FINAL
Site Inspection Report
Army Aviation Support Facility #3
Jackson, Tennessee

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

April 2023

Prepared for:

Army National Guard Bureau
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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film-forming foam
AOI	Area of Interest
ARNG	Army National Guard
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
DoD	Department of Defense
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
EDR™	Environmental Data Resources, Inc.™
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
FTA	Fire Training Area
GPRS	Ground Penetrating Radar Systems
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
MIL-SPEC	military specification
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NOAA	National Oceanic Atmospheric Administration
OSD	Office of the Secretary of Defense
OWS	Oil-Water Separator
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

131	PQAPP	Programmatic UFP-QAPP
132	PVC	polyvinyl chloride
133	QA	quality assurance
134	QAPP	Quality Assurance Project Plan
135	QC	quality control
136	QSM	Quality Systems Manual
137	SI	Site Inspection
138	SL	screening level
139	SOP	standard operating procedure
140	TDEC	Tennessee Department of Environment and Conservation
141	TNARNG	Tennessee Army National Guard
142	TOC	total organic carbon
143	TPP	Technical Project Planning
144	UCMR 3	Third Uncontaminated Monitoring Rule
145	UFP	Uniform Federal Policy
146	US	United States
147	USACE	United States Army Corps of Engineers
148	USCS	Unified Soil Classification System
149	USEPA	United States Environmental Protection Agency
150	USFWS	United States Fish and Wildlife Service
151	USGS	United States Geological Survey
152	WWTP	Wastewater Treatment Plant

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 perfluorooctanesulfonic acid (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 and the applicable screening levels (SLs) are provided in **Table ES-1**.

The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI location). The objective of the SI is to identify whether there has been a release to the environment from the AOI 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 SLs for relevant compounds. This SI was completed at the Jackson Army Aviation Support Facility #3 (AASF) in Jackson, Tennessee and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1. AASF #3 will also be referred to as the "facility" throughout this document.

AASF #3 is located at 2254 Westover Rd, Jackson, Tennessee, at the McKellar-Sipes Regional Airport in Madison County, Tennessee. The facility is approximately 6 miles west of the City of Jackson and approximately 71 miles northeast of the City of Memphis. The airfield was originally established in 1941 as a military training center (McKellar-Sipes Regional Airport, 2018). The lease agreement references the parcel as previously conveyed to Madison County and the City of Jackson; however, the date of conversion from military to commercial use (likely post-World War II) is not readily available. According to facility personnel, the Tennessee ARNG (TNARNG) has occupied the facility since 1999, with no prior tenants. Historical aerial photos show infrastructure at the AASF #3 location as early as 1997 (Environmental Data Resources [EDR™], 2018).

The PA identified one AOI for investigation during the SI phase. SI sampling results from the one AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation (RI) for AOI 1.

[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.

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.) 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 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	Hangar and Wash Rack	◐	●	◐	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 Army Aviation Support Facility #3 (AASF) in Jackson, Tennessee. The AASF #3 is also referred to as the "facility" throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 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 AASF #3 (AECOM Technical Services, Inc. [AECOM], 2018c) that identified one Area of Interest (AOI) 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 AOI 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. 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.

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2. Facility Background

2.1 Facility Location and Description

AASF #3, which is used by the Tennessee ARNG (TNARNG), is located at the McKellar-Sipes Regional Airport in Madison County, Tennessee, approximately 6 miles west of the City of Jackson, and approximately 71 miles northeast of the City of Memphis (**Figure 2-1**). The geographic coordinates for the facility are (35°35'54.22" N; 88°54' 47.10" W).

TNARNG leases 59.29 acres of the airport property from the City of Jackson and Madison County. The airfield was originally established in 1941 as a military training center (McKellar-Sipes Regional Airport, 2018). The lease agreement references the parcel as previously conveyed to Madison County and the City of Jackson; however, the date of conversion from military to commercial use (likely post-World War II) is not readily available. According to facility personnel, the TNARNG has occupied the facility since 1999, with no prior tenants. Historical aerial photos show infrastructure at the AASF #3 location as early as 1997 (Environmental Data Resources, LLC™ [EDR™], 2018).

2.2 Facility Environmental Setting

AASF #3 lies within the Gulf Coastal Plain physiographic province, within the eastern portion of the Mississippi Embayment, in central southwestern Tennessee. The facility lies west of Johnson Creek, a tributary that flows north to the South Fork of the Forked Deer River. The topography at the facility is generally flat with elevations ranging from 400 to 450 feet above mean sea level (**Figure 2-2**). The area surrounding the facility is rural farm land.

2.2.1 Geology

The geology at AASF #3 is dominated by the Mississippi Embayment, which is a broad structural syncline (trough) that plunges southward along an axis that approximates the Mississippi River (Parks, et al., 1993). The facility is underlain mostly by Quaternary-age loess (United States Geological Survey, 2018). These deposits, under which lies the Memphis Sand, are gray to brown massive clayey and sandy silt (US Department of Agriculture, 1978) and reach maximum thicknesses of 100 feet along bluffs of the Mississippi River and thin to the west (Hardeman, 1966) (**Figure 2-3**). At the facility, the fine-grained loess deposits are characterized as silt with fine-grained sands to fat clays with depths ranging from 14 to 50 feet below ground surface (bgs). Alluvial deposits are found off-facility along the South Fork of the Forked Deer River and tributaries.

Soil borings completed during the SI found low to high plasticity fines with varying levels of clay and sand as the dominant lithology of the unconsolidated soils below the AASF #3. The borings were completed at depths between 25 and 50 feet bgs. Isolated layers of fat clay, lean clay with sand, clayey sand, silty sand, sandy silt, medium sand, and poorly graded sand were also observed in the boring logs at thicknesses ranging from a few inches to 40 feet. Generally, the silt and clay were observed within the top 15-25 feet of the borings. In some borings, the transition from this layer to the poorly graded sand was sharp. Borings AOI01-04 and AOI01-05 were different from the other borings onsite because they did not have any observed poorly graded sand at depth. These observations are consistent with the understood depositional environment of the region.

2.2.2 Hydrogeology

The principal aquifer underlying the facility is the Memphis Sand aquifer. The Memphis Sand primarily consists of a thick body of sand that contains subordinate lenses or beds of clay or silt at various horizons. Recharge to the aquifer comes from infiltration of precipitation that falls on broad area of western Tennessee (Parks and Carmichael, 1990). The sand can range from 400 to 900 feet thick. Where the Memphis Sand aquifer is confined, the potentiometric surface gently slopes (and groundwater flows) to the west (Parks and Carmichael, 1990). Locally, shallow groundwater flow is likely to follow topography, which slopes downward to the northeast (**Figure 2-3**). During the SI, depth to water from temporary monitoring wells was recorded from 10.25 to 46.23 feet bgs. Using this information, groundwater contours were drawn and are shown in **Figure 2-4**. The observed groundwater flow direction at the facility is to the southwest (opposite of the inferred regional groundwater flow direction). This is partly due to the limited spatial coverage of the monitoring well network gauged and the removal of AOI01-04 from the network. After reviewing the boring log and screen interval, it is likely this particular boring was not in hydraulic communication with the other temporary monitoring wells installed.

As noted in the EDR™ Report (2018), a query of the Tennessee Department of Environment and Conservation (TDEC) water well database identified 27 water supply wells within 1 mile of the facility: nine residential, nine commercial or industrial, two agricultural, and seven unspecified. These wells are reportedly located between one-eighth and one mile to the north and west of AASF #3 and range in depth from 28 to 200 feet. Drinking water at AASF #3 is supplied by the local municipal water authority (Jackson Energy Authority). Water is extracted from the Memphis Sands aquifer from 17 deep wells. The water is treated, filtered, and tested at two water treatment plants (Jackson Energy Authority, 2023). Groundwater features are presented in **Figure 2-3.**

2.2.3 Hydrology

Surface water in the vicinity of AASF #3 drains east-northeast toward Johnson Creek, which flows north to the South Fork of the Forked Deer River. The Forked Deer River is used recreationally for activities including paddling and fishing. Local surface drainage at AASF #3 is conveyed to the south and east, toward shallow ditches that generally align with fencing. The ditches drain to a ponded area (**Figure 2-4**) east and outside of the facility boundary and to Johnson Creek through tributaries. Drains in the AASF and wash rack are connected to an onsite oil water separator which eventually end up in the local wastewater treatment plant (WWTP). Regional watersheds and surface drainage features within the vicinity of AASF #3 are presented in **Figure 2-5**.

