Final
Site Inspection Report
Army Aviation Support Facility #2
Wheeling, West Virginia

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

September 2023

Prepared for:

Army National Guard Headquarters
111 S. George Mason Drive
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LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
°C	Degrees Celsius
°F	Degrees Fahrenheit
µg/kg	Microgram(s) per kilogram
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous film forming foam
amsl	Above mean sea level
AOI	Area of interest
ARNG	Army National Guard
bgs	Below ground surface
btoc	Below top of casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	Chain-of-custody
CSM	Conceptual site model
DA	US Department of the Army
DoD	Department of Defense
DQO	Data quality objective
DUA	Data Usability Assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
EB	Equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
ft	Foot (feet)
FTA	Fire Training Area
gal	Gallon(s)
GIS	Geographic information system
HAZMAT	Hazardous material
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
IDW	Investigation-derived waste
ITRC	Interstate Technology Regulatory Council
JPS	Jet propulsion fuel (Grade 8)

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

LC/MS/MS	Liquid chromatography tandem mass spectrometry
mg/kg	Milligram(s) per kilogram
MS	Matrix spike
MSD	Matrix spike duplicate
NA	Not applicable
ng/L	Nanogram(s) per liter
No.	Number
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	Per- and polyfluoroalkyl substances
PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOA	Perfluorooctanoic acid
PFOS	Perfluorooctanesulfonic acid
PID	Photoionization detector
PVC	Polyvinyl chloride
QAPP	Quality Assurance Project Plan
QSM	Quality Systems Manual
RI	Remedial investigation
SI	Site inspection
SL	Screening level
TOC	Total organic carbon
TPP	Technical Project Planning
UCMR 3	Unregulated Contaminant Monitoring Rule 3
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WHAASF #2	Wheeling Army Aviation Support Facility #2
WVARNG	West Virginia Army National Guard

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EXECUTIVE SUMMARY

The Army National Guard (ARNG) G-9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) (Assistant Secretary of Defense) dated 6 July 2022. The six compounds listed in the OSD memorandum include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA).[1] These compounds are collectively referred to as "relevant compounds" throughout the document and the applicable screening levels (SLs) are provided in **Table ES-1.**

The PA identified two Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on a comparison of SI results to SLs for the relevant compounds. This SI was completed at the Wheeling Army Aviation Support Facility #2 (WHAASF #2), in Wheeling, West Virginia, and determined further investigation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1. Based on the results of the SI, no further evaluation of AOI 2 is warranted. WHAASF #2 is also referred to as the "Facility" throughout this document.

WHAASF #2, operated by the West Virginia ARNG (WVARNG), encompasses approximately 38.14 acres in Wheeling, West Virginia, within Ohio County, directly south of the Brooke County border. The Facility is located adjacent to the Wheeling Ohio County Airport, east of Runway 34. The WHAASF #2 has been an operational military facility for an active ARNG unit since the completion of construction in 1996 and the Facility provides support for helicopter operation and maintenance. The Facility is situated within the Allegheny Plateau, characterized by steep hillslopes and ravines (AECOM Technical Services, Inc. 2020).

The PA identified two AOIs for investigation during the SI phase. SI sampling results from the AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOIs. Based on the results of this SI, further evaluation under CERCLA is warranted in a remedial investigation (RI) for AOI 1. Based on the results of the SI, no further evaluation of AOI 2 is warranted at this time.

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

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels (SLs) in Groundwater and Soil using U.S. Environmental Protection Agency's Regional SL Calculator. Hazard Quotient=0.1. May 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the 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.

bgs = Below ground surface
ft = Feet
µg/kg = Microgram(s) per kilogram
ng/L = Nanogram(s) per liter

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

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	FTAs, Surface Drainage Path, HAZMAT Room, and Tri-Max™ Fill Area 2	●	Not applicable[1]	○	Proceed to RI
2	AFFF Storage Shed and TriMax™ Fill Area 1	◐	○	○	No further action

Legend:
● = Detected; exceedance of Screening Levels
◐ = Detected; no exceedance of Screening Levels
○ = Not detected
[1] No groundwater encountered prior to bedrock; therefore, no temporary wells were installed

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

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

1.2 SITE INSPECTION PURPOSE

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

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

WHAASF #2 occupies 38.14 acres in Wheeling, West Virginia (**Figure 2-1**). The facility is located adjacent to the Wheeling Ohio County Airport, east of Runway 34. Aside from the airport and runways to the northwest, WHAASF #2s immediate surroundings are primarily forest and agricultural land. The nearest urban area is the City of Wheeling, located 8.5 miles southwest of the Facility (AECOM 2020).

WHAASF #2 is located on a portion of land the West Virginia National Guard leased from the Ohio County Commission for a term of 99 years, beginning 14 December 1988. The Facility was fully operational starting in 1996 (AECOM 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

WHAASF #2 is located in Ohio County, West Virginia, directly south of the Brooke County border (**Figure 2-2**). The Facility is located northeast of the City of Wheeling and southeast of the residential community, Windsor Heights. The Facility is approximately 643 feet (ft) above mean sea level (amsl). This area of West Virginia is considered part of the Allegheny Plateau, which formed during the last glacial recession through the leveling of terrain beneath the retreating ice sheet. Typical surface features in the surrounding area include steep hillslopes and ravines formed through post-glacial erosional processes. The Facility and Wheeling-Ohio County Airport sit atop one of these plateaus (AECOM 2020).

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

2.2.1 Geology

The Facility is located in a region where the soil is shallow and acidic, with a pH range of 4.5 to 5. Soil is described as well drained, with immediate water holding capacity and primarily composed of silt loam. The exposed geologic group in this portion of Ohio County is from the Paleozoic era, specifically, the Pennsylvanian period. The primary rock types are sandstone, shale, clay, coal, and limestone. To the west of the Facility, approaching the Ohio River, alluvial deposits are the primary geologic feature (AECOM 2020).

Soils encountered during the SI field event were indicative of silty loam and consisted of 61.5 percent (%) silt, 18.1% sand, 2.9% gravel, and 17.5% clay. Shallow bedrock was encountered across the facility between 5-10 ft below ground surface (bgs). Soil thicknesses were generally consistent across the facility with 0-1ft of topsoil, 1-2ft of silt and some sand, 3-4ft of fat clay, and 1-2ft of weathered shale and clay sitting atop bedrock. Most variation came in the thicknesses of the fat clay layer and the weathered shale layer. The pH of the soil ranged from 2.6 to 6.5 and had a total organic carbon (TOC) concentration ranging between 9,800 and 22,000 milligrams/kilogram (mg/kg).

2.2.2 Hydrogeology

Sands and gravel form an alluvial aquifer above bedrock in Wheeling, West Virginia. The depth to water in this area is generally approximately 30 ft bgs. Beneath the alluvial aquifer is the Upper Pennsylvanian Sedimentary Bedrock Aquifer. The regional hydraulic gradient is such that groundwater flows west from the surrounding hills and valleys in Ohio County toward the Ohio River, as shown on **Figure 2-3** and **Figure 2-4.** However, local shallow groundwater generally flows east across the facility. Depth to groundwater in three wells installed along the facility's eastern boundary during the SI ranged from 7.56-16.5 ft below ground surface; groundwater was not encountered in the central portion of the facility at AOI 1, where shallow bedrock was encountered around 5 ft bgs. Groundwater data observed from the SI field event is presented on **Figure 2-5**.

In the Upper Ohio South Watershed, where WHAASF #2 is located, both groundwater and surface water are used for public water supply in Ohio, Brooke, Marshall, and Wetzel counties. An Environmental Data Resources, Inc. (EDR™) Report conducted a well search for a 1-mile radius surrounding the Facility. Using additional online resources, such as state and local geographic information system (GIS) databases, wells were researched to a 4-mile radius of the facility. According to the EDR™ Radius Map Report, there are two cross gradient wells of unknown type within 1 mile of the Facility; one located northwest of WHAASF #2 and the other located south of the Facility, near a residential property (**Figure 2-3**). It is unknown if these wells are potable, domestic, or non-potable. According to the U.S. Geological Survey (USGS) National Water Information System Mapper, there are two active USGS monitoring wells located cross gradient within a 4-mile radius of the Facility: one 3.8 miles north of the WHAASF #2 and the other 2.7 miles northeast. Additional inactive USGS monitoring wells were identified within 4 miles and are shown on **figure 2-3**. GIS data for wells within a 4-mile radius of the Facility was unavailable at the city, county, state, and national levels. Therefore, it is possible that additional unidentified public or private wells may be located within 4 miles of the Facility (AECOM 2020).

2.2.3 Hydrology

The major water feature near the Facility is the Ohio River, which is located approximately 2 miles west of the facility boundary. The Ohio River is used for recreational activities and public water supply. The Ohio River begins in Pittsburgh, Pennsylvania, at the union of the Allegheny and Monongahela Rivers. From its origin in Pittsburgh, the river flows southwest, ending at the borders of Kentucky, Illinois, and Missouri when it meets with the Mississippi River. Wheeling, West Virginia, is within the Upper Ohio South Watershed, one of many watersheds of the Ohio River **(Figure 2-4**). The Upper Ohio South Watershed extends from Brooke County to the south through Ohio and Marshall Counties, ending in Wetzel County. Around the Facility, water flows towards the ravines, joining the primary tributary for the area, Short Creek. Short Creek is approximately 1 mile south of the Facility and flows northwest, where it joins the Ohio River (AECOM 2020).

2.2.4 Climate

Wheeling, West Virginia, has a continental climate. As such, Wheeling experiences four distinct seasons, with moderately severe winters and warm, rainy summers. The amount of precipitation between the seasons is about equal. Climate data for Wheeling records the average annual high temperature as 63.2 degrees Fahrenheit (°F), the average annual low temperature as 42.7°F, and the average annual rainfall as 40.4 inches (AECOM 2020).

2.2.5 Current and Future Land Use

WHAASF #2 currently resides on a portion of land leased from the Ohio County Commission under the terms of a 99-year lease. The Facility has been an operational military facility for an active ARNG unit since 1996, following the completion of construction. The unit at this Facility provides support for helicopter operation and maintenance. Future land use is not anticipated to change (AECOM 2020).

2.2.6 Sensitive Habitat and Threatened/Endangered Species

A wildlife survey has not occurred at the Facility, and the Facility does not have any significant areas of habitat. The following species have not been identified at the facility but may be present in the surrounding area. The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Ohio County, West Virginia (U.S. Fish and Wildlife Service 2022):

- Insects: Monarch Butterfly (*Danaus plexippus*) – Federal Candidate

- Mammal: Indiana Bat (Myotis sodalist) – Federally Endangered; and Northern Long eared Bat (Myotis septentrionalis) – Federally Threatened.

2.3 HISTORY OF PFAS USE

Seven potential PFAS release areas were identified at the site during the PA (AECOM 2020). Interviews and records obtained during the PA indicate that annual fire training with aqueous film forming foam (AFFF) was conducted on-site at multiple locations (Hangar Ramp and Wash Pad). A one-time fire training exercise was also conducted on a helicopter located in the center of the landing pads. Additionally, Tri-Max™ fire extinguishers were refilled on-site at two locations (Tri-Max™ Fill Areas 1 and 2) and AFFF was stored in a small storage shed while in use at the Facility. The potential release areas were grouped into two AOIs based on preliminary data and presumed drainage and groundwater flow directions. A description of each AOI is presented in Section 3.

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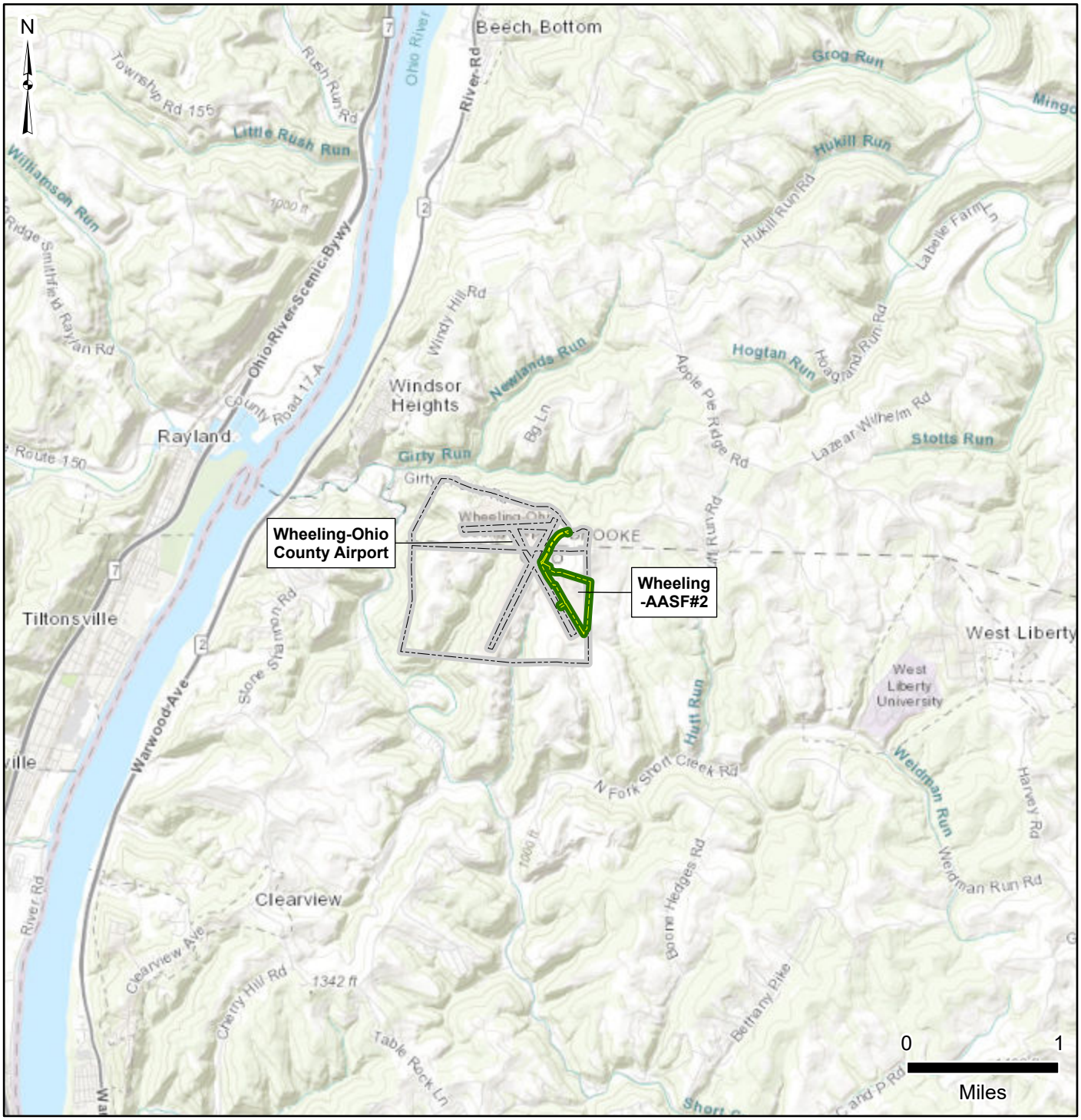
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 2-1
Facility Location



