FINAL
Site Inspection Report
Army Aviation Support Facility #1
Williamstown, 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
Arlington, VA 22204

UNCLASSIFIED

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LIST OF ACRONYMS AND ABBREVIATIONS

%	Percent
°C	Degrees Celsius
°F	Degrees Fahrenheit
µg/kg	Microgram(s) per kilogram
µg/L	Microgram(s) per liter
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous film forming foam
amsl	Above mean sea level
AOI	Area of interest
ARNG	Army National Guard
ASTM	ASTM International
bgs	Below ground surface
btoc	Below top of casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CSM	Conceptual site model
DoD	Department of Defense
DQO	Data quality objective
DUA	Data Usability Assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
EB	Equipment blank
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
ft	Foot (feet)
FTA	Fire Training Area
HFPO-DA	Hexafluoropropylene oxide dimer acid
ID	Identification
IDW	Investigation-derived waste
in.	Inch(es)
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	Liquid chromatography tandem mass spectrometry
LQU	Large Quantity User
mg/kg	Microgram(s) per kilogram
MIL-SPEC	Military specification

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

MS	Matrix spike
MSD	Matrix spike duplicate
NFA	No further action
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
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
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
WVARNG	West Virginia Army National Guard
WAASF #1	Williamstown Army Aviation Support Facility #1
WHAASF #2	Wheeling Army Aviation Support Facility #2

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), and 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 three Areas of Interest (AOIs) where PFAS-containing materials may have been stored, disposed, or released historically (see **Table ES-2** for AOI listing). 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 Williamstown Army Aviation Support Facility (AASF) #1 in Williamstown, West Virginia, and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 2. Williamstown AASF is also referred to as the "Facility" throughout this document.

Williamstown AASF #1, operated by the West Virginia ARNG (WVARNG), encompasses approximately 102.8 acres in Williamstown, West Virginia, within Wood County. The Facility is located adjacent to the Mid-Ohio Valley Regional Airport, west of Runway 21, and is utilized as an operational military facility, providing training and support for an active WVARNG unit since the completion of the Facility in 1992. The Facility is located in the Appalachian Plateau Physiographic Province, characterized by steep hillslopes and ravines formed through post-glacial erosional processes. The Ohio River can be found between 2.5 to 3.5 miles to the north, east, and west of the Facility (AECOM Technical Services, Inc. 2020).

The PA identified three 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 2.

[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 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.

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

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	Burn Pit FTA	◐	NA	NA	NFA
2	Wash Pad FTA	●	NA	NA	Proceed to RI
3	AFFF Storage	◐	NA	NA	NFA

Legend:
● = Detected; exceedance of SLs
◐ = Detected; no exceedance of SLs
○ = Not detected
FTA = Fire Training Area
NA = Not applicable; no temporary wells were installed at any AOI, or boundary location and no groundwater samples were collected or analyzed.
NFA = No further action

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 Williamstown AASF #1 in Williamstown, West Virginia. Williamstown AASF #1 is also referred to as the "Facility" throughout this report.

The SI project elements were performed in compliance 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 Army requirements and guidance for field investigations.

1.2 SITE INSPECTION PURPOSE

A PA was performed at Williamstown AASF #1 (AECOM Technical Services, Inc. [AECOM] 2020) that identified three Areas of Interest (AOIs) where PFAS-containing materials were used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action (NFA) 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

AASF #1 occupies 102.8 acres in Williamstown, West Virginia (**Figure 2-1**). The Facility is located adjacent to the Mid-Ohio Valley Regional Airport, west of Runway 21. Land to the south and east of the Facility is a combination of residential and forested, while land to the north and west is primarily forested and agricultural. The nearest suburban area is Parkersburg, West Virginia, and is located 7.8 miles southwest of the Facility (AECOM 2020).

The AASF is located on a portion of land the West Virginia National Guard leased from the Wood County Airport Authority for a term of 50 years starting in August 1986. On 1 July 2022, a new lease agreement with Wood County Airport Authority was entered for a period of five years, up for renewal on 27 June 2027. AASF #1 has operated as a military facility since construction was completed around 1992 when the unit moved from their previous location on the opposite side of the airport to the southeast (AECOM 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

Williamstown AASF #1 is located in Wood County, West Virginia, directly south of the residential area of Williamstown, and northeast of Parkersburg, West Virginia. The Facility is approximately 627 feet (ft) above mean sea level (amsl) (**Figure 2-2**). This area of West Virginia is located in the Appalachian Plateau Physiographic Province. Typical surface features in the surrounding area include steep hillslopes and ravines formed through erosional processes. AASF #1 sits at the top of a plateau, with forested land in its immediate surroundings. AASF #1 is within the Middle Ohio South Watershed, the tributaries of which feed the major geographic feature in this area, the Ohio River, which is found between 2.5 to 3.5 miles from the Facility to the east, north, and west (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**.

2.2.1 Geology

The exposed geologic group in the Williamstown area is the Upper Pennsylvanian or Permian Dunkard group, which consists of shale, sandstone, limestone, and coal. Underlying is the Lower Pennsylvanian group, also comprised of shale, sandstone, limestone, coal, and a sandstone conglomerate in the older section of the stratum. Below this group is the Mississippian group, consisting of undivided sedimentary rocks, siltstone, shale, sandstone, Pleistocene age glacial deposits, and Maxville Limestone. Soils in this area are composed of shale, sandstone, limestone, and coal, the same rocks that make up the underlying Pennsylvanian or Permian Dunkard group (AECOM 2020).

Soils primarily composed of silts and medium to fine grained sands with varying amounts of clay and gravel were the dominant lithology encountered during the SI field events. Boring completion depths ranged between 5 to 44 ft below ground surface (bgs). Grain size analysis was

performed on samples AOI01-03, AOI02-02, AOI03-02, and boundary sample WAASF-03 and analyzed via ASTM International (ASTM) Method D-422. Results indicated soil comprised of 4–13.9 percent (%) clay, 33.9–43.6% silt, 33.6–52.9% sand, and 0–20.6% gravel.

2.2.2 Hydrogeology

The Pleistocene sands and gravel within stream valleys form alluvial aquifers directly above bedrock that is between 15 and 25 ft thick in nearby Parkersburg, West Virginia. Groundwater within the fractured bedrock hills in the Facility area is generally between 30 and 40 ft bgs. In the area around the Facility, under normal conditions, the hydraulic gradient is such that groundwater flows northwest from the surrounding hills, towards the Ohio River, as shown on **Figure 2-3**. No groundwater wells were installed during the SI due to absence of shallow groundwater; thus, no groundwater elevation contour figures were able to be produced. During floods and high-water events that happen over a short period of time, the hydraulic gradient can reverse, causing river water to flow into and recharge the aquifer. This process during high-water events could affect the flow of contaminants in the aquifer. There is a semi-confining silt-clay layer over the alluvial aquifers; however, the bedrock and alluvium are hydraulically interconnected. This connectivity was determined by observing identical well responses during high-water events (AECOM 2020).

West Virginia's water resources predominantly come from the alluvial aquifers. Multiple entities draw water from the Middle Ohio South Watershed for public water supply. Fourteen cities receive most of their public water supply from groundwater of the Middle Ohio South Watershed, three of which specifically draw groundwater from Wood County. The City of Williamstown's public water supply is completely sourced from groundwater within the Middle Ohio North Watershed (AECOM 2020).

An EDR™ Report conducted a well search for a 1-mile radius surrounding the Facility. Using additional online resources, such as state and local GIS databases, wells were researched to a 4-mile radius of the Facility. Based on the EDR™ Report, no public water supply wells, private domestic wells, or monitoring wells were identified within 1 mile of the Facility. According to the U.S. Geological Survey (USGS) National Water Information System Mapper, there are two active USGS monitoring wells located within a 4-mile radius of the Facility: one 2.5 miles east and one 3.2 miles north of the Facility. Additional inactive USGS monitoring wells were identified within 4 miles and are shown on **Figure 2-3** . Geographic information system (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. Drinking water at the Facility is provided by the City of Williamstown public water supply (AECOM 2020).

2.2.3 Hydrology

The Ohio River is the major water feature near the Facility, beginning in Pittsburgh, Pennsylvania at the union of the Allegheny and Monongahela rivers. From there, the Ohio River flows southwest, ending at the border of Kentucky, Illinois, and Missouri, where it meets with the Mississippi River. Williamstown, West Virginia, is within the Middle Ohio South Watershed, one of many watersheds along the banks of the Ohio River. The Ohio River is used for recreational activities in the area of the Facility. The Middle Ohio South Watershed is spread through Wood, Wirt, Jackson, Roane, and Mason counties. There is no single, major tributary in this area of Wood County, as it consists of multiple Ohio River tributaries flowing through valleys, toward the river. This watershed contributes 7% of the public water supply within West Virginia. Wood County overall is one of three counties with the largest reported withdrawals by Large Quantity Users (LQUs) for public water supply. Approximately 80% of water withdrawn in Wood County for public supply is groundwater withdrawn by LQUs and groundwater privately withdrawn for self-supply (AECOM 2020). The City of Williamstown's public water supply is completely sourced from groundwater within the Middle Ohio North Watershed.

Surface water flow at the Facility follows topography (**Figure 2-4**). Surface water runoff on the northwest side of the Facility flows north to Plum Run. From Plum Run, water flows northwest to join Big Run. On the southern end of the Facility, surface water runoff flows southwest to Big Run. Big Run continues north for approximately 3 miles before discharging into the Ohio River, which has a southwestern flow (AECOM 2020).

2.2.4 Climate

Williamstown, West Virginia has a continental climate, which is characterized by four distinct seasons with moderately severe winters and warm, rainy summers. Topography and elevation are primary influences on climatic variations and temperature in West Virginia. The eastern region of West Virginia is generally a few degrees cooler than the western region of the state, including AASF #1, due to higher elevation. Climate data from Parkersburg, approximately 8.5 miles from the Facility, records an annual average high temperature of 65.3 degrees Fahrenheit (°F), the annual average low temperature is 44.1°F, annual rainfall precipitation is 42.09 inches (in.), and annual average snowfall precipitation is 11 in. (AECOM 2020).

2.2.5 Current and Future Land Use

AASF #1 currently resides on a portion of land leased from the Wood County Airport Authority under the terms of a 5-year lease. AASF #1 has been an operational military facility for an active National Guard unit since 1992, following the completion of construction. Future land use is not anticipated to change (AECOM 2020).

2.2.6 Sensitive Habitat and Threatened/Endangered Species

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Wood County, West Virginia (U.S. Fish and Wildlife Services 2022):

- Snails: Flat-spired Three-toothed Snail (*Triodopsis platysayoides*) – Federally Threatened

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

- Mammal: Indiana Bat (*Myotis sodalis*) – Federally Endangered; Northern Long-eared Bat (*Myotis septentrionalis*) – Federally Threatened; Virginia Big-eared Bat (*Corynorhinus townsendii virginianus*) – Federally Endangered.

2.3 HISTORY OF PFAS USE

Three AOIs were identified in the PA where AFFF may have been used, stored, disposed, or released historically at Williamstown AASF (AECOM 2020). AFFF may have historically been released at the Facility during a one-time fire training event at the burn pit area in the early 2000s. Additional AFFF releases may also have occurred from annual fire training and refilling of fire extinguishers that took place at the wash pad. Additionally, AFFF in 5-gallon buckets were stored in the AFFF storage location. The potential release areas were grouped into three AOIs based on preliminary data and presumed groundwater flow directions. A description of each AOI is presented in **Section 3**.

Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

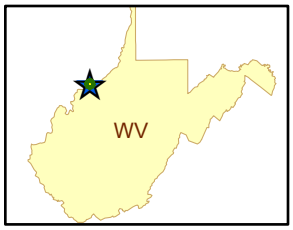
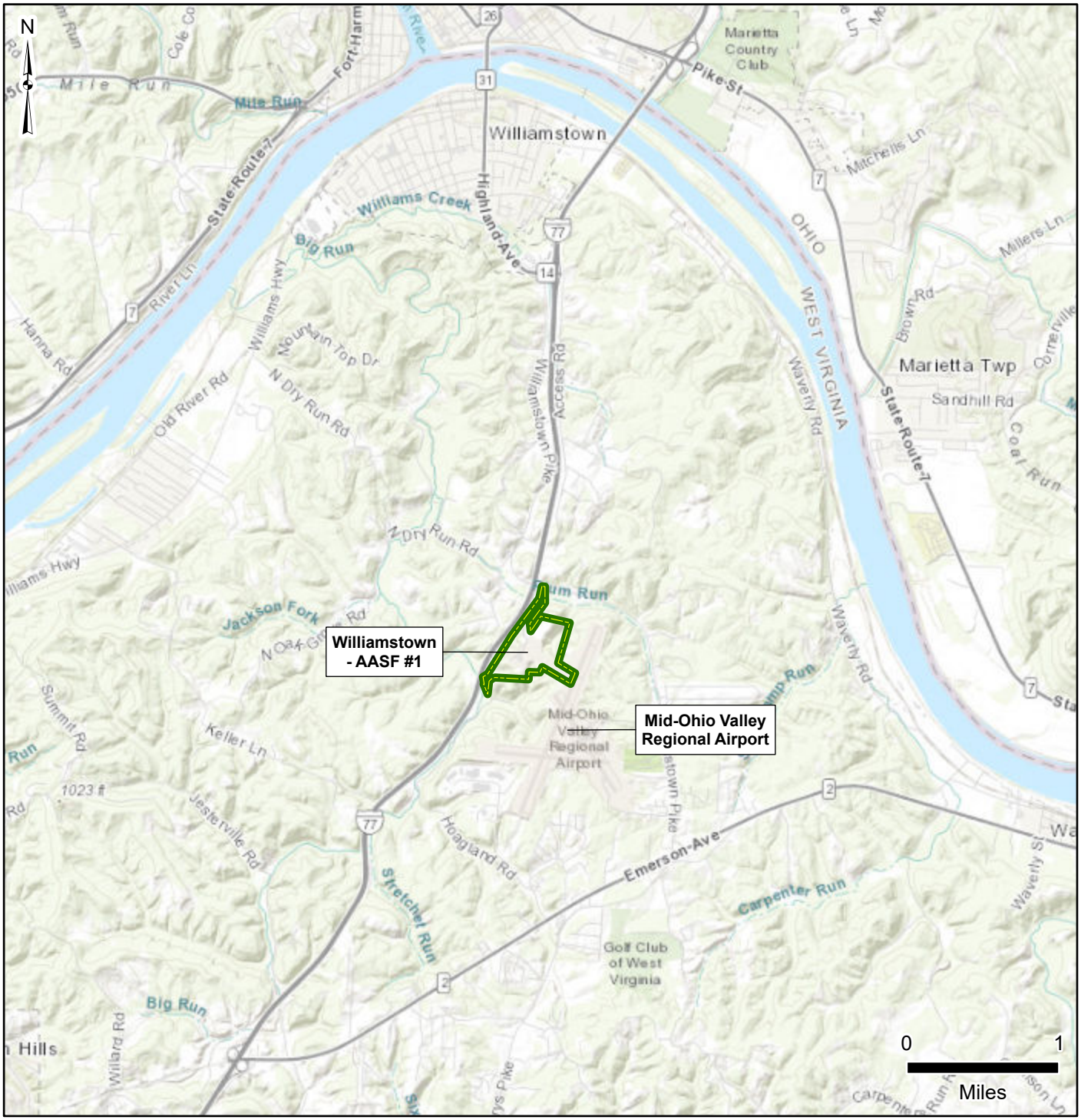