2.2.4 Climate

Data from McKellar-Sipes Regional Airport indicate that the mean annual temperature between 1981 and 2010 was 59.8 degrees Fahrenheit (ºF) (National Oceanic and Atmospheric Administration [NOAA], 2018). The warmest months are July and August, with normal daily mean temperatures of 79.5 ºF and 78.6 ºF, respectively. January is the coldest month, with a mean temperature of 38.2 ºF. Average annual precipitation measured from 1981 to 2010 at McKellar-Sipes Regional Airport was 53.27 inches; average monthly precipitation ranges from 3.00 inches in August to 5.69 inches in May. Rainfall is heaviest during the spring and winter, with seasonal average rainfalls of 15.30 inches and 13.59 inches respectively. August and September are the driest months in this region.

2.2.5 Current and Future Land Use

The AASF is generally used for the operation and maintenance of rotary winged aircraft. The McKellar-Sipes Regional Airport is a public use airport, with general aviation services located on the west side and AASF #3 on the east side. A variety of residential, commercial/industrial, and

agricultural parcels surround the northern and western sides of the airport property; areas east and south are predominately agricultural. No future changes to the current use were noted during personnel interviews.

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 birds, clams, plants, insects, and mammals are federally endangered, threatened, proposed, and/ or are listed as candidate species in Jackson County, Tennessee (US Fish and Wildlife Service, 2022).

- **Birds:** Bald Eagle, *Haliaeetus leucocephalus* (recovery)
- **Clams:** Pink mucket, *Lampsilis abrupta* (endangered); Purple lilliput, *Toxolasma lividum* (resolved taxon); Dromedary pearlymussel, *Dromus dromas* (endangered); Yellow blossom, *Epioblasma florentina* (endangered); Spectaclecase, *Cumberlandia monodonta* (endangered)
- **Flowering Plants:** Shorts bladderpod, *Physaria globosa* (endangered)
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)
- **Mammals**: Gray bat, *Myotis grisescens* (endangered); Tricolored bat, *Perimyotis subflavus* (under review); Little brown bat, *Myotis lucifugus* (under review); Northern long-eared bat, *myotis septentrionalis* (threatened); Indiana bat, *myotis sodalis* (endangered)

2.3 History of PFAS Use

One AOI was identified in the PA where AFFF may have been used, stored, disposed, or released historically at AASF #3 (AECOM, 2018c). AFFF may have historically been released at the facility during annual fire suppression system testing at the former and current hangar. This annual testing occurred from 1997 to 2016. Additionally, a 2006 release of approximately 300 gallons of AFFF occurred when the AFFF aboveground storage tank bladder was replaced. The potential release areas were grouped into one AOI based on preliminary data and presumed groundwater flow directions. A description of the AOI is presented in **Section 3**.

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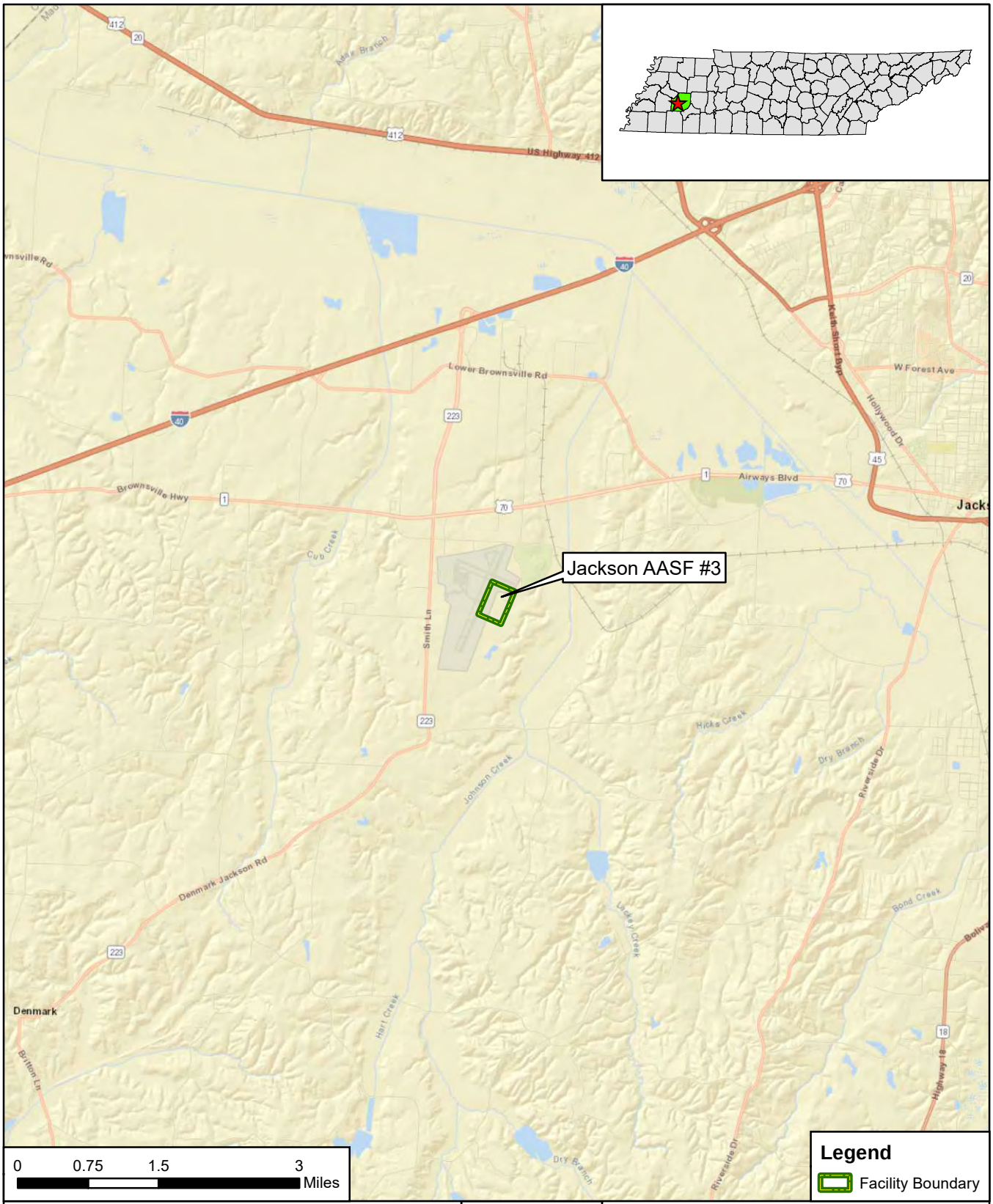

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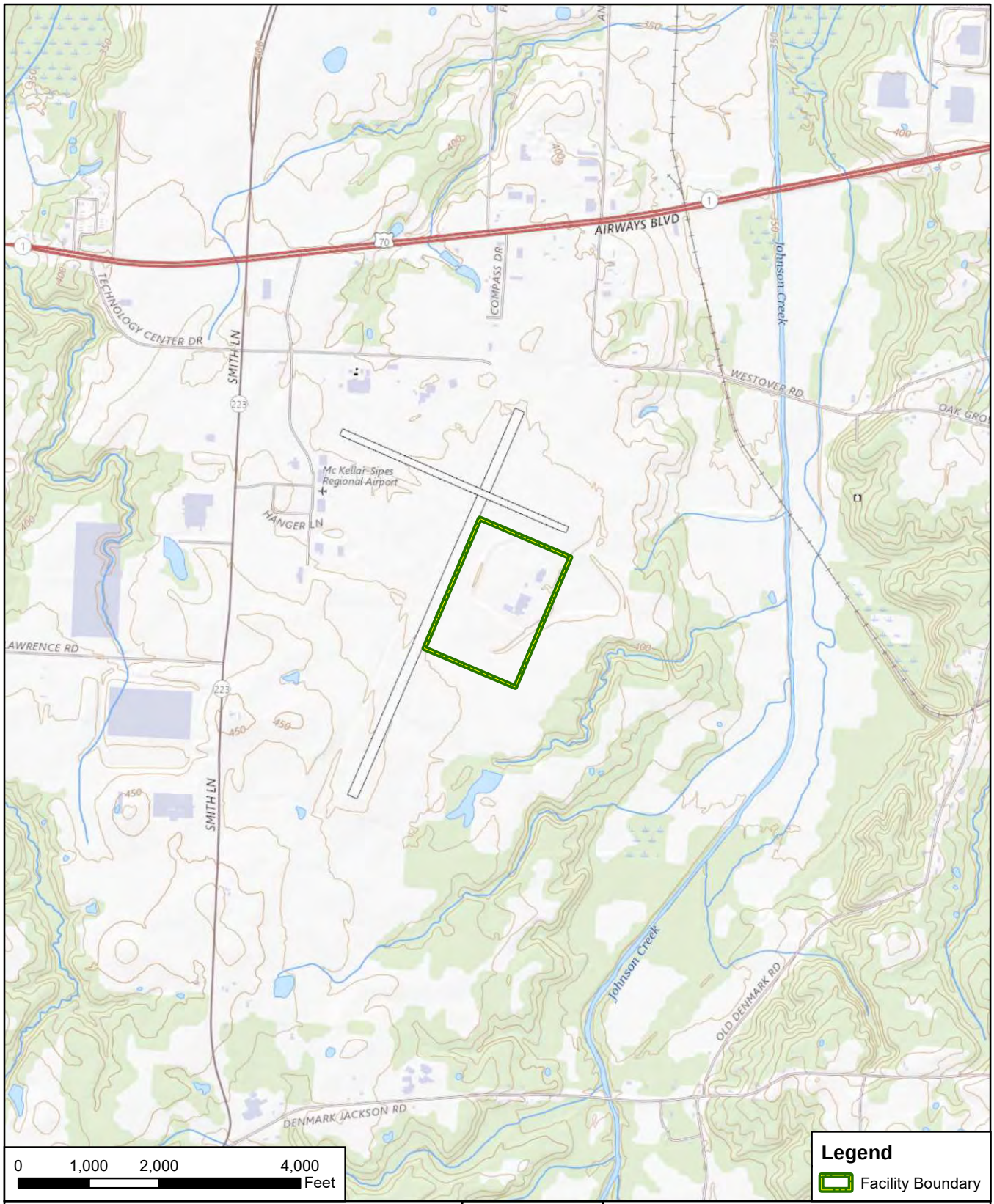
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China		PM	CM	9/16/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