Facility Data

- Facility Boundary
- Wheeling-Ohio County Airport

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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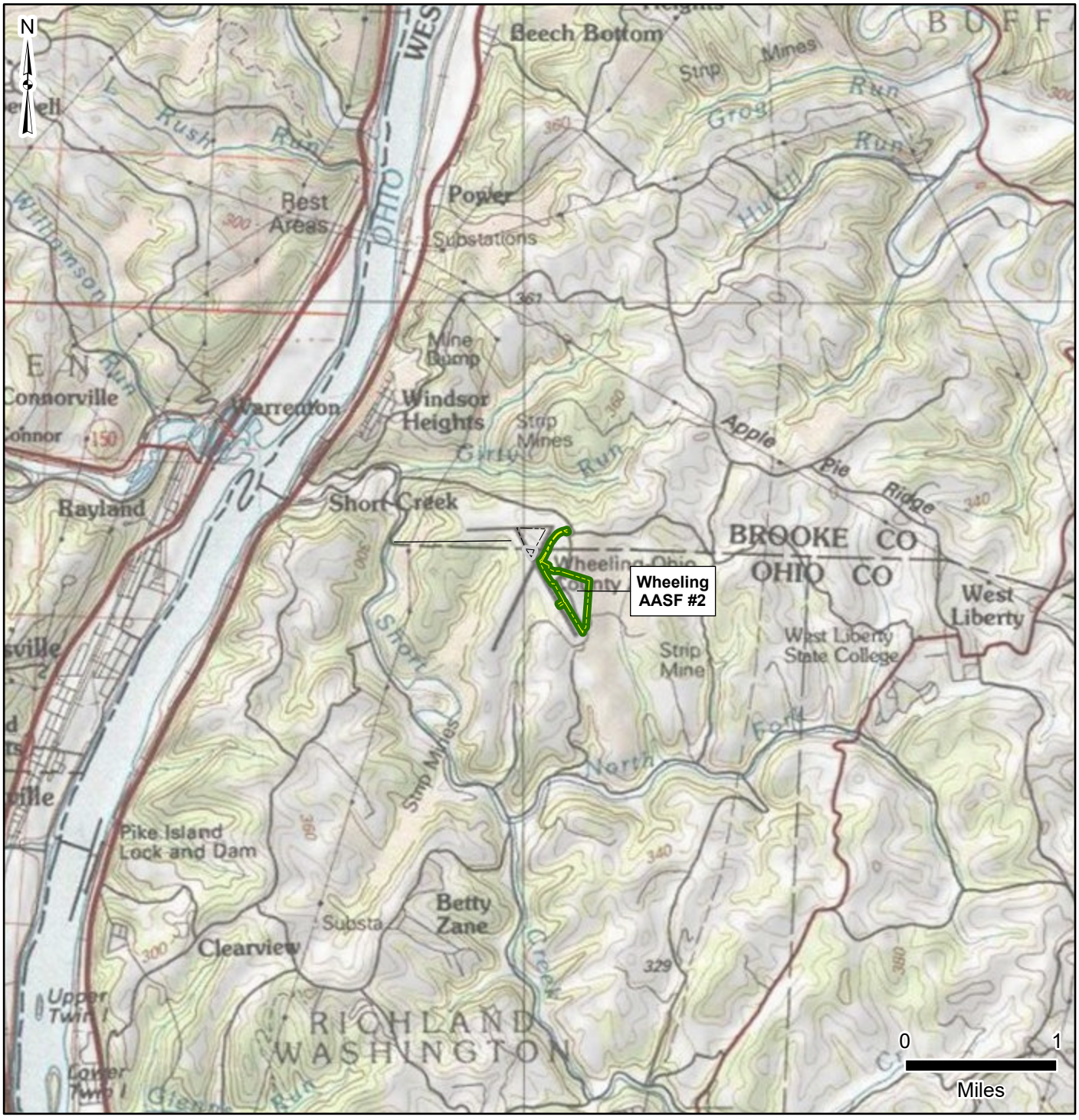
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 2-2
Facility Topography



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Data Sources:
ESRI 2020
AECOM 2020

Facility Data

Facility Boundary

Contour interval = 10ft

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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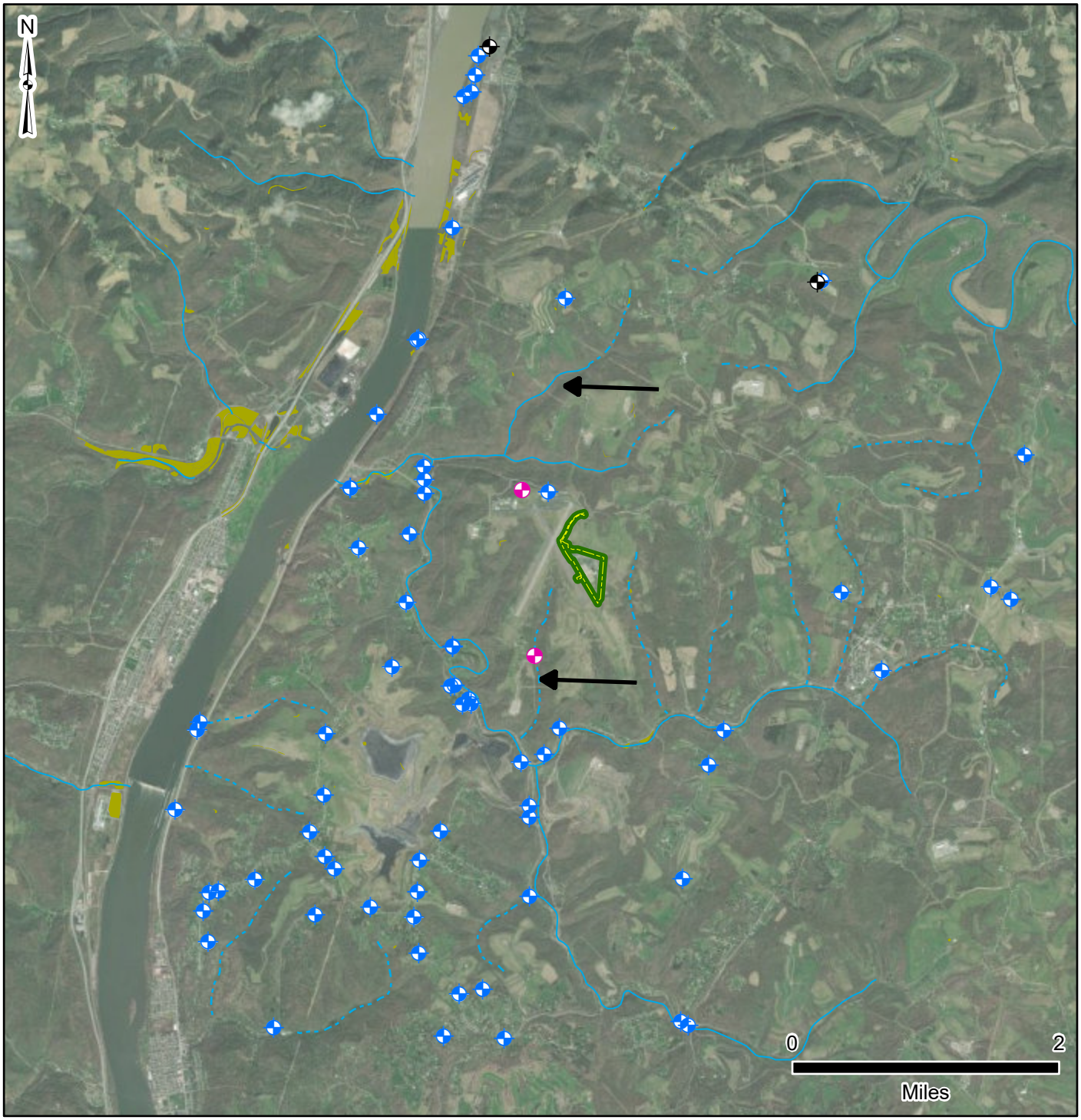
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 2-3
Groundwater Features



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Facility Data
- Facility Boundary

Well Type
- USGS Active Monitoring Well
- USGS Inactive Monitoring Well
- Other/Unknown Well

Hydrology/Hydrogeology
- Groundwater Flow Direction
- Perrenial Creek/Stream
- Intermittent Creek/Stream
- Wetlands

Data Sources:
ESRI 2020
AECOM 2020

Date:..... .September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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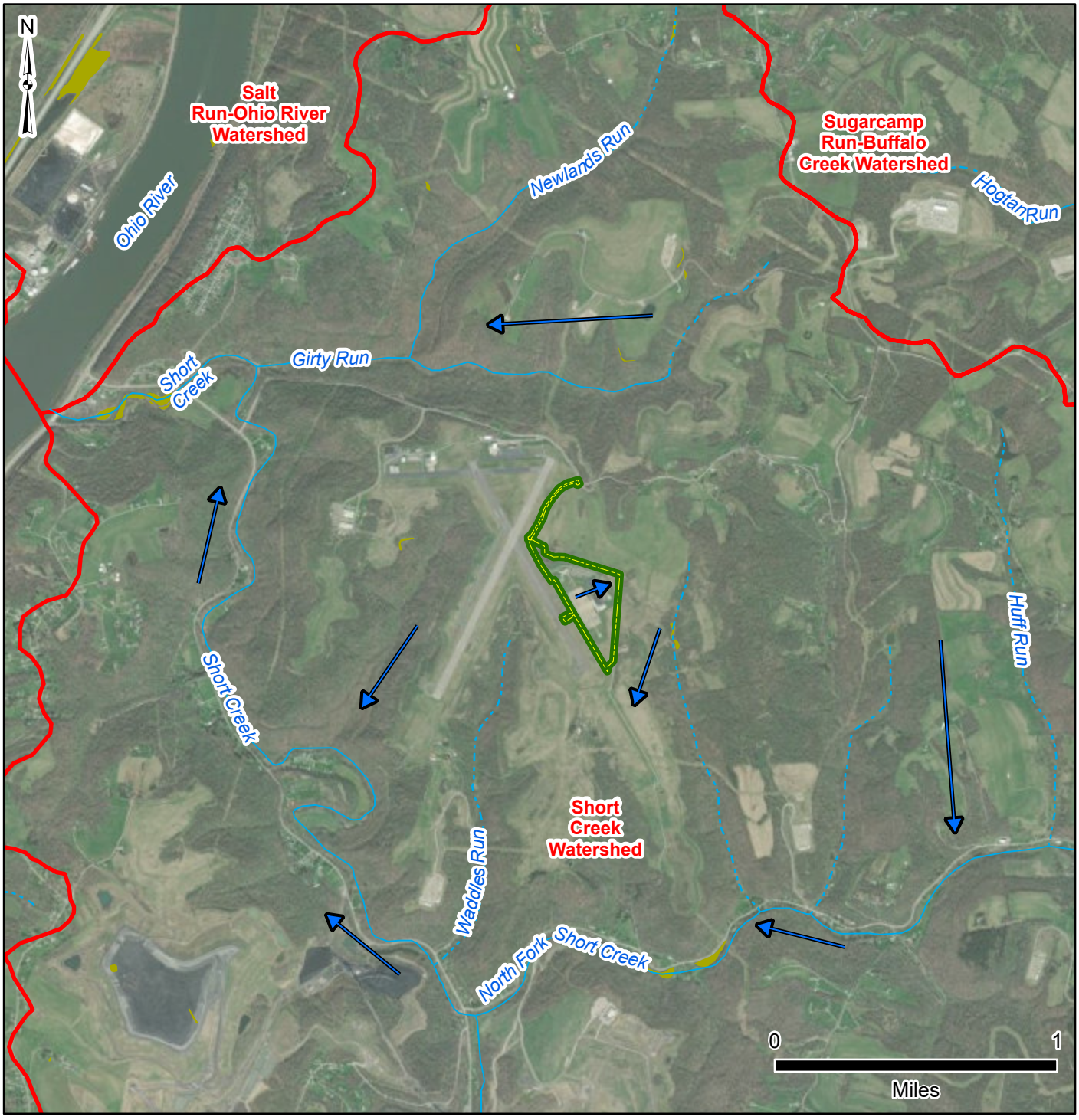
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 2-4
Surface Water Features



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Facility Data
- Facility Boundary

Hydrology
- Surface Water Flow Direction
- Perrenial Creek/Stream
- Intermittent Creek/Stream
- Wetlands
- Watershed Boundary

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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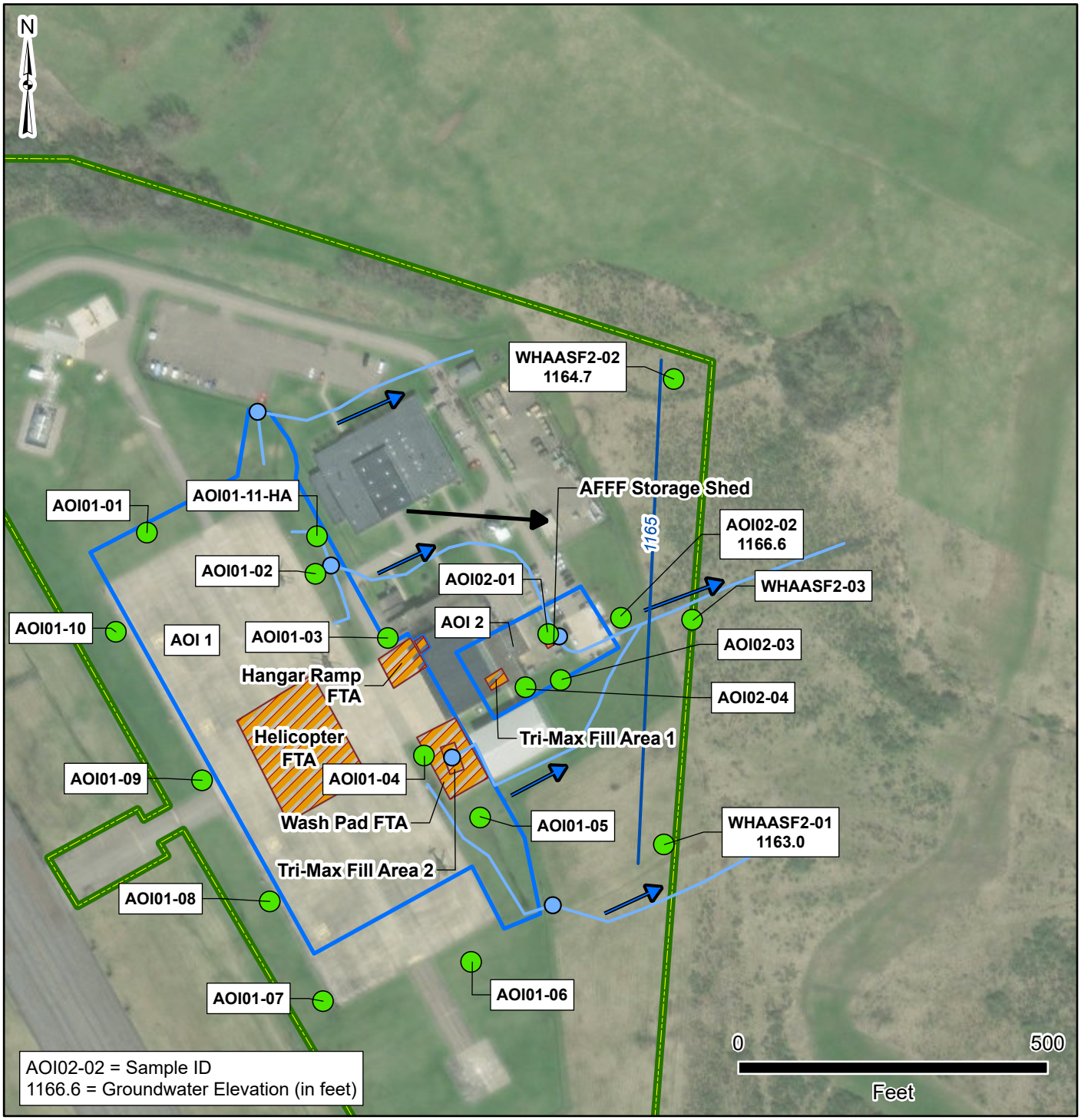
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 2-5
Groundwater Elevations



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

Sample Locations
- Sample Location

Hydrology/Hydrogeology
- Local Groundwater Flow Direction
- Surface Water Flow Direction
- Storm Water Pathway
- Surface Water Inlet
- Groundwater Elevation Contour Interval (1 Foot)

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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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, seven potential release areas were identified at WHAASF #2 and grouped into two AOIs identified as: AOI 1 Fire Training Areas (FTAs), Surface Drainage Path, Hazardous Material (HAZMAT) Room, and TRI-MAX™ Fill Area 2 and AOI 2 encompassing the AFFF Storage Shed and Tri-Max™ Fill Area 1. The potential AOIs are shown on **Figure 3-1**.