Figure 2-1
Facility Location



Facility Data

Facility Boundary

Data Sources:
ESRI 2020
AECOM 2020

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

Path: G:\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Williamstown\WilliamstownSI.aprx\Figure 2-1 Site Location

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Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

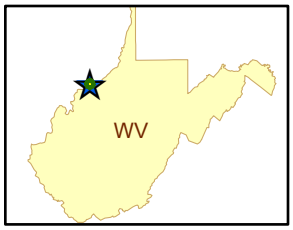
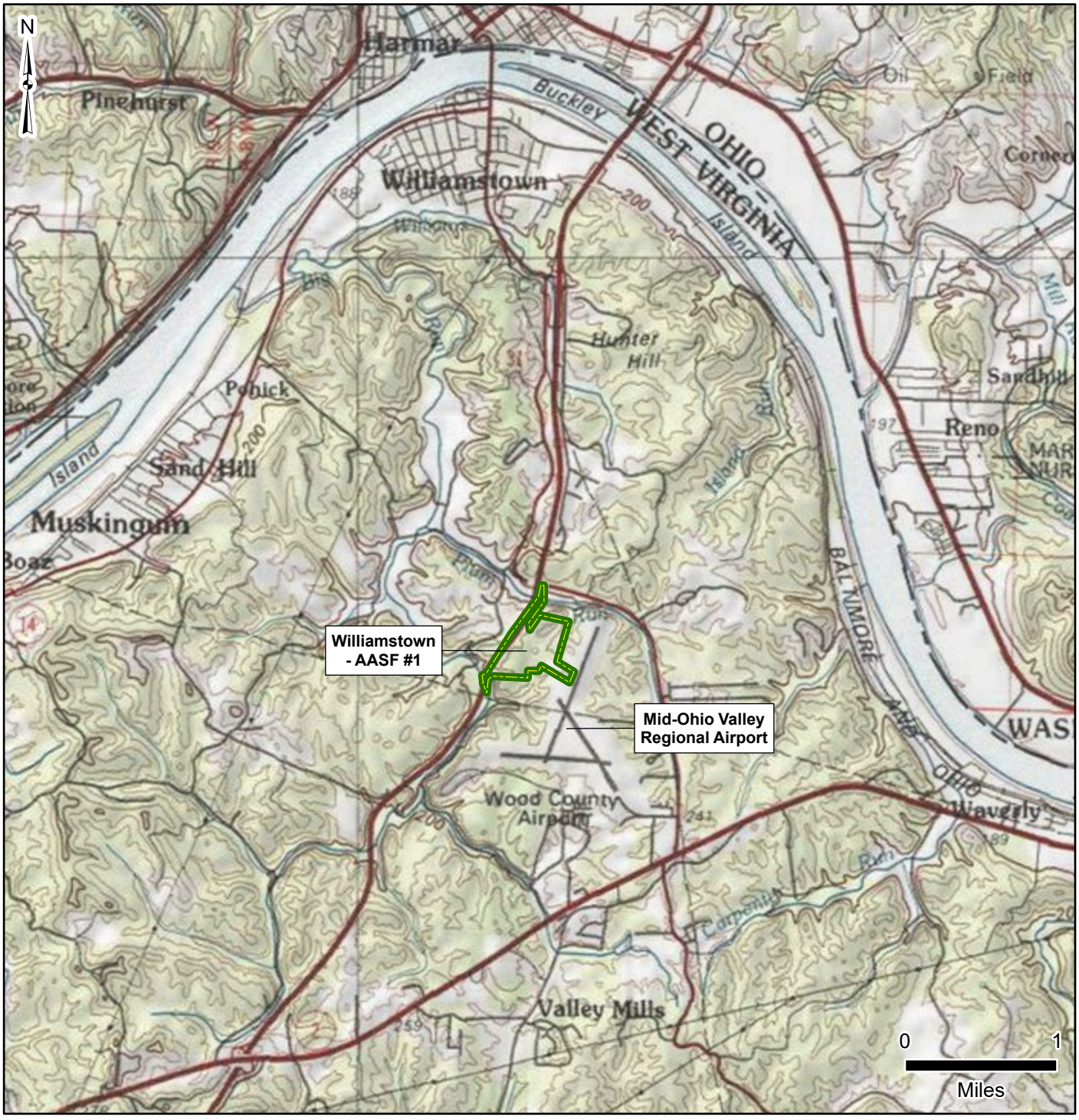


Figure 2-2
Topography



Path: G:\Federal\Nationwide\PFAS\MAES_6342503831\PROJECTS\SIReport\Williamstown\WilliamstownSI.aprx\Figure 2-2 Topography

Facility Data

Facility Boundary

Contour interval = 20 ft

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
Williamstown AASF #1, West Virginia

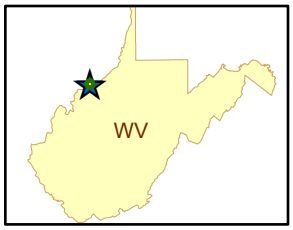
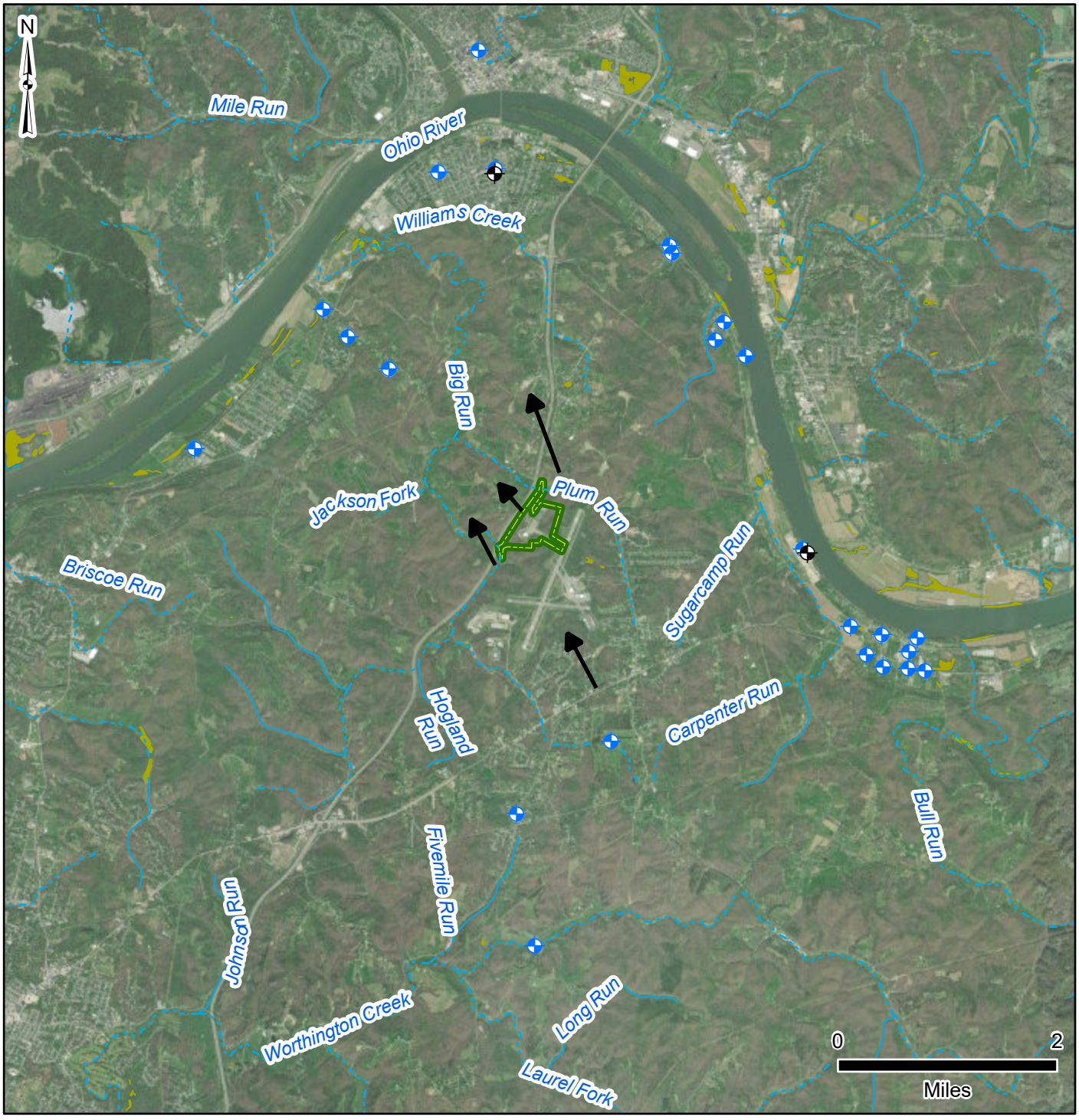


Figure 2-3
Groundwater Features



Facility Data
- Facility Boundary

Well Type
- USGS Active Monitoring Well
- USGS Inactive Monitoring Well

Hydrology/Hydrogeology
- Inferred 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

Path: G:\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Williamstown\WilliamstownSI.aprx\Figure 2-3 Groundwater Features

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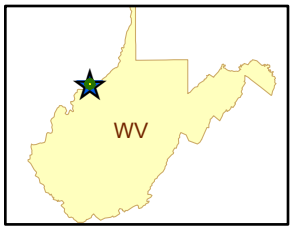
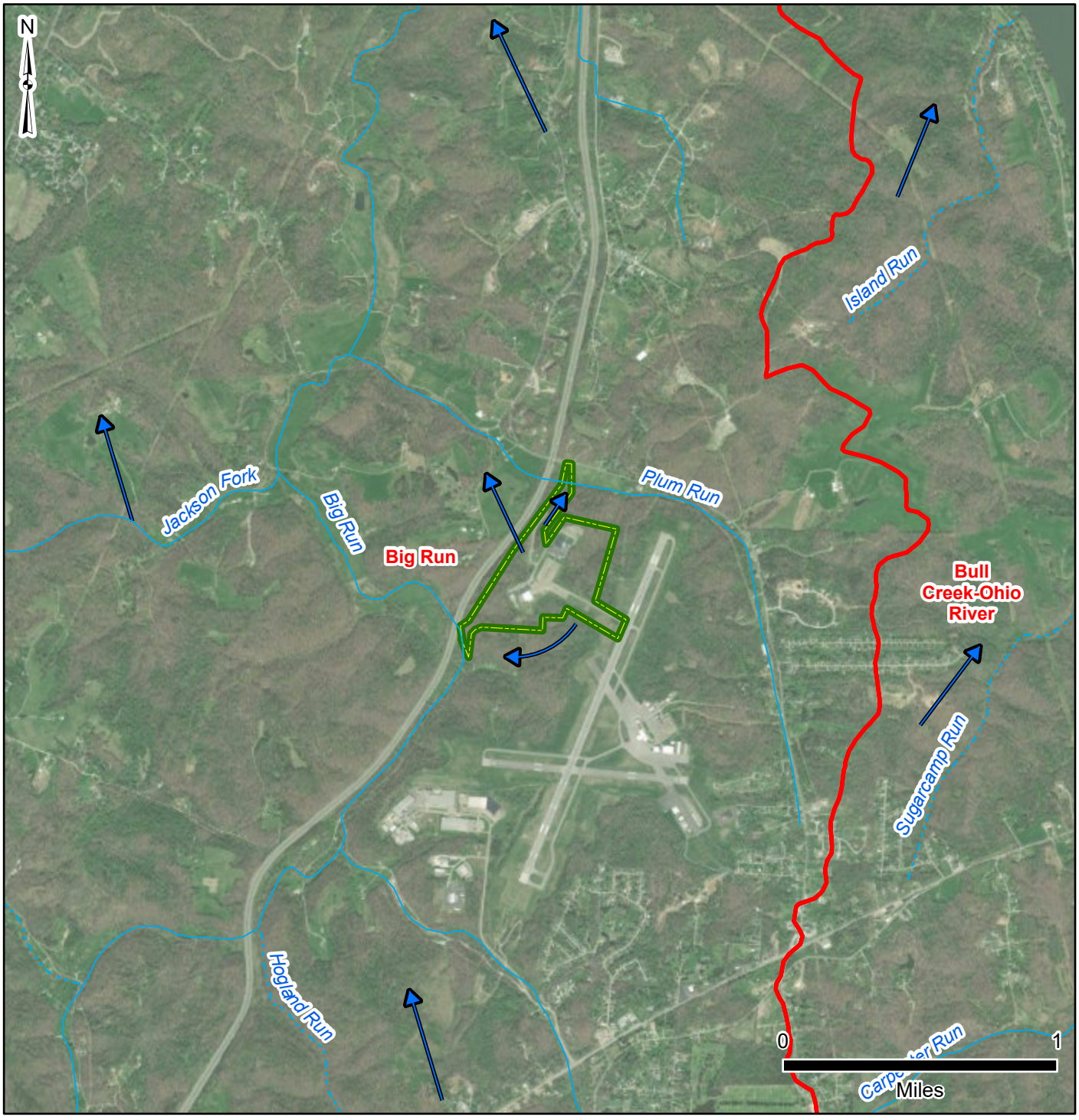
Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 2-4
Surface Water Features





Facility Data
- Facility Boundary

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

Data Sources:
ESRI 2020
AECOM 2020

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

Path: G:\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Williamstown\WilliamstownSI.aprx\Figure 2-4 Surface Water Features

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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, three potential release areas were identified at Williamstown AASF #1 and grouped into three AOIs. The potential release areas are shown on **Figure 3-1** and described below.

3.1 AOI 1 – BURN PIT FTA

In the early 2000s, the Williamstown AASF gave the adjacent Airport's Fire Department a truck equipped with AFFF. The Airport Fire Department had permission to conduct a fire training event on AASF #1 property to see how the firetruck operated. For this exercise, a training location was chosen on the southeastern side of the Facility, near a large concrete pad. The exact location is unknown, but the estimated area is shown on Figure 3-1. The Airport Fire Department poured water into the pit, followed by fuel, then ignited the water-fuel mixture. The exercise fire was then extinguished using the Fire Department's fire truck that contained AFFF. The quantity of foam used is unknown, but personnel remember the firetruck's foam being sprayed for approximately 1 to 2 minutes. Following the exercise, the firetruck was not cleaned at the AASF #1 wash pad. Instead, the truck returned to the airport, and it is not known if the firetruck was washed after returning. This training event was a one-time occurrence. The foam released likely infiltrated soils on the surface as well as subsurface soils within the pit. The general burn pit location is a potential PFAS-release area (AECOM 2020).

3.2 AOI 2 – WASH PAD

Annual fire training took place with AFFF at the wash pad of the Facility. Interviewees recall AFFF being incorporated into the Facility's emergency response equipment between 2000 and 2001 and removed in 2010. During this period, annual fire training with AFFF took place on the Facility wash pad. During these events, wood was placed on the wash pads and ignited for participants to practice using Tri-Max™ AFFF extinguishers. Interviewees recall Airport Fire Department personnel and employees from Fire Extinguisher Specialists, the company contracted for annual inspections of AFFF extinguishers, observing the annual fire training. Neither group brought outside extinguishers to the Facility, but Fire Extinguisher Specialists supplied propane torches to assist in lighting wood for the exercises. During these training events, the contents of one 150-pound, or 30-gallon, extinguisher would be expended in the wash pad area and rinsed down the drain with a water hose (AECOM 2020).