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SCALE	1:24,000	CHK BY	JD	9/16/2022
USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names		PM	CM	9/16/2022

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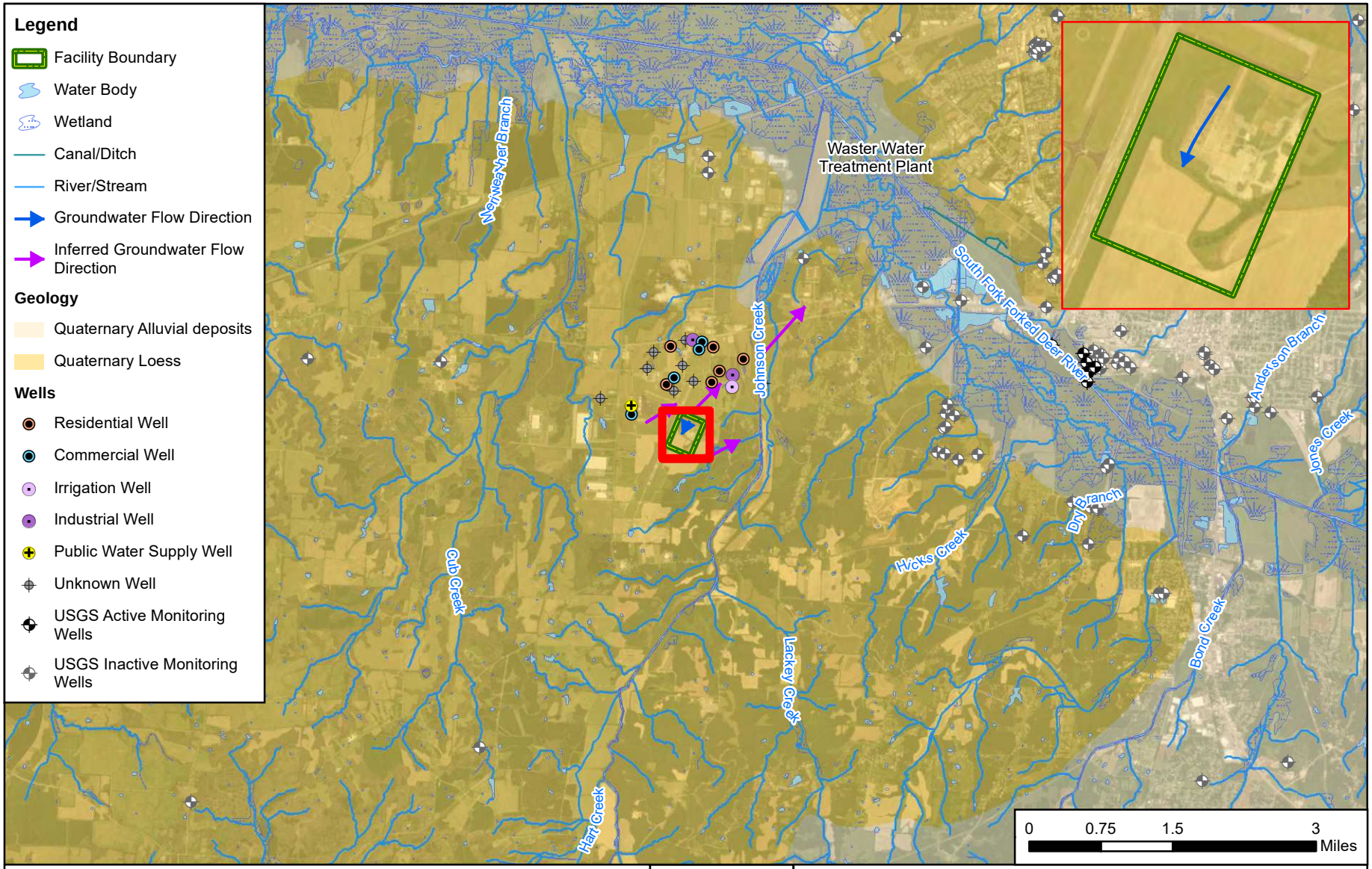
Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

Groundwater elevations in ft NAVD88.

* Not included in contour map. Hydraulically not connected.

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
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SCALE	1:4,800	CHK BY	JD	11/3/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	11/3/2022

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Groundwater Elevations, April 2022

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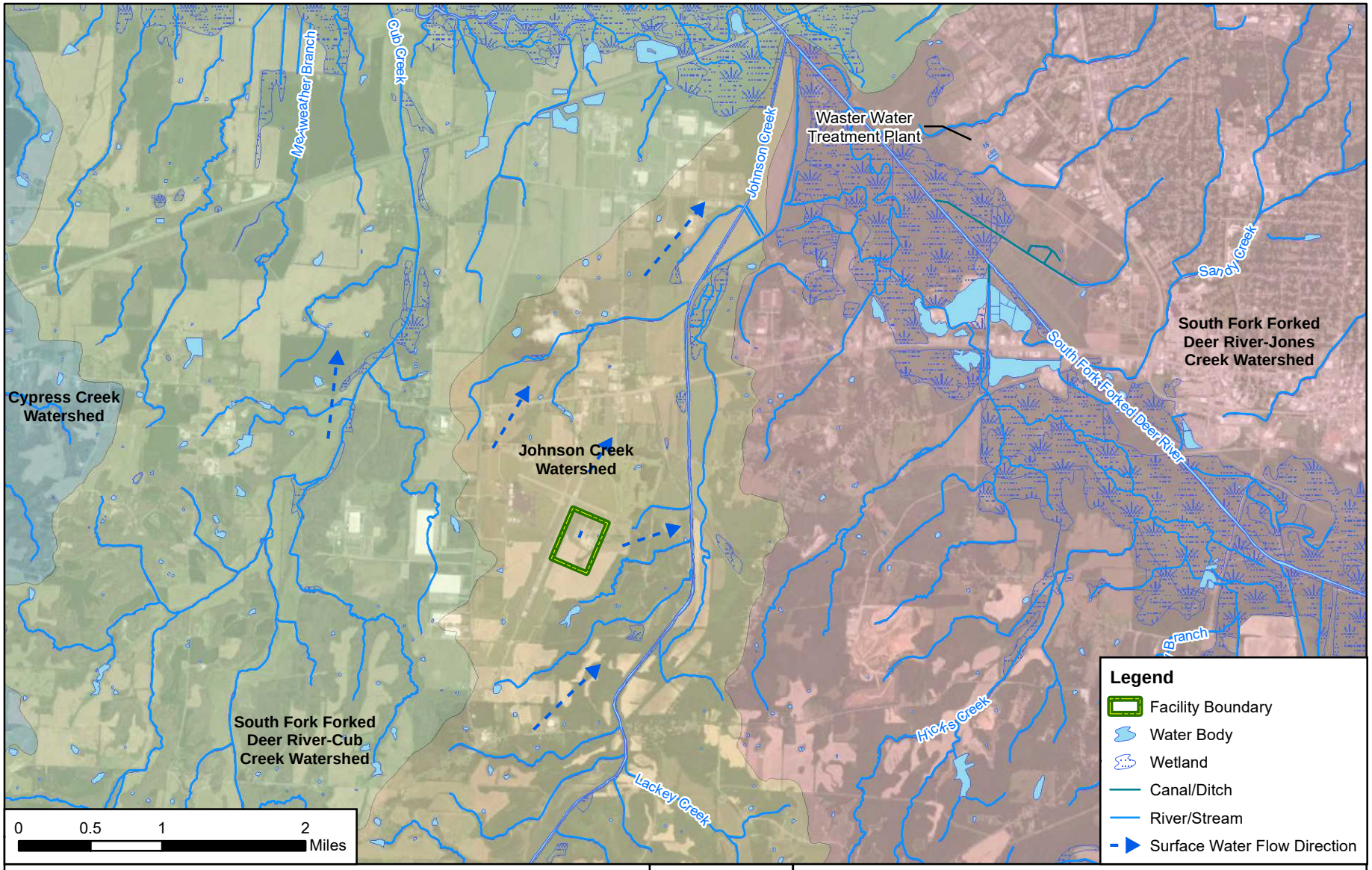
Figure 2-4



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Surface Water Features

AECOM
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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. Based on the PA findings, one Area of Interest was identified at AASF #3. The AOI is shown on **Figure 3-1**.

