FINAL
Site Inspection Report
Building 835
Wendover, Utah

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

September 2023

Prepared for:

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Acronyms and Abbreviations

%	percent
°F	degrees Fahrenheit
°C	degrees Celsius
µg/kg	micrograms per kilogram
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film-forming foam
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DoD	Department of Defense
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
HDPE	high-density polyethylene
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
MDL	method detection limit
mg/L	milligrams per liter
MIL-SPEC	military specification
MS	matrix spike
MSD	matrix spike duplicate
MWH	MWH Americas, Inc
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector

PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TDS	Total Dissolved Solids
TOC	total organic carbon
TPP	Technical Project Planning
UDEQ	Utah Department of Environmental Quality
UFP	Uniform Federal Policy
US	United States
USAAF	United States Army Air Force
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UTARNG	Utah Army National Guard
WRF	Water Reclamation Facility
WWTP	wastewater treatment plant

Executive Summary

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

The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically(see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for relevant compounds. This SI was completed at Building 835 at the Wendover Airport in Wendover, Utah and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1. Building 835 will also be referred to as the "facility" throughout this document.

Building 835 is located within the Wendover Airport just east of the border between Utah and Nevada. The Wendover Airport has a history of military use since World War II. Building 835 was leased from the Wendover Airport Authority by the Utah ARNG in 2014 and remodeled to its current state for use in support of drone operations.

The PA identified one AOI where PFAS-containing materials may have been used, stored, disposed, or released historically (see Table ES-2 for AOI locations). SI sampling results from the AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation (RI) for AOI 1.

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

Table ES-1 Screening Levels (Soil and Groundwater)

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

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

a.) Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.

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

Table ES-2 Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Building 835	●	●	●	Proceed to RI

Legend:
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense, 2022). The six compounds listed in the OSD memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS) at ARNG facilities nationwide. The ARNG performed this SI at Building 835 in Wendover, Colorado. Building 835 is also referred to as the "facility" throughout this document.

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

1.2 SI Purpose

A PA was performed at Building 835 (AECOM Technical Services, Inc. [AECOM], 2020) that identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

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

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2. Facility Background

2.1 Facility Location and Description

The facility is located in Tooele County, approximately 133 miles west of Salt Lake City, Utah. The facility is situated within the Wendover Airport at 345 Airport Apron, Wendover, Utah, 84083. The airport is positioned south of the City of Wendover and Interstate 80 (**Figure 2-1**).

The Wendover Airport was erected in 1943 by the US Army Air Force (USAAF) to be used as a bombing brigade. Between 1940 and 1960, the facility transitioned into the Wendover Air Force Auxiliary Field. Between 1957 and 1977, a total of 80,102.607 acres were disposed of to various parties, the majority of which went to the Bureau of Land Management and the City of Wendover. The remaining 16,894.293 acres became part of the Utah Test and Training Range, owned by the Department of Defense (DoD) (MWH Americas, Inc. [MWH], 2014).

According to the Tooele County tax assessor, the airport comprises eight parcels totaling 1,692.39 acres owned by Tooele County. Building 835 is located within one of the eight airport parcels (parcel number 01-271-0-0007 totaling 490.32 acres) (Tooele County, 2019).

Building 835 is a large, 21,858 square foot, prefabricated steel building located at the north edge of the aircraft acreage and at the east end of the original historic airfield row of hangars (MWH, 2014). The building was originally used as an aircraft maintenance hangar and ceased being under the control of the USAAF in 1947. USAAF assets were distributed to the Air Force in 1948. Building 835 was subsequently used by the Air Force for dry storage of fuel tankers and other miscellaneous equipment. Circa 1972 the assets were turned over to the Wendover Airport Authority. Building 835 was leased from the Wendover Airport Authority by the Utah ARNG (UTARNG) in 2014 and remodeled to its current state. The lease does not require UTARNG to accept responsibility for past airport activities. The ARNG first occupied Building 835 in the summer of 2016, and the building began operations in February 2017.

2.2 Facility Environmental Setting

Building 835 occupies approximately 0.66 acres, approximately 95 percent (%) of which are impervious surfaces. The topography of the facility is generally flat. The areas surrounding Building 835 are primarily vacant land to the north, and general aviation facilities at the Wendover Airport to the west, south, and east. The airport is surrounded by desert, much of which is public and Air Force land. There is a series of mineral evaporation ponds owned by Intrepid Potash and located approximately 5,000 feet east of the facility. The facility sits at an elevation of 4,237 feet above mean sea level, with a very slight general topographic gradient to the southeast (**Figure 2-2**). The Silver Island Mountains are located approximately 1.5 miles north of the facility, and the Bonneville Salt Flats are located approximately 5 miles northeast of the facility.

2.2.1 Geology

The facility is located in the Basin and Range physiographic province. The geologic features of the province are complex and involve rocks that range in age from Precambrian to Holocene. The geologic history includes major episodes of sedimentation, volcanic activity, and tectonic deformation by both compressional and extensional forces. Groundwater is present in all the rock types in the province; however, basin-fill aquifers are the primary groundwater reservoirs (Prudic et al., 1993).

The area now occupied by the Wendover Airport was once inundated by Pleistocene-age Lake Bonneville, which covered much of the land surface of western Utah and eastern Nevada

approximately 32,000 to 14,000 years ago. The Great Salt Lake is a shrunken remnant of this formerly vast lake. The lake shore and lakebed sediments deposited in Lake Bonneville form the surficial and near surface deposits of the Wendover Airport (Science Applications International Corporation, 1989). Geology at the facility is characterized as mud flats. Geologic units are depicted on **Figure 2-3**.