3.1 AOI 1 – FIRE TRAINING AREAS, SURFACE DRAINAGE PATH, HAZMAT ROOM, AND TRI-MAX™ FILL AREA 2

AOI 1 consists of three FTAs (which include the hangar ramp, the wash pad, and the helicopter landing pads), the HAZMAT Room, the Tri-Max™ Fill Area 2, and their respective potential surface drainage pathways. First-hand knowledge from interviewees noted that training with AFFF occurred annually for the duration of time AFFF was kept at WHAASF #2. Interviewees recalled AFFF use at the Facility dating prior to 2001 and ending between 2011 and 2013.

3.1.1 Hangar Ramp FTA

During the time AFFF was kept on-site, annual fire training was conducted with extinguishers equipped with AFFF on the ramp in front of the hangar doors. On one occasion, shortly after AFFF was brought on by the ARNG, there was a brief demonstration held at AASF #2 along the wall of the hangar. AFFF was sprayed on the wall to demonstrate how the foam sticks to surfaces during firefighting activities. Following this event, foam was left to dissipate on its own without being washed away. Interviewees present for the demonstration recalled the foam dissipating on the wall and paved ground before it could reach a drain. Though this demonstration was only held on one occasion, since foam was left to dissipate on its own, the foam may have leeched into the wall or pavement where it was sprayed at WHAASF #2 (AECOM 2020).

This location is also where the annual barrel burn training took place. Facility personnel's recollection, barrel burn training at this location may date back to 2005. During these trainings, there were occasional outside participants from the airport, local fire departments, as well as drill soldiers sent to WHAASF #2 for drill around the time of the Safety Stand-Down. One such event was held in September 2010. During these annual trainings, a 55-gallon (gal) drum that had been cut in half was filled with water and jet propulsion fuel (Grade 8) (JP8) fuel. This jet fuel was then ignited, and AFFF foam was used to extinguish the flames. At least one tank of AFFF was used in each training, and up to 50 soldiers, including drill soldiers at the facility for safety day, participated at once. After training was over, foam would be allowed to dissipate on its own without being rinsed away. The foam released likely infiltrated surface soils in the area, as it would collect in the grass or travel down one of the stormwater inlets in the grass on either side of the ramp. The hangar ramp FTA is considered a potential PFAS-release area (AECOM 2020).

3.1.2 Wash Pad FTA

Interviewees could not recall the timeframe; however, for 2 years, the wash pad was used for fire training activities with AFFF. During these exercises, an ARNG truck would be parked on

the wash pad and sprayed down with AFFF to demonstrate how the foam sticks to surfaces and how to properly use the extinguisher. During these events, the foam was contained to the wash pad. Prior to 2006, drainage from the wash pad went to the oil-water separator and then to a surface water outflow on-site. After 2006, the WHAASF #2 wash pad was connected to municipal sewage; therefore, AFFF released at the wash pad would have gone to the municipal water treatment plant, located approximately 9 miles southwest of the Facility if the drainage valve were in proper operating position. Due to a lack of information on when these two fire training activities occurred, and uncertainty on whether the valve was set to properly direct liquids to municipal sewage, the path AFFF would have taken is uncertain. Therefore, it is equally likely the AFFF would have infiltrated surface water via outflow from the site prior to 2006, or that it would have made its way to the municipal water treatment plant. Therefore, the wash pad FTA is a potential PFAS-release area (AECOM 2020).

3.1.3 Helicopter FTA

On one occasion, a fire training exercise was conducted where AFFF was sprayed on the tail of a helicopter to familiarize personnel with the process of using Tri-Max™ extinguishers. This training occurred in the center of the landing pads at WHAASF #2. Aircraft were relocated for the duration of the exercise, and approximately one Tri-Max™ unit was expended. Following training, foam was rinsed off the helicopter's tail, then left to dissipate on its own. It is possible that foam from this FTA traveled to a grassy area and infiltrated the surface soil or followed on-site drainage pathways to stormwater inlets in the grass. Therefore, the helicopter FTA is considered a potential PFAS-release area. Based on interviewee recollection, it is believed this event occurred in the early 2000s, prior to 2006 (AECOM 2020).

3.1.4 HAZMAT Room

While AFFF was in-use at WHAASF #2, five-gal buckets of Tri-Max™ were stored in the facility HAZMAT Room. To interviewee knowledge, no spills occurred in this location; however, due to the potential for unintended spills or releases, this location is considered a potential PFAS-release area (AECOM 2020).

3.1.5 Tri-Max™ Fill Area 2

The wash pad at WHAASF #2 is one of two areas where Tri-Max™ extinguishers were refilled with AFFF. Buckets of AFFF were stored in spill containment buckets at collection points but were occasionally brought to the wash pad when refilling was necessary. If AFFF was spilled during refills, it would have been sprayed with water and washed down the wash pad drain. There is no record or recollection of a spill at this location throughout the time AFFF was kept at the WHAASF #2. However, due to the potential for unintended spills or releases, this area is considered a potential PFAS-release area (AECOM 2020).

3.2 AOI 2 – AFFF STORAGE SHED AND TRI-MAX FILL AREA 1

AOI 2 consists of an AFFF storage shed and Tri-Max™ fill Area 1 on the eastern side of the property near the parking lot where Tri-Max™ extinguishers were filled. During the time WHAASF #2 had Tri-Max™ extinguishers at the Facility, 5-gal AFFF buckets were kept in a

storage shed in the parking lot. While there were no spills or leaks to interviewee knowledge, this location is considered a potential PFAS release area due to the potential for undocumented spills or releases (AECOM 2020).

3.2.1 AFFF Storage Shed Tri-Max™ extinguishers

While AFFF was kept at the Facility, a small storage shed was also used to store 5-gal buckets of AFFF. The shed is located within a fenced area adjacent to the parking lot. There is no knowledge of any spills or expended AFFF in this area. However, due to the potential for unintended spills or releases, this location is considered a potential PFAS-release area (AECOM 2020).

3.2.2 Tri-Max™ Fill Area 1

In the southeast corner of the hangar, an area that was used for filling Tri-Max™ extinguishers inside the hangar is marked out. Interviewees do not recall any instances of spills during the time AFFF was in use at the Facility. However, due to the potential for unintended spills or releases, this area is considered a potential PFAS-release area (AECOM 2020).

3.3 ADJACENT SOURCES

Four potential off-facility sources of PFAS located adjacent to the Wheeling AASF #2 were identified during the PA (**Figure 3-1**).

3.3.1 Plane Crash Site 1

Between the years 2009 and 2012, there was a civilian plane crash near a runway of the adjacent airport at the northeast corner of airport property. Interviewees recalled the municipal fire department responding to the scene and determining there was no firefighting action necessary. There was no fire resulting from the crash, and interviewees who were present at the crash recalled that no foam or water were sprayed in response. Due to no known use of AFFF at this location, there is no suspected PFAS release (AECOM 2020). This area is located cross-gradient of the AOIs.

3.3.2 Plane Crash Site 2

Another crash occurred adjacent to AASF #2 between the years 1996 and 2005. A civilian plane crashed west of the adjacent airport's runways. However, according to interviewees who were present at this incident, there was no fire, and therefore, no AFFF response necessary by the municipal fire department responding to the scene. Due to no known use of AFFF at this location, there is no suspected PFAS release (AECOM 2020). This area is located downgradient of the AOIs.

3.3.3 Short Creek Landfill

Short Creek Landfill is located approximately 1.7 miles downgradient of the Facility and is currently active. Landfills are not typically a primary potential release area of PFAS, but

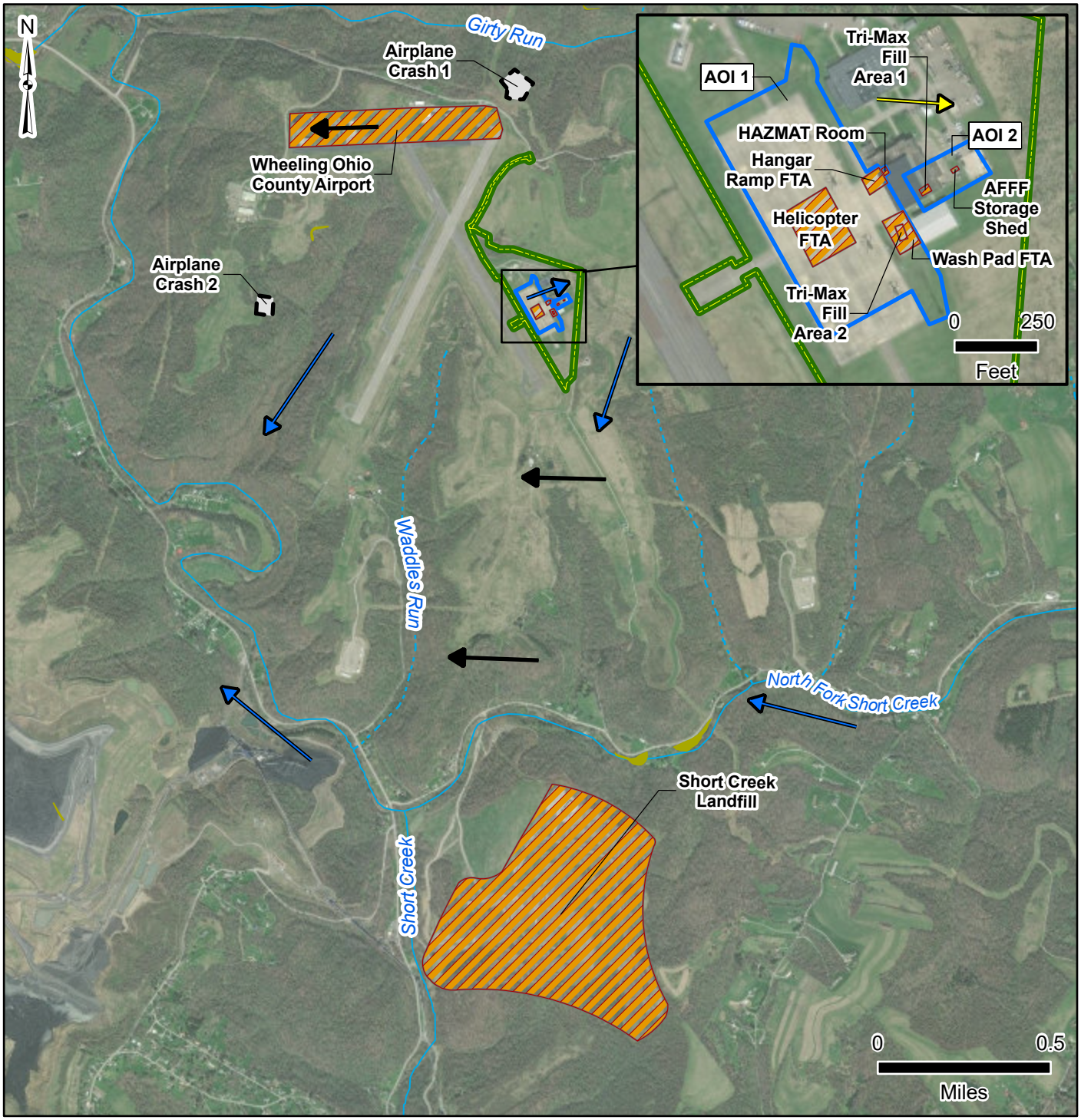
materials disposed of in landfills may create a secondary source of contamination. Such materials may include sludge from wastewater treatment plants that process PFAS-laden water or products associated with waterproofing uniforms or boots. The exact materials disposed of at Short Creek Landfill are unknown. Due the potential that PFAS-containing materials were disposed of in the landfill, the Short Creek Landfill is considered a potential adjacent source of PFAS. However, because the landfill is located downgradient, it is unlikely that PFAS contamination from the landfill would migrate to the Facility (AECOM 2020). This area is located cross gradient, and to the south, of the AOIs.

3.3.4 Wheeling Ohio County Airport

The Wheeling Ohio County Airport sits approximately 0.6 miles northwest of the Facility. Secondary information from an airport employee contacted by WVARNG personnel asserts that there are no AFFF-equipped firetrucks at the airport, and no annual fire training with AFFF. However, due to a lack of robust information on the history of use of AFFF at the airport, there may have been releases at the airport outside of the employee's knowledge. For this reason, the airport is considered a potential adjacent source of PFAS (AECOM 2020). This area is cross- and down gradient of the AOIs.

Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 3-1
Areas of Interest



Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Wheeling\WheelingSI.aprx\Figure

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release
- No Suspected Release

Hydrology/Hydrogeology
- Surface Water Flow Direction
- Regional Groundwater Flow Direction
- Local Groundwater Flow Direction
- Perennial Creek/Stream
- Intermittent Creek/Stream
- Wetlands

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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4. PROJECT DATA QUALITY OBJECTIVES

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

4.1 PROBLEM STATEMENT

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

4.2 INFORMATION INPUTS

Primary information inputs for the SI include the following:

- The PA Report for WHAASF #2 (AECOM 2020)
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the UFP-QAPP Addendum (EA 2021a)
- 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 horizontally by the property limits of the Facility (**Figures 2-1 and 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 earliest available time field resources were available to complete the study.

4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins Lancaster Laboratories Env, LLC, accredited under the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP); Accreditation No. 1.01). PFAS data underwent 100% Stage 2B validation in accordance with the DoD General Data Validation Guidelines (2019a) and DoD Data Validation Guidelines Module 3: Data Validation Procedure of Per- and Polyfluoroalkyl Substances Analysis by Quality Systems Manual (QSM) Table B-15 (2020).

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

4.5 DATA USABILITY ASSESSMENT

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

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

5. SITE INSPECTION ACTIVITIES

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

- *Final Preliminary Assessment Report, Army Aviation Support Facility #2, Wheeling, West Virginia,* dated August 2020 (AECOM 2020)
- *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide,* dated December 2020 (EA 2020a)
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Army Aviation Support Facility #2, Wheeling, West Virginia,* dated December 2021 (EA 2021a)
- *Final Programmatic Accident Prevention Plan, Revision 1,* dated November 2020 (EA 2020b)
- *Final Accident Prevention Plan/Site Safety and Health Plan Addendum, Army Aviation Support Facility #2, Wheeling, West Virginia,* dated October 2021 (EA 2021b).

The SI field activities were conducted from 1 to 3 November 2022 followed by one subsequent day on 10 November 2022. Field activities consisted of sonic drilling and hand auger borings, and soil sample collection, temporary monitoring well installation, and grab groundwater sample collection. Three preparatory facility visits without intrusive work were also conducted on 15 November 2021 (source water sampling) and two utility location visits, one performed on 10 February 2022 and another on 8 September 2022. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as noted in **Section 5.9**.