3.1 AOI 1 Hangar and Current & Former Wash Rack

AOI 1 includes the AASF #3 hangar building, wash rack building, storage building, and former wash rack. The hangar is located in the central portion of the facility, adjacent to the eastern side of the flight line; it is used for helicopter maintenance, storage, and training. The current hangar was built in October 2003, in the same location as the previous (original) hangar, which was destroyed by a tornado. Historical aerial photos indicate the original hangar was constructed between 1992 and 1997 (EDR™, 2018). TNARNG staff report the original hangar was not equipped with a fire suppression system; only dry chemical fire extinguishers were installed. The current hangar contains an AFFF fire suppression system with dispensing nozzles installed in the hangar ceiling connected via piping to two 300-gallon AFFF above ground storage tanks inside the hangar.

A 2006 release of approximately 300 gallons of AFFF is suspected during an AFFF aboveground storage tank bladder replacement, with additional unspecified quantities released in the past from 2003-2015. The releases occurred inside the AASF #3 hangar building. Releases may have also occurred during AFFF fire extinguisher testing/training (hand-held and mobile carts) conducted at the former wash rack (1997-2003) and current wash rack building (2003-2016).

Releases at the hangar and wash racks would have been conveyed to their respective drains and oil-water separators (OWSs), and then to the airport wastewater collection system, and possibly ultimately discharged to the Jackson Energy Authority WWTP. Based on the nature of the release (during maintenance/routine testing/training), it appears unlikely AFFF would have been discharged to the ground surface outside of the hangar building or wash racks, where surface drainage is conveyed to an area of ponding outside the AASF #3 boundary, to the east. AFFF has historically been stored in the storage building on the property and is, therefore, also considered a potential release area.

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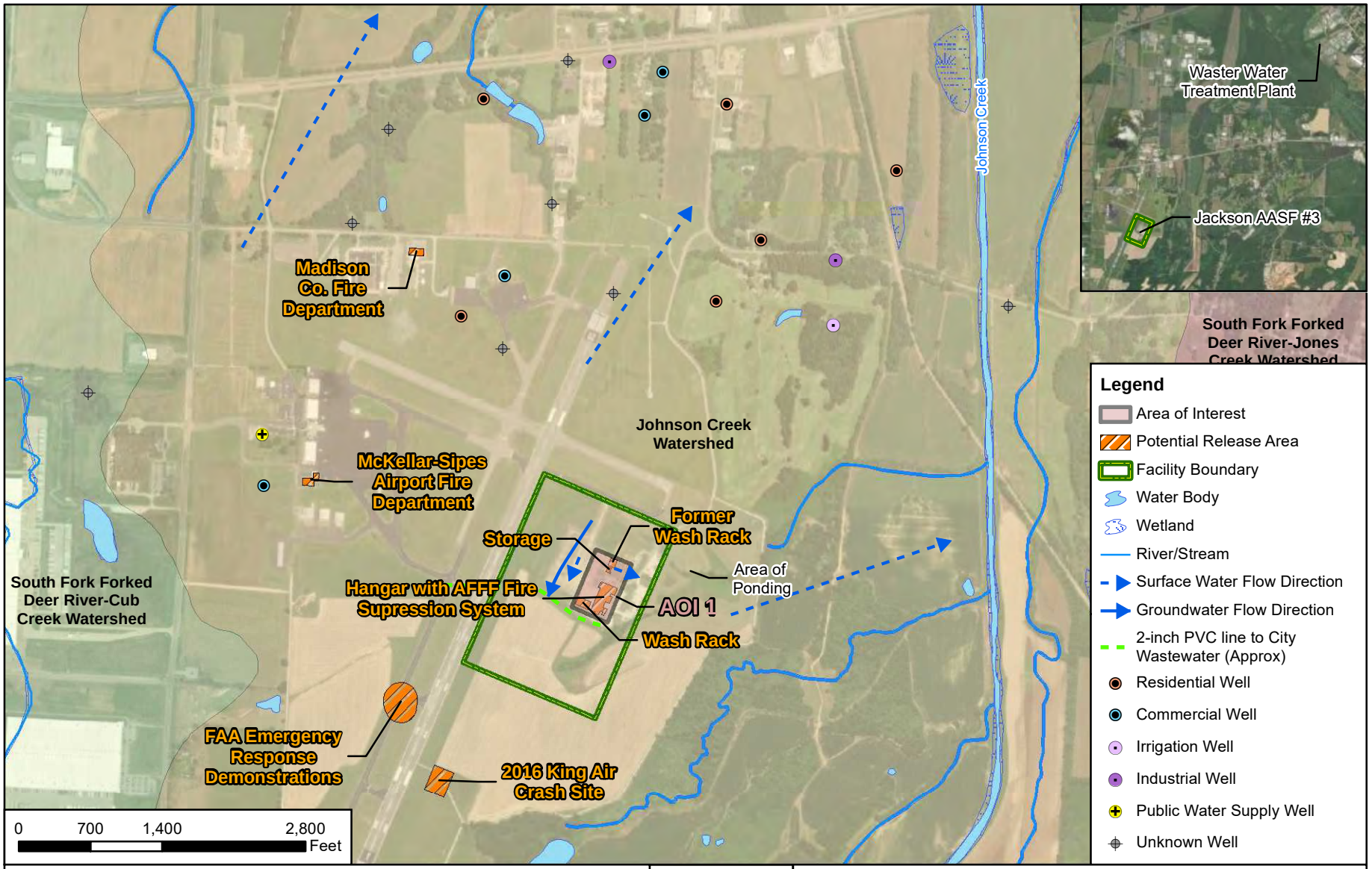

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PROJECT	Site Inspection at Jackson AASF #3, TN			
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Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

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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, 2022a), the objective of the SI is to identify whether there has been a release to the environment at the AOI identified in the PA. For the 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 the sampled AOI.

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 included:

- The PA for AASF #3 (AECOM, 2018c);
- 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, 2022a); 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 is horizontally bounded by the property limits of AASF #3 (**Figure 2-2**). Off-facility sampling is not included in the scope of this SI; however, if future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with the property owner(s). The scope of the SI is vertically bounded as follows: groundwater (50 feet bgs), soil from direct-push technology (DPT)/rotosonic borings (50 feet bgs), surface soil (0 to 2 feet bgs). The temporal boundaries of the study are limited by the seasonal conditions present when the field work was performed in Spring 2022.

4.4 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the Department of Defense (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, 2022a).

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; DoD, 2019b; USEPA, 2017b).

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, 2022a).

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, Jackson Army Aviation Support Facility #3, Jackson* dated January 2022 (AECOM, 2018c);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Army Aviation Support Facility #3, Jackson, Tennessee* dated March 2022 (AECOM, 2022a); and
- *Final Site Safety and Health Plan, Army Aviation Support Facility #3, Jackson, Tennessee* dated March 2022 (AECOM, 2022b).

The SI field activities were conducted from 22 March to 14 April 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2022a), 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:

- Nineteen (19) soil samples from 7 boring locations;
- Six grab groundwater samples from 6 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**, land survey data are provided in **Appendix B3**, and Field Change Request Forms are provided in **Appendix B4**. 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 AOI identified in the PA.

A combined TPP Meeting 1 and 2 was held on 26 March 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 G-9, TNARNG, USACE, and TDEC. 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, 2022a).

A TPP Meeting 3 was held (TDB)_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's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the USA north 811 "Call Before You Dig" Tennessee utility clearance provider to notify them of intrusive work on 15 March 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 23 March 2022 with input from the AECOM field team and AASF #3 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

One potable water source at AASF #3 was sampled on 20 January 2022 to assess usability for decontamination of drilling equipment. The sample (JAASF-DECON) collected at the spigot was analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. Results, including the detected PFOA concentration, confirmed this source to be acceptable for use in this investigation based on the 2021 OSD memo SLs applicable at the time; therefore, it was used throughout the field activities. After the field investigation was completed, the July 2022 OSD update was issued. 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, 2022a). 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 to avoid disturbing concrete or asphalt surfaces. Soil samples were collected via DPT and rotosonic drilling, in accordance with the SI QAPP Addendum (AECOM, 2022a). A Geoprobe® DPT rig was used to collect continuous soil cores to the target depth. Due to site conditions and DPT limitations, a rotosonic drill rig was mobilized to advance those borings installed via DPT and collect deeper soil samples. 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 in **Table 5-1**. Several boring locations were adjusted within a 50-feet offset for reasons including drill rig access, utility

avoidance, and bias toward sampling within observed drainage features (see **Section 5.8** for additional details).