Soil borings completed during the SI found clay as the dominant lithology of the unconsolidated material observed below the Building 835 parcel. The borings were completed to a depth of 15 feet below ground surface (bgs). The clays were described as predominantly lean clay, due to the higher silt or sand content, although some fat clay intervals were also noted. Intervals of silty or clayey sand were observed in each of the borings. Many of the logs also reported varying percentages of gravel at the surface intervals. A sample for grain size analysis was collected at location AOI01-05 from 3-5 feet bgs and analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil sample is comprised primarily of silt (40.29%), clay (31.37%), and fine sand (20.67%). These facility observations are consistent with near surface fill material expected at a developed site and the understood lacustrine depositional environment of the underlying native material. Boring logs are presented in **Appendix E**, and grain size results are presented in **Appendix F**.

2.2.2 Hydrogeology

Three aquifers are present in much of the northern Great Salt Lake Desert in which the facility sits. An aquifer composed of crystalline salt and jointed lakebed deposits at and just beneath the land surface averages 25 feet in thickness, underlies about 1,650 square miles of desert floor, and yields brine. An aquifer of unknown thickness and extent is present in surficial and buried alluvial fans along the mountain flanks and yields fresh to moderately saline water. The most extensive aquifer underlies the entire area where consolidated rocks are not exposed and is made up of unconsolidated to partly consolidated valley fill. This aquifer yields brine to wells completed at depths of 1,000 to 1,600 feet bgs in the Bonneville Salt Flats area (Stephens, 1974).

Basin fill deposits constitute the primary hydrogeologic units in the region. Groundwater occurs in shallow unconfined units to a depth of approximately 40 feet bgs. Deeper hydrogeologic units are comprised of carbonate rocks that range in thickness from 500 to 25,000 feet (Bedinger, et al., 1990). Depth to water in the area ranges from near ground surface to 50 feet bgs. The general hydraulic conductivity of the basin fill deposits is 0.002 meters per day. Typical hydraulic gradients in the basin fill deposits are extremely flat and are approximately 0.005 meters per meter. Shallow groundwater flow direction at the facility area is generally to the southeast (URS, 2015). Groundwater features are presented on **Figure 2-3**.

Water quality is characterized by the presence of dissolved solids and chemical constituents in solution. The major chemical constituents in the groundwater are calcium, magnesium, and sodium bicarbonate. Groundwater with higher Total Dissolved Solids (TDS) typically contains chloride as the primary anion (URS, 2015). In general, water under the desert floor contains 150,000 milligrams per liter (mg/L) or more of TDS (Stephens, 1974). According to the State of Utah Ground Water Quality Protection Program, groundwater containing greater than 10,000 mg/L of TDS is considered class IV ground water, which is also referred to as saline ground water and is not used as a water supply source. There is a number of non-production groundwater wells in the vicinity of the facility; however, there are no drinking water sources nearby (AECOM, 2020). Drinking water supplies for Wendover, Utah and the facility come from developed springs located near Pilot Peak, which is approximately 35 miles north of Wendover, Utah (MWH, 2014).

Depths to water measured in November 2021 during the SI ranged from 11.02 to 12.30 feet below top of casing. Groundwater elevation contours from the SI are presented on **Figure 2-4** and indicate groundwater flow direction is generally to the southeast.

2.2.3 Hydrology

The facility is located within the Great Salt Lake Basin, which dictates the flow of water in the region. Groundwater recharge most likely comes from mountain precipitation, which can enter alluvial sediments or bedrock fractures and flow down gradient to the lake basin. There is regional discharge of groundwater within the lakebed sediments to the surface, where it is evaporated, leaving salt and other evaporate deposits (URS, 2015).

Based on a desktop review of the National Wetlands Inventory online mapping system, the facility does not contain any mapped wetlands or surface waters (US Fish and Wildlife Service [USFWS], 2021). No surface water was observed during the site visit.

Surface water in the area of Wendover and the facility does not occur in permanent, naturally occurring streams. Surface water does occur east of the facility in evaporation ponds used to reclaim water and commercially recover potash. Because of high evapotranspiration rates and low rainfall, surface water is only present at the facility during brief episodes following snow melt and storm events (Radian, 1996). During these events, surface water runoff generally drains from northwest to southeast. Surface water features are presented on **Figure 2-5**.

2.2.4 Climate

The facility is located in an area characterized by an arid climate. Winters are moderately to severely cold, and summers are hot and dry. Daily temperature fluctuations exceed 20 to 30 degrees Fahrenheit (°F) (National Oceanic and Atmospheric Administration, 2019). Average annual humidity ranges from about 30% to 40% over most of the region. Average annual precipitation ranges from about 4.5 to slightly more than 12 inches. Low humidity, abundant sunshine, and light to moderate winds result in rapid evaporation. Runoff is scant and reaches the desert floor only during or immediately after thunderstorms and periods of rapid snowmelt (Stephens, 1974).

2.2.5 Current and Future Land Use

The facility is currently occupied by UTARNG and is comprised of a hangar, maintenance and storage areas, and an administrative office area. Reasonably anticipated future land use is not expected to change significantly from the current land use described above.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

The following insects, mammals, fishes, birds, and plants are federally endangered, threatened, proposed, and/ or are listed as candidate species in Tooele County, Utah (USFWS, 2022).