Prior to 2006, the wash pad drain led to the Facility's oil-water separator (OWS), then to a surface water outfall leading to Big Run, off-property. In 2006, the drainage system was restructured, and an equalization tank was installed. At this time, a valve was installed that directs liquid draining through the wash pad to the equalization tank, then to municipal sewage and the Williamstown wastewater treatment plant. Interviewees recall the valve being turned to the equalization tank during wash pad activities, including fire training. However, if the valve was not turned to the equalization tank, the wash pad water followed its original path to the OWS, followed by release to Big Run. Therefore, following renovations in 2006, AFFF from fire training activities followed the updated wash water path to the equalization tank, then to municipal sewage and a water treatment plant (AECOM 2020).

In addition to fire training exercises, the wash pad was used to dispose and refill off-specification AFFF. According to the Fire Extinguishers Inspection Sheet provided by AASF #1 personnel, there were 18 of the 30-gallon Tri-Max™ AFFF extinguishers on the Facility that underwent hydrostatic testing every five years. When it was time for the extinguishers to be submitted for testing, the contents of each extinguisher were emptied into the wash pad before they were given to the contractor, Fire Extinguisher Specialists. At this time, Fire Extinguisher Specialists replaced them with re-certified extinguishers. This process was followed every five years, until AASF #1 had Tri-Max™ AFFF extinguishers replaced by Purple K extinguishers in 2010. At this time, 18 extinguishers were emptied into the wash pad, and the empty extinguishers were given to the US Property and Fiscal Office. Disposal of large quantities of AFFF via wash pad drain potentially occurred before drainage renovations in 2006, as AFFF was acquired between 2000 and 2001 and required service every five years. Therefore, it is likely that there was one disposal event prior to drainage renovations, resulting in AFFF going to Big Run, and one disposal event resulting in AFFF going to the municipal water treatment plant (AECOM 2020).

The foam released during these annual training events and at the disposal of off-specification AFFF likely infiltrated surface water and sediment along drainage pathways from the outfall leading to Big Run and were introduced to the municipal sewer system. The pathway of potential contamination is dependent on the date of release. Though interviewees assert that the valve was turned to direct flow to municipal water treatment any time AFFF was used in the wash pad area following renovations, there is a degree of uncertainty due to the lack of documentation and reliance on interviewee recollection. The wash pad area is a potential PFAS-release area (AECOM 2020).

3.3 AOI 3 – AFFF STORAGE

While AFFF was in-use at AASF #1, 5-gallon buckets of Tri-Max™ were stored in a Materials Storage Room on the property with oil and spill kits. To interviewee knowledge, no spills occurred in this location. Due to the potential for unintended leaks or spills of AFFF, this location is considered a potential PFAS-release area (AECOM 2020).

3.4 ADJACENT SOURCES

There are potential PFAS sources adjacent to the Williamstown AASF #1 that may impact PFAS concentrations in groundwater underlying the Facility. The Hard Landing and Airport Crash Simulation Training areas are located south and hydraulically upgradient of the AOIs, but there is no associated AFFF or PFAS release suspected at these sites. The Nozzle Test Area, which was used for testing that biannually released 5 to 10 gal of AFFF until 2017, is located south and hydraulically upgradient of the Facility. As such, the nozzle test area is a suspected adjacent PFAS release area and could potentially impact the groundwater underlying the Facility. The Williamstown Waste Water Treatment Plant is approximately 3.5 miles north and hydraulically downgradient of the AOIs. As such, this area is not expected to impact PFAS concentrations in the groundwater underlying the Facility.

Army National Guard Site Inspections
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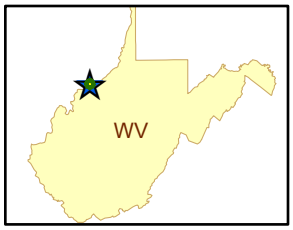
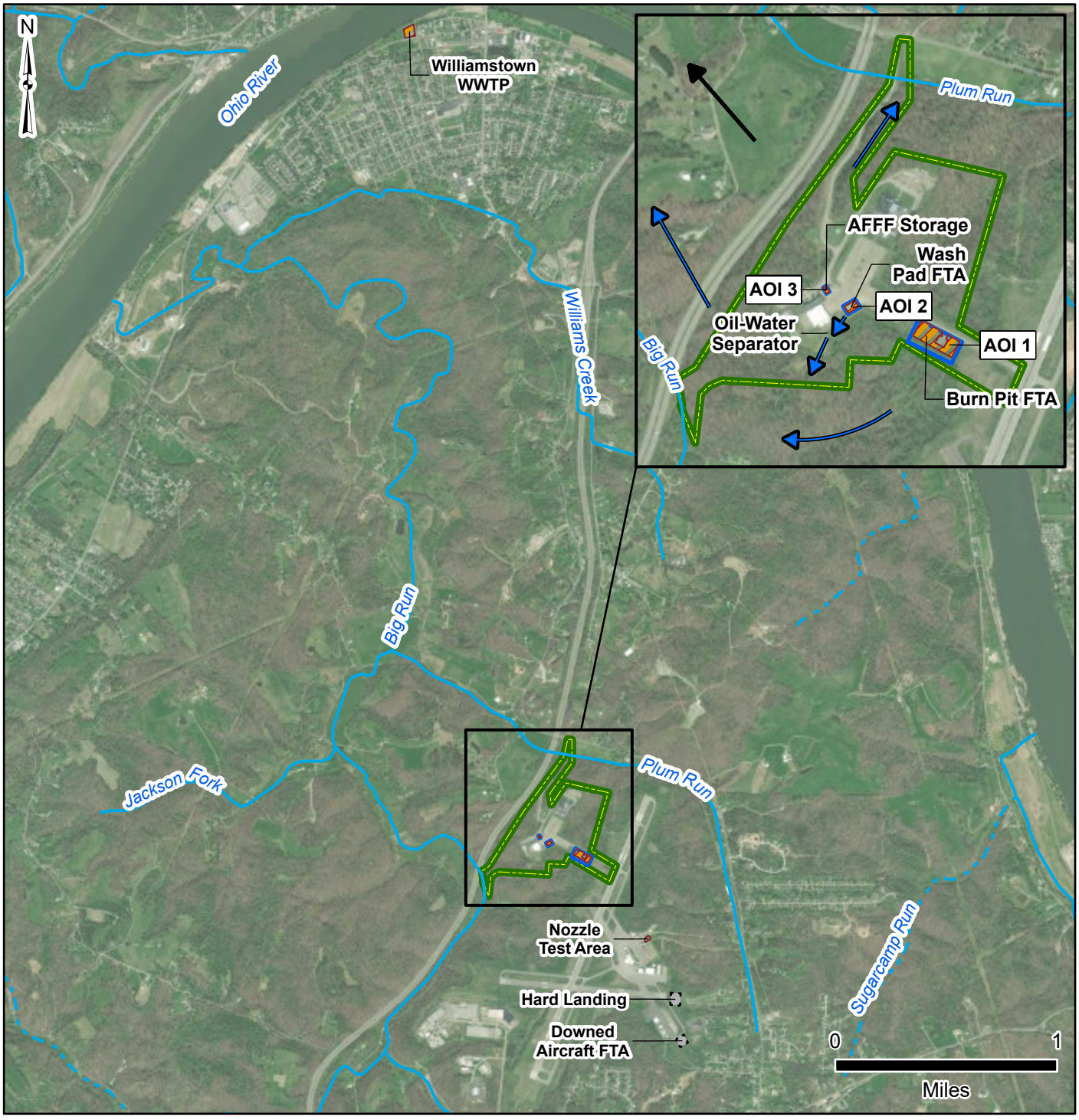
Williamstown AASF #1, West Virginia

Figure 3-1
Areas of Interest





Path: G:\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SIReport\Williamstown\WilliamstownSI.aprx\Figure 3-1 Areas of Interest

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

Hydrology
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Perennial Creek/Stream
- Intermittent Creek/Stream

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] 2022a), 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 NFA 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 may 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 Williamstown AASF #1 (AECOM 2020)
- Analytical data from soil samples collected as part of this SI in accordance with the UFP-QAPP Addendum (EA 2022)

4.3 STUDY BOUNDARIES

The scope of the SI was bounded horizontally by the property limits of the Facility (**Figure 2-1**). 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 Environmental, 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 PFAS Analysis by Quality Systems Manual (QSM) Table B-15 (2020).

Data were compared to applicable SLs within this document and decision rules as defined in the SI UFP-QAPP Addendum (EA 2022a).

4.5 DATA USABILITY ASSESSMENT

The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD 2019a, 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 2022a).

5. SITE INSPECTION ACTIVITIES

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

- *Final PA Report, Army Aviation Support Facility #1, Williamstown, West Virginia,* dated July 2020 (AECOM 2020)
- *Final Programmatic UPF-QAPP, SIs for PFAS Impacted Sites, ARNG Installations, Nationwide,* dated December 2020 (EA 2020a)
- *Final SI UFP-QAPP Addendum, Army Aviation Support Facility #1, Williamstown, West Virginia,* dated March 2022 (EA 2022)
- *Final Programmatic APP, Revision 1,* dated November 2020 (EA 2020b)
- *Final APP/Site Safety and Health Plan Addendum, Army Aviation Support Facility #1, Williamstown, West Virginia,* dated October 2021 (EA 2021).

The SI field activities were conducted from 31 January to 9 February 2023 and consisted of Sonic drilling and hand auger borings and soil sample collection. Two preparatory facility visits without intrusive work were also conducted on 15 November 2021 (source water sampling) and 30 January 2023 (utility location). Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2022a), 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:

- Fifty-Two (52) soil samples from 14 primary locations, 9 secondary (hand auger) locations, and 3 boundary locations
- Twenty (20) 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**. Sampling forms are provided in **Appendix B2,** and land survey data is provided in **Appendix B3**. Field change request forms are provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 PRE-INVESTIGATION ACTIVITIES

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 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, WVARNG, USACE, 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, 2022a).

*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 30 January 2023 with input from the EA field team. General locating services and ground-penetrating radar were used to complete the clearance. The location AOI03-01 was offset approximately 40 ft east due to the presence of an obstruction in the original location. Location WAASF-02 was relocated 400ft southwest due to access and steep gradients. Hand auger clearances to a full 5 ft bgs for the remaining boring locations were unsuccessful due to intercepting weathered bedrock and resulted in a deviation from the UFP-QAPP 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 via a spout located outside the 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. These samples included multiple detections of PFAS relevant compounds at concentrations above one-fifth of their associated SL. As such, the water could not be used for decontamination and source-water collected at Wheeling AASF #2 via a spigot outside the main hangar (using PFAS-free hose tubing), was brought for use at WAASF #1 during the SI. The results for Wheeling Army Aviation Support Facility #2 (WHAASF #2) indicated that the water contained trace levels of PFOA detected at an estimated concentration less than one-tenth of the SL of 6 nanograms per liter (ng/L). Based on these low-level detections, the water was deemed acceptable for use in decontamination. Further discussion

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

Eleven borings were advanced exclusively by hand auger; AOI01-06 through AOI01-10, AOI02-05 through AOI02-08, as well as two additional hand auger samples obtained at locations AOI02-01 and WAASF-03 (see **Section 5.9**).

5.3 SOIL BORINGS AND SOIL SAMPLING

Each boring was pre-cleared by EA's drilling subcontractor, Cascade Drilling, using a hand auger to verify utility clearance in the shallow subsurface where utilities would typically be encountered (see **Section 5.9**). Soil samples collected from depths shallower than 5 ft bgs were collected using the hand auger. The hand auger was decontaminated between each boring to ensure no cross-contamination occurred between samples. Soil sample locations are shown on **Figure 5-1** and described in the subsequent section. Non-dedicated sampling equipment (i.e., hand auger) was decontaminated between sampling locations.

Beyond 5 ft depth, soil samples were collected via Sonic drilling methods in accordance with the UFP-QAPP Addendum (EA 2022).

Three discrete soil samples were collected for chemical analysis from each soil boring (except as noted in **Section 5.9**); one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. One subsurface soil sample was collected from the midpoint of the boring (not to exceed 15 ft bgs), and one was collected approximately one foot above the terminal depth of the boring. Shallow groundwater was not encountered at the Facility during the SI field event. Total boring completion depths ranged from ~5 to 44 ft bgs.

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 2022). Several boring locations were adjusted and offset for various 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 bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express under standard chain-of-custody procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15), total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM D422) in accordance with the UFP-QAPP Addendum (EA 2022).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. Matrix spike (MS)/matrix spike duplicates (MSDs) were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, 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.

5.4 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

There were no temporary wells installed at the Williamstown AASF #1 Facility because shallow refusal was reached prior to encountering groundwater. Thus, no grab groundwater samples were able to be collected for any AOI at the Facility. Shallow groundwater is a pathway of concern in the SI.

5.5 SYNOPTIC WATER LEVEL MEASUREMENTS

No temporary wells were installed during this SI field event. Due to this, no synoptic gauging event occurred, and no groundwater elevation contour maps were created.

5.6 SURVEYING

No temporary wells were installed so no surveying was performed.

5.7 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA 2022).

Soil IDW (i.e., soil cuttings) and liquid IDW (i.e., decon water and drilling water) generated during the SI activities was containerized (except as noted in **Section 5.9**) in properly labeled 55-gallon drums (two water, eleven soil) and staged within a connex box at an approved location at the western end of the parking lot near AOI 3. The solid and liquid IDW will be sampled and disposed offsite via a Resource Conservation and Recovery Act Subtitle C landfill. Specifics on the disposal of solid and liquid IDW will be addressed in an IDW Technical Memorandum.

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 at a licensed solid waste landfill.

5.8 LABORATORY ANALYTICAL METHODS

Samples were analyzed for PFAS 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 D422.

5.9 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 (EA 2022) are noted below and are documented in the field change requests forms in **Appendix B4**:

- During utility clearance, it was noted that WAASF-02 was located in a position that was difficult to access via drill rig. The location was relocated approximately 400 ft southwest, inside the fence line and downgradient of all associated AOIs. Full details can be found in **Appendix B4**.

- Due to shallow bedrock and/or refusal encountered between 0 and 5 ft bgs across the site, the majority of borings were not cleared via hand auger to the full 5 ft bgs but went to at least to the frost line between 3 and 4 ft bgs

- Refusal/bedrock was encountered at variable depths across the Facility. As such, the third sample outlined in the UFP-QAPP Addendum (EA 2022) was not collected from boring locations AOI01-01 and AOI01-10, due to unanticipated shallow depths to bedrock (less than 10 ft bgs).

- On the first day of drilling (31 January 2023), silt and clay (between 10 and 20 ft bgs), a stiff clay (beginning at 20 ft bgs), and refusal attributed to weathered rock (at 31 ft bgs) was encountered in the WAASF-03. No groundwater was encountered and no sediments with moisture content above “moist” quality were observed in the boring. A project team call between ARNG G-9 and EA was held to determine a path forward if similar subsurface conditions were encountered at subsequent locations. Based on the call, it was determined a well would not be installed if these conditions occurred; thus, no temporary wells were installed at any AOI due to these similar conditions being encountered in every boring.