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table.

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 low to high plasticity fines with varying levels of clay and sand as the dominant lithology of the unconsolidated soils below the AASF #3. The borings were completed at depths between 25 and 50 feet bgs. Isolated layers of fat clay, lean clay with sand, clayey sand, silty sand, sandy silt, medium sand, and poorly graded sand were also observed in the boring logs at thicknesses ranging from a few inches to 40 feet. Generally, the silt and clay were observed within the top 15-25 feet of the borings. In some borings, the transition from this layer to the poorly graded sand was sharp. Borings AOI01-04 and AOI01-05 were different from the other borings onsite because they did not have any observed poorly graded sand at depth. 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) and pH (USEPA Method 9045D) in accordance with the SI QAPP Addendum (AECOM, 2022a).

Field duplicate samples were collected at a rate of 10 percent (%) and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/MS 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 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, 2022a) using bentonite chips at completion of sampling activities.

5.3 Temporary Well Installation and Groundwater Grab Sampling

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

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 peristaltic 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, and oxidation-reduction potential) 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, 2022a).

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, 2022a) by removing the PVC and backfilling the hole with bentonite chips to approximately 6 inches bgs. 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 8 April 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 is provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Tennessee-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2022a). Survey data from the newly installed wells on the facility were collected on 14 April 2022 in the applicable Universal Transverse Mercator zone projection with North American Datum 1983 State Plane (horizontal) and North American Vertical Datum 1988. The surveyed well data are provided in **Appendix B3**.

5.6 Investigation-Derived Waste

As of the date of this report, the disposal of investigation-derived waste (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, 2022a) 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 waste storage area designated by the AASF #3 Environmental Manager and TNARNG. ARNG will coordinate waste

profiling, transportation, and disposal of the solid IDW. The soil IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were contained in labeled, 55-gallon DOT-approved steel drums, and left onsite in a waste storage area designated by TNARNG. The liquid IDW was not sampled and assumes the PFAS characteristics of the associated groundwater samples collected from that source location. Containerized liquid IDW will be managed and disposed of by ARNG (either by offsite disposal or onsite disposal with treatment, as appropriate) under a separate contract in accordance with SOP No. 042A (EA, 2021).

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. The deviations are noted below and are documented in Field Change Request Forms (**Appendix B4**):

- During the first mobilization to AASF #3 (21 to 24 March 2022), a DPT drill rig was used to advance three of the six scoped borings. First water was observed in a relatively tight, sand-dominated unit between approximately 15 and 35 feet bgs. Field personnel observed that groundwater levels fluctuated in two boreholes, and the third borehole was dry to 30 feet bgs. It was determined that borings would need to be advanced to a greater depth in order to collect groundwater samples. Additionally, the tight sand formation at depth made it difficult for the DPT rig to pull rods out of hole. According to AECOM drilling subcontractor Cascade, rotosonic drilling methods are ideal for depths greater than 30 feet bgs. Continuing with DPT method would have led to continued delays and potential equipment damage. The decision was made by USACE, ARNG, and AECOM to mobilize a rotosonic drill to facilitate drilling in tighter soils and to a greater depth than DPT. This action was documented in a field change request provided in **Appendix B4**.

- During the site walk on 22 March 2022, two proposed boring locations (AOI01-01 and AOI01-05) were revised due to onsite conditions or limitations. The original location of AOI01-01 was in a grassy area north-northeast of the Wash Rack but surrounded by a fire hydrant and other possible underground utilities. Additionally, facility personnel expressed concern about visual obstruction of the flight ramp from the Hangar window during drilling activities. The revised location for AOI01-01 was moved north by approximately 120 feet to a drainage swale in a grassy area. The new location still conformed with the rationale for original location, as it is still downgradient of the Wash Rack potential release area. The original location of AOI01-05 was in a grassy patch north-northeast of the OWS. Site observations indicated the area would be too tight for drill rig due to presence of multiple CONNEX boxes. The revised location for AOI01-05 was moved immediately adjacent to the OWS, to the north, approximately 50 feet south-southwest of the original location. This action was documented in a field change request provided in **Appendix B4**.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Jackson AASF #3, Tennessee

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)	Comments
Soil Samples						
AOI01-01-SB-00-02	3/23/2022 9:00	0-2	x			
AOI01-01-SB-00-02-D	3/23/2022 9:00	0-2	x			Duplicate
AOI01-01-SB-00-02-MS	3/23/2022 9:00	0-2	x			MS
AOI01-01-SB-00-02-MSD	3/23/2022 9:00	0-2	x			MSD
AOI01-01-SB-13-15	3/23/2022 9:54	13-15	x			
AOI01-01-SB-40-42	4/5/2022 10:30	40-42	x			
AOI01-02-SB-00-02	3/24/2022 7:50	0-2	x	x		TOC/pH
AOI01-02-SB-00-02-D	3/24/2022 7:50	0-2		x		TOC/pH Duplicate
AOI01-02-SB-00-02-MS	3/24/2022 7:50	0-2		x		TOC/pH MS
AOI01-02-SB-00-02-MSD	3/24/2022 7:50	0-2		x		TOC/pH MSD
AOI01-02-SB-13-15	3/24/2022 8:40	13-15	x			
AOI01-02-SB-32-34	4/5/2022 16:00	32-34	x			
AOI01-03-SB-00-02	3/23/2022 11:05	0-2	x			
AOI01-03-SB-13-15	3/23/2022 14:23	13-15	x			
AOI01-03-SB-32-34	4/5/2022 13:30	32-34	x			
AOI01-04-SB-00-02	3/24/2022 13:40	0-2	x			
AOI01-04-SB-05-07	4/6/2022 12:50	5-7	x			
AOI01-04-SB-11-13	4/6/2022 13:00	11-15	x			
AOI01-05-SB-00-02	4/7/2022 14:15	0-2	x			
AOI01-05-SB-13-15	4/7/2022 14:00	13-15	x			
AOI01-05-SB-38-40	4/7/2022 14:30	38-40	x			
AOI01-06-SB-00-02	3/24/2022 13:15	0-2	x			
AOI01-06-SB-13-15	4/6/2022 10:15	13-15	x			
AOI01-06-SB-30-32	4/6/2022 10:40	30-32	x			
AOI01-07-SB-00-02	3/24/2022 10:30	0-2	x			
Groundwater Samples						
AOI01-01-GW	4/6/2022 16:02	NA	x			
AOI01-02-GW	4/6/2022 13:26	NA	x			
AOI01-02-GW- D	4/6/2022 13:26	NA	x			Duplicate
AOI01-02-GW- MS	4/6/2022 13:26	NA	x			MS
AOI01-02-GW- MSD	4/6/2022 13:26	NA	x			MSD
AOI01-03-GW	4/6/2022 14:26	NA	x			
AOI01-04-GW	4/7/2022 11:12	NA	x			
AOI01-05-GW	4/7/2022 9:30	NA	x			
AOI01-06-GW	4/6/2022 15:21	NA	x			

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Jackson AASF #3, Tennessee

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)	Comments
Quality Control Samples						
JAASF-FRB-01	3/23/2022 8:50	NA	x			FRB
JAASF-ERB-01	3/24/2022 14:30	NA	x			ERB taken off of hand auger #1 (old from dril
JAASF-ERB-02	3/24/2022 13:00	NA	x			ERB taken off of hang auger #2 (AECOM rer
JAASF-ERB-03	3/24/2022 12:00	NA	x			ERB taken off of hand auger #3 (drillers' repl
JAASF-ERB-04	3/24/2022 15:30	NA	x			ERB taken off of cutting shoe (DPT rig)
JAASF-ERB-SHOE	4/7/2022 12:00	NA	x			ERB taken off of cutting shoe (sonic rig)
JAASF-DECON	1/20/2022 0:00	NA	x			
JAASF-DECON-02	3/24/2022 11:50	NA	x			DECON (through hose)

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

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Jackson AASF #3, Tennessee

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	45	40 - 45	415.56	413.60	35.65	33.69	379.91
	AOI01-02	50	45 - 50	416.00	414.00	36.32	34.32	379.68
	AOI01-03	50	45 - 50	415.00	412.80	35.75	33.55	379.25
	AOI01-04	25	10 - 15	415.40	415.10	10.55	10.25	404.85
	AOI01-05	50	45 - 50	414.70	414.30	46.63	46.23	368.07
	AOI01-06	45	40 - 45	412.89	410.99	33.01	31.11	379.88

Notes:

[1]Temporary well screen at AOI01-04 set above total depth to capture groundwater interface.