- **Insects:** Monarch butterfly, *Danaus plexippus* (Candidate)
- **Mammals:** Little brown bat, *Myotis lucifugus* (Under Review)
- **Fishes:** Lahontan cutthroat trout, *Oncorhynchus clarkii henshawi* (Threatened); Least chub, *Iotichthys phlegethontis* (Resolved Taxon)
- **Birds:** Greater sage-grouse, *Centrocercus urophasianus* (Resolved Taxon); Yellow-billed Cuckoo, *Coccyzus americanus* (Threatened) Flowering
- **Plants:** Ute ladies'-tresses, *Spiranthes diluvialis* (Threatened)

2.3 History of PFAS Use

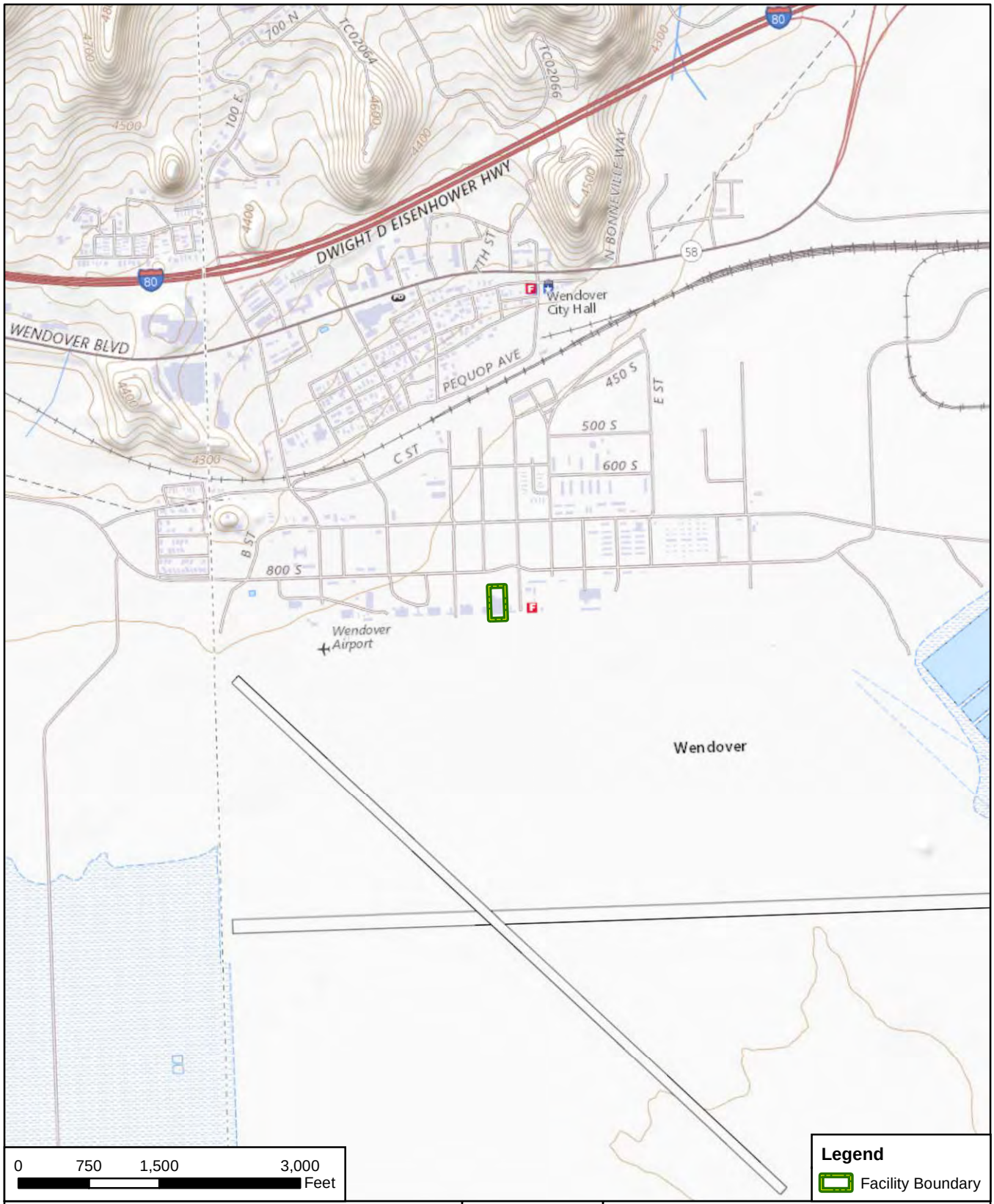
Two mobile fire extinguisher units were brought onsite for training purposes but have reportedly never been used. The units were observed to be stored in Building 835 in July 2019 during the PA; however, one had been removed by the time of the SI. Due to the presence of the tanks which may contain AFFF, the entire building is considered a potential release area identified as one AOI. A description of AOI 1 is presented in **Section 3**.

CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
SCALE	1:63,360	CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/22/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



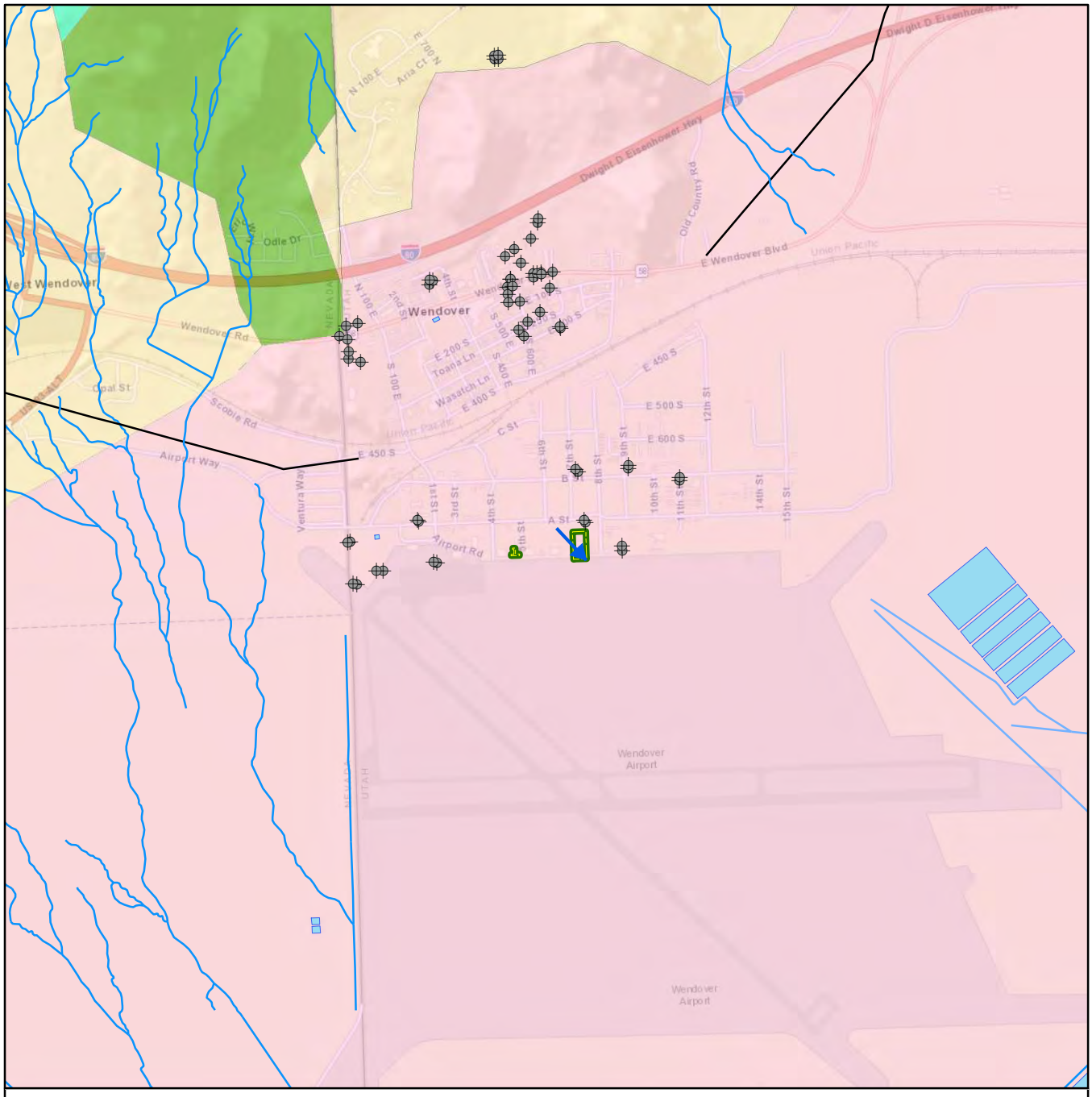
CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
SCALE	1:18,000	CHK BY	AD	8/22/2022
Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	8/22/2022

N

Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	10/4/2022	GIS BY	MS	10/4/2022
SCALE	1:24,000	CHK BY	AD	10/4/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	10/4/2022