The following samples were collected during the SI and analyzed for a subset of 24 PFAS via liquid chromatography/tandem mass spectrometry (LC/MS/MS) compliant with QSM Version 5.3 Table B-15 to fulfill the project DQOs:

- Twenty-Eight (28) soil samples from fourteen (14) primary locations, one (1) additional hand auger location, and three (3) boundary locations
- Three (3) grab groundwater samples from three (3) temporary well locations
- Ten (10) quality assurance/quality control 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 medium. Field documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was completed throughout the SI field activities, which

is provided in **Appendix B1**; Field Forms are provided in **B2**; Survey information is provided in **B3**; and Field Change Request forms are provided in **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 of these activities are presented below.

5.1.1 Technical Project Planning

A combined TPP Meeting 1 and 2 was held on 10 November 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, WVARNG, USACE, the West Virginia 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 (EA 2021a).

*Note: A TPP Meeting (no. 3) will be held to discuss the results of the SI. Meeting minutes for TPP 3 will be 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

EA contracted Ground Penetrating Radar Systems (GPRS) Inc., a private utility location service, to perform utility clearance at the Facility. Utility clearance was performed at each of the proposed boring locations on 10 February 2022 with input from the EA field team. General locating services and ground-penetrating radar were used to complete the clearance. Seven locations, as documented in the Field Change Request Form (**Appendix B4**), were relocated based on observations made during the site walk/utility clearance including overhead power lines, refusal in the form of a rip-rap lined channel, and subsurface utilities. Hand auger clearance of the boring locations to the full 5 ft bgs was unsuccessful as outlined in **Section 5.9**.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was sampled prior to the start of field activities. A sample from a potable water source outside the main hangar was collected on 15 November 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. The results indicated that the potable water source contained trace levels of PFAS, with all relevant compound concentrations below the SLs. PFHxS and PFNA were not detected, while PFBS was detected at a concentration less than one-tenth of the SL of 600 nanograms per liter (ng/L). PFOS and PFOA were detected at

concentrations less than one-third of the SLs of 4 and 6 ng/L, respectively. Based on these low-level detections, the water was deemed acceptable for use in decontamination. It is noted that the presence of the relevant compounds introduces limited uncertainty in environmental media samples below the SLs. Further discussion of uncertainty is provided in the DUA (**Appendix A**). Analytical results for this sample can be found in **Appendix F**.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures appendix to the Programmatic UFP-QAPP (EA 2020a).

5.2 HAND AUGER SOIL SAMPLING

Two borings were completed exclusively by hand auger; AOI01-11 and AOI02-01 (see **Section 5.9**). No borings beyond AOI 01-11 and AOI02-01 were advanced exclusively by hand auger based on terminal depth.

Hand augering of each boring was performed by EA's drilling subcontractor, Enviroprobe, to verify utility clearance in the shallow subsurface where utilities would typically be encountered. However, due to refusal at most locations, hand augering to 5 ft was not able to be completed, with most locations having a hand augering terminal depth of 3-4 ft bgs. A decontaminated hand auger was used to collect surface soil samples from the top 0 to 2 ft of each boring in compliance with utility clearance procedures. For samples collected beyond 5 ft in depth, Sonic drilling methods were used in accordance with the UFP-QAPP Addendum (EA 2021a).

As per the UFP-QAPP (EA 2021a), three discrete soil samples were to be collected for analysis from each soil boring: one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples (one subsurface soil sample collected approximately 1 ft above the groundwater table, and one collected at the mid-point between the surface and the groundwater table) (not to exceed 15 ft bgs). However, shallow bedrock was encountered across the Facility between 4 and 10 ft bgs, preventing a shallow subsurface and/or deep subsurface sample from being collected from the majority of locations (see **Section 5.9**). Further, drillers discarded the soil samples from AOI02-02 prior to a mid-point sample being collected; thus, this location only had a surface and deep subsurface soil sample collected. Groundwater was encountered in three locations at depths ranging from 7.56 to 16.5 ft bgs during SI drilling. Total boring completion depths, to accommodate temporary well installation, ranged from 5 to 29 ft bgs.

All soil sample locations are shown on **Figure 5-1**, and boring sample depths are provided in **Table 5-1**. The soil boring locations were selected based on the AOI information provided in the PA (AECOM 2020) and as agreed upon by stakeholders during the TPP and review of the UFP-QAPP Addendum (EA 2021a). Several boring locations were adjusted within a 20-ft offset for reasons including drill rig access, utility avoidance, and drill equipment refusal.

During the mobilization, the soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS). A photoionization detector (PID) was used to screen the breathing zone during boring activities as a part of personal safety requirements. Observations and measurements were recorded on sampling forms

(**Appendix B2**) and in a non-treated field logbook. Depth interval, recovery thickness, PID concentrations, moisture, relative density, Munsell color, and USCS texture were recorded. The boring logs are provided in **Appendix E**.

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain-of-custody (CoC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15), TOC (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM International D422) in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/matrix spike duplicates (MSDs) were collected at a rate of 5 percent 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, one equipment blank (EB) was collected per day 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.

Borings were converted to temporary wells (where groundwater was encountered), which were subsequently abandoned after sampling and surveying in accordance with the UFP-QAPP Addendum (EA 2021a). After removal of the casings, boreholes were abandoned using bentonite chips. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces. Restoration of the drilling areas was completed per the Facility request including leveling and the placement of several yards of soil and spreading of grass seed in denuded areas.

5.3 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Temporary wells were installed by sonic drilling methods, using a Geoprobe™ 8150LS Sonic drill rig. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-ft section of 1-inch Schedule 40 polyvinyl chloride (PVC) screen with sufficient casing to reach the ground surface. New PVC pipe and screen were used at each location 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 intervals. After the recharge period, groundwater samples were collected using a peristaltic pump, with PFAS-free HDPE tubing. Each sample was collected in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) prior to sample collection. Samples were packaged on ice and transported via FedEx under standard CoC

procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. Field blanks were collected in accordance with the UFP-QAPP Addendum (EA 2021a). In instances when non-dedicated sampling equipment was used, such as a bladder pump, one EB was collected a day and analyzed for the same parameters as the groundwater samples. 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 (EA, 2021a) 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

Groundwater levels were used to monitor sitewide groundwater elevations and assess groundwater flow. Synoptic water level elevation measurements were collected from the newly installed temporary monitoring wells on 10 November 2022, taken from the survey mark on the northern side of the well casing. Groundwater elevation data is provided in **Table 5-3**.

5.5 SURVEYING

The northern side of each new temporary well casing was surveyed using a GEOMAX Zoom 90 Robotic total station by EA's West Virginia licensed professional surveyor subcontractor, Bell Land Surveying. Positions were collected in the applicable datum as referenced on the survey report. Surveying data were collected on 10 November 2022 and are provided in **Appendix B3**.

5.6 INVESTIGATION-DERIVED WASTE

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

Soil IDW (i.e., soil cuttings) and liquid IDW (i.e., purge water) generated during the SI activities were containerized in four properly labeled 55-gal drums (1 water, 3 soil) and staged in the hangar in front of the washpad. Following the submittal of the Draft IDW Work Plan, dated 16 March 2023, the soil IDW will be disposed of in a Resource Conservation and Recovery Act Subtitle C landfill, while the liquid IDW, upon approval, will be discharged to the ground at a location that is not near surface water bodies and which does not create pondage. Specifics on the disposal of solid and liquid IDW will be summarized in an IDW Technical Memorandum which will be distributed to stakeholders.

Other solids such as spent personal protective equipment, plastic sheeting, tubing, rope, and unused monitoring well construction materials 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 Version 5.3 Table B-15 at Eurofins Lancaster Laboratories Environmental, LLC, in Lancaster, Pennsylvania, a DoD ELAP- and National Environmental Laboratory Accreditation Program-certified laboratory.

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

5.8 DEVIATIONS FROM SITE INVESTIGATION UFP-QAPP ADDENDUM

Deviations from the UFP-QAPP Addendum occurred based on field conditions. These deviations were discussed between EA, ARNG, and USACE. Deviations from the UFP-QAPP Addendum are noted below:

- Due to the rocky subsurface and shallow bedrock encountered on-site, a hand auger was not able to clear the first 5 ft of all boring locations, as planned in the UFP-QAPP; attempts were instead made to the frostline between 3 and 4 ft bgs.

- Two boring locations were advanced exclusively by hand auger with only a surface soil sample collected, AOI01-11HA and AOI02-01; a drainage pattern following a surface water inlet was noticed by ARNG G-9 while on-site and a decision was made to take a surface sample exclusively by hand auger within this inlet (AOI01-11HA). The second boring, AOI02-01, was located near an electrical junction box and the drillers refused to drill the location as the utility markings had faded/dissipated. Therefore, a hand auger was used at this location to collect a 0 to 2 ft surface soil sample only.

- On the first day of drilling, bedrock was encountered at approximately 5.5 ft bgs at AOI01-05; a subsequent offset of 10 ft east confirmed bedrock at 4.5 to 5 ft bgs. A call with ARNG G-9 took place to confirm the removal of the subsequent offset process for other locations when shallow bedrock was encountered between 5 and 10 ft bgs, as this was now the anticipated depth the majority of borings would reach. Subsequent borings confirmed these suspicions as bed rock was seen across the Facility between 4 and 10 ft bgs

- Further, a call with ARNG G-9 took place on the second day of drilling to discuss a plan for sample collection, as only the surface 0–2 ft bgs sample was collected for the first three samples, due to the shallow bedrock encountered around 5 ft bgs. It was determined that a mid-point sample would only be collected if borings encountered competent bedrock deeper than 5 ft bgs; thus, a surface and shallow subsurface soil sample were collected for only seven locations, while only two locations had a full three samples

(surface, and two subsurface) collected; one location (AOI02-02) had a surface and deep sample collected but no midpoint as the drillers discarded the midpoint sample prior to EA being able to collect it

- During utility clearance, seven soil boring/temporary monitoring well locations were relocated approximately 15 to 20 ft east, southeast, and north of the original proposed locations due to issues including rip-rap lined channel, subsurface utility lines, and overhead powerlines. The boring identifications and full extent of these relocations were submitted in a Field Change Request Form and can be found in Appendix B4.

Table 5-1. Site Inspection Samples by Medium
Wheeling AASF #2, Wheeling
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft 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	11/2/2022	0-2	X				
AOI01-02-0-2	11/2/2022	0-2	X				
AOI01-03-0-2	11/2/2022	0-2	X				
AOI01-04-0-2	11/2/2022	0-2	X				
AOI01-04-2-3	11/2/2022	2-3	X				
AOI01-05-0-2	11/2/2022	0-2	X				
AOI01-05-4-5	11/2/2022	4-5	X				
AOI01-06-0-2	11/2/2022	0-2	X				
AOI01-07-0-2	11/2/2022	0-2	X				
AOI01-08-0-2	11/2/2022	0-2	X				
AOI01-09-0-2	11/2/2022	0-2	X				
AOI01-09-2-3	11/2/2022	2-3	X				
AOI01-10-0-2	11/2/2022	0-2	X				
AOI01-11HA-0-2	11/2/2022	0-2	X				Surface Soil Sample – added in the field
AOI02-01-0-2	11/3/2022	0-2	X				
AOI02-02-0-2	11/3/2022	0-2	X				
AOI02-02-29-30	11/3/2022	29-30	X				
AOI02-03-0-2	11/3/2022	0-2	X				MS/MSD collected
AOI02-03-4-5	11/3/2022	4-5	X				
AOI02-04-0-2	11/3/2022	0-2	X				
WHAASF2-01-0-2	11/3/2022	0-2	X				
WHAASF2-01-6-7	11/3/2022	6-7	X				
WHAASF2-01-14-15	11/3/2022	14-15	X				
WHAASF2-02-0-2	11/3/2022	0-2	X				
WHAASF2-02-6-7	11/3/2022	6-7	X				
WHAASF2-02-13-14	11/3/2022	13-14	X				
WHAASF2-03-0-2	11/3/2022	0-2	X				
WHAASF2-03-14-15	11/3/2022	14-15	X				MS/MSD collected
AOI01-11HA-pH	11/3/2022	0-2			X		Surface Soil Sample – added in the field
AOI01-11HA-TOC	11/3/2022	0-2		X			Surface Soil Sample – added in the field
AOI02-01-pH	11/3/2022	0-2			X		
AOI02-01-TOC	11/3/2022	0-2		X			
AOI01-04-0-2	11/2/2022	0-2				X	
DUP01-20221102	11/2/2022	0-2	X				Field duplicate of AOI01-08-0-2

Table 5-1. Site Inspection Samples by Medium
Wheeling AASF #2, Wheeling
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft 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
DUP02-20221102	11/2/2022	0-2	X				Field duplicate of AOI02-03-0-2
DUP03-20221103	11/3/2022	6-7	X				Field duplicate of WHAASF2-01-6-7
DUP04-20221103	11/3/2022	0-2	X				Field duplicate of AOI01-11HA-0-2
Groundwater Samples							
AOI02-02-GW	11/10/2022	--	X				
WHAASF2-01	11/10/2022	--	X				
WHAASF2-02	11/10/2022	--	X				
DUP01-20221110	11/10/2022	--	X				Field duplicate of AOI02-02-GW
Blank Samples							
FB1-20221110	11/10/2022	--	X				Field Blank
EB1-20221102	11/2/2022	--	X				EB
EB2-20221103	11/2/2022	--	X				EB

Notes:
ATSM = American Society for Testing and Materials
bgs = below ground surface
EB = Equipment Blank
ft = foot (feet)
LC/MS/MS = Liquid Chromatography with tandem mass spectrometry
QSM = Quality Systems Manual

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
Wheeling AASF #2, Wheeling, West Virginia
Site Inspection Report

Area of Interest	Boring Identification	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)	Ground Surface Elevation ft amsl
1	AOI01-01	10	NA	NA
	AOI01-02	10	NA	NA
	AOI01-03	8	NA	NA
	AOI01-04	9	NA	NA
	AOI01-05	6	NA	NA
	AOI01-06	7	NA	NA
	AOI01-07	5	NA	NA
	AOI01-08	8	NA	NA
	AOI01-09	10	NA	NA
	AOI01-10	5	NA	NA
	AOI01-11	2*	NA	NA
2	AOI02-01	2*	NA	NA
	AOI02-02	29	24-29	1,165.45
	AOI02-03	12	NA	NA

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
Wheeling AASF #2, Wheeling, West Virginia
Site Inspection Report

Area of Interest	Boring Identification	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)	Ground Surface Elevation ft amsl
	AOI02-04	6	NA	NA
Facility Boundary	WHAASF2-01	20	15-20	1,162.05
	WHAASF2-02	20	15-20	1,163.76
	WHAASF2-03	22	NA	NA

Notes:
amsl = Above mean sea level
bgs = below ground surface
ft = feet
NA = Not applicable; shallow bedrock was encountered, and no temporary wells were installed
* = Boring was exclusively sampled via hand auger and did not advance passed surface 0–5 ft interval.