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

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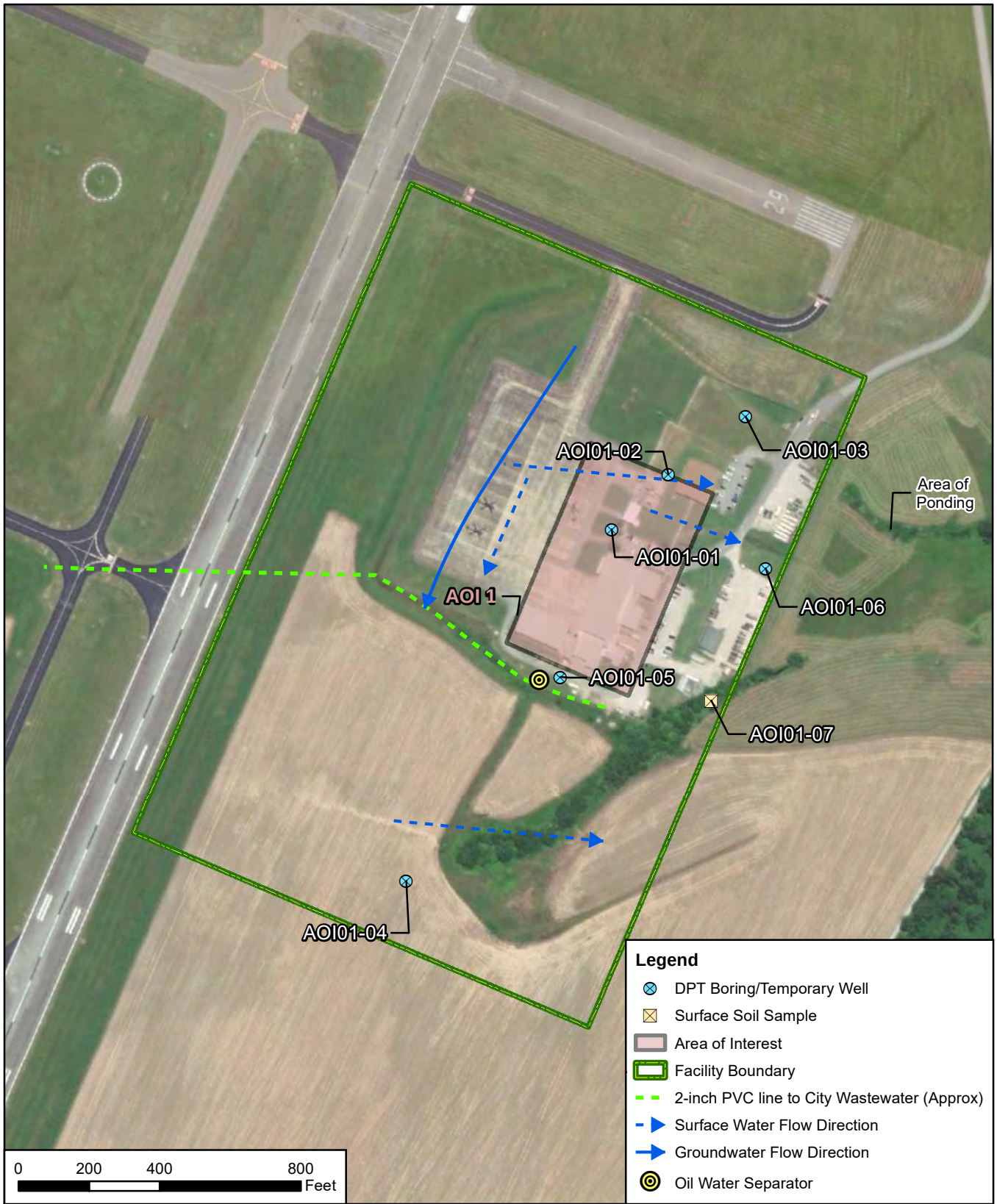

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	JD	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

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 6.5**. **Table 6-2** through **Table 6-5** 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. 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.) 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.

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

6.2 Soil Physicochemical Analyses

To provide basic soil parameter information, soil samples were analyzed for TOC and pH, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC and pH sampling. TOC results ranged from 297 to 1110 micrograms per liter and the one pH result was 5.57.

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: Hangar and Current & Former Wash Rack. The soil and groundwater results are summarized on **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.3.1 AOI 1 Soil Analytical Results

Surface soil samples were taken from 0 to 2 feet bgs at boring locations AOI01-01 through AOI01-07. Soil samples were also collected from shallow subsurface intervals (5 to 15 feet bgs) and deep subsurface intervals (30 to 42 feet bgs) from boring locations AOI01-01 through AOI01-03, AOI01-05, and AOI01-06. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in surface soil at concentrations below their SLs. The maximum detected concentration among all five compounds was for PFOA, detected at 0.428 J micrograms per kilogram (µg/kg) at AOI01-01. PFOS, PFOA, and PFNA were detected in shallow subsurface soil at concentrations below their SLs. Similar to the surface soil, PFOA had the highest detected concentration at 0.160 J µg/kg at AOI01-01. PFOA was detected in deep subsurface soil at concentrations below its SL. PFOA was detected at location AOI01-01 with a concentration of 0.181 J µg/kg. PFBS, PFHxS, PFOS, and PFNA were not detected in deep 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 6-5** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring wells AOI01-01 through AOI01-06. PFOA was detected above the SL of 6 nanograms per liter (ng/L) at location AOI01-01, with a concentration of 76.3 ng/L. PFOS, PFBS, and PFHxS was detected, but were below their applicable SLs. PFNA was not detected in any temporary monitoring wells.

6.3.3 AOI 1 Conclusions

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

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Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Army Aviation Support Facility #3

	Area of Interest	AOI01		AOI01		AOI01		AOI01		AOI01		AOI01		AOI01		AOI01	
	Sample ID	AOI01-01-SB-00-02		AOI01-01-SB-00-02-D		AOI01-02-SB-00-02		AOI01-03-SB-00-02		AOI01-04-SB-00-02		AOI01-05-SB-00-02		AOI01-06-SB-00-02		AOI01-07-SB-00-02	
	Sample Date	03/23/2022		03/23/2022		03/24/2022		03/23/2022		03/24/2022		04/07/2022		03/24/2022		03/24/2022	
	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	
Analyte	**OSD Screening Level [a]**	**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	U	0.024	J	ND	U
PFHxS	130	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	0.062	J	ND	U
PFNA	19	0.306	J	0.265	J	ND	U	0.105	J	0.030	J	0.057	J	0.026	J	0.307	J
PFOA	19	0.376	J	0.428	J	ND	U	ND	U	ND	U	ND	U	ND	U	0.363	J
PFOS	13	0.332	J	0.315	J	ND	U	0.141	J	0.074	J	ND	U	0.107	J	0.185	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

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
SB	soil boring
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, Army Aviation Support Facility #3

Area of Interest		AOI01													
Sample ID		AOI01-01-SB-13-15		AOI01-02-SB-13-15		AOI01-03-SB-13-15		AOI01-04-SB-05-07		AOI01-04-SB-11-13		AOI01-05-SB-13-15		AOI01-06-SB-13-15	
Sample Date		03/23/2022		03/24/2022		03/23/2022		04/06/2022		04/06/2022		04/07/2022		04/06/2022	
Depth		13-15 ft		13-15 ft		13-15 ft		5-7 ft		11-13 ft		13-15 ft		13-15 ft	
Analyte	**OSD Screening Level [a]**	**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	25000	ND	U	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	ND	U
PFNA	250	0.071	J	ND	U	ND	U	0.027	J	ND	U	0.079	J	ND	U
PFOA	250	0.160	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	0.088	J	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

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
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
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Army Aviation Support Facility #3

Area of Interest	AOI01									
Sample ID	AOI01-01-SB-40-42		AOI01-02-SB-32-34		AOI01-03-SB-32-34		AOI01-05-SB-38-40		AOI01-06-SB-30-32	
Sample Date	04/05/2022		04/05/2022		04/05/2022		04/07/2022		04/06/2022	
Depth	40-42 ft		32-34 ft		32-34 ft		38-40 ft		30-32 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)										
PFBS	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	0.181	J	ND	U	ND	U	ND	U	ND	U
PFOS	ND	U	ND	U	ND	U	ND	U	ND	U

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
DL	detection limit
ft	feet
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
µg/kg	micrograms per kilogram

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Army Aviation Support Facility #3