N

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

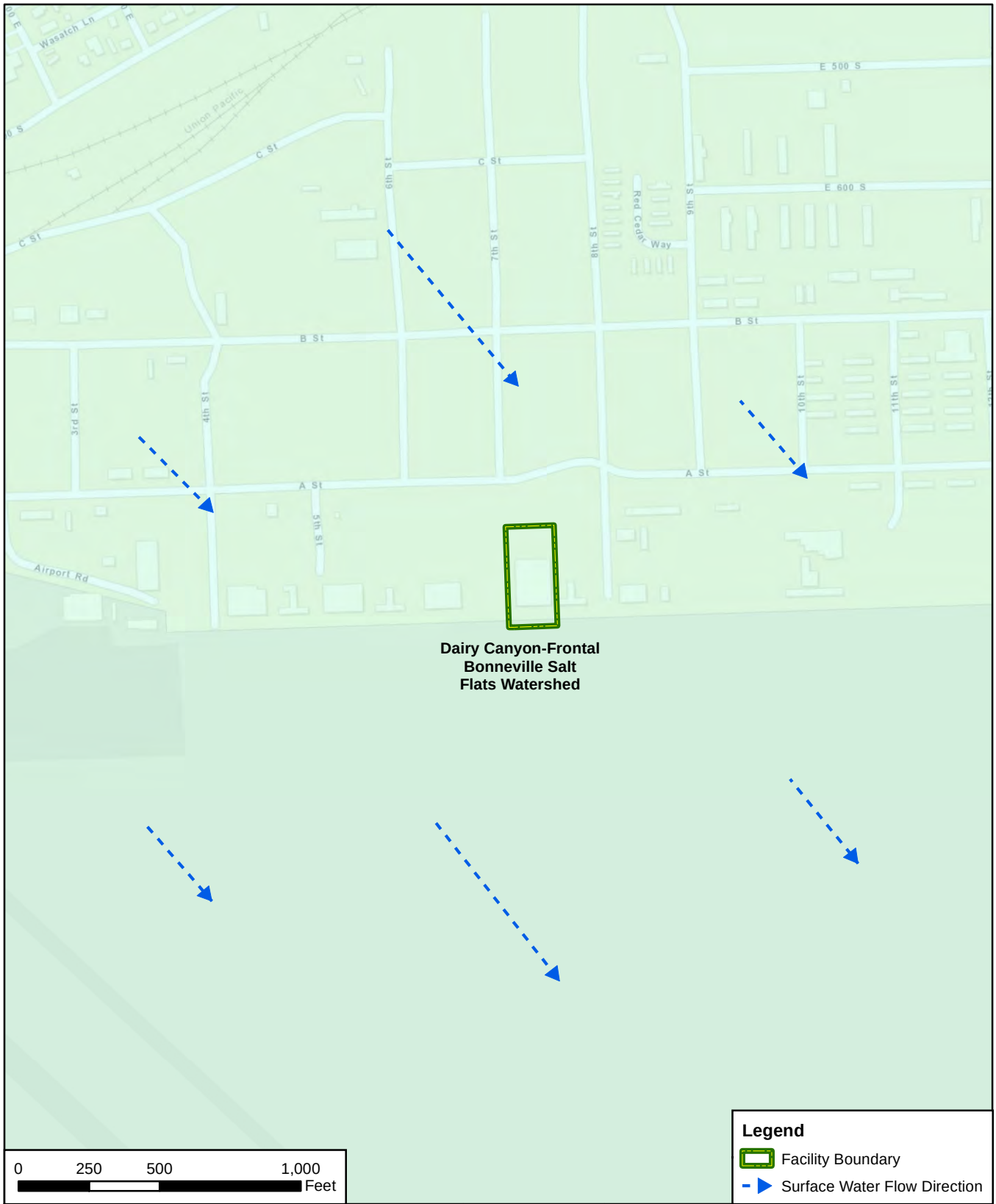
CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	7/24/2023	GIS BY	EG	7/24/2023
SCALE	1:1,800	CHK BY	AD	7/24/2023
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	7/24/2023

N

Groundwater Elevations, November, 2021

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4



CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
SCALE	1:6,000	CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/22/2022

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Surface Water Features

AECOM
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Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, Building 835 was identified as the only potential release area and was made into AOI 1 (AECOM, 2020). The potential release area is shown on **Figure 3-1**. This figure also shows the location of off-facility potential release areas not associated with ARNG activities, including two potential release areas immediately adjacent to the west and east of Building 835. These off-facility areas were not investigated in this SI and are shown for informational purposes only.

3.1 AOI 1 Building 835

AOI 1 is Building 835, where two approximately 120-gallon mobile fire extinguisher tanks were observed to be stored during the PA. The tanks appeared to be manufactured by Fire Solutions, LLC. The material contained within the tanks is unknown. The tanks were brought onsite after 2014 by another unit for training purposes, but the mobile tanks were reportedly not discharged, filled, or serviced. The tanks were left at the facility and not intended for future use. Although there are no known discharges from the tanks and they remain presumably full of the original material, it is possible that the tanks discharged or leaked AFFF at or near the facility, unbeknownst to interviewed personnel.

3.2 Adjacent Sources

Several potential off-facility sources of PFAS adjacent to the facility were identified during the PA through interviews. A description of each potential adjacent source identified during the PA interviews is presented below for informational purposes, and the sources are shown on **Figure 3-1**.

3.2.1 Wendover Airport Fire Station

The building adjacent to the facility on the west side is the fire station for the Wendover Airport. The fire station reportedly has one firetruck that carries 1,500 gallons of water, 220 gallons of foam, and 550 gallons of dry chemicals. Fire training, equipment testing, nozzle testing, equipment washing, and line purging have occurred on the south side of the fire station since 2014 (AECOM, 2020).

3.2.2 World War II Fire Station

The building adjacent to the facility on the east side is the former fire station used since World War II until approximately 2014 when the new fire station was built. The former fire station was used to store the firetruck and approximately 250 gallons of AFFF concentrate foam stored in 55-gallon drums. No discharges in the storage area were reported; however, fire training, equipment testing, nozzle testing, equipment washing, and line purging activities similar to those currently conducted at the new fire station are assumed to have taken place south of the World War II fire station (AECOM, 2020).

3.2.3 2006 Runway Crash

In early 2006 a small aircraft crashed on the runway directly south of the facility. The fire was suppressed with foam by the Wendover Airport emergency services, although the quantity used is unknown. No other major emergencies have been reported on the runways since 2006 (AECOM, 2020).