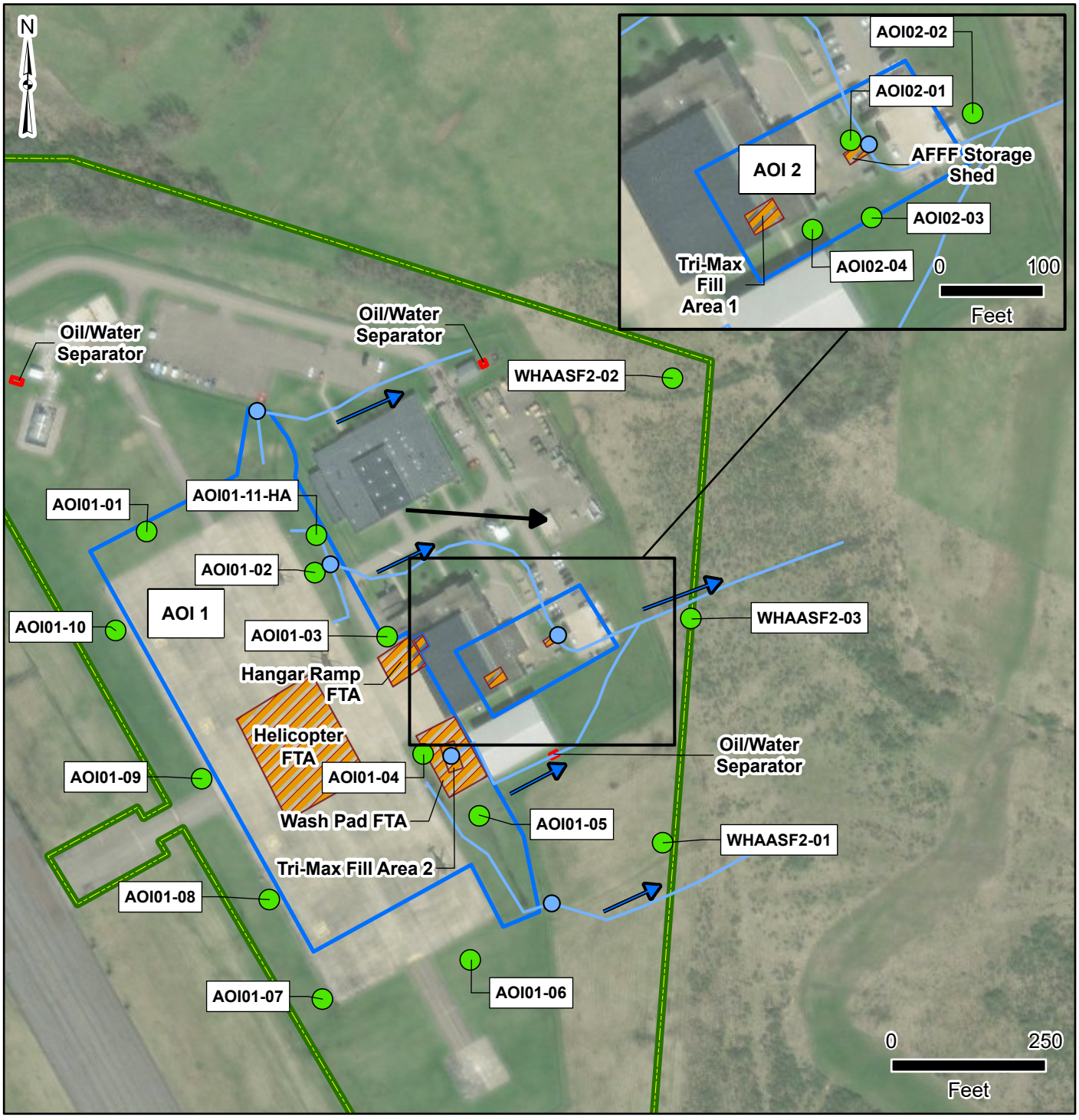
Table 5-3. Groundwater Elevation
Wheeling AASF #2, Wheeling, West Virginia
Site Inspection Report

Temporary Well Identification	Top of Casing Elevation (ft amsl)	Depth to Water (ft btoc)	Groundwater Elevation (ft amsl)	Depth to Water (ft bgs)
AOI02-02	1182.71	16.1	1166.6	14.95
WHAASF2-01	1179.95	16.95	1163.0	16
WHAASF2-02	1173.20	8.5	1164.7	7.56

Notes:
Only the above listed temporary wells were installed due to shallow bedrock encountered at 5 to 10 ft.
amsl = Above mean sea level
bgs = below ground surface
btoc = below top of casing

Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 5-1
Site Inspection Sample Locations



Path: \\lovetongis\GISdata\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Wheeling\WheelingSI.aprx\Figure

Facility Data
- Facility Boundary
- Area of Interest
- Potential PFAS Release
- Oil/Water Separator

Sample Locations
- Sample Location

Hydrology/Hydrogeology
- Local Groundwater Flow Direction
- Surface Water Flow Direction
- Storm Water Pathway
- Surface Water Inlet

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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** in **Table 6-1**. A discussion of the results for the AOIs and boundary areas is provided in **Sections 6.3 through 6.5**. **Tables 6-2 through 6-5** present results for 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[2]	Residential 0 to 2 ft bgs (Soil) (µg/kg)[1]	Industrial/Commercial Composite Worker 2 to 15 ft bgs (Soil) (µg/kg)[1]	Tap Water (Groundwater) (ng/L)[1]
PFOA	19	250	6
PFOS	13	160	4
PFBS	1,900	25,000	601
PFHxS	130	1,600	39
PFNA	19	250	6

Notes:
1. Assistant Secretary of Defense. 2022. Risk-Based Screening Levels in Groundwater and Soil using USEPA's Regional Screening Level Calculator. Hazard Quotient=0.1. 6 July 2022.
2. Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the 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.

bgs = below ground surface
ft = feet
ng/L = Nanograms per liter
µg/kg = Microgram(s) per kilogram

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the Facility; the residential scenario is applied to surface soil results (0 to 2 ft bgs) and the industrial/commercial worker scenario is applied to shallow subsurface soil results (2 to 15 ft bgs). The SLs are not applied to deep subsurface soil results (greater than 15 ft bgs) because 15 ft 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 PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions; and are therefore, relatively mobile in groundwater (Xiao et al. 2015) but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (K_{oc} values) can help in evaluating transport potential, though other geochemical factors (e.g., pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC 2018).

Soil pH and TOC was analyzed in soil samples AOI01-11HA-pH, AOI01-11HA-TOC, AOI02-01-pH, and AOI02-01-TOC. Results showed pH values of 2.6 and 6.5 for AOI 1 and AOI 2, respectively, and TOC results of 22,000 and 9,800 mg/kg, respectively. The grain size analysis conducted on sample AOI01-04-SB-[0-2] consisted of approximately 18.1% sand, 2.9% gravel, 17.5% clay, and 61.5% silt. This result corresponds to a soil texture of silt loam.

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes the FTAs (hangar ramp, the wash pad, and helicopter FTA), the HAZMAT Room, Tri-Max™ Fill Area 2, and their respective potential surface drainage pathways. The soil and groundwater results are summarized on **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.3.1 AOI 1– Soil Analytical Results

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

Soil was sampled in 10 boring locations associated with the potential release areas at AOI 1, with an additional location (AOI01-11HA) collected exclusively by hand auger in surface soils (0 to 2 ft bgs). Per the UFP-QAPP, three samples (one surface, one shallow subsurface, and one deep subsurface) were to be collected from each boring; however, due to shallow bedrock encountered at roughly 5 ft bgs, only three borings had a shallow subsurface sample collected (between 2 and 5 ft bgs), and no borings in AOI 1 had deep subsurface samples collected. See **Section 5.9** for complete details.

Surface soil (0 to 2 ft bgs) samples were collected from eleven locations, AOI01-01 through AOI01-11HA. Four of the five relevant compounds, including PFOA, PFOS, PFHxS, and PFBS, were detected at AOI 1, with every location having one or more of the four relevant compounds detected except for AOI01-01, which had no detections of any relevant compounds. PFOA was

detected in all locations (except AOI01-01) with estimated concentrations ranging from 0.25 J µg/kg in AOI01-03 to 0.75 µg/kg in AOI01-07, below the SL of 19 µg/kg. PFOS was detected in four borings with concentrations ranging from 0.35 J µg/kg for the duplicate sample at AOI01-11HA, to a concentration of 14 µg/kg in AOI01-02 (the concentration in AOI01-02 exceeded the associated SL of 13 µg/kg). PFHxS was detected in three locations below the SL of 130 µg/kg with concentrations ranging from 0.3 J µg/kg in the duplicate sample of AOI01-11HA, to 10 µg/kg in location AOI01-05. PFBS was detected in a single location, AOI01-05, below the SL of 1900 µg/kg, with a concentration of 1.2 J µg/kg. PFNA was not detected in any location.

As mentioned previously, only three locations had shallow subsurface soil samples (between 2 and 5 ft bgs) collected due to the shallow bedrock encountered: AOI01-04, AOI01-05, and AOI01-09. PFOA, PFOS, PFHxS, and PFBS were detected in one or more of these samples, all below their respective SLs of 250, 160, 1,600, and 25,000 µg/kg, respectively. PFOA was detected in AOI01-04 and AOI01-09 at estimated concentrations of 0.7 J and 0.37 J µg/kg, respectively. PFOS was detected in AOI01-04 and AOI01-05 at concentrations of 20 and 0.36 J µg/kg, respectively. PFHxS was detected in AOI01-04 and AOI01-05 at concentrations of 14 and 0.21 J µg/kg, respectively. PFBS was detected in AOI01-04 at an estimated concentration of 0.82 J µg/kg. PFNA was not detected at any location.

6.3.2 AOI 1 – Groundwater Analytical Results

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

No groundwater samples were collected from AOI 1 due to shallow bedrock encountered between 5 and 10 ft bgs.

6.3.3 AOI 1 – Conclusions

Based on the results of the SI, one location, AOI01-02, had a single exceedance in surface soil for PFOA above the 13 µg/kg SL, with a concentration of 14 µg/kg. Groundwater samples were not collected from AOI 1 due to the shallow bedrock. Based on the exceedances of the SLs in soil, 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, which includes the AFFF storage shed and Tri-Max™ Fill Area 1 on the eastern side of the property near the parking lot. The soil and groundwater results are summarized on **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.4.1 AOI 2 – Soil Analytical Results

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

Soil was sampled in four boring locations associated with the potential release areas at AOI 2. Per the UFP-QAPP, three samples (one surface, one shallow subsurface, and one deep subsurface) were to be collected from each boring; however, due to shallow bedrock encountered at roughly 5 ft bgs, only one boring had a surface and shallow subsurface sample collected, and one boring had surface and deep subsurface sample collected (no midpoint sample; see **Section 5.9**).

Surface soil samples (0–2 ft bgs) were collected at boring locations AOI02-01 through AOI02-04. PFOA, PFOS, and PFHxS were detected in one or more locations below their respective SLs of 19, 13, and 130 µg/kg, respectively. PFOA was detected at concentrations ranging from 0.36 J µg/kg in AOI02-02 to 0.79 µg/kg in the duplicate AOI02-03 sample. PFOS was detected in AOI2-04, and AOI02-03 and its' associated duplicate at concentrations of 1, 1.2, and 1.2 µg/kg, respectively. PFHxS was detected in AOI2-04, the duplicate of AOI02-03, and AOI02-03 at estimated concentrations of 0.38 J, 0.52 J, and 0.55 J µg/kg, respectively. PFNA and PFBS were not detected in any surface soil sample at AOI 2.

One shallow subsurface soil sample was collected at AOI02-03 between 4-5 ft bgs. PFOA was detected below the 250 µg/kg SL at an estimated concentration of 0.24 J µg/kg at AOI2-03. There were no other detections of relevant compounds in shallow subsurface soil.

One deep subsurface soil sample was collected for AOI02-02 (from 29 to 30 ft bgs). PFOA was detected in the sample at an estimated concentration of 0.28 J µg/kg. There were no other detections of relevant compounds.

6.4.2 AOI 2 – Groundwater Analytical Results

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

Groundwater samples were collected from one temporary well at AOI 2 during the SI. There were no detections of relevant compounds in groundwater.

6.4.3 AOI 2 – Conclusions

Based on the results of the SI, none of the relevant compounds were detected in soil above their respective SLs and there were no detections of relevant compounds in groundwater. Therefore, further evaluation at AOI 2 is not warranted.

6.5 FACILITY BOUNDARY

This section presents the analytical results for soil and groundwater in comparison to SLs for samples collected at the Facility Boundary, which include locations downgradient of AOI 1 surface water intakes (WHAASF2-01 and WHAASF2-02) and surface water intakes passing through both AOI 1 and AOI 2 (WHAASF2-03). The soil and groundwater results are summarized on **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.5.1 Facility Boundary – Soil Analytical Results

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

Soil was sampled from three borings located on the eastern Facility Boundary. These three borings were associated with locations downgradient of AOI 1 and AOI 2 surface water intakes, as well as the groundwater flow direction. Soil was sampled from three intervals at WHAASF2-01 and WHAASF2-02, and two intervals (surface and shallow subsurface) at WHAASF2-03. Samples were collected from: surface (0-2 ft bgs), and shallow subsurface (6-7 ft bgs; 14-15 ft bgs; 13-15 ft bgs).

Surface soil was sampled for all three Facility Boundary locations. PFOA, PFOS, and PFHxS were detected at concentrations below their respective SLs of 19, 13, and 130 µg/kg. PFOA was detected at concentrations ranging from 0.23 J µg/kg in WHAASF2-03 to 0.4 µg/kg in WHAASF2-02. PFOS and PFHxS were detected in a single location at concentrations of 0.88 and 0.96 µg/kg, respectively.

Shallow subsurface samples were collected at all three boundary locations. PFOA was detected at two locations, WHAASF2-01 and WHAASF2-02, at concentrations of 0.28 µg/kg and 0.31 J µg/kg, respectively. No other relevant compounds were detected.

6.5.2 Facility Boundary – Groundwater Analytical Results

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

Groundwater boundary samples were collected from two temporary wells, WHAASF-01 and WHAASF2-02, associated with the Facility Boundary during the SI. There were no detections of relevant compounds in groundwater.

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

Location ID		AOI01-01		AOI01-02		AOI01-03		AOI01-04		AOI01-05		AOI01-06		AOI01-07	
Sample Name		AOI01-01-0-2		AOI01-02-0-2		AOI01-03-0-2		AOI01-04-0-2		AOI01-05-0-2		AOI01-06-0-2		AOI01-07-0-2	
Parent Sample ID															
Sample Date		11/2/2022		11/2/2022		11/2/2022		11/2/2022		11/1/2022		11/2/2022		11/2/2022	
Sample Depth (ft bgs)		0-2		0-2		0-2		0-2		0-2		0-2		0-2	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	1900	ND	U	ND	U	ND	U	ND	U	1.2	J	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	6.1		ND	U	2.5		10		ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	ND	U	14		ND	U	6.5		3.8		ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	ND	U	0.54		0.25	J	0.32	J	0.73		0.51	J	0.75	

Notes:
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
Values exceeding the Screening Level are shaded gray.

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

Location ID		AOI01-08		AOI01-08		AOI01-09		AOI01-10		AOI01-11		AOI01-11		AOI02-01	
Sample Name		AOI01-08-0-2		DUP01		AOI01-09-0-2		AOI01-10-0-2		AOI01-11HA-0-2		DUP04		AOI02-01-0-2	
Parent Sample ID				AOI01-08-0-2								AOI01-11HA-0-2			
Sample Date		11/2/2022		11/3/2022		11/2/2022		11/2/2022		11/3/2022		11/3/2022		11/3/2022	
Sample Depth (ft bgs)		0-2		0-2		0-2		0-2		0-2		0-2		0-2	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	ND	U	ND	U	ND	U	1.5	J	0.3	J	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	ND	U	ND	U	ND	U	ND	U	2	J	0.35	J	ND	U
Perfluorooctanoic acid (PFOA)	19	0.47	J	ND	U	0.44	J	0.56	J	0.42	J	0.28	J	0.57	J

Notes:
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
Values exceeding the Screening Level are shaded gray.