Area of Interest		AOI01													
Sample ID		AOI01-01-GW		AOI01-02-GW		AOI01-02-GW-D		AOI01-03-GW		AOI01-04-GW		AOI01-05-GW		AOI01-06-GW	
Sample Date		04/06/2022		04/06/2022		04/06/2022		04/06/2022		04/07/2022		04/07/2022		04/06/2022	
Analyte	OSD Screening Level [a]	Result	Qual	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	2.58	J	1.62	J	1.38	J	1.24	J	ND	U	1.18	J	2.00	J
PFHxS	39	4.02		21.7		21.2		1.78	J	1.61	J	7.85		4.42	J
PFNA	6	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	6	76.3		2.09	J	2.00	J	ND	U	ND	U	ND	U	ND	U
PFOS	4	ND	U	ND	U	ND	U	0.871	J	2.58	J	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 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
DL	detection limit
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

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Oil Water Separator

0 200 400 800 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

Deep

AOI01-01
AOI01-02
AOI01-03
AOI01-04
AOI01-05
AOI01-06
AOI01-07

PFOS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Oil Water Separator

0 200 400 800 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

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Oil Water Separator

0 200 400 800 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

Deep

AOI01-01
AOI01-02
AOI01-03
AOI01-04
AOI01-05
AOI01-06
AOI01-07

PFHxS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Oil Water Separator

0 200 400 800 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

CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,800	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Oil Water Separator

0 200 400 800 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 Jackson AASF #3, TN			
REVISED	10/6/2022	GIS BY	MS	10/6/2022
SCALE	1:4,800	CHK BY	AB	10/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/6/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Groundwater Flow Direction
Oil Water Separator

0 200 400 800 Feet

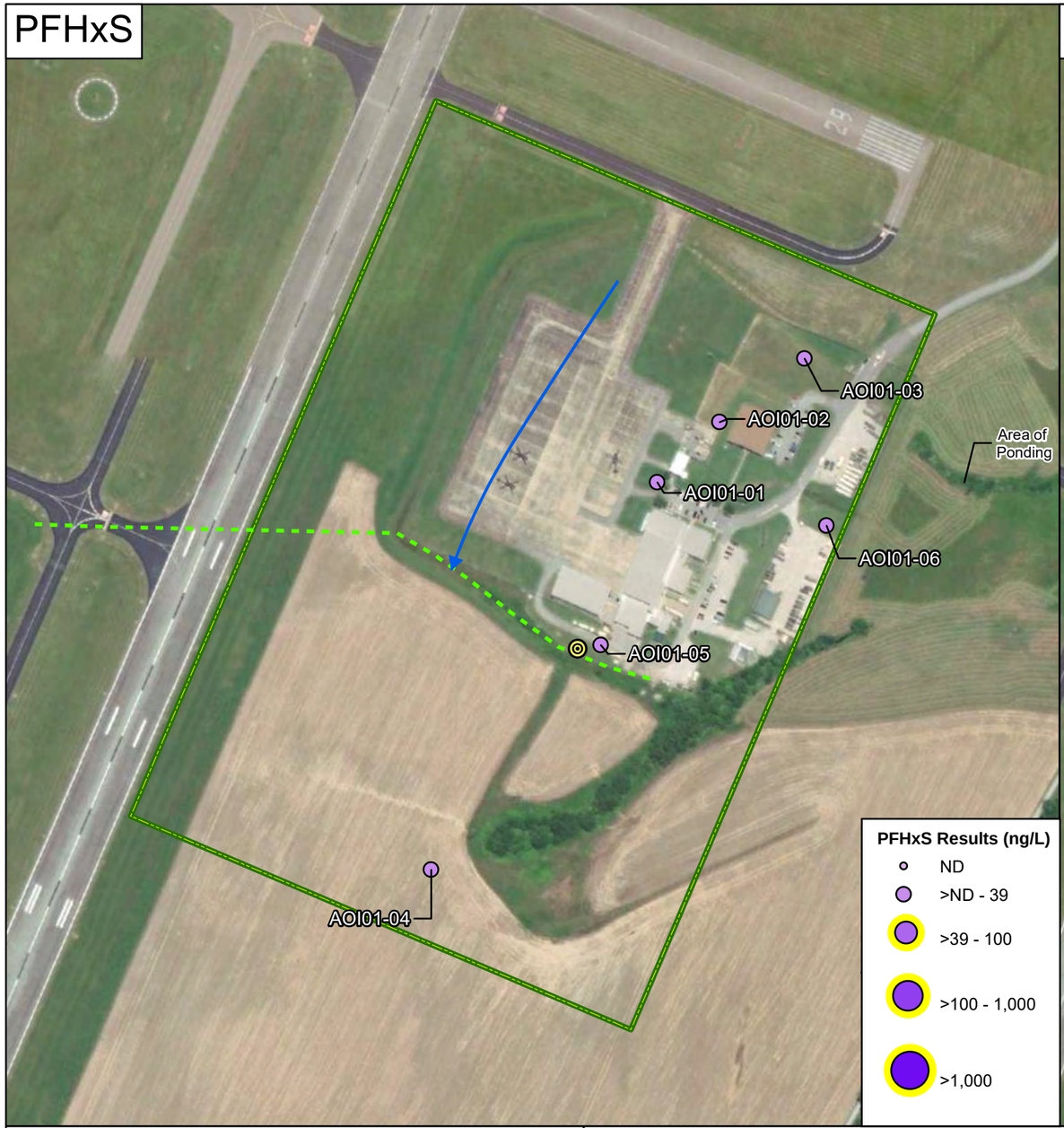
Exceedances of the OSD SL are depicted with a yellow halo.

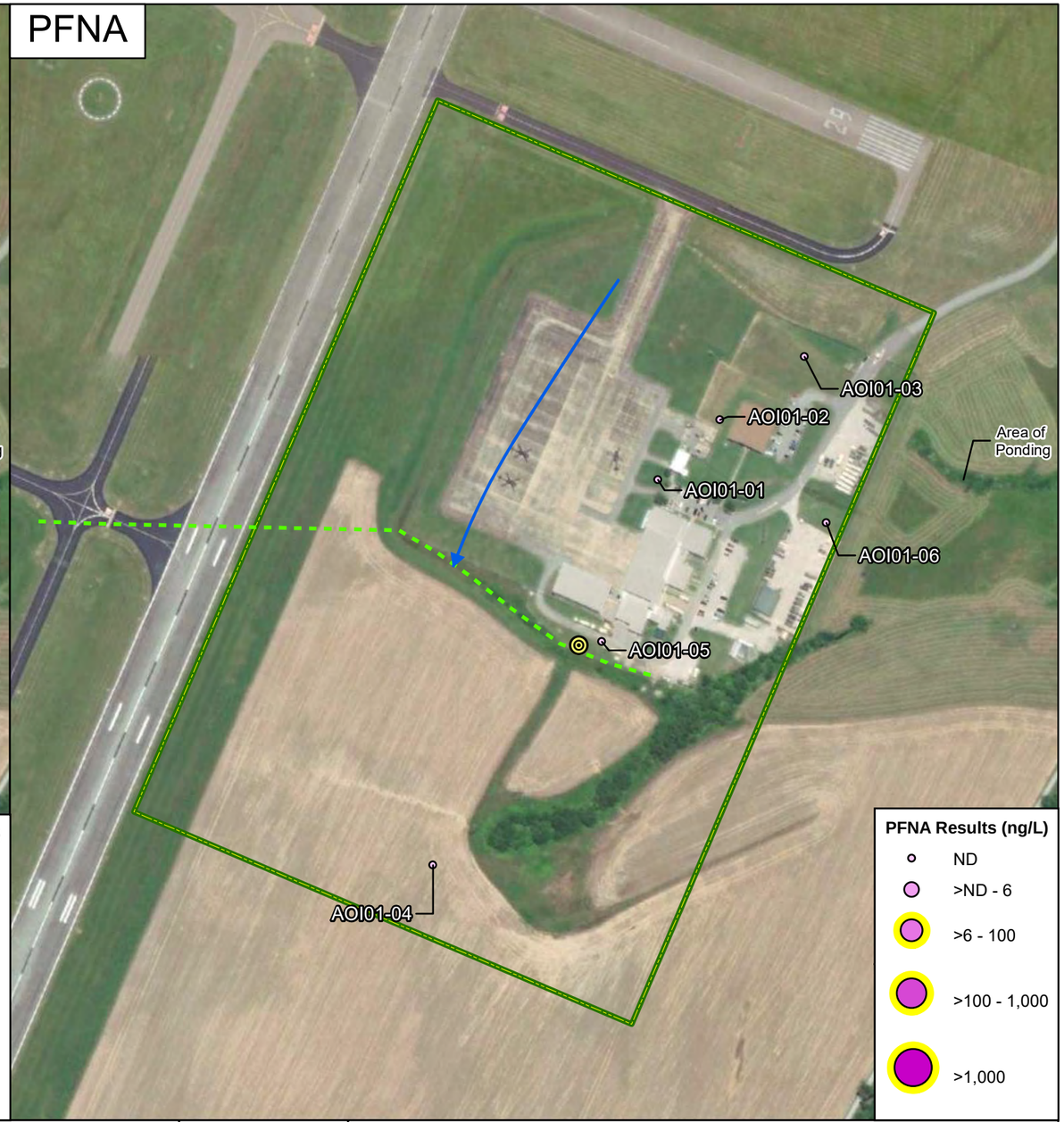
N

PFOA, PFOS, and PFBS Detections in Groundwater

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-6





CLIENT	ARNG			
PROJECT	Site Inspection at Jackson AASF #3, TN			
REVISED	9/16/2022	GIS BY	MS	9/16/2022
SCALE	1:4,200	CHK BY	AB	9/16/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/16/2022