3.2.4 Wendover Water Reclamation Facility

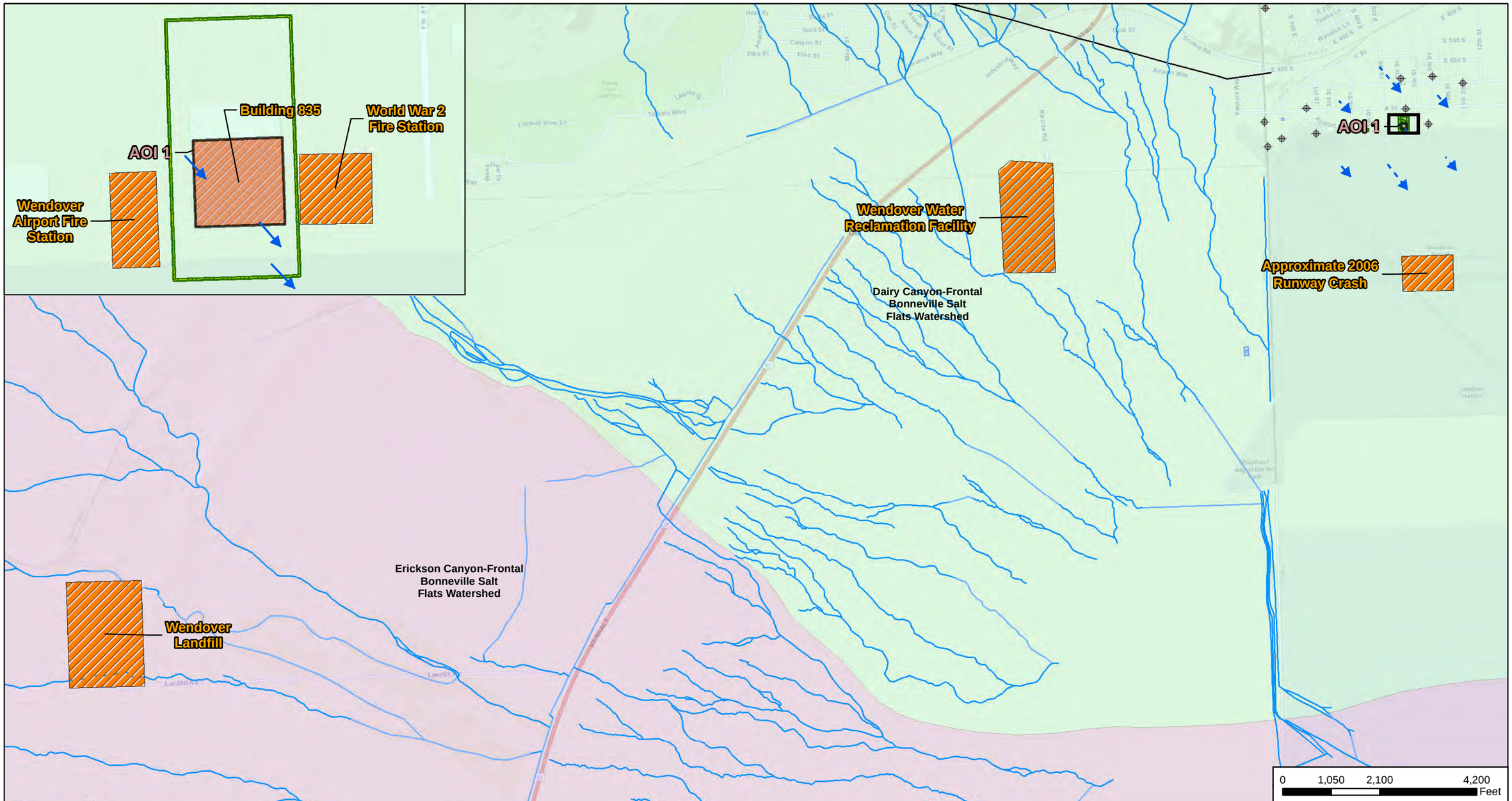
The Wendover Water Reclamation Facility (WRF) is located 1.5 miles southwest of Building 835. Wastewater from the city of is conveyed to the WRF where it is treated and reused for irrigation and compost. The WRF utilizes an activated sludge treatment process with filtration (AECOM, 2020).

Wastewater treatment plants (WWTPs) are not usually a primary potential release area of PFAS, but sludges and liquids from areas of potential release that are treated at WWTPs may create a secondary source of contamination. Known AFFF releases at fire training areas and emergency response locations in the area may contribute to PFAS in sludge and discharged, treated water from the WRF (Qua Engineering, Inc., 2004).

3.2.5 Wendover Landfill

There are no landfills within the footprint of the Wendover airport; however, there is a landfill associated with the city of Wendover. The Wendover Landfill is located approximately 5.6 miles southwest of Building 835, off Lincoln Highway. The landfill is a disposal facility for construction/demolition debris, dry industrial waste, municipal solid waste, and automobile tires.

Landfills are not usually a primary potential release area of PFAS, but materials disposed of in landfills may create a secondary source of contamination. Such materials, to name a few, may include used AFFF storage containers, or products associated with waterproofing uniforms or boots. Known PFAS release areas in the city of Wendover may have contributed to waste-containing PFAS being disposed of at the landfill (AECOM, 2020).



CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/30/2022	GIS BY	MS	8/30/2022
SCALE	1:25,200	CHK BY	AD	8/30/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/30/2022

- Area of Interest
- Potential Release Area
- Facility Boundary
- Water Body
- River/Stream
- Canal/Ditch
- Pipeline
- Surface Water Flow Direction
- Groundwater Flow Direction
- Unknown Well

N

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

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

4.1 Problem Statement

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

4.2 Information Inputs

Primary information inputs included:

- The PA for Building 835 (AECOM, 2020);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-QAPP Addendum (AECOM, 2021a); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.3 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). The SI scope was bounded vertically by the observed depths of the surficial groundwater table. Temporal boundaries of the study were limited to the Fall to avoid winter storms and freezing conditions.

4.4 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs within this document and decision rules as defined in the SI QAPP Addendum (AECOM, 2021a).

4.5 Data Usability Assessment

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

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

5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Building 835, Wendover, Utah* dated August 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Building 835, Wendover, Utah* dated July 2021 (AECOM, 2021a); and
- *Final Site Safety and Health Plan, Building 835, Wendover, Utah* dated August 2021 (AECOM, 2021b).