- Due to shallow bedrock encountered and/or no groundwater observed at each AOI, a decision was made by ARNG G-9 to add nine additional surface soil (hand auger; 0 to 2ft

bgs) samples to ensure there was complete representation and capture of each AOI release area. AOI 1 added five locations – AOI01-06 through AOI01-10 – and AOI 2 added four locations – AOI02-05 through AOI02-08.

- Due to the extensive, dense clay encountered at WAASF-03 during drilling, source-water (obtained from WHAASF #2) was introduced to alleviate friction generated-heat on the core barrel; as a result, two 55-gallon drums of water were collected following pumping of the completed boring. Similar circumstances generated half of a 55-gallon drum at AOI02-01. Per the UFP-QAPP Addendum (EA 2022), "Liquid IDW generated during SI activities (i.e., drilling and decontamination fluids) will be discharged directly to the ground surface slightly downgradient of the source of generation. This IDW will not be sampled and will assume the PFAS characteristics of the associated groundwater samples collected from that source location." Under this work plan, collected water was subsequently discharged to the surface at each respective location. However, based on discussions with ARNG G-9, WVDEP had made a statement subsequent to the finalization of the QAPP that all liquid IDW should be drummed and staged until receipt of SI sampling results. Based on this statement, EA collected confirmatory surface soil samples (0 to 2ft bgs) at each location where water was discharged, labeled AOI02-01HA and WAASF-03HA, and analyzed them for PFAS-relevant compounds. Further, solid and liquid IDW was containerized following this added procedure.

Table 5-1. Site Inspection Samples by Medium
AASF #1, Williamstown, West Virginia
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC[1]	pH[2]	Grain Size[3]	Comments
Soil Samples							
AOI01-01-SB-[0-2]	2/8/2023	0-2	X				MS/MSD Sample Collected
AOI01-01-SB-[4-5]	2/8/2023	4-5	X				
AOI01-02-SB-[0-2]	2/9/2023	0-2	X				
AOI01-02-SB-[14-15]	2/9/2023	14-15	X				
AOI01-02-SB-[28-29]	2/9/2023	28-29	X				
AOI01-03-SB-[0-2]	2/9/2023	0-2	X	X	X	X	MS/MSD Sample Collected
AOI01-03-SB-[11-12]	2/9/2023	11-12	X				
AOI01-03-SB-[23-24]	2/9/2023	23-24	X				
AOI01-04-SB-[0-2]	2/8/2023	0-2	X				
AOI01-04-SB-[7-8]	2/8/2023	7-8	X				
AOI01-04-SB-[14-15]	2/8/2023	14-15	X				
AOI01-05-SB-[0-2]	2/8/2023	0-2	X				
AOI01-05-SB-[4-6]	2/8/2023	4-6					
AOI01-06-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample
AOI01-07-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample; MS/MSD Sample Collected
AOI01-08-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample
AOI01-09-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample
AOI01-10-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample
AOI02-01-HA-[0-2]	2/9/2023	0-2	X				Hand auger only sample – surface soil confirmation sample from IDW dump
AOI02-01-SB-[0-2]	2/1/2023	0-2					MS/MSD Sample Collected
AOI02-01-SB-[14-15]	2/1/2023	14-15	X				
AOI02-01-SB-[34-35]	2/1/2023	34-35	X				
AOI02-02-SB-[0-2]	2/2/2023	0-2	X				
AOI02-02-SB-[9-10	2/1/2023	9-10	X				
AOI02-02-SB-[19-20]	2/1/2023	19-20	X	X	X	X	
AOI02-03-SB-[0-2]	2/1/2023	0-2	X				
AOI02-03-SB-[9-10	2/1/2023	9-10	X				
AOI02-03-SB-[19-20]	2/1/2023	19-20	X				
AOI02-04-SB-[0-2]	2/1/2023	0-2	X				MS/MSD Sample

Table 5-1. Site Inspection Samples by Medium
AASF #1, Williamstown, West Virginia
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC[1]	pH[2]	Grain Size[3]	Comments
							Collected
AOI02-04-SB-[9-10]	2/1/2023	9-10	X				
AOI02-04-SB-[19-20]	2/1/2023	19-20	X				
AOI02-05-HA-[0-2]	2/6/2023	0-2	X				
AOI02-06-HA-[0-2]	2/6/2023	0-2	X				
AOI02-07-HA-[0-2]	2/6/2023	0-2	X				
AOI02-08-HA-[0-2]	2/6/2023	0-2	X				
AOI03-01-SB-[0-2]	2/3/2023	0-2	X				
AOI03-01-SB-[8-9]	2/3/2023	8-9	X				
AOI03-01-SB-[17-18]	2/3/2023	17-18	X				
AOI03-02-SB-[0-2]	2/7/2023	0-2	X	X	X	X	
AOI03-02-SB-[9-10]	2/7/2023	9-10	X				
AOI03-02-SB-[19-20]	2/7/2023	19-20	X				
WAASF-01-SB-[0-2]	2/7/2023	0-2	X				
WAASF-01-SB-[14-15]	2/7/2023	14-15	X				
WAASF-01-SB-[43-44]	2/7/2023	43-44	X				
WAASF-02-SB-[0-2]	2/7/2023	0-2	X				
WAASF-02-SB-[11-12]	2/7/2023	11-12	X				
WAASF-02-SB-[23-24]	2/7/2023	23-24	X				
WAASF-03-HA-[0-2]	2/7/2023	0-2	X				Hand auger only sample – surface soil confirmation sample from IDW dump
WAASF-03-SB-[0-2]	1/31/2023	0-2	X				
WAASF-03-SB-[14-15]	1/31/2023	14-15	X				
WAASF-03-SB-[30-32]	1/31/2023	30-32	X				
WAASF-03-SB-[25-26]	1/31/2023	25-26		X	X	X	
DUP1	1/31/2023	0-2	X				Field Duplicate of WAASF-03-SB-[0-2]
DUP2	2/2/2023	0-2	X				Field Duplicate of AOI02-02-SB-[0-2]
DUP3	2/6/2023	0-2	X				Field Duplicate of AOI02-06-HA-[0-2]
DUP4	2/7/2023	11-12	X				Field Duplicate of WAASF-04-SB-[11-12]
DUP5	2/8/2023	0-2	X				Field Duplicate of AOI01-05-SB-[0-2]
DUP6	2/8/2023	0-2	X				Field Duplicate of AOI01-04-SB-[0-2]
Blank Samples							
EB-01312023	1/31/2023	--	X				Equipment Blank

Table 5-1. Site Inspection Samples by Medium
AASF #1, Williamstown, West Virginia
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC[1]	pH[2]	Grain Size[3]	Comments
EB-02012023	2/01/2023	--	X				Equipment Blank
EB-02022023	2/02/2023	--	X				Equipment Blank
EB-02032023	2/03/2023	--	X				Equipment Blank
EB-02062023	2/06/2023	--	X				Equipment Blank
EB-02072023	2/07/2023	--	X				Equipment Blank
EB-02082023	2/08/2023	--	X				Equipment Blank

Notes:
1 = TOC by USEPA Method 9060A
2 = pH by USEPA Method 9045D
3 = Grain Size by ASTM International D422
ft = foot (feet)
bgs = below ground surface

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
AASF #1, Williamstown, West Virginia
Site Inspection Report

AOI	Boring ID	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval[1] (ft bgs)
1	AOI01-01	5	--
	AOI01-02	30	—
	AOI01-03	30	—
	AOI01-04	20	—
	AOI01-05	8	—
	AOI01-06-HA	2	—
	AOI01-07-HA	2	—
	AOI01-08-HA	2	—
	AOI01-09-HA	2	—
	AOI01-10-HA	2	—
2	AOI02-01-HA	2	—
	AOI02-01	40	—
	AOI02-02	20	—
	AOI02-03	20	—
	AOI02-04	20	—
	AOI02-05-HA	2	—
	AOI02-06-HA	2	—
	AOI02-07-HA	2	—
	AOI02-08-HA	2	—
3	AOI03-01	18	—
	AOI03-02	20	—
Facility Boundary	WAASF-01	44	—
	WAASF-02	20	—
	WAASF-03	33	—
	WAASF-03-HA	2	—

Notes:
1 = No temporary wells were installed at any AOI; thus, there are no well screen intervals to report
HA = Hand Auger; location was exclusively a hand auger soil sample

Army National Guard Site Inspections
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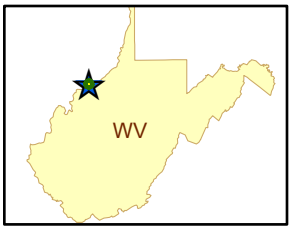
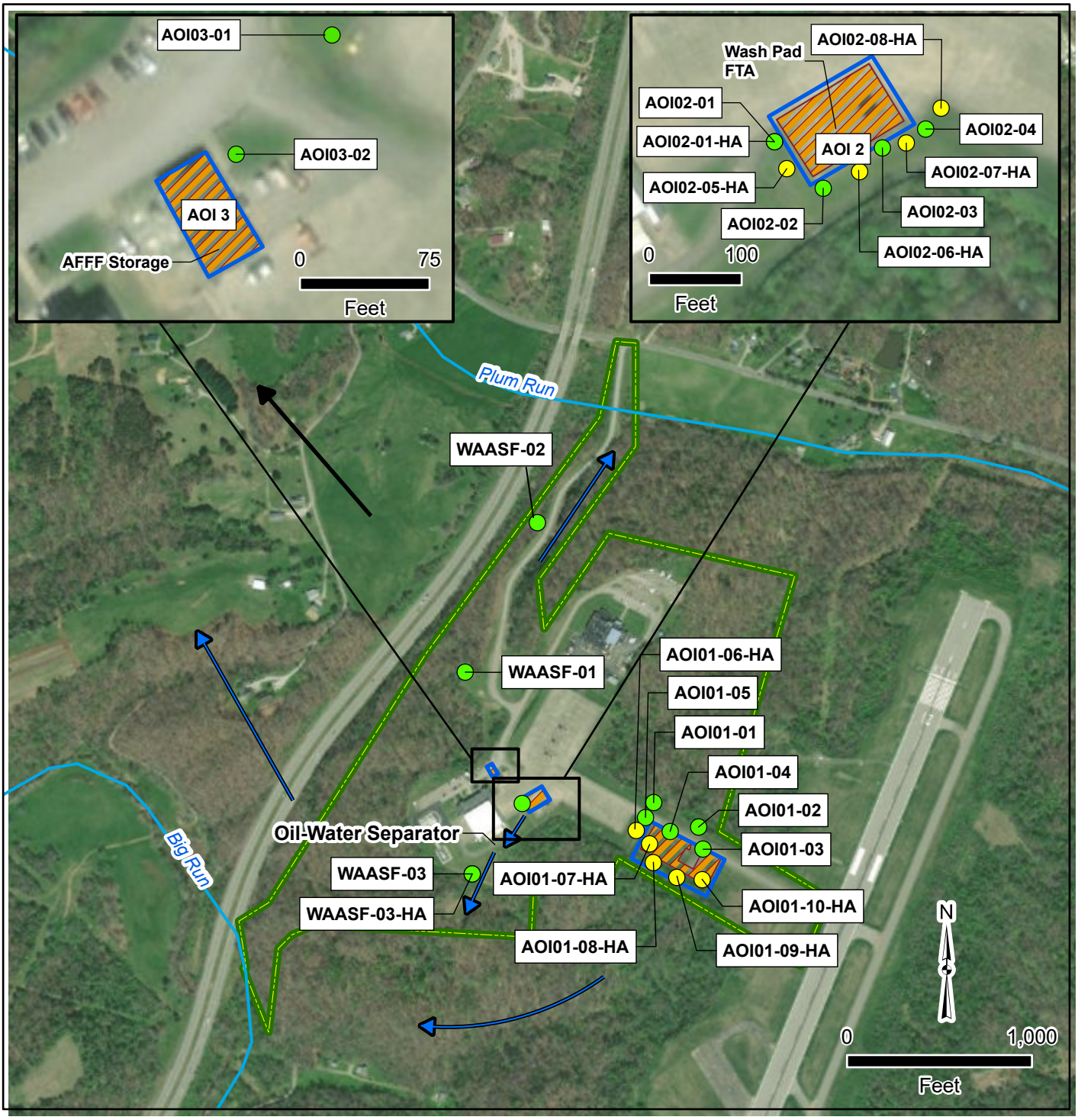


Figure 5-1
Site Inspection Sample Locations



Path: G:\Federal\Nationwide\PFAS\MAES_634250383\PROJECTS\SI\Report\Williamstown\WilliamstownSI.aprx\Figure 5-1 Site Inspection Sample Locations

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

Sample Locations
- Soil Boring
- Surface Soil Sample

Hydrology
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Perennial Creek/Stream
- Intermittent Creek/Stream

Data Sources:
ESRI 2020
AECOM 2020

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

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6. SITE INSPECTION RESULTS

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1** in **Table 6-1**. A discussion of the results for the AOIs and boundary areas is provided in **Sections 6.3 through 6.6**. **Tables 6-2 through 6-4** present results for soil 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.

Table 6-1. 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. July 2022. Risk-Based SLs in Groundwater and Soil using USEPA's Regional Screening Level 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

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 grain size, TOC, and pH, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the grain size, TOC, and pH 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 were analyzed in soil samples AOI01-03-SB-[0-2] and AOI02-02-SB-[19-20], AOI03-02-SB2-0-2, and WAASF-03-SB-[25-26]. Results were similar, with pH ranging from 7.4 to 8.9, and TOC results ranged from 450 to 12,000 milligrams per kilogram (mg/kg). The grain size analysis showed varying amounts of clay (4–13.9%), sand (33.6–52.9%), silt (33.9–43.6%), and minor gravel. This result corresponds to a soil texture of sandy loam.

6.3 AOI 1

This section presents the analytical results for soil in comparison to SLs for AOI 1, which includes the Burn Pit FTA. The soil results are summarized on **Tables 6-2 through 6-4** and presented on **Figures 6-1 through 6-5**.

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 ten boring locations associated with the potential release areas at AOI 1 (AOI01-06 through AOI01-10 were exclusively hand auger samples from 0 to 2ft bgs). Soil was sampled from three intervals at locations AOI01-02 through AOI01-04; due to shallow refusal, locations AOI01-01 and AOI01-05 only had two intervals. Samples were collected from surface soil (0 to 2 ft bgs), shallow subsurface soil (4 to 15 ft bgs), and deep subsurface soil (17 to 29 ft bgs).

Nine of 10 locations had detections of PFOA in surface soil (0 to 2ft bgs) under the 19 µg/kg SL. Concentrations ranged from (estimated) 0.29 J to 1.2 µg/kg in AOI01-09 and AOI01-07, respectively. One location (AOI01-09) had a PFOS detection with an estimated concentration of 0.29 J µg/kg, below the 13 µg/kg SL. There were no other detections of relevant compounds in surface soil.

There was one detection of PFOA in subsurface soil at AOI01-05 at an estimated concentration of 0.26 J µg/kg, which was below the SL of 250 µg/kg. There were no other detections of relevant compounds in any shallow or deep subsurface sample.

6.3.2 AOI 1 – Groundwater Analytical Results

Groundwater was not encountered at any location within AOI 1. Due to this, no temporary wells were installed, and no grab groundwater samples were collected or analyzed.

6.3.3 AOI 1 – Conclusions

Two of the five relevant compounds were detected in soil at AOI 1. PFOA and PFOS were detected well below their respective SLs. No groundwater samples were collected at any location at AOI 1. Based on the results of the soil analytics, and the lack of any groundwater analytics, no further evaluation at AOI 1 is warranted.