Facility Boundary
2-inch PVC line to City Wastewater (Approx)
Groundwater Flow Direction
Oil Water Separator

0 175 350 700 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 CSM for the AOI, 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 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 CSM indicates 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 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 based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 is the Hangar and Current & Former Wash Rack, where controlled AFFF releases through familiarization training have occurred annually potentially as early as 1997. Releases may have also occurred during AFFF fire extinguisher testing/training (hand-held and mobile carts) conducted at the former wash rack (1997-2003) and current wash rack building (2003-2016).

PFOA, PFOS, PFHxS, PFNA, and PFBS 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 pathways for site workers and future construction workers are potentially complete. PFNA, PFOA, and PFOS were detected in subsurface soil at AOI 1. Construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the subsurface soil exposure pathway for construction workers is potentially complete. There are no residential properties or recreational areas immediately adjacent to the facility. Additionally, the facility is secured against trespassers. Therefore, the surface soil pathway is incomplete to off-facility residents and recreational users/trespassers. The CSM for AOI 1 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

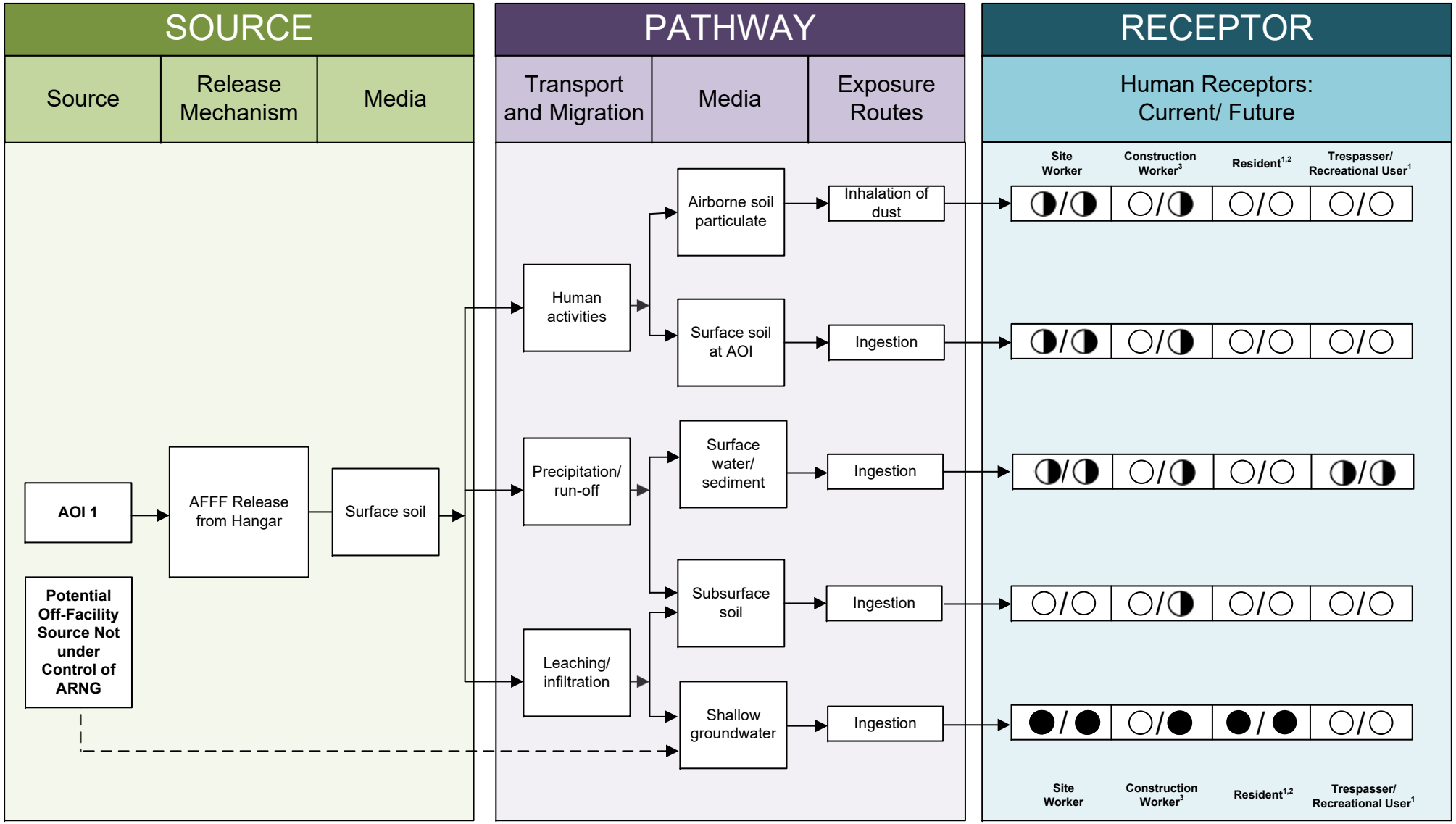
PFOA was detected above its SL in groundwater samples collected at AOI 1. Potential PFAS contamination may have further infiltrated to groundwater, which is shown to flow southwest at the facility and northeast on a regional scale. A well inventory of the area indicated that groundwater could migrate to water supply wells identified within 1 mile of the facility. It is unclear whether water at the facility is provided by the identified water supply wells. Due to the presence of public water supply wells within a 1-mile radius of the facility, the pathway for exposure to current and future site workers and current and future off-facility residents via ingestion of groundwater is considered potentially complete. Depths to water measured at AOI 1 in April 2022 during the SI ranged from 10.25 to 46.23 feet bgs. Therefore, the ingestion exposure pathway for future construction workers is considered potentially complete. The CSM for AOI 1 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 the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors. At the AOI where surface water and sediment samples were not collected, data from downgradient AOI or the SI results in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 AOI 1

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 1, therefore, it is possible that these compounds may have migrated from soil and groundwater to Johnson or Cub Creek. Furthermore, releases at the hangar and wash racks would have been conveyed to their respective drains and OWSs and ultimately discharged to the Jackson Energy Authority WWTP. The Jackson Energy Authority WWTP discharges to the South Fork of the Deer Forked River. Therefore, the surface water and sediment exposure pathway is potentially complete for current and future site workers, future construction workers, and current and future off-facility recreational users.



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. No current active construction at the facility.

Figure 7-1
Conceptual Site Model, AOI 1
Jackson AASF#3

835

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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 22 March to 14 April 2022 and consisted of utility clearance, direct push/ rotosonic drilling, 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, 2022a), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2022a), 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.

- Nineteen (19) soil samples from 7 boring locations;
- Six grab groundwater samples from 6 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 an AOI 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 AOI, which are described in **Section 7**.

8.2 Outcome

Based on the results of this SI, further evaluation under CERCLA is warranted in an RI for AOI 1. Based on the CSM developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1 sources on the facility resulting from historical DoD activities. Analytical concentrations from samples collected during the SI were compared to the project SLs for 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:
    - The detected concentrations of PFOA, PFOS, PFHxS, PFNA, and PFBS in soil at AOI 1 were below their SLs.
    - PFOA in groundwater exceeded the SL of 6 ng/L, with a maximum concentration of 76.3 ng/L at location AOI01-01. Based on the results of the SI, further evaluation of AOI 1 is warranted in an RI.

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 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	Hangar and Wash Rack	◐	●	◐	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.

AECOM. 2018b. *Final Programmatic Accident Prevention Plan, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide Contract No. W912DR-12-D-0014/W912DR17F0192.* July.

AECOM. 2018c *Final Preliminary Assessment Report, Jackson Army Aviation Support Facility #3, Tennessee*. December.

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AECOM. 2022b. *Final Site Safety and Health Plan, Army Aviation Support Facility #3, Jackson, Tennessee, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide*. March.

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DoD. 2019a. *Department of Defense (DoD), Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3*.

DoD. 2019b. *General Data Validation Guidelines. Environmental Data Quality Workgroup*. 4 November.

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