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

Location ID		AOI02-02		AOI02-03		AOI02-03		AOI02-04		WHAASF2-01		WHAASF2-02		WHAASF2-03	
Sample Name		AOI02-02-0-2		AOI02-03-0-2		DUP02		AOI02-04-0-2		WHAASF2-01-0-2		WHAASF2-02-0-2		WHAASF2-03-0-2	
Parent Sample ID						AOI02-03-0-2									
Sample Date		11/3/2022		11/3/2022		11/3/2022		11/3/2022		11/3/2022		11/3/2022		11/3/2022	
Sample Depth (ft bgs)		0-2		0-2		0-2		0-2		0-2		0-2		0-2	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)															
Perfluorobutanesulfonic acid (PFBS)	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	0.55	J	0.52	J	0.38	J	ND	U	0.96		ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	ND	U	1.2		1.2		1		ND	U	0.88		ND	U
Perfluorooctanoic acid (PFOA)	19	0.36	J	0.44	J	0.79		0.54	J	0.29	J	0.4		0.23	J

Notes:
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on a residential scenario for direct ingestion of contaminated soil.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
Values exceeding the Screening Level are shaded gray.

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil Site Inspection Report, Wheeling Army Aviation Support Facility #2, West Virginia

	Location ID	AOI01-04		AOI01-05		AOI01-09		AOI02-03		WHAASF2-01		WHAASF2- 01		WHAASF2-02		WHAASF2-03	
	Sample Name	AOI01-04-2-3		AOI01-05-4-5		AOI01-09-2-3		AOI02-03-4-5		WHAASF2-01-6-7		DUP03		WHAASF2-02-6-7		WHAASF2-03-14-15	
	Parent Sample ID											WHAASF2-01-6-7					
	Sample Date	11/2/2022		11/1/2022		11/2/2022		11/3/2022		11/3/2022		11/3/2022		11/3/2022		11/3/2022	
	Sample Depth (ft bgs)	2-3		4-5		2-3		4-5		6-7		6-7		6-7		14-15	
Analyte	Screening Level[1,2]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)																	
Perfluorobutanesulfonic acid (PFBS)	25000	0.82	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1600	14		0.21	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	20		0.36	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	0.7	J	ND	U	0.37	J	0.24	J	0.28		ND	U	0.31	J	ND	U

Notes:
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the Values exceeding the Screening Level are shaded gray.

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil Site Inspection Report, Wheeling Army Aviation Support Facility #2, West Virginia

Location ID	WHAASF2-01		WHAASF2-02	
Sample Name	WHAASF2-01-14-15		WHAASF2-02-13-14	
Parent Sample ID				
Sample Date	11/3/2022		11/3/2022	
Sample Depth (ft bgs)	14-15		13-14	
Analyte	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)				
Perfluorobutanesulfonic acid (PFBS)	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	ND	U	ND	U
Perfluorononanoic acid (PFNA)	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	ND	U	ND	U

1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. The Screening Levels for soil are based on incidental ingestion of soil in a industrial/commercial worker scenario.

µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
J = Estimated concentration.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the Values exceeding the Screening Level are shaded gray.

Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Wheeling Army Aviation Support Facility #2, West Virginia

Location ID	AOI02-02	
Sample Name	AOI02-02-29-30	
Parent Sample ID		
Sample Date	11/3/2022	
Sample Depth (ft bgs)	29-30	
Analyte	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)		
Perfluorobutanesulfonic acid (PFBS)	ND	U
Perfluorohexanesulfonic acid (PFHxS)	ND	U
Perfluorononanoic acid (PFNA)	ND	U
Perfluorooctanesulfonic acid (PFOS)	ND	U
Perfluorooctanoic acid (PFOA)	0.28	J

Notes:
µg/kg = Microgram(s) per kilogram.
ft bgs = Feet below ground surface.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

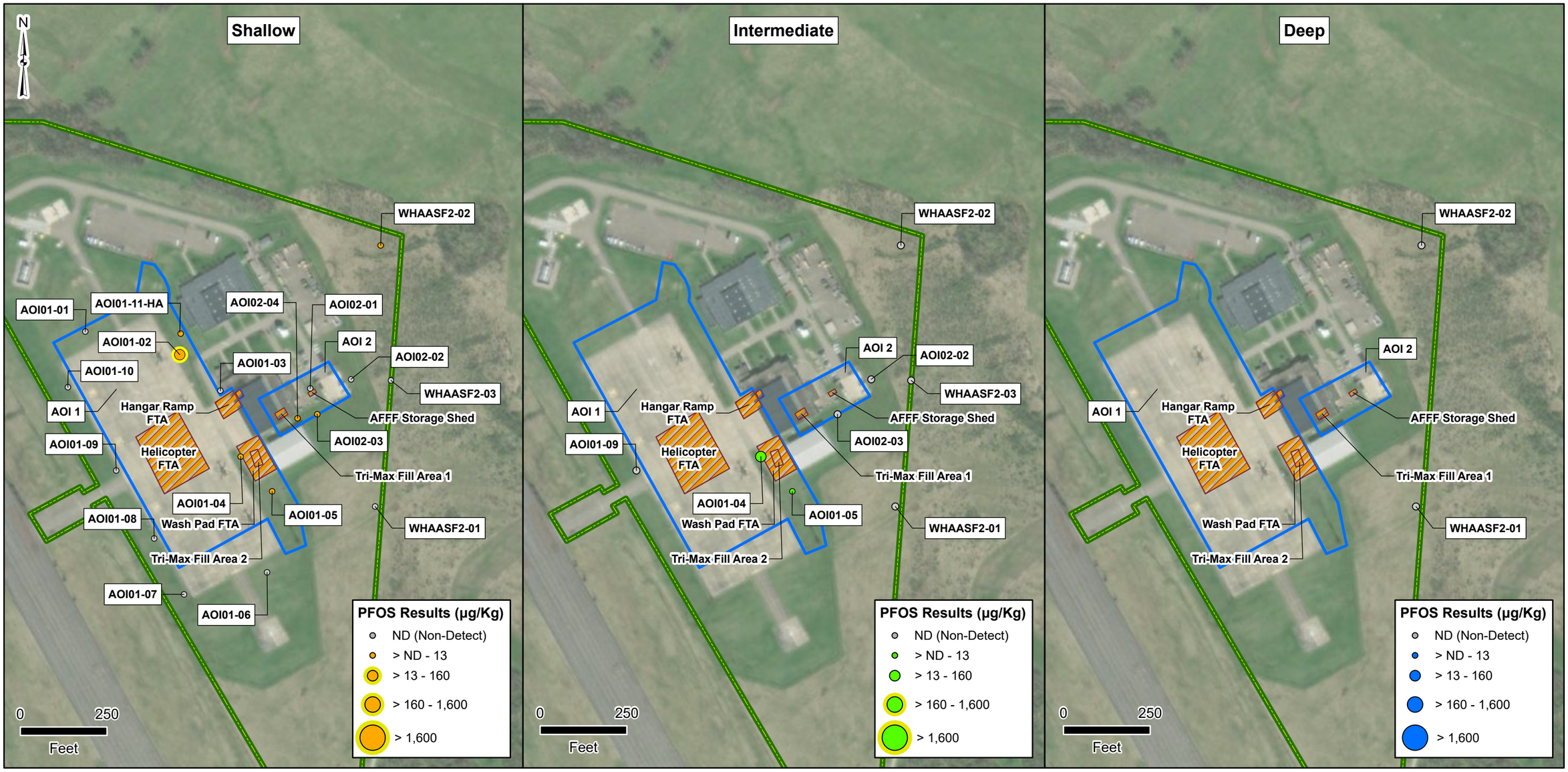
Table 6-5. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Wheeling Army Aviation Support Facility #2, West Virginia

Location ID		AOI02-02		AOI02-02		WHAASF2-01		WHAASF2-02	
Sample Name		AOI02-02-GW		DUP01		WHAASF2-01-GW		WHAASF2-02-GW	
Parent Sample ID				AOI02-02-GW					
Sample Date		11/10/2022		11/10/2022		11/10/2022		11/10/2022	
Analyte	**Screening Level[1]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (ng/L)									
Perfluorobutanesulfonic acid (PFBS)	601	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	39	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	6	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	4	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	6	ND	U	ND	U	ND	U	ND	U

Notes:
1. Assistant Secretary of Defense. July 2022. Risk-Based Screening Levels in Groundwater and Soil using EPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
ng/L = Nanogram(s) per liter.
Qual = Qualifier.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).
Values exceeding the Screening Level are shaded gray.

Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-1
AOI 1 and AOI 2
PFOS Detections in Soil



Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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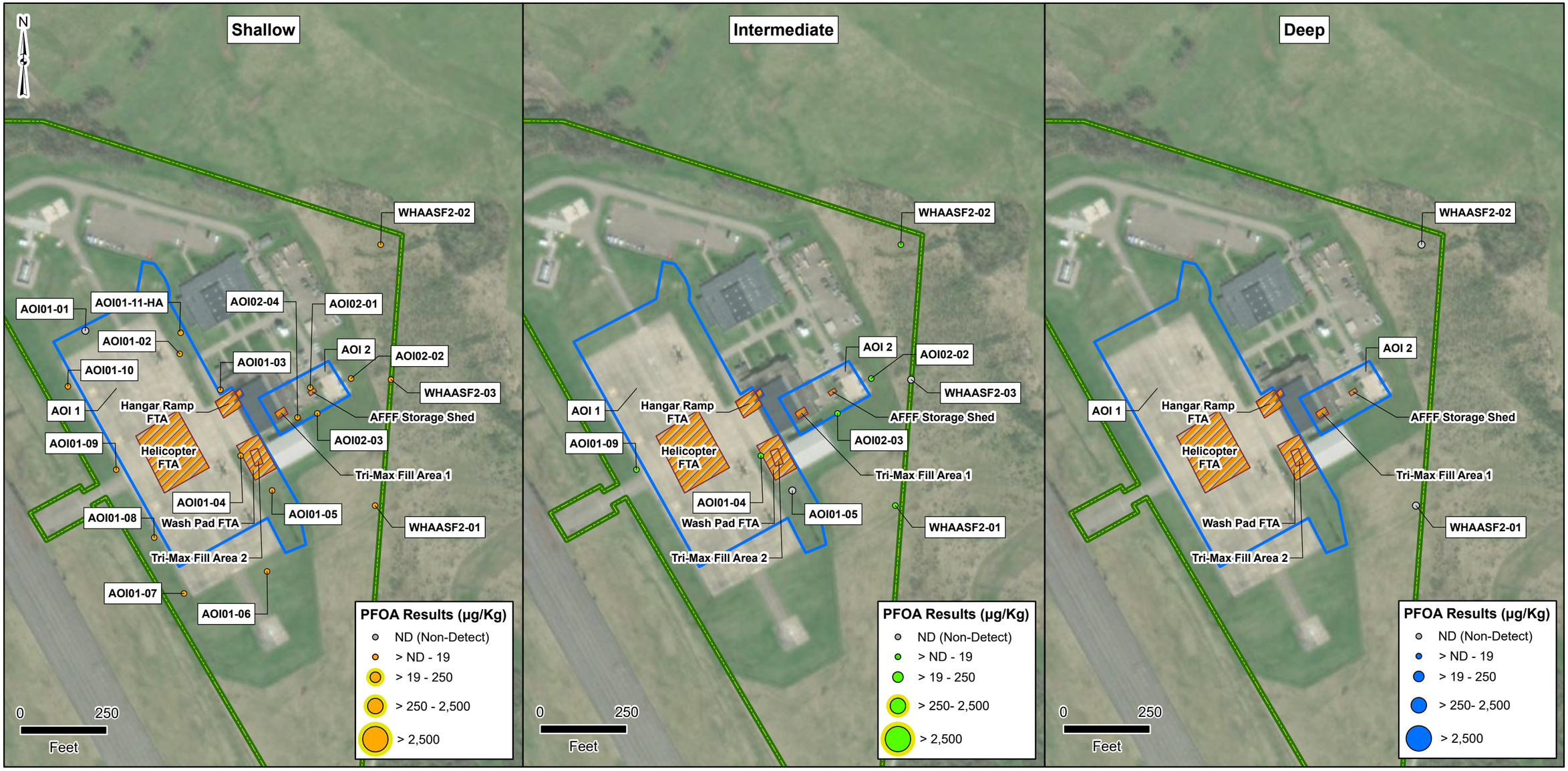
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-2
AOI 1 and AOI 2
PFOA Detections in Soil



Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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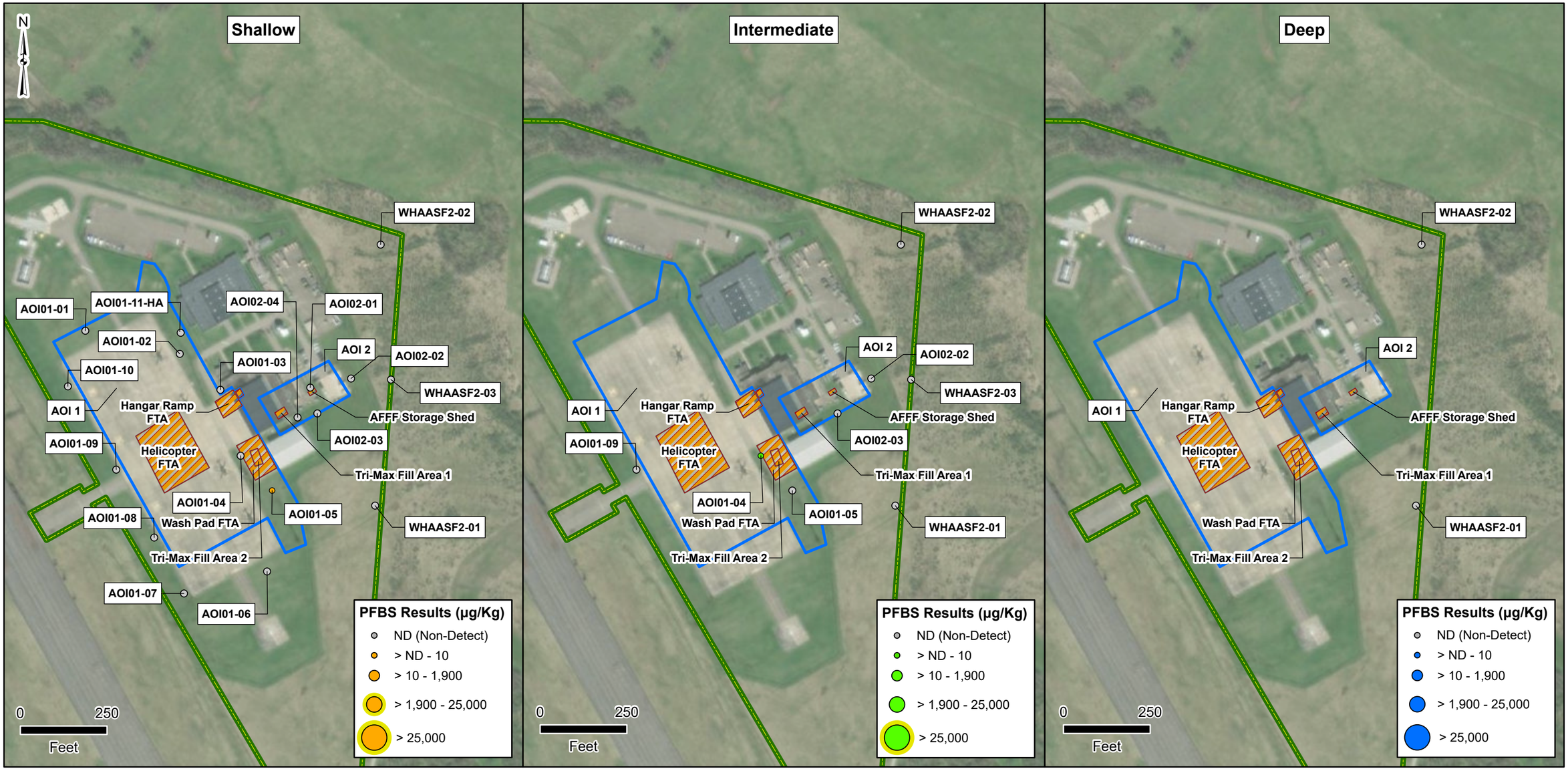
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-3
AOI 1 and AOI 2
PFBS Detections in Soil



Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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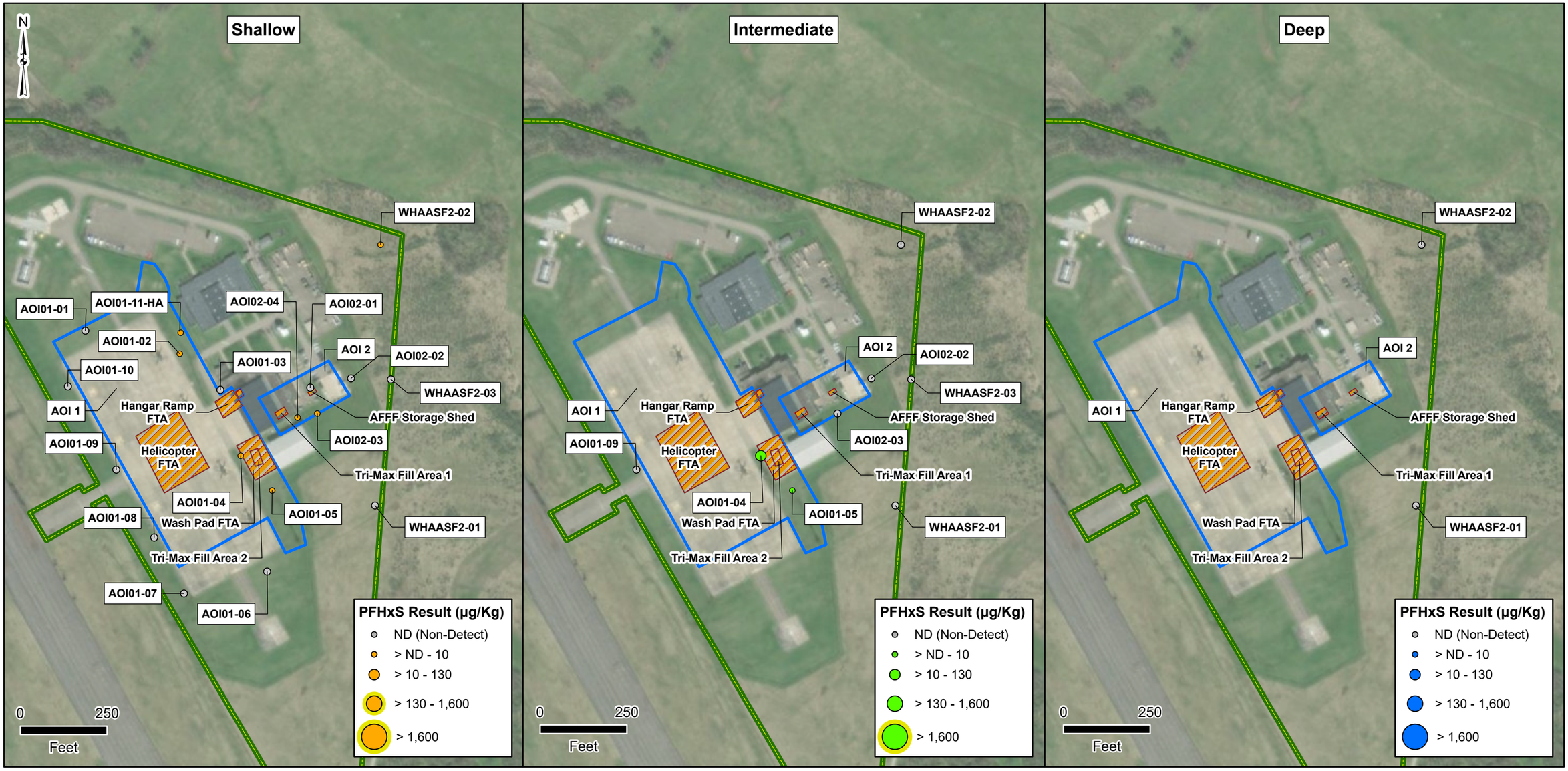
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-4
AOI 1 and AOI 2
PFHxS Detections in Soil



Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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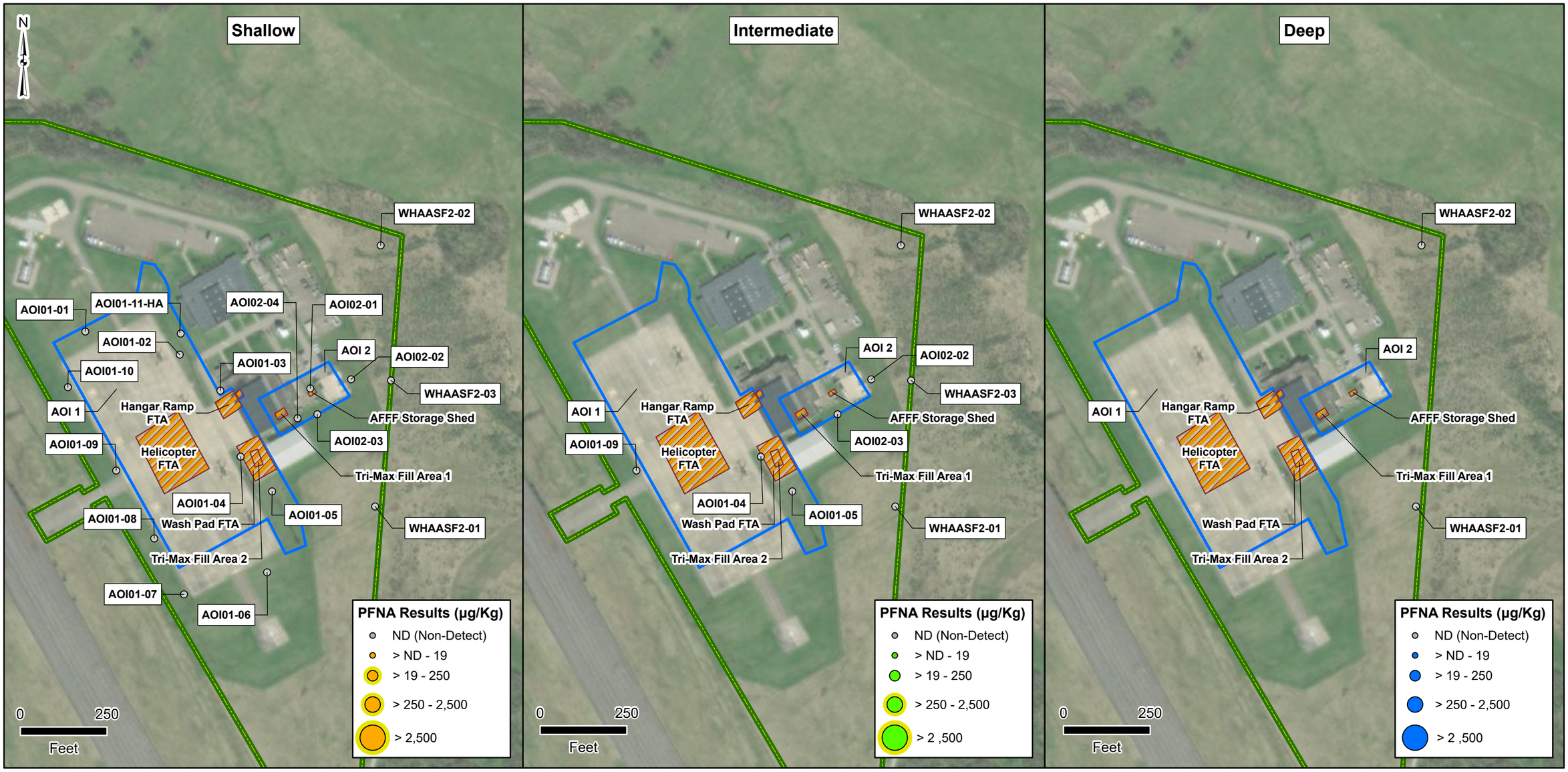
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-5
AOI 1 and AOI 2
PFNA Detections in Soil



Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

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

Facility Data

- Facility Boundary
- Area of Interest
- Potential PFAS Release

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

Data Sources:
ESRI 2022
AECOM 2019

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

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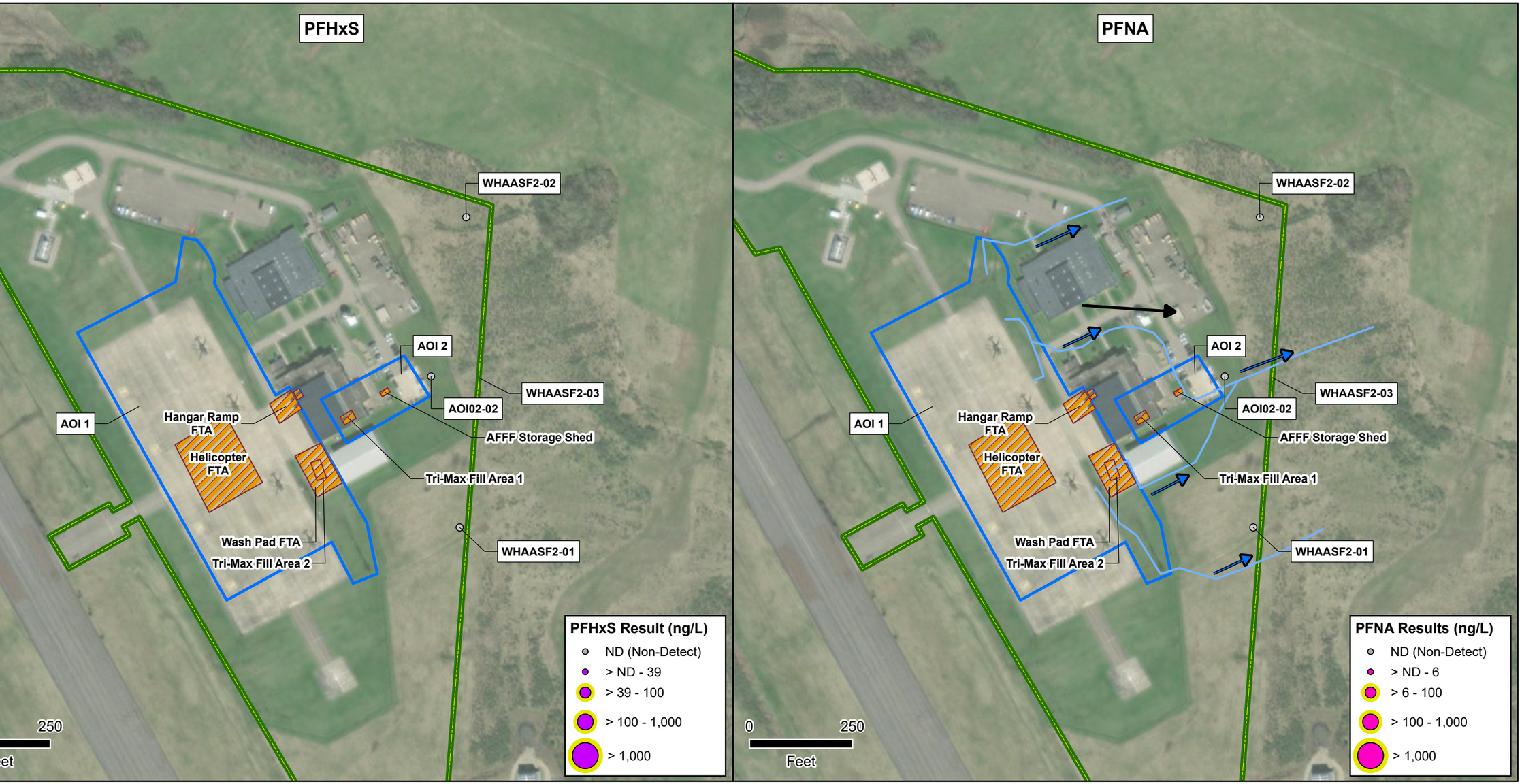
Army National Guard Site Inspections
Site Inspection Report
Wheeling AASF #2, West Virginia

Figure 6-7
AOI 1 and AOI 2
PFHxS and PFNA Detections in Groundwater



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

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

Data Sources:
ESRI 2020
AECOM 2020

Date:.....September 2023
Prepared By:.....EA
Prepared For:.....USACE
Projection:.....WGS 84 UTM 17N

Path: \\lovetongis\GIS\data\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Wheeling\WheelingSI.aprx

7. EXPOSURE PATHWAYS

The conceptual site model (CSM) for the AOIs, revised based on the SI findings, is presented on **Figures 7-1 and 7-2**. 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
5. Potentially exposed populations.

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of relevant compounds above the SLs. Areas with an identified potentially complete pathway that have detections of the relevant compounds above the SLs may warrant further investigation. Although the CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in 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., staff and visiting soldiers), construction workers, trespasser/off-facility recreational users, and residents. The CSMs for AOI 1 and AOI 2, revised based on the SI findings, are presented on **Figures 7-1 and 7-2**, respectively.

7.1 SOIL EXPOSURE PATHWAY

The SI results for soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 and AOI 2 based on the aforementioned criteria. AOIs 1 and 2 are co-located within the Facility and share surface water drainage pathways; however, due to exceedances detected in AOI 1 and not AOI 2, they will be treated as separate CSMs.

7.1.1 AOI 1

AOI 1 consists of the locations of the hangar ramp, the wash pad, the HAZMAT Room, the helicopter FTAs, and Tri-Max™ Fill Area 2.

Facility personnel recalled AFFF use at the Facility prior to 2001 and ending between 2011 and 2013. First-hand knowledge of events during this time period indicate AFFF was used for training at various locations including the wash pad and helicopter FTAs, stored in the HAZMAT room, and had fire extinguishers filled and re-filled at the Tri-Max™ Fill Area 2. These events included barrel burnings, spills during fire extinguisher fills, and small, one-time events of fire extinguisher familiarization techniques. During these events, AFFF was either washed away into the grass and surface water inlets or left to dry on the concrete.

PFOA, PFOS, PFHxS, and PFBS were detected in surface soils at AOI 1, as well as two Facility Boundary locations downgradient of the AOI 1 surface drainage paths, with one or more of these relevant compounds detected in all boring locations except for AOI01-01. PFOA, PFHxS, and PFBS were detected in concentrations well below their respective SLs, while PFOS exceeded the SL at one location in AOI 1. Site workers and future 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. There were also detections of PFOA, PFOS, PFHxS, and PFBS below their respective SLs in subsurface soil at AOI 1. The two downgradient boundary samples, WHAASF2-01 and WHAASF2-02, also had detections of PFOA well below the SL in subsurface soil. Ground-disturbing activities to subsurface soil could result in future construction worker exposure to detected constituents via incidental ingestion. Therefore, the exposure pathways for subsurface soil is considered potentially complete for the future construction worker at AOI 1. The CSM is presented in **Figure 7-1**.