6.4 AOI 2

This section presents the analytical results for soil in comparison to SLs for AOI 2, which includes the Wash Pad FTA. The soil results are summarized in **Tables 6-2 through 6-4** and are presented on **Figures 6-5 through 6-10**.

6.4.1 AOI 2 – Soil Analytical Results

Tables 6-2 through 6-4 summarize the detected compounds in soil. **Figures 6-6 through 6-10** present the ranges of detections in soil.

Soil was sampled in nine boring locations associated with the potential release areas at AOI 2 (AOI02-05 through AOI02-08 were exclusively hand auger samples from 0 to 2ft bgs; AOI02-01HA was an additional hand auger sample collected at this location after drilling water was discharged, see **Section 5.9**). Soil was sampled from three intervals at locations AOI02-01 through AOI02-04. Samples were collected from surface soil (0 to 2 ft bgs), shallow subsurface soil (9 to 15 ft bgs), and deep subsurface soil (19 to 35 ft bgs).

Four of the five relevant compounds (PFOA, PFOS, PFNA, and PFHxS) were detected in surface soils in one or more locations at AOI 2. PFOA was detected at estimated concentrations ranging from 0.33 J µg/kg (AOI02-04) to 1.2 J+ µg/kg (AOI02-06), below the 19 µg/kg SL. PFOS was detected above and below the SL of 13 µg/kg, with concentrations ranging from (estimated) 0.25 J µg/kg (AOI02-02) to 73 µg/kg at AOI02-03, which was the only exceedance at AOI 2. PFNA was detected at one location (AOI02-01-HA) with an estimated concentration of 0.25 J µg/kg, below the SL of 19 µg/kg. PFHxS was detected below the 130 µg/kg SL with concentrations ranging from (estimated) 0.29 J to 3.0 µg/kg in AOI02-08HA and AOI02-03, respectively.

In shallow subsurface soil, one location (AOI02-03) had a detection of PFBS with an estimated concentration of 0.84 J µg/kg, below the 25,000 µg/kg SL. There were no other detections of relevant compounds in shallow or deep subsurface soil.

6.4.2 AOI 2 – Groundwater Analytical Results

Groundwater was not encountered at any location within AOI 2. Therefore, no temporary wells were installed, and no grab groundwater samples were collected or analyzed.

6.4.3 AOI 2 – Conclusions

Four of the five relevant compounds (PFOA, PFOS, PFHxS, PFNA,) were detected in surface soils at AOI 2 below their respective SLs, with the exception of AOI02-03, which had an exceedance for PFOS with a concentration of 73 µg/kg. One location had a detection below the SL for PFBS in shallow subsurface soil. No groundwater samples were collected, and thus no groundwater analytical data is available for AOI 2. Based on the exceedance of an SL in soil, further evaluation at AOI 2 is warranted.

6.5 AOI 3

This section presents the analytical results for soil in comparison to SLs for AOI 3, which includes the AFFF Storage location. The soil results are summarized on **Tables 6-2 through 6-4** and presented on **Figures 6-5 through 6-10**.

6.5.1 AOI 3 – Soil Analytical Results

Tables 6-2 through 6-4 summarize the detected compounds in soil. **Figures 6-6 through 6-10** present the ranges of detections in soil.

Soil was sampled at two locations associated with release areas at AOI 3. Soil was sampled from three intervals at each location. Samples were collected from surface soil (0 to 2 ft bgs), shallow subsurface soil (8 to 10 ft bgs), and deep subsurface (17 to 20 ft bgs).

Two relevant compounds were detected in surface soil at one location, AOI03-01. PFOA was detected at an estimated concentration of 0.37 J µg/kg, below the SL of 19 µg/kg. PFOS was detected at an estimated concentration of 0.64 J µg/kg below the SL of 13 µg/kg. No other relevant compounds were detected.

There was one detection of PFOA in shallow subsurface soil at AOI3-02 at an estimated concentration of 0.45 J µg/kg, which is below the associated SL of 250 µg/kg. There were no other detections of relevant compounds in shallow subsurface soil.

There were no detections of relevant compounds at any location in deep subsurface soil at AOI 3.

6.5.2 AOI 3 – Groundwater Analytical Results

Groundwater was not encountered at any location within AOI 3. Therefore, no temporary wells were installed, and no grab groundwater samples were collected or analyzed.

6.5.3 AOI 3 – Conclusions

None of the relevant compounds were detected in soil above their respective SLs. No groundwater samples were collected, and thus no groundwater analytical data is available for AOI 3. Based on the results of the soil analytics, and the lack of any groundwater analytics, no further evaluation at AOI 3 is warranted.

6.6 FACILITY BOUNDARY

This section presents the analytical results for soil in comparison to SLs for the Facility Boundary locations, which includes WAASF-01 (near western Facility boundary, roughly 700 ft slightly northwest of AOIs 2 and 3 and downgradient to potential contaminants leaving the central portion of the Facility), WAASF-02 (at the northwest Facility boundary, roughly 1200 ft north of WAASF-01 and downgradient of all AOIs and to contaminants leaving the Facility), and WAASF-03 (roughly 300 ft south of AOIs 2 and 3 at the OWS outfall). The soil results are summarized in **Tables 6-2 through 6-4** and presented on **Figures 6-1 through 6-5** as well.

6.6.1 Soil Analytical Results

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

Soil was sampled at three locations associated with the Facility Boundary. These three borings were associated with locations downgradient of AOIs 1, 2 and 3 via surface water and presumed groundwater flow direction. Soil was sampled from three intervals at each location. An additional surface soil sample was collected at WAASF-03 (hand auger sample WAASF-03-HA) due to drilling water being discharged at this location (see **Section 5.9**). Samples were collected from surface soil (0 to 2 ft bgs), shallow subsurface soil (11 to 15 ft bgs), and deep subsurface soil (23 to 44 ft bgs).

PFOA and PFOS relevant compounds were detected in surface soils at the boundary locations. PFOA was detected in WAASF-01, WAASF-03, and WAASF-03HA with concentrations ranging from (estimated) 0.3 J µg/kg in WAASF-01 to 1.7 µg/kg in WAASF-03-HA, below the 19 µg/kg SL. PFOS was detected in WAASF-01 at an estimated concentration of 0.55 J µg/kg, below the SL of 13 µg/kg. No other relevant compounds were detected in surface soil in Facility Boundary samples.

There were no detections of relevant compounds in the shallow subsurface or deep subsurface soil intervals Facility Boundary Samples.

6.6.2 Groundwater Analytical Results

Groundwater was not encountered at any Facility Boundary location. Therefore, no temporary wells were installed, and no groundwater samples were collected or analyzed.

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Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

Location ID		AOI01-01		AOI01-02		AOI01-03		AOI01-04		AOI01-04		AOI01-05		AOI01-05		AOI01-06	
Sample Name		AOI01-01-SB-0-2		AOI01-02-SB-0-2		AOI01-03-SB-0-2		AOI01-04-SB-0-2		DUP6		AOI01-05-SB-0-2		DUP5		AOI01-06-HA-0-2	
Parent Sample ID										AOI01-04-SB-0-2				AOI01-05-SB-0-2			
Sample Date		2/8/2023		2/9/2023		2/9/2023		2/8/2023		2/8/2023		2/8/2023		2/8/2023		2/9/2023	
Sample Depth (ft bgs)		0-2		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**	**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	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	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	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	0.31	J	0.52	J	0.73		ND	U	0.36	J	ND	U	ND	U	0.42	J

Notes:
J = Estimated concentration.
J- = Estimated concentration, biased low.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

Location ID		AOI01-07		AOI01-08		AOI01-09		AOI01-10		AOI02-01		AOI02-01		AOI02-02		AOI02-02	
Sample Name		AOI01-07-HA-0-2		AOI01-08-HA-0-2		AOI01-09-HA-0-2		AOI01-10-HA-0-2		AOI02-01-HA-01		AOI02-01-SB-0-2		AOI02-02-SB-0-2		DUP2	
Parent Sample ID																AOI02-02-SB-0-2	
Sample Date		2/9/2023		2/9/2023		2/9/2023		2/9/2023		2/9/2023		2/1/2023		2/2/2023		2/2/2023	
Sample Depth (ft bgs)		0-2		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**	**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	ND	U
Perfluorohexanesulfonic acid (PFHxS)	130	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	0.25	J	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	ND	U	ND	U	0.29	J	ND	U	0.74		ND	U	0.25	J	0.58	J
Perfluorooctanoic acid (PFOA)	19	1.2		0.32	J	0.29	J	0.79		0.65	J	0.4	J-	0.53	J	0.41	J

Notes:
J = Estimated concentration.
J- = Estimated concentration, biased low.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

Location ID		AOI02-03		AOI02-04		AOI02-05		AOI02-06		AOI02-06		AOI02-07		AOI02-08	
Sample Name		AOI02-03-SB-0-2		AOI02-04-SB-0-2		AOI02-05-HA-0-2		AOI02-06-HA-0-2		DUP3		AOI02-07-HA-0-2		AOI02-08-HA-0-2	
Parent Sample ID										AOI02-06-HA-0-2					
Sample Date		2/2/2023		2/2/2023		2/6/2023		2/6/2023		2/6/2023		2/6/2023		2/6/2023	
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	3		ND	U	0.41	J	2.3	J	0.78	J	0.35	J	0.29	J
Perfluorononanoic acid (PFNA)	19	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	13	73		0.72		1.3		5.4		4.8		0.9		0.29	J
Perfluorooctanoic acid (PFOA)	19	0.53	J	0.33	J	1	J+	1.2	J+	0.96	J+	1	J+	0.87	J+

Notes:
J = Estimated concentration.
J- = Estimated concentration, biased low.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-2. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

Location ID		AOI03-01		AOI03-02		WAASF-01		WAASF-02		WAASF-03		WAASF-03		WAASF-03	
Sample Name		AOI03-01-SB-0-2		AOI03-02-SB-0-2		WAASF-01-SB-0-2		WAASF-02-SB-0-2		WAASF-03-SB-0-2		DUP1		WAASF-03-HA-01	
Parent Sample ID												WAASF-03-SB-0-2			
Sample Date		2/3/2023		2/6/2023		2/7/2023		2/7/2023		1/31/2023		1/31/2023		2/9/2023	
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	ND	U	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	0.64	J	ND	U	0.55	J	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	19	0.37	J	ND	U	0.3	J	ND	U	0.99		0.88		1.7	

Notes:
J = Estimated concentration.
J- = Estimated concentration, biased low.
J+ = Estimated concentration, biased high.
U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.
µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

	Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-04		AOI01-04		AOI01-05	
	Sample Name	AOI01-01-SB-4-5		AOI01-02-SB-14-15		AOI01-03-SB-11-12		AOI01-04-SB-7-8		AOI01-04-SB-14-15		AOI01-05-SB-5-6	
	Parent Sample ID												
	Sample Date	2/8/2023		2/9/2023		2/9/2023		2/9/2023		2/9/2023		2/8/2023	
	Sample Depth (ft bgs)	4-5		14-15		11-12		7-8		14-15		5-6	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)													
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	ND	U	ND	U	ND	U	ND	U	0.26	J

Notes:

J = Estimated concentration.

U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

	Location ID	AOI02-01		AOI02-02		AOI02-03		AOI02-04		AOI03-01	
	Sample Name	AOI02-01-SB-14-15		AOI02-02-SB-9-10		AOI02-03-SB-9-10		AOI02-04-SB-9-10		AOI03-01-SB-8-9	
	Parent Sample ID										
	Sample Date	2/1/2023		2/2/2023		2/2/2023		2/2/2023		2/3/2023	
	Sample Depth (ft bgs)	14-15		9-10		9-10		9-10		8-9	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)											
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	0.84	J	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	ND	U	ND	U	ND	U	ND	U	ND	U

Notes:

J = Estimated concentration.

U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier
AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-3. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

	Location ID	AOI03-02		WAASF-01		WAASF-02		WAASF-02		WAASF-03	
	Sample Name	AOI03-02-SB-9-10		WAASF-01-SB-14-15		WAASF-02-SB-11-12		DUP4		WAASF-03-SB-14-15	
	Parent Sample ID							WAASF-02-SB-11-12			
	Sample Date	2/7/2023		2/7/2023		2/7/2023		2/7/2023		1/31/2023	
	Sample Depth (ft bgs)	9-10		14-15		11-12		11-12		14-15	
Analyte	**Screening Level[1,2]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 (µg/kg)											
Perfluorobutanesulfonic acid (PFBS)	25,000	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	1,600	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	250	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	160	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	250	0.45	J	ND	U	ND	U	ND	U	ND	U

Notes:

J = Estimated concentration.

U = The analyte was not detected at a level greater than or equal to the adjusted Limit of Detection (LOD).

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.

Values exceeding the Screening Level are shaded gray.

µg/kg = Microgram(s) per kilogram
ft bgs = Foot (feet) below ground surface
ND = Analyte not detected above the LOD (LOD values are presented in Appendix F).
Qual = Qualifier

AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

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Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

Location ID	AOI01-02		AOI01-03		AOI02-01		AOI02-02		AOI02-03	
Sample Name	AOI01-02-SB-28-29		AOI01-03-SB-23-24		AOI02-01-SB-34-35		AOI02-02-SB-19-20		AOI02-03-SB-19-20	
Parent Sample ID										
Sample Date	2/9/2023		2/9/2023		2/1/2023		2/2/2023		2/2/2023	
Sample Depth (ft bgs)	28-29		23-24		34-35		19-20		19-20	
Analyte	**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)	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	ND	U	ND	U	ND	U	ND	U	ND	U

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

AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Table 6-4. PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, AASF #1, Williamstown, West Virginia