The SI field activities were conducted on 12 October and from 11 to 12 November 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as noted in **Section 5.8**.

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

- Fifteen (15) soil samples from five borings;
- Five grab groundwater samples from five temporary wells; and
- Thirteen (13) quality assurance (QA)/quality control (QC) samples.

Figure 5-1 provides the sample locations for all media across the facility. **Table 5-1** presents the list of samples collected for each media. Field documentation is provided in **Appendix B**. A Log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**, a Nonconformance and Corrective Action Report is provided in **Appendix B3**, and land survey data are provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 30 June 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, UTARNG, USACE, Utah Department of Environmental Quality (UDEQ), and representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021a).

A TPP Meeting 3 was held on DATE TBD to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with Blue Stakes of Utah 811 utility clearance provider to notify them of intrusive work on 9 November 2021. However, because Building 835 is a private facility, the participating Blue Stakes of Utah 811 locators did not clear utilities at the entire facility. Therefore, AECOM contracted ESI Engineering, Inc., a private utility location service, to perform utility clearance. ESI Engineering, Inc. performed utility clearance of the proposed boring locations on 12 October 2021 with input from the AECOM field team and Building 835 facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger or air vacuum to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

One potable water source at Building 835 was sampled on 26 May 2021 to assess usability for decontamination of drilling equipment. Results of the sample collected at the interior faucet (835-DECON-01) confirmed this source to be acceptable for use in this investigation. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample associated with the wash rack spigot source used during the SI are provided in **Appendix F**. A discussion of the results is presented in the DUA (**Appendix A**).

Materials that were used within the sampling zone were confirmed as acceptable for use in the sampling environment. The checklist of acceptable materials for use in the sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the SI QAPP Addendum (AECOM, 2021a). Prior to the start of field work each day, a Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021a). A direct push 7730DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger or air vacuum was used to collect soil from the top 5 feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1** and depths are provided **Table 5-1**.

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

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

Soil borings completed during the SI found clay as the dominant lithology of the unconsolidated material observed below the Building 835 parcel. The clays were described as predominantly lean clay, due to the higher silt or sand content, although some fat clay intervals were also noted. Intervals of silty or clayey sand were observed in each of the borings. Many of the logs also reported varying percentages of gravel at the surface intervals. The borings were completed to a depth of 15 feet bgs. These facility observations are consistent with fill material and the understood lacustrine depositional environment at the facility.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15, total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) using bentonite chips at completion of sampling activities. Borings were installed in dirt or gravel areas to avoid disturbing concrete or asphalt surfaces.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a direct push 7730DT dual-tube sampling system. Once the borehole was advanced to the desired depth, wherever conditions allowed, a temporary well was constructed of a 5-foot section of 2-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

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

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

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. One field reagent blank was collected in accordance with the PQAPP (AECOM, 2018a). A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6 °C during shipment.

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with bentonite chips. Temporary wells were installed in dirt or gravel areas and no paving restoration was required.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 12 November 2021. Groundwater elevation measurements were collected from the five new temporary monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Utah-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed wells on the facility were collected on 12 November 2021 in the applicable Universal Transverse Mercator zone projection with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B4**.

5.6 Investigation-Derived Waste

As of the date of this report, the disposal of 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 SI QAPP Addendum (AECOM, 2021a) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Soil IDW (i.e., soil cuttings) generated during the SI activities were left in place and land spread on the ground surface at the immediate downgradient side of the point of generation on-facility (i.e., at each respective boring location). The soil IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were discharged directly to the ground surface on the immediate downgradient side of the point of generation on-facility (i.e., at each respective boring location). The liquid IDW was not sampled and assumes the PFAS characteristics of the associated groundwater samples collected from that source location.

Geographic coordinates were collected using a global positioning system (GPS) around each location where IDW was placed (i.e., an IDW polygon). The IDW polygons are displayed on the figure in **Appendix B5**.

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

5.7 Laboratory Analytical Methods

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

5.8 Deviations from SI QAPP Addendum

One deviation from the SI QAPP Addendum was identified during review of the field documentation. The deviation is noted below and is documented in a Nonconformance and Corrective Action Report (**Appendix B3**):

- The subcontracted licensed surveyor collected the coordinates and top of casing elevations of the temporary monitoring wells but inadvertently failed to record the ground surface elevations at these temporary well locations. The SI QAPP stated that ground surface measurements would be collected at all five locations. The error was not recognized until the surveyor's data package was provided to AECOM several weeks after the field event. The coordinates and top of casing elevations are considered sufficient to meet the DQOs for the temporary wells. Groundwater elevations are calculated using the recorded top of casing elevations and depths to water, which were measured from the top of casing. This action was documented in a Nonconformance and Corrective Action Report provided in **Appendix B3**.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Building 835 Wendover, Utah