7.1.2 AOI 2

AOI 2 consists of AFFF storage shed and the Tri-Max™ Fill Area 1.

Facility personnel recalled AFFF being kept on pallets in the AFFF Storage Shed in the form of 5-gal buckets. Fire extinguishers were also filled and re-filled at the Tri-Max™ Fill Area 1. Although there are no known instances of spills or leaks, there is the potential for spills to have occurred during any of the above activities.

PFOA, PFOS, PFHxS were detected in surface soils at AOI 2 below their respective SLs. WHAASF2-03, the boundary sample located downgradient of the AOI 2 surface drainage path, also had a single detection of PFOA below the SL. Site workers and future 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. Further, PFOA was detected in subsurface soil at AOI 2 below the respective SL. Ground-disturbing activities to subsurface soil could result in future construction worker exposure to detected constituents via incidental ingestion. Therefore, the exposure pathways for subsurface soil is considered potentially complete for the future construction worker at AOI 2. The CSM is presented in **Figure 7-2**.

7.2 GROUNDWATER EXPOSURE PATHWAY

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

7.2.1 AOI 1

There were no groundwater samples collected from AOI 1 due to shallow refusal depths above the water table elevation. However, AOI02-02 and Facility Boundary locations WHAASF2-01 and WHAASF2-02 are located in a downgradient direction from AOI 1 and AOI 2 based on the surface inlet drainage and groundwater elevations observed in this SI. There were no detections of relevant compounds in groundwater for any temporary well location.

The Facility receives drinking water from the City of Wheeling municipal water system, which has surface water intakes located approximately 8 miles downgradient to the Facility on the Ohio River. Based on the results of this SI and the fact that there were no relevant compounds detected in groundwater at the AOIs or in Facility Boundary wells, the exposure pathway for groundwater for construction workers, site workers, and trespassers/off-facility residents and recreational users is considered incomplete. The CSM is presented in **Figure 7-1**.

7.2.2 AOI 2

Due to shallow refusal depths above the water table elevation, only one temporary well (AOI02-02) was installed in AOI 2. Additionally, Facility Boundary location WHAASF2-03 is located downgradient of AOI02-02. There were no relevant compounds detected in groundwater at either location.

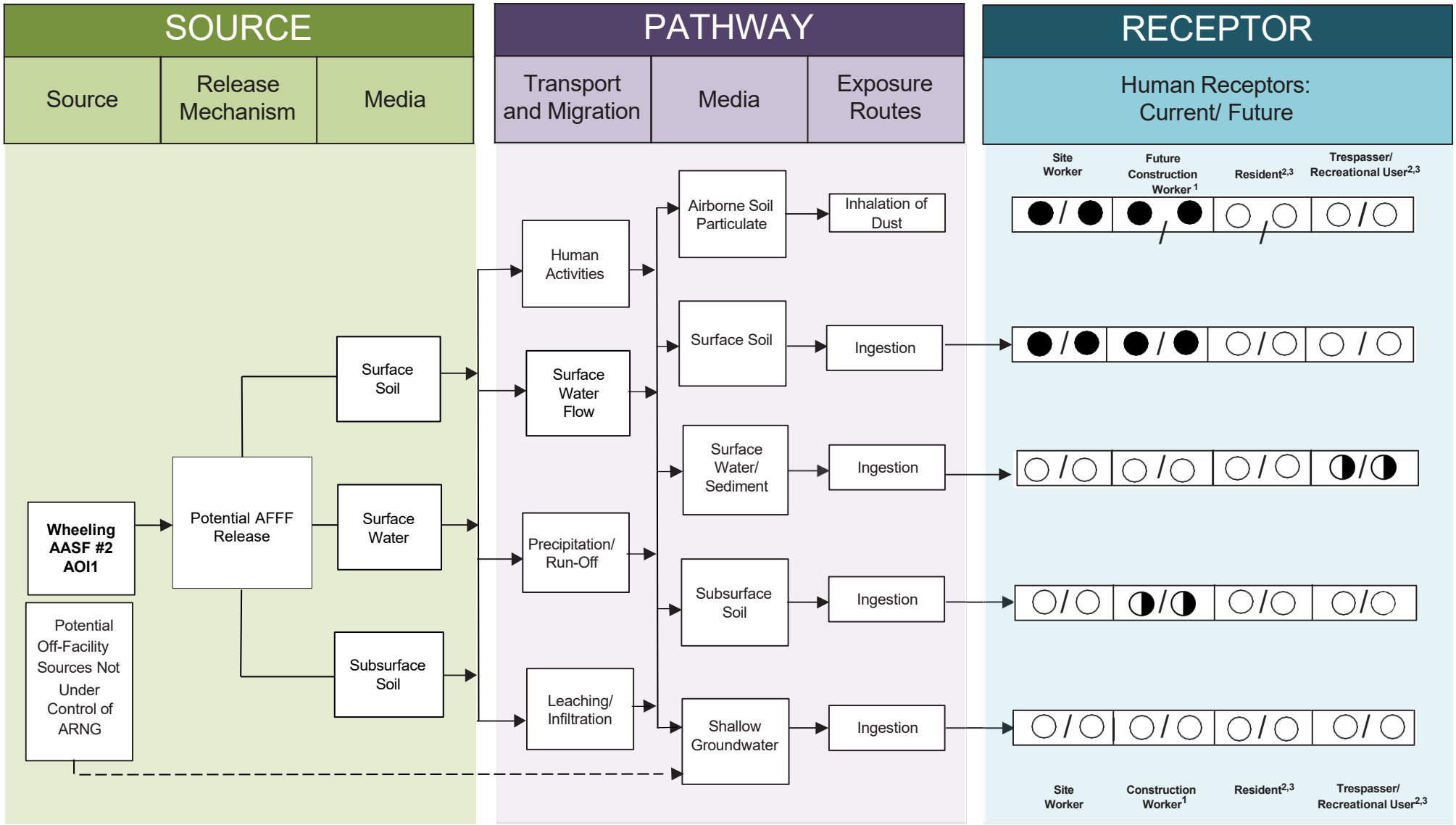
The Facility receives drinking water from the City of Wheeling municipal water system, which has surface water intakes located downgradient to the Facility. Further, there are two unidentified wells located northwest and southwest of the Facility.

Based on the results of this SI and the fact that there were no relevant compounds detected in groundwater at the AOIs or in Facility Boundary wells, the exposure pathway for groundwater for construction workers, site workers, and trespassers/off-facility residents and recreational users is considered incomplete. The CSM is presented in Figure 7-2.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

Surface water and sediment were not sampled as part of this SI, as the scope of sampling was limited to the presence or absence of the relevant compounds in soil and groundwater within the facility boundary. The Facility is comprised of numerous surface water intakes (**Figure 5-1**) beginning the eastern side of AOI 1. These intakes lead to grates that transfer water from the inlets to around both the northern and southern ends of the Facility and east through AOI 2, and finally end near the Facility boundaries as well as past the Facility boundaries via exposed PVC pipes that empty directly onto the ground surface. The terrain at the locations where these inlets empty gently slopes for roughly ½ mile towards a ravine. This ravine then descends roughly a mile, through a residential area at the bottom, and empties into the Ohio River. This river is popular for recreational use including swimming, fishing, and boating, as well as is a source of

potable drinking water to a high number of residential receptors downgradient of the Facility. The detections of relevant compounds seen in surface soil in the AOIs and Facility Boundary locations, but not in the groundwater, lends credence to surface water and sediment being transferred out and way as runoff via the surface water inlets and off the Facility property; the silty-clayey soils, weathered bedrock, and lack of shallow groundwater flow seen throughout the Facility also could contribute to slow infiltration rates, high storability, and surface runoff events with soils comprised of PFAS relevant compounds. Due to this, and the potential for PFAS relevant compounds to discharge to the nearby Ohio River, the ingestion exposure pathway for surface water and sediment is considered potentially complete for off-facility residents and recreational users downgradient of the Facility. Further, human consumption of fish potentially affected by PFAS from the river is also possible. The CSMs are presented in **Figures 7-1 and Figure 7-2**.



LEGEND

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

Notes:

1. No current/active construction at the site.
2. The resident and recreational users refer to off-site receptors.
3. Inhalation of dust for off-site receptors is likely insignificant.

Figure 7-1
Conceptual Site Model
AOI 1 Wheeling AASF #2

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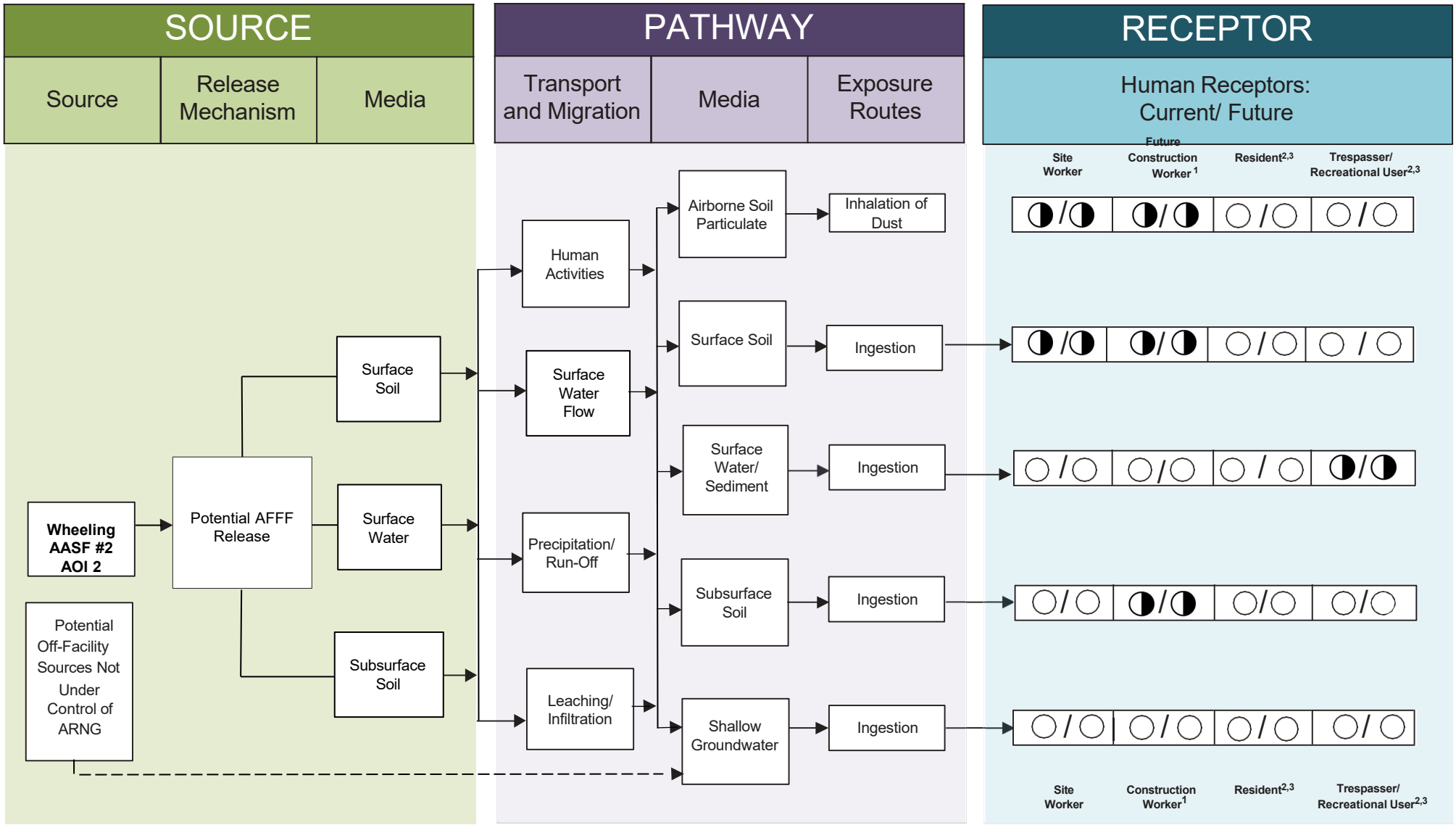

LEGEND

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

Notes:

1. No current/active construction at the site.
2. The resident and recreational users refer to off-site receptors.
3. Inhalation of dust for off-site receptors is likely insignificant.

Figure 7-2
Conceptual Site Model
AOI 2 Wheeling AASF #2

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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 SITE INSPECTION ACTIVITIES

The SI field activities were conducted from 1 to 3 November 2022 followed by one subsequent day on 10 November 2022. Field activities consisted of sonic drilling and hand auger borings and soil sample collection, temporary monitoring well installation and grab groundwater sample collection. Three preparatory facility visits without intrusive work were also conducted on 15 November 2021 (source water sampling) and two utility location visits, one performed on 10 February 2022 and another on 8 September 2022. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2021a), except as noted in **Section 5.9**.

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

- Twenty-Eight (28) soil samples from fourteen (14) primary locations, one (1) additional hand auger location, and three (3) boundary locations
- Three (3) grab groundwater samples from three (3) temporary well locations
- Ten (10) quality assurance/quality control samples.

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

8.2 OUTCOME

Based on the results of this SI, further evaluation under an RI is warranted for AOI 1. Based on the CSMs developed and revised with SI findings, there is the potential for exposure to off-facility residential drinking water receptors, surface water recreators, and on-site construction and site workers from releases during historical DoD activities at the Facility. Sample chemical analytical concentrations collected during this SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**.

A summary of the results of the SI data relative to SLs is as follows:

- AOI 1:
  - PFOA, PFOS, PFHxS, and PFBS were detected in soil below their respective SLs, with a single exceedance for PFOS.
  - No groundwater samples were collected in AOI 1 due to shallow boring refusal above the water table depth. Groundwater contours (**Figure 2-5**) depicts flow moving off-facility to the east. The possibility exists that the surface soils, composed primarily of silts, clays, and weathered rock, are providing infiltration with high storability, and the majority of the PFAS relevant compounds detected in soil are exiting the Facility via run-off events, especially as there is no shallow groundwater at AOI 1 to help drive contaminants through the site.
- AOI 2:
  - PFOA, PFOS, and PFHxS were detected in soil at AOI 2 at concentrations below their respective SLs.
  - A single temporary well was installed at AOI 2 (AOI02-02). There were no detections of relevant compounds in the groundwater sample. AOI 2 is downgradient of AOI and was installed immediately adjacent to a surface water drainage outlet being fed from AOI 1. Like AOI 1, infiltration and high storability coupled with surface run-off events likely explains the surface soil concentrations at AOI 2 and no relevant compound detections in groundwater.
- Facility Boundary
  - Facility Boundary soil samples collected downgradient of AOI 1 and 2 surface water drainage pathways had detections of PFOS, PFOA, and PFHxS below their respective SLs.
  - Facility Boundary wells WHAASF2-02, WHAASF2-01, and WHAASF2-03 had no detections of relevant compounds in groundwater. As mentioned previously, the lack of a shallow groundwater table at AOI 1 coupled with the soil composition is most likely a contributor to why no relevant compounds were detected in groundwater at the Facility Boundary samples, but it was detected in Facility Boundary and AOI soil samples.

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 be determine if an AOI should 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	FTAs, Surface Drainage Path, HAZMAT Room, and Tri-MaxTM Fill Area 2	●	Not applicable[1]	○	Proceed to RI
2	AFFF Storage Shed and TriMax Fill Area 1	◐	○	○	No further action

Legend:
● = Detected; exceedance of SLs
◐ = Detected; no exceedance of SLs
○ = Not detected
[1] No groundwater was encountered prior to bedrock; therefore, no wells were installed.

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