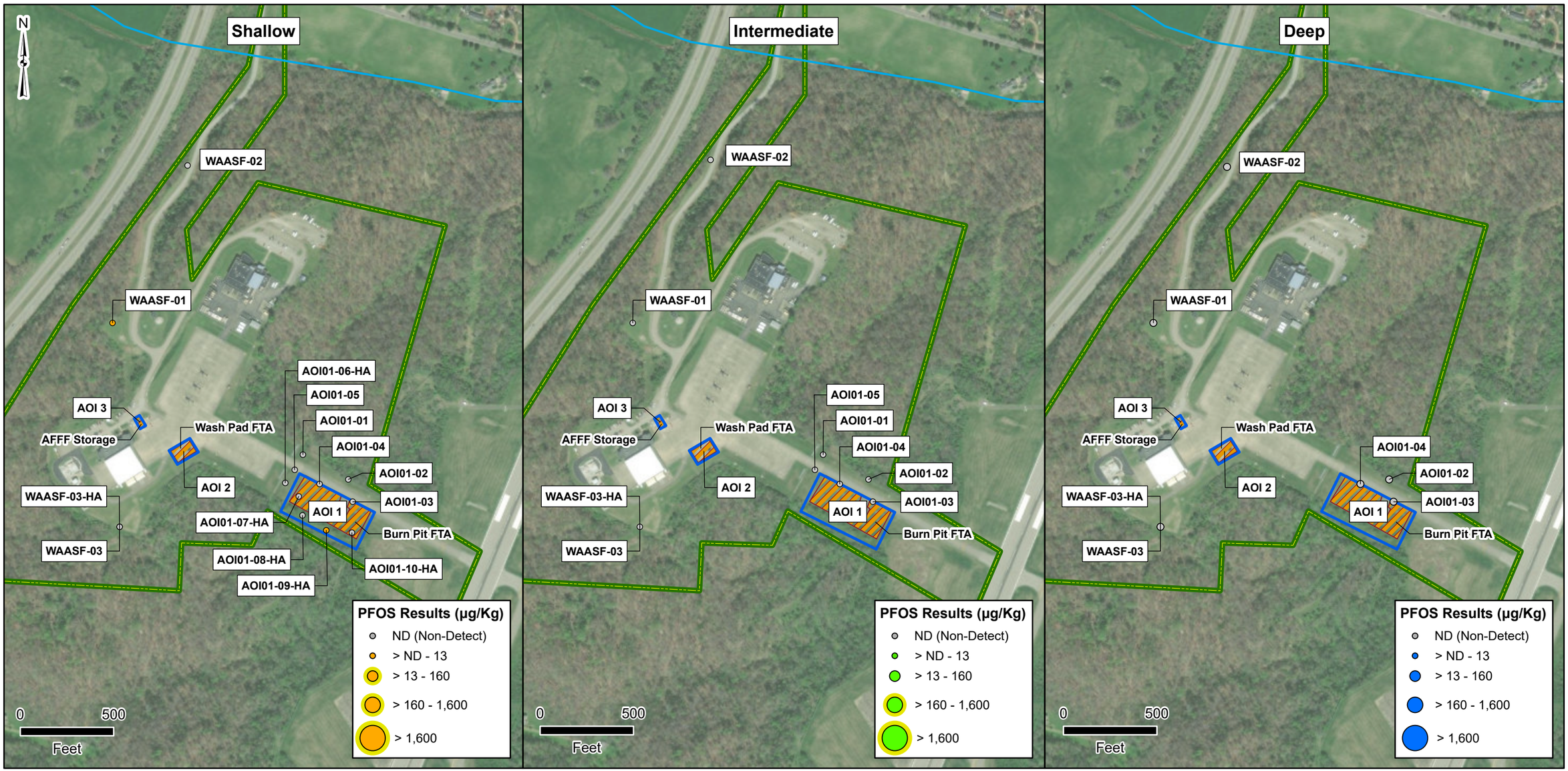
Location ID	AOI02-04		AOI03-01		AOI03-02		WAASF-01		WAASF-02		WAASF-03	
Sample Name	AOI02-04-SB-19-20		AOI03-01-SB-17-18		AOI03-02-SB-19-20		WAASF-01-SB-43-44		WAASF-02-SB-23-24		WAASF-03-SB-30-32	
Parent Sample ID												
Sample Date	2/2/2023		2/3/2023		2/7/2023		2/8/2023		2/7/2023		1/31/2023	
Sample Depth (ft bgs)	19-20		17-18		19-20		43-44		23-24		30-32	
Analyte	**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)	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorohexanesulfonic acid (PFHxS)	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorononanoic acid (PFNA)	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanesulfonic acid (PFOS)	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
Perfluorooctanoic acid (PFOA)	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

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

AOI = Area of Interest
DUP = Duplicate
LC/MS/MS = Liquid chromatography/tandem mass spectrometry
QSM = Quality Systems Manual

Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-1
AOI 1
PFOS Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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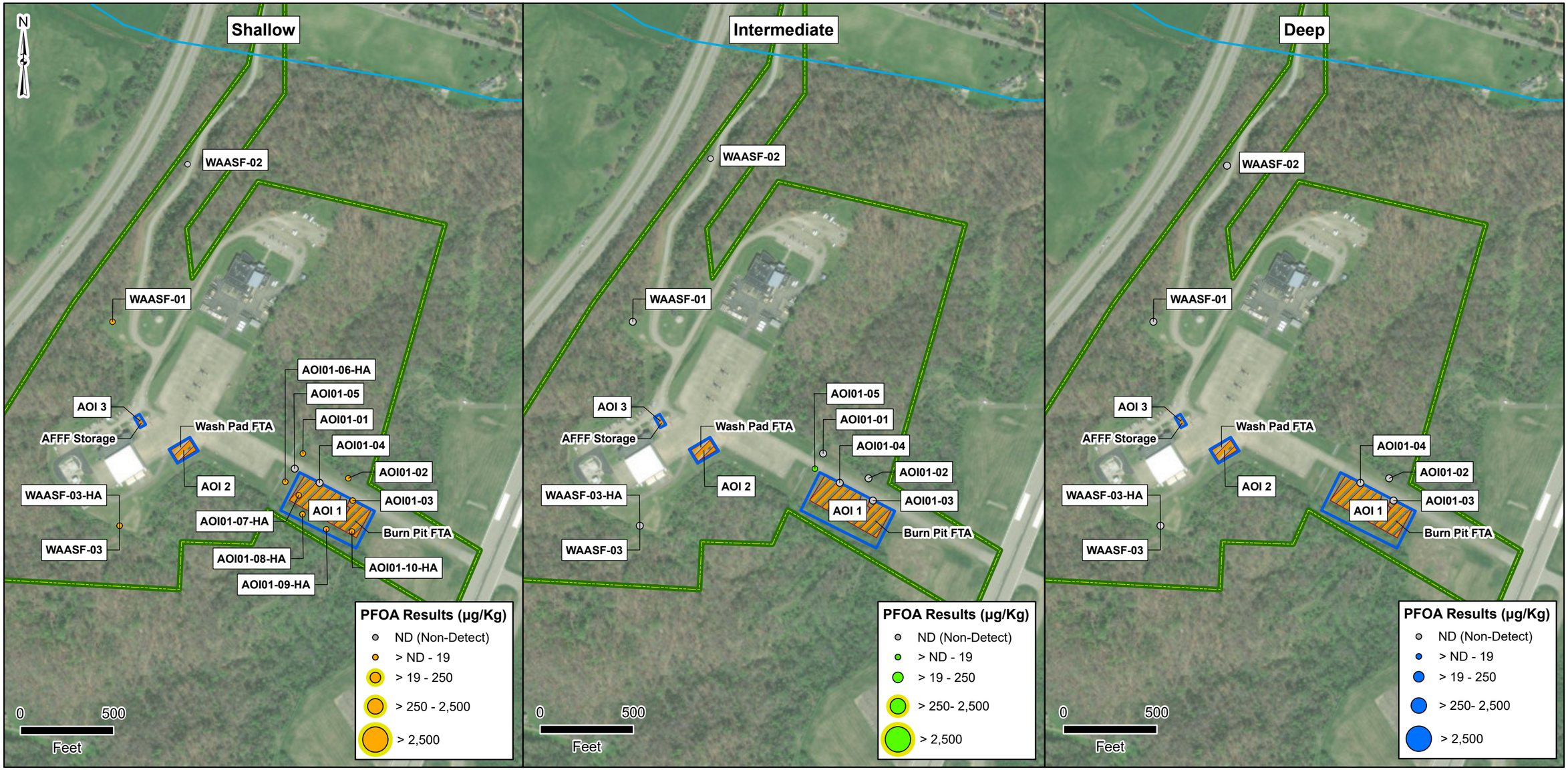
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-2
AOI 1
PFOA Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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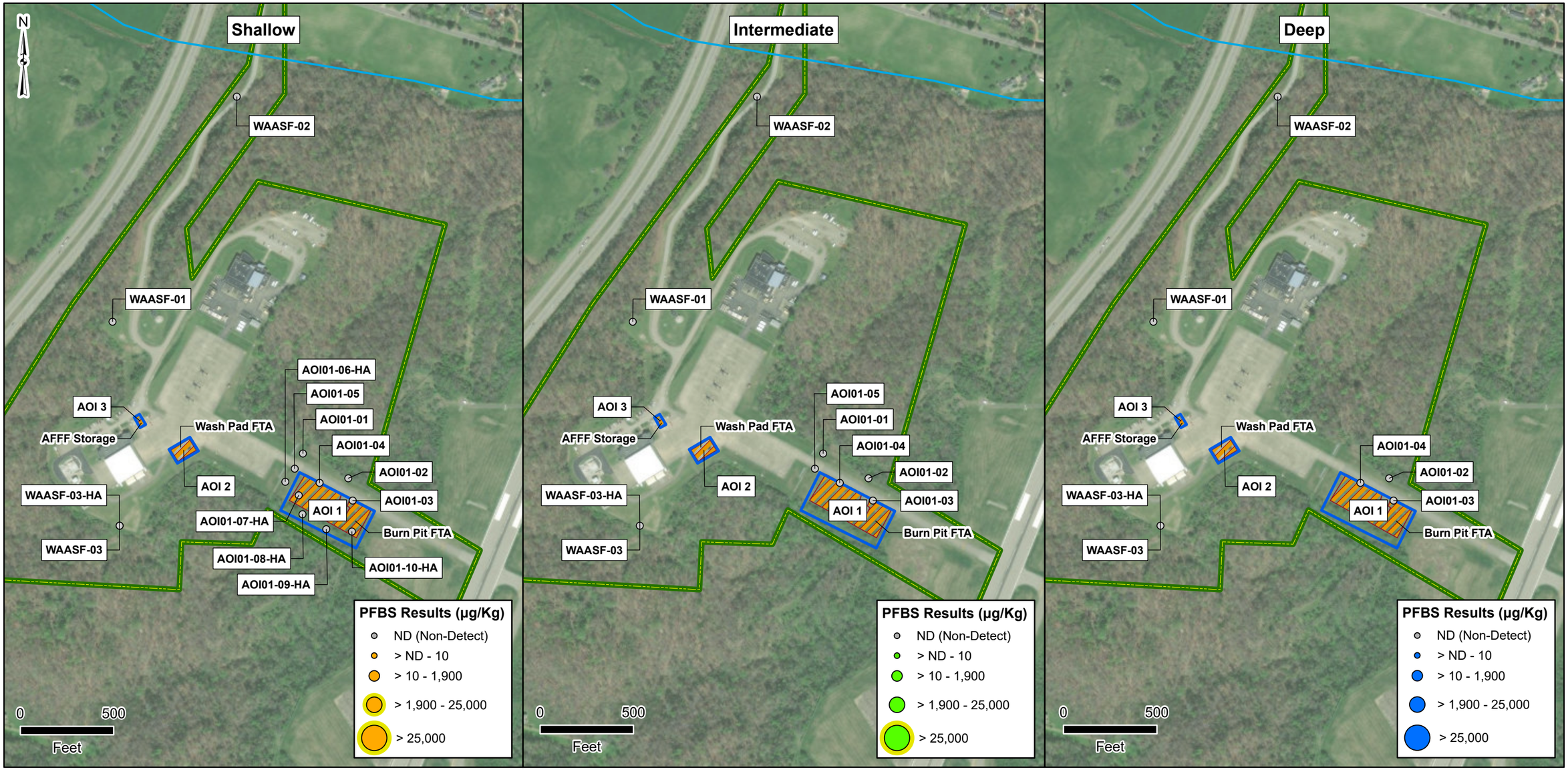
Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-3
AOI 1
PFBS Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

*Results for AOI2 and AOI3 are discussed on Figures 6-6 through 6-10

Data Sources:
ESRI 2022
AECOM 2019

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

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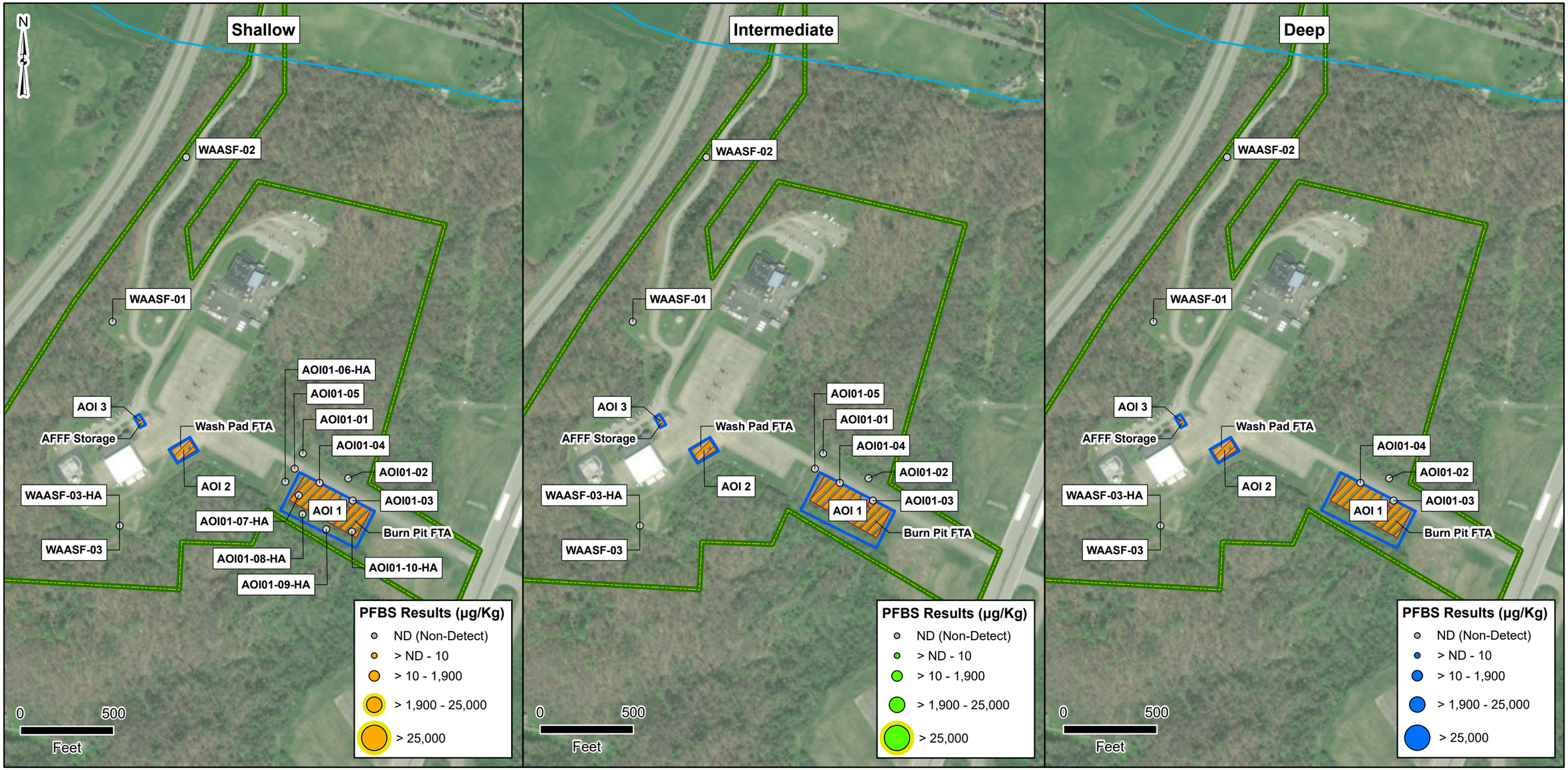
Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-3
AOI 1
PFBS Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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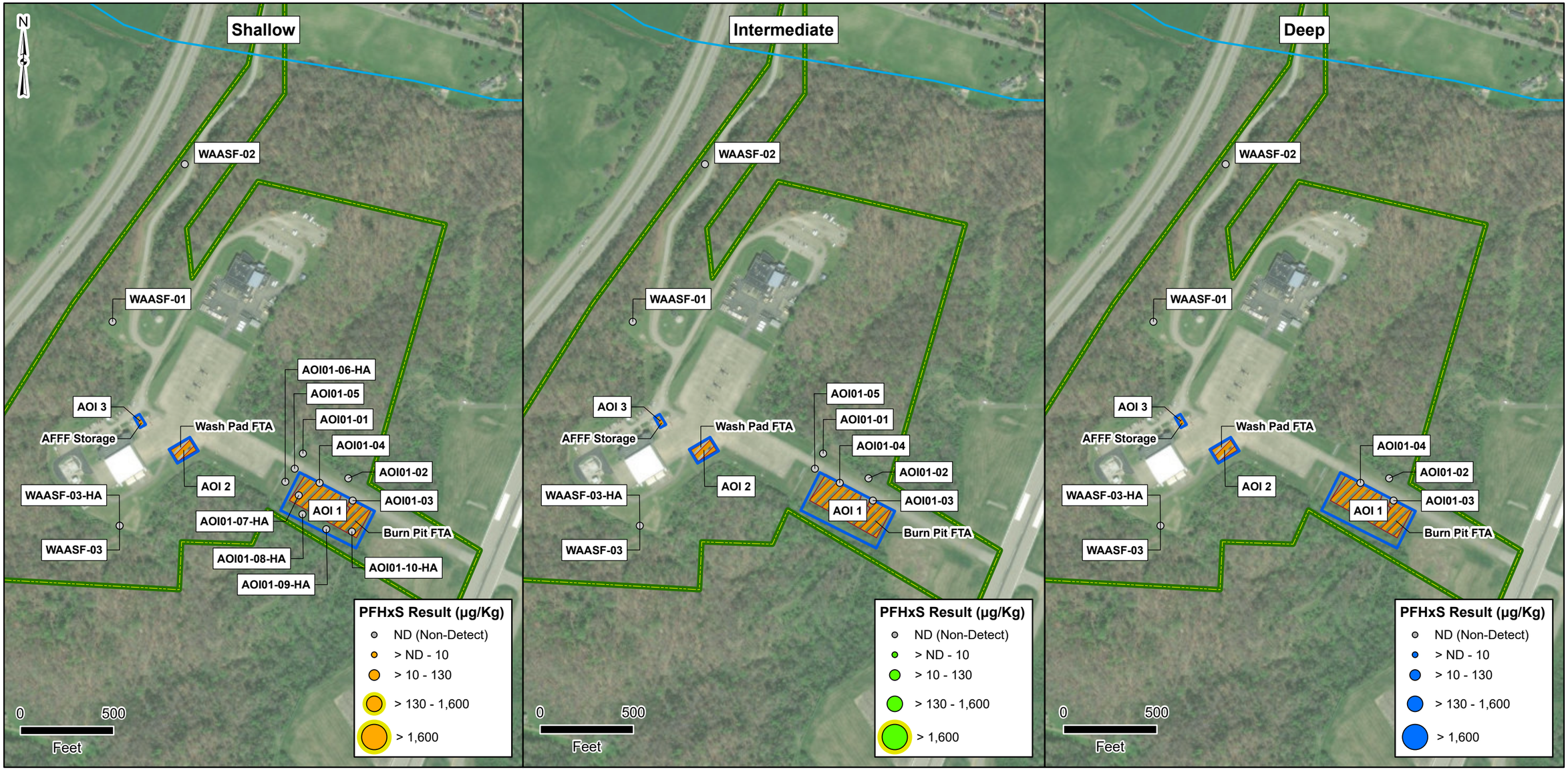
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-4
AOI 1
PFHxS Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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Williamstown AASF #1, West Virginia

