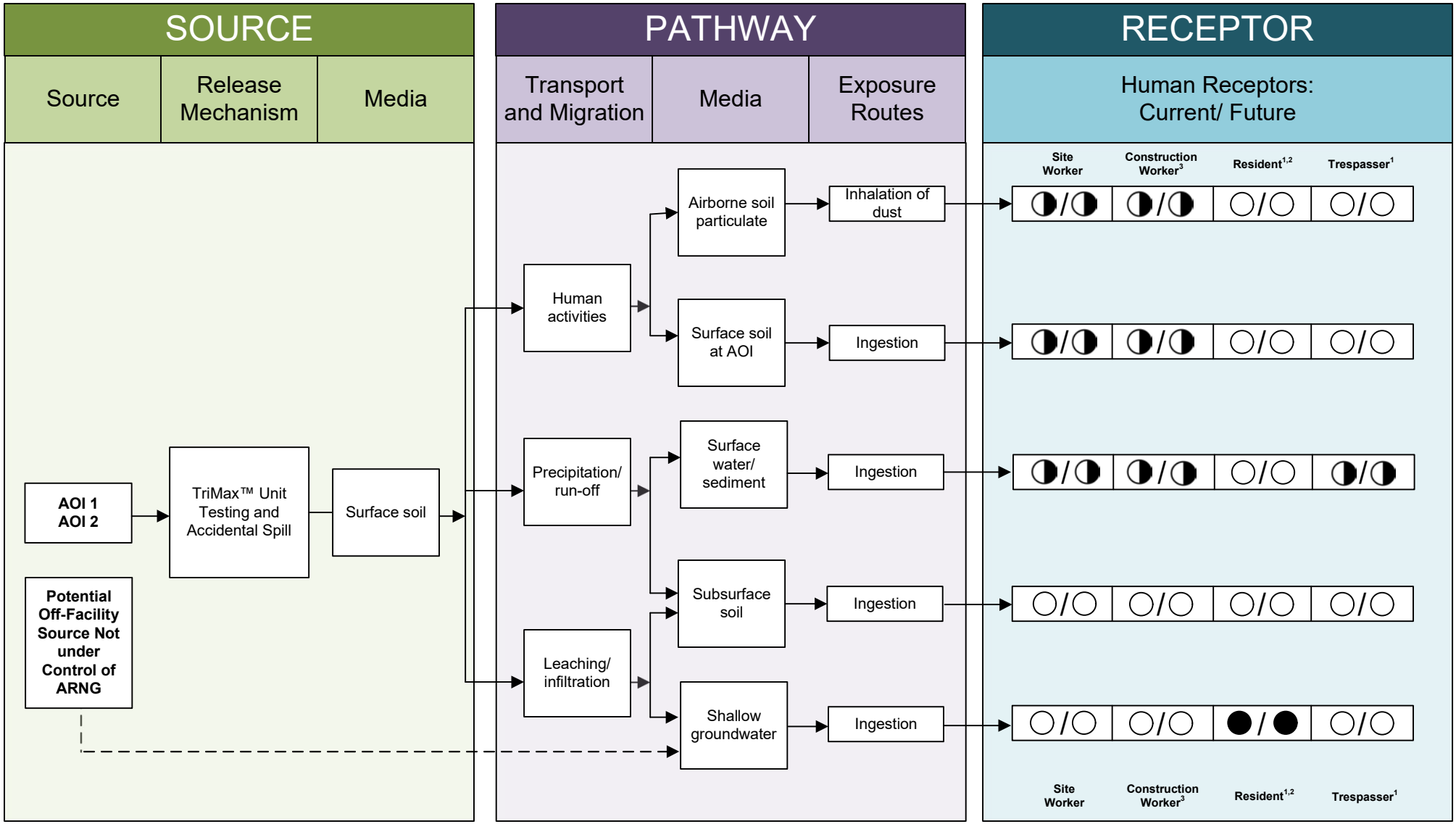
PFOA and PFOS were detected above their respective SLs in groundwater samples collected at AOI 1 and AOI 2. Brooksville RC receives its potable water from Hernando County Utilities. Therefore, the ingesting exposure pathway for site workers is considered incomplete. Private and public supply wells currently exist within a 3-mile radius both down- and side-gradient of the facility; therefore, groundwater pathway to off-facility residents through ingestion is potentially complete. However, the downgradient wells are screened deeper (approximately 100 feet bgs) than groundwater samples collected during the SI (approximately 24 to 43 feet bgs). Therefore, exposure is unlikely. Additionally, due to depths to water measured during the SI, it is unlikely groundwater would be encountered during construction activities and the ingestion exposure pathway for construction workers is considered incomplete. The CSM is presented on **Figure 7-1**.

7.3 Surface Water and Sediment Exposure Pathway

The SI results in soil and groundwater, in combination with knowledge of fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 AOI 1 & AOI 2

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. Because PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 1 and AOI 2, it is possible that those compounds may have migrated from soil and groundwater to the stormwater retention ponds on the facility via groundwater discharge or the storm sewer system. Therefore, the surface water and sediment ingestion exposure pathway for site workers, construction workers, or trespassers is considered potentially complete.



LEGEND

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

Notes:

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Construction activities were observed to be occurring on the south side of the site near the runway at the time of the SI field work.

Figure 7-1
Conceptual Site Model, AOI 1 & AOI 2
Brooksville RC

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted from 13 to 27 January 2022 and consisted of utility clearance, hand augering, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021), samples were collected and analyzed for a subset of 18 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows.

- One soil sample from one hand auger location;
- Thirteen (13) soil samples from six boring locations;
- Five grab groundwater samples from five temporary well locations;
- Fourteen (14) 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 CSM was refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOIs, which are described in **Section 7**.

8.2 Outcome

Based on the results of this SI, further evaluation is warranted in an RI for AOI 1: Wash Rack and AOI 2: AFFF Spill Area. Sample analytical concentrations collected during the 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 the SLs is as follows:

- At AOI 1:
    - PFOA and PFOS in groundwater exceeded their respective SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 7.79 ng/L at location AOI01-03. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 25.3 ng/L at location AOI01-02. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
    - The detected concentrations of PFOS and PFNA in soil at AOI 1 were below their respective SLs. PFOA, PFHxS, and PFBS were not detected in soil at AOI 1.
- At AOI 2:

- PFOA and PFOS in groundwater exceeded their respective SLs. PFOA exceed the SL of 6 ng/L with a maximum concentration of 22.9 ng/L at location AOI02-04. PFOS exceed the SL of 4 ng/L with a maximum concentration of 5.23 ng/L at location AOI02-03. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.
- The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at AOI 2 were below their respective SLs. PFBS was not detected in soil at AOI 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.

Table 8-1 summarizes the SI results for soil and groundwater used 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 – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Wash Rack	◐	●	N/A	Proceed to RI
2	AFFF Spill Area	◐	●	N/A	Proceed to RI

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

9. References

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

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