Figure 6-6
AOI 2 and AOI 3
PFOS Detections in Soil

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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 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
Williamstown AASF #1, West Virginia

Figure 6-7
AOI 2 and AOI 3
PFOA Detections in Soil

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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 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
Williamstown AASF #1, West Virginia

Figure 6-8
AOI 2 and AOI 3
PFBS Detections in Soil

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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 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
Williamstown AASF #1, West Virginia

Figure 6-9
AOI 2 and AOI 3
PFHxS Detections in Soil

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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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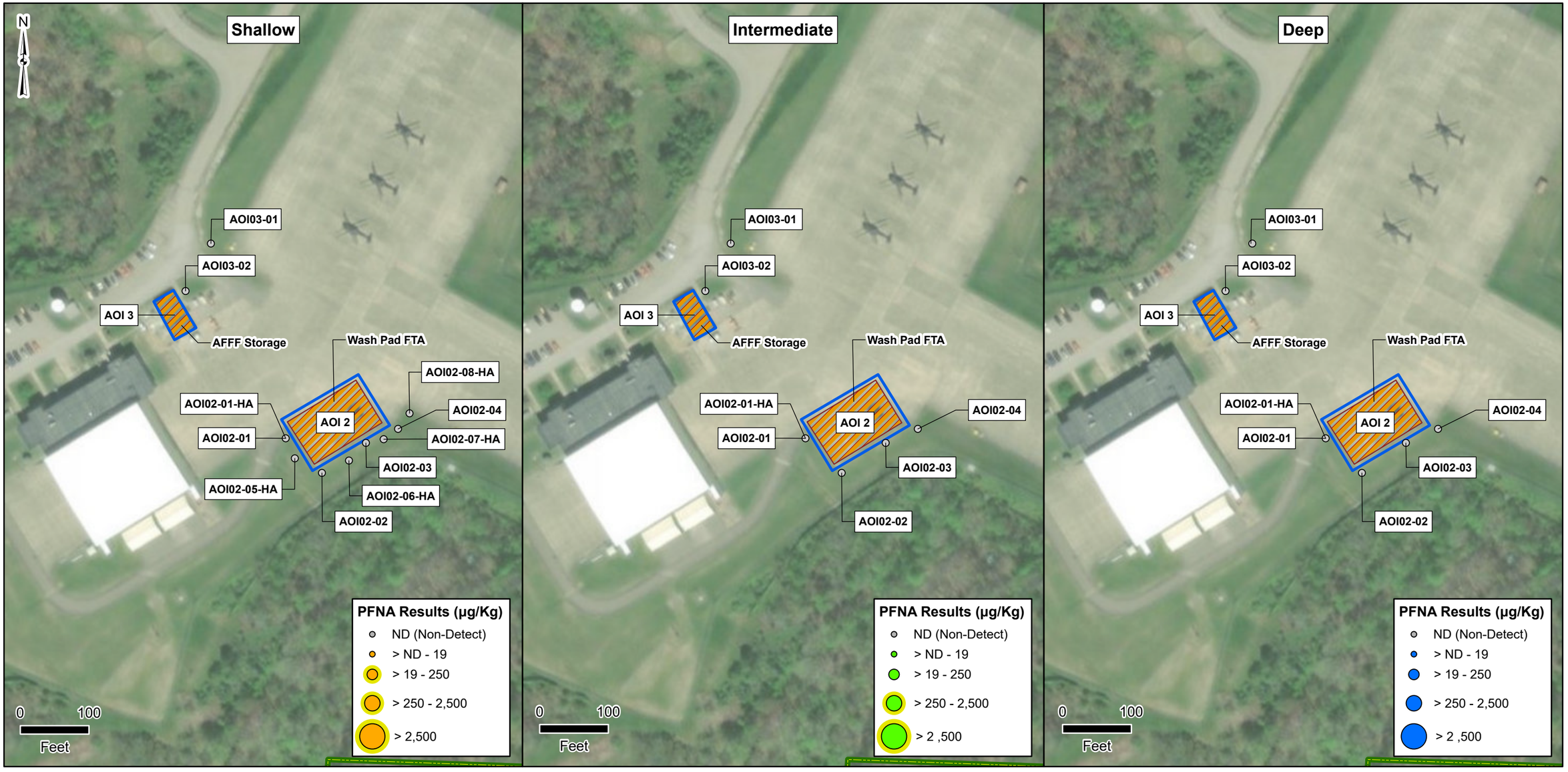
Army National Guard Site Inspections
Site Inspection Report
Williamstown AASF #1, West Virginia

Figure 6-10
AOI 2 and AOI 3
PFNA Detections in Soil



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

Hydrology
- Perennial Creek/Stream

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

Data Sources:
ESRI 2022
AECOM 2019

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

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7. EXPOSURE PATHWAYS

CSMs for the AOIs, revised based on the SI findings, are presented on **Figure 7-1 through Figure 7-3**. Please note that while the CSM discussions 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), future construction workers, trespassers (though unlikely due to restricted access), off-Facility recreational users, and residents.

7.1 SOIL EXPOSURE PATHWAY

The SI results for soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at each AOI (AOIs 1 through 3) based on the aforementioned criteria. Due to its' location with respect to AOI 2 and AOI 3, AOI 1 will be treated as a singular CSM. AOIs 2 and 3 are co-located within 300ft of each other, but due to different surface water flow directions, as well as an exceedance in AOI 2 and not in AOI 3, AOIs 2 and 3 will also be treated as separate CSMs.

7.1.1 AOI 1

AOI 1 is the Burn Pit FTA, located on the central-eastern side of the Facility. The Burn Pit FTA was once located on an unpaved stretch of land near the large concrete pad where AFFF was released directly to the surface soil around the pit. Facility personnel interviewed noted that the adjacent Airport Fire Department was permitted to conduct a singular fire training exercise at this location, where the fire department used their firetruck equipped with an unknown AFFF agent to extinguish flames at an undocumented time period.

PFOA and PFOS were detected in surface soils associated with nine of the ten boring locations at concentrations below their respective SLs. 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 considered potentially complete. There was a single detection for PFOA in the shallow subsurface sample at AOI01-05, below the SL for shallow subsurface soils, roughly 6ft below grade. Ground disturbing activities in this location could result in incidental ingestion for future construction workers. Therefore, the exposure pathways for subsurface soil are considered potentially complete for the future construction worker. The CSM is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 is the Wash Pad FTA, located in the central portion of the Facility, roughly 300 ft slightly southeast of the AFFF Storage (AOI 3). Prior to 2006, AFFF released to the concrete wash pad during annual fire training activities was rinsed down the wash pad drain with water, which flowed south through pipes into the OWS, then flowed out through an outfall at the facility boundary and towards Big Run River. After 2006, a restructured tank with a valve directing water to the Williamstown Wastewater Treatment Plant was installed and used during fire training activities. The potential exists for the valve to have accidentally not been used during trainings and for overflow to continue to flow out the outfall at the property boundary, although no documentation exists for this occurring.

PFOA, PFOS, PFNA, and PFHxS were detected in AOI 2 surface soils. PFOA, PFNA, and PFHxS were detected in surface soils at concentrations below their respective SLs. PFOS was detected below and above the SL, with a single exceedance at AOI02-03. The downgradient boundary location at the OWS outflow, WAASF-03 and the additional hand auger sample WAASF-03-HA, also had detections 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. A single detection for PFBS below the SL occurred in AOI 2 shallow subsurface soil roughly 10 ft below grade, with no other relevant compounds detected in shallow or deep subsurface soils at AOI 2 or the boundary location. Although unlikely, ground disturbing activities in AOI 2 could result in incidental ingestion for future construction workers. Therefore, the exposure pathways for subsurface soil are considered potentially complete for the future construction worker. The CSM is presented in **Figure 7-2**.

7.1.3 AOI 3

AOI 3 is the Materials Storage Room, or AFFF Storage, previously used to store 5-gallon buckets of AFFF of an unknown concentration. No record or documentation exists of spills or leaks at this location.

PFOA and PFOS were detected in surface soils at AOI 3 at concentrations below their respective SLs. 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 and future construction workers are considered potentially complete. There was a single detection of PFOA below the SL in shallow subsurface between 9 and 10 ft bgs. There were no deep subsurface detections in soil. Future construction workers could contact constituents in shallow subsurface soil through ground disturbing activities. Therefore, the exposure pathways for subsurface soil are considered potentially complete for future construction workers. The CSM is presented in **Figure 7-3.**

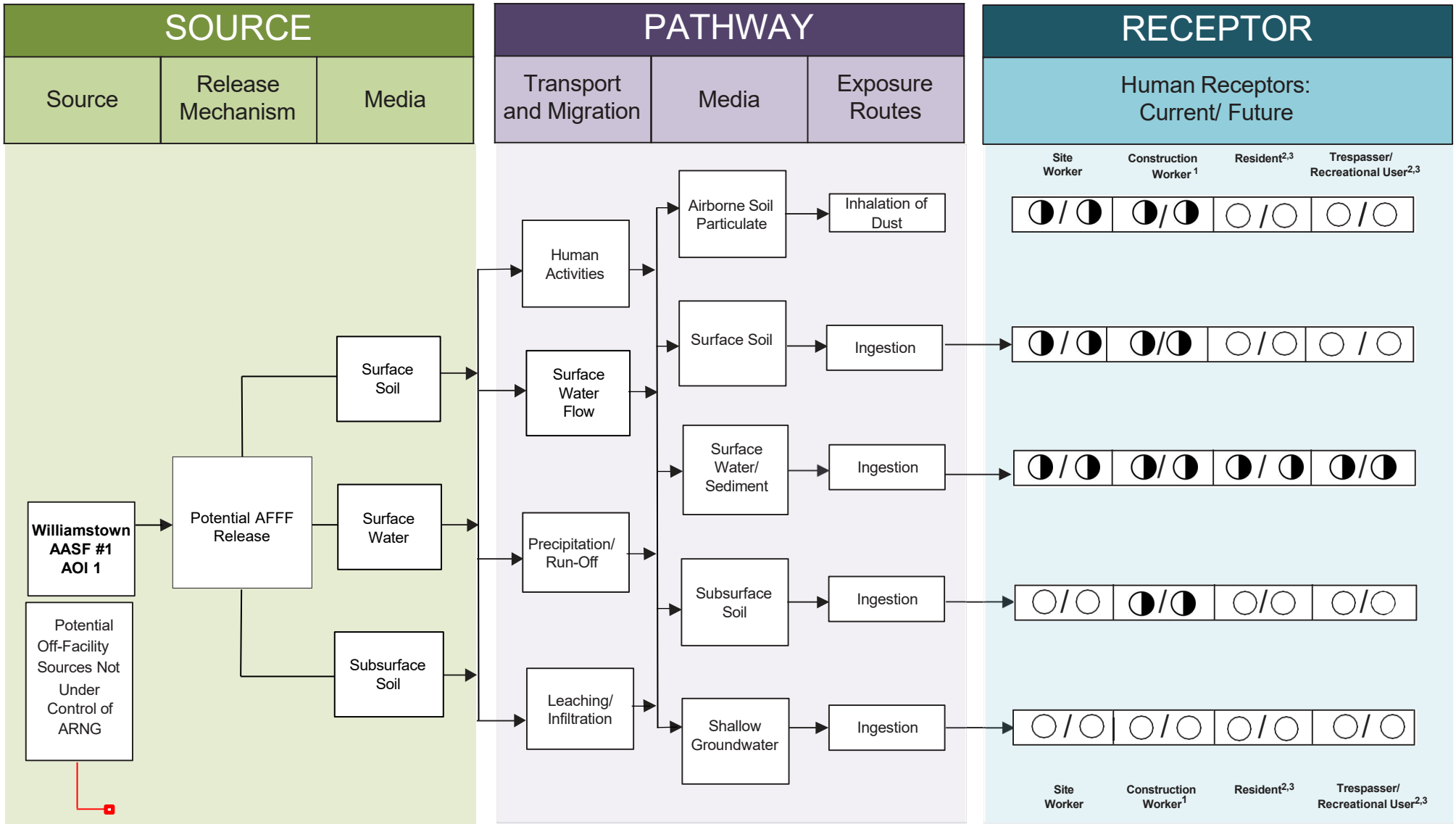
7.2 GROUNDWATER EXPOSURE PATHWAY

The SI results for groundwater are used to determine whether a potentially complete pathway exists between the source and potential receptors based on the aforementioned criteria. However, shallow groundwater was not encountered, and no temporary wells were installed at any AOI or boundary location; therefore, no grab groundwater samples were collected or analyzed. This pathway is considered incomplete.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

Off-Facility surface water and sediment were not sampled as part of this SI, as the scope of sampling was limited to the presence or absence of the relevant compounds in soil and groundwater within the facility boundary. Although no surface water features flow through Williamstown AASF #1, the Facility sits on a topographic high with the ground sloping steeply off-facility between the southwestern to northwestern boundary in the direction of presumed groundwater flow and observed surface water flow direction. Big Run, a tributary to the Ohio River, is roughly 1,500 ft southwest of boundary location WAASF-03 and the outfall from the AOI 2 OWS. Further, Plum Run, which connects to Big Run and then the Ohio River, is roughly 200 ft north of boundary location WAASF-02 (which is upgradient to all AOIs), and roughly 1700ft north of WAASF-01 (which is upgradient of AOIs 2 and 3). The Ohio River, as well as tributaries it connects to, continue north downgradient and are high-use bodies of water for fishing, swimming, boating, and are a source for groundwater. The detections of relevant compounds seen in surface soil at WAASF-03 and AOI 2 (with an exceedance for PFOS) lends credence to surface water and sediment being transferred out and away as runoff via topography and the OWS outfall and off the Facility property. No detections were observed in WAASF-02; however, this is likely, as surface water and sediment runoff from AOI 3 would flow off-site near WAASF-01, due to its proximity and the topographic gradient between AOI 3 and WAASF-01. Indeed, surface soil detections in AOI 3 and WAASF-01 corroborate this. Further, the extensive clayey-silty soils, weathered bedrock, and lack of a shallow groundwater unit observed throughout the entire Facility could also 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 nearby tributaries of the Ohio River, the ingestion exposure pathway for surface water and sediment is considered potentially complete for site and future construction workers, trespassers, and off-Facility recreational users and residents who use the downgradient water bodies. The CSMs are presented on **Figures 7-1 through 7-3**.



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.

Figure 7-1
Conceptual Site Model
AOI 1 Williamstown AASF #1

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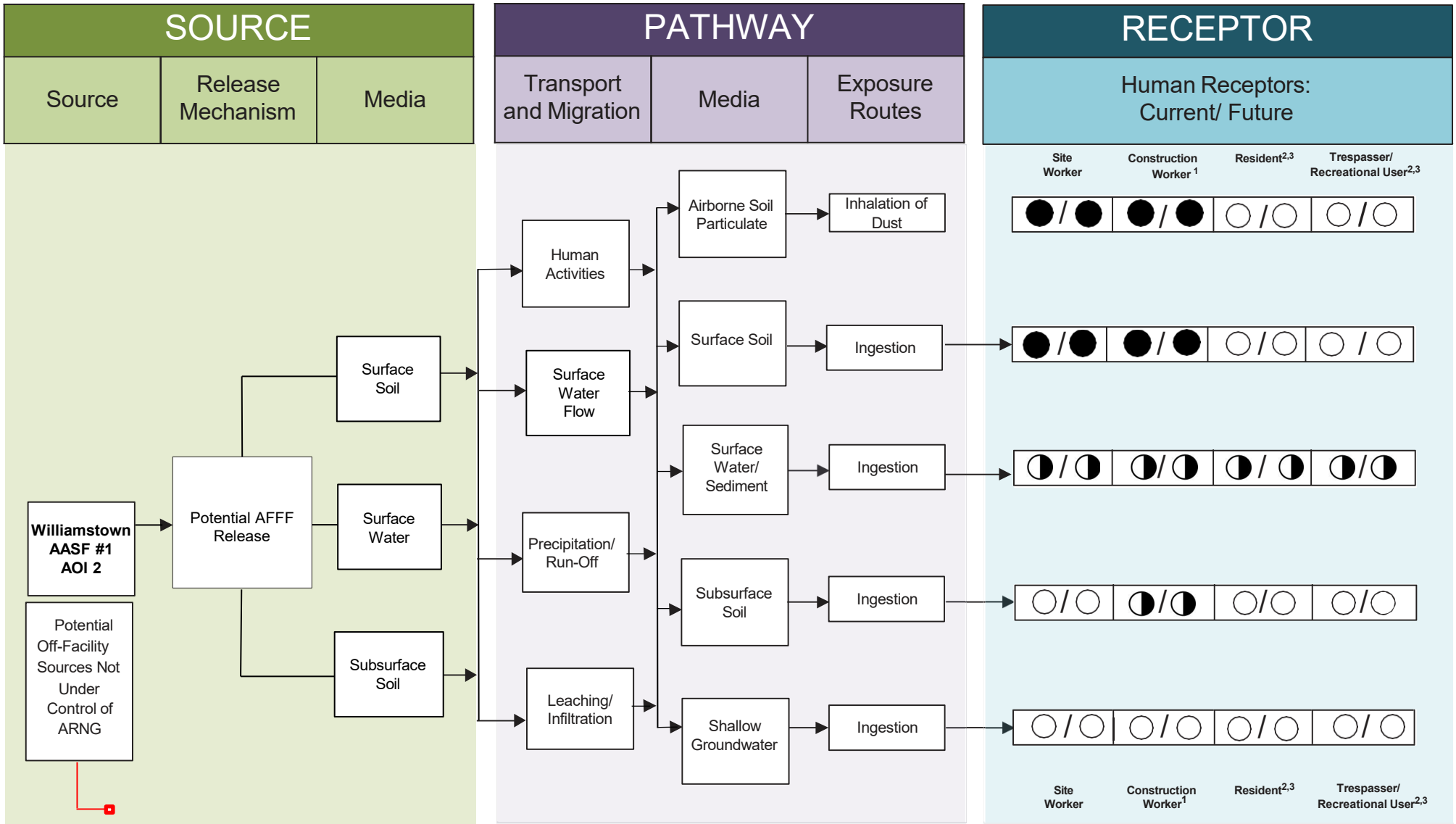

LEGEND

- 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.

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

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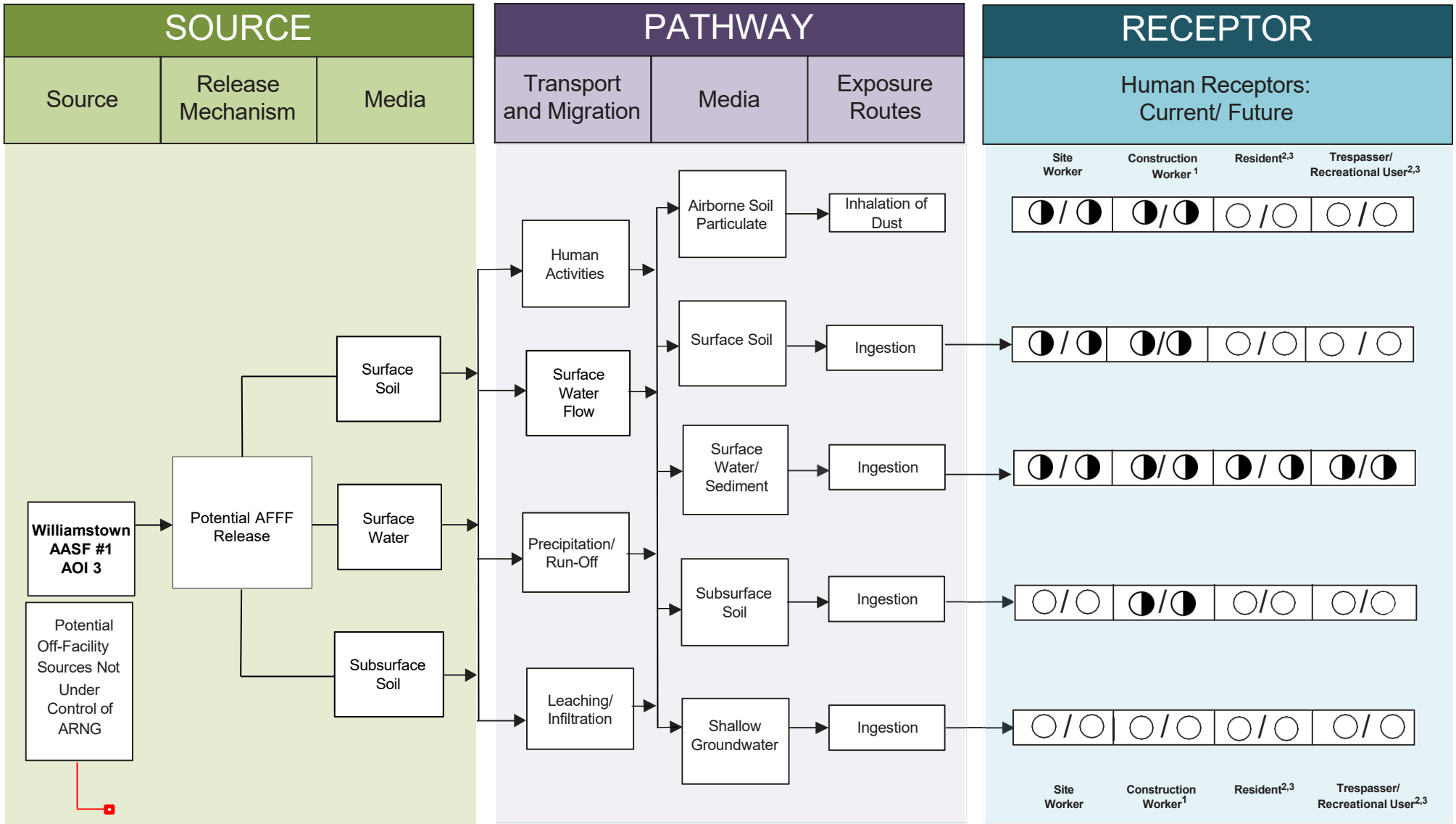

LEGEND

- 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.

Figure 7-3
Conceptual Site Model
AOI 3 Williamstown AASF #1

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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 31 January to 9 February 2023 and consisted of Sonic drilling and hand auger borings and soil sample collection. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA 2022), except as noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA 2022), 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:

- Fifty-Two (52) soil samples from 14 primary locations, 9 secondary (hand auger) locations, and 3 boundary locations

- Twenty (20) 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 NFA 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 RI is warranted for AOI 2. Based on the CSMs developed and revised on the SI findings, there is potential for exposure to off-Facility residential drinking water receptors, surface water recreators, and on-site future 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 as described in **Table 6-1**.

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

- AOI 1:

    — No groundwater samples were collected or analyzed at AOI 1.

- PFOA was detected in surface soil at AOI 1, with a single detection in subsurface soil. No other relevant compounds were detected. Based on the results of this SI, NFA is warranted for AOI 1.

- AOI 2:

  - No groundwater samples were collected or analyzed at AOI 2.

  - PFOA, PFNA, and PFHxS were detected in surface soil at AOI 2 at concentrations below their respective SLs. PFOS was also detected in surface soil, with an exceedance of the SL observed at one location. PFBS was detected in a single location in shallow subsurface soil below the SL. There were no other detections for relevant compounds in shallow or deep subsurface soil. Based on the results of this SI, further action for AOI 2 is warranted in the RI.

- AOI 3:

  - No groundwater samples were collected or analyzed at AOI 3.

  - PFOA and PFOS were detected at concentrations below their respective SLs in surface soil, with a single PFOA detection in shallow subsurface soil below the SL. There were no other detections of relevant compounds at AOI 3. Based on the results of this SI, no further action is warranted for AOI 3.

- Facility Boundary:

  - No groundwater samples were collected or analyzed at the Facility Boundaries.

  - PFOA and PFOS were detected in surface soil at the Facility Boundary at concentrations below their respective SLs. There were no detections of relevant compounds in shallow or deep subsurface soil.

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 MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

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

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

AOI	Potential Release Area	Soil Source Area	Groundwater Source Area	Groundwater Facility Boundary	Future Action
1	Burn Pit FTA	◐	NA	NA	NFA
2	Wash Pad FTA	●	NA	NA	Proceed to RI
3	AFFF Storage	◐	NA	NA	NFA

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

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9. REFERENCES

AECOM Technical Services, Inc. (AECOM). 2020. *Final Preliminary Assessment Report, Army Aviation Support Facility #1, Williamstown, West Virginia*. July.

Assistant Secretary of Defense. 2022. *Investigation Per- and Polyfluoroalkyl Substances within The Department of Defense Cleanup Program*. United States Department of Defense. 6 July.

Department of the Army. 2016. *EM-200-1-2, Environmental Quality, Technical Project Planning Process*. 29 February.

Department of Defense (DoD). 2019a. *General Data Validation Guidelines*. November.

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

———. 2020. *Data Validation Guidelines Module 3: Data Validation Procedure for Per- and Polyfluoroalkyl Substances Analysis by QSM Table B-15*. May.

EA, Engineering, Science, and Technology, PBC (EA). 2020a. *Final Programmatic Uniform Federal Policy Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide*. December.

———. 2020b. *Programmatic Accident Prevention Plan, Revision 1*, November 2020.

———. 2021. *Final Accident Prevention Plan Site Safety and Health Plan, Army Aviation Support Facility #1, Williamstown, West Virginia Revision 0*, October 2021.

———. 2022. *Final Site Inspection Uniform Federal Policy Quality Assurance Project Plan (UFP-QAPP) Addendum Army Aviation Support Facility #1, Williamstown, West Virginia, Per- and Polyfluoroalkyl Substances Impacted Sites ARNG Installations, Nationwide*. March.

Guelfo, J.L. and C.P. Higgins. 2013. *Subsurface transport potential of perfluoroalkyl acids and aqueous film-forming foam (AFFF)-impacted sites*. Environmental Science and Technology 47(9):4164-71.

Higgins, C.P., and R.G. Luthy. 2006. *Sorption of perfluorinated surfactants on sediments*. Environmental Science and Technology 40 (23): 7251-7256.

Interstate Technology Regulatory Council (ITRC). 2018. *Environmental Fate and Transport for Per- and Polyfluoroalkyl Substances*. March.

U.S. Environmental Protection Agency (USEPA). 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*. 11 December.

———. 1994. *National Oil and Hazardous Substances Pollution Contingency Plan (Final Rule).* 40 Code of Federal Regulations Part 300; 59 Federal Register 47384. September.

———. 2001. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation* Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments). December.

———. 2017. UCMR 3 (2013-2015) Occurrence Data by State. Occurrence Data for the Unregulated Contaminant Monitoring Rule. Accessed 9 July 2019 at https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule. January.

U.S. Fish and Wildlife Service. 2022. *Endangered Species.* http://ecos.fws.gov/ipac/. Accessed 28 October.

Xiao, F., M. F. Simcik, T.R. Halbach, and J.S Gulliver. 2015, *Perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in soils and groundwater of a U.S. metropolitan area: Migration and implications for human exposure*. Water Research 72:64-74