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-00-02	11/11/2021 14:00	0 - 2	x				
AOI01-01-SB-03-05	11/11/2021 14:20	3 - 5	x				
AOI01-01-SB-07-09	11/11/2021 14:35	7 - 9	x				
AOI01-01-SB-07-09-MS	11/11/2021 14:35	7 - 9	x				MS
AOI01-01-SB-07-09-MSD	11/11/2021 14:35	7 - 9	x				MSD
AOI01-02-SB-00-02	11/11/2021 9:25	0 - 2	x				
AOI01-02-SB-03-05	11/11/2021 10:00	3 - 5	x				
AOI01-02-SB-05-07	11/11/2021 10:15	5 - 7	x				
AOI01-03-SB-00-02	11/11/2021 16:15	0 - 2	x				
AOI01-03-SB-03-05	11/11/2021 16:25	3 - 5	x				
AOI01-03-SB-06-08	11/12/2021 8:30	6 - 8	x				
AOI01-03-SB-06-08-D	11/12/2021 8:30	6 - 8	x				FD
AOI01-04-SB-00-02	11/11/2021 11:40	0 - 2	x				
AOI01-04-SB-03-05	11/11/2021 11:50	3 - 5	x	x	x		
AOI01-04-SB-03-05-D	11/11/2021 11:50	3 - 5	x	x	x		FD
AOI01-04-SB-06-08	11/11/2021 12:15	6 - 8	x				
AOI01-05-SB-00-02	11/11/2021 15:00	0 - 2	x				
AOI01-05-SB-03-05	11/11/2021 15:20	3 - 5	x			x	
AOI01-05-SB-07-09	11/11/2021 15:35	7 - 9	x				
Groundwater Samples							
AOI01-01-GW	11/11/2021 16:10	NA	x				
AOI01-01-GW-D	11/11/2021 16:10	NA	x				FD
AOI01-02-GW	11/12/2021 10:40	NA	x				
AOI01-03-GW	11/12/2021 11:50	NA	x				
AOI01-04-GW	11/11/2021 14:00	NA	x				
AOI01-04-GW-MS	11/11/2021 14:00	NA	x				MS
AOI01-04-GW-MSD	11/11/2021 14:00	NA	x				MSD
AOI01-05-GW	11/12/2021 9:20	NA	x				
Quality Control Samples							
835-DECON-01	5/26/2021 10:30	NA	x				source decon water
835-FRB-01	11/11/2021 10:40	NA	x				
835-ERB-01	11/11/2021 10:35	NA	x				hand auger
835-ERB-02	11/11/2021 11:25	NA	x				hand auger
835-ERB-03	11/11/2021 12:00	NA	x				from DPT shoe
835-PW-02	11/11/2021 12:40	NA	x				driller tank decon water

Notes:

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

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Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Building 835 Wendover, Utah

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	15	10-15	4234.903	NM	11.30	NM	4223.603
	AOI01-02	15	10-15	4235.808	NM	11.24	NM	4224.568
	AOI01-03	15	10-15	4235.834	NM	11.40	NM	4224.434
	AOI01-04	15	10-15	4235.058	NM	11.02	NM	4224.038
	AOI01-05	15	10-15	4235.731	NM	12.30	NM	4223.431

Notes:

AOI = area of interest

bgs = below ground surface

btoc = below top of casing

NA = not applicable

NM = not measured

NAVD88 = North American Vertical Datum 1988

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CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
SCALE	1:720	CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/22/2022

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for AOI 1 is provided in **Section 6.3. Table 6-2** through **Table 6-4** present results in soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022 (Assistant Secretary of Defense, 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1** below.

Table 6-1 Screening Levels (Soil and Groundwater)

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

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

a.) Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.

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

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

6.2 Soil Physicochemical Analyses

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

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

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1: Building 835. The soil and groundwater results are summarized on **Table 6-2** through **Table 6-4**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.3.1 AOI 1 Soil Analytical Results

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

Soil was sampled from surface soil (0 to 2 feet bgs) at all boring locations. Shallow subsurface soil was also sampled from all boring locations at two depth intervals; the mid-point (3 to 5 feet bgs) and from just above observed groundwater (5 to 9 feet bgs). Due to shallow groundwater, deep subsurface soil samples (>15 feet bgs) were not collected. The deeper shallow subsurface soil samples are shown as “Deep” samples on **Figure 6-1** through **Figure 6-5**. A greater number of compounds were observed in surface and shallow soil in comparison to subsurface soil above the capillary fringe.

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface soil. PFOS was detected in surface soil above the SL of 13 micrograms per kilogram (µg/kg) at AOI01-05 (13.7 µg/kg). PFOA, PFBS, PFHxS, and PFNA detections in surface soil were below their SLs by at least one order of magnitude.

PFOA, PFOS, PFHxS, and PFBS were detected in shallow subsurface soil at concentrations at least two orders of magnitude below their SLs. The highest concentration of any compound in the shallow subsurface soil was PFHxS, detected at 5.62 µg/kg in the 3-5 feet bgs interval at AOI01-05. PFNA was not detected in the shallow subsurface soil.

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI01-01 through AOI01-05. PFOS was detected above the SL of 4 nanograms per liter (ng/L) at three wells, with concentrations ranging from 13.9 ng/L to 39.8 ng/L. PFHxS was detected above the SL of 39 ng/L at two wells,

with concentrations of 46.0 ng/L in AOI01-01 (duplicate) and 68.1 ng/L in AOI01-05. PFOA was detected at four of the five wells at concentrations below the SL of 6 ng/L. PFBS was detected at all five wells at concentrations below the SL of 601 ng/L. PFNA was not detected at any of the five well locations. The maximum detection of each compound was observed at well AOI01-05.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOS was detected in surface soil above the SL at AOI01-05. PFOA, PFHxS, PFNA, and PFBS were detected in soil below their SLs. PFOS and PFHxS were detected in groundwater at concentrations above their SLs at multiple locations. PFOA, PFBS, and PFNA were detected in groundwater below their SLs. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 1 is warranted.

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Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Building 835 Wendover Airport

Area of Interest		AOI01									
Sample ID		AOI01-01-SB-00-02		AOI01-02-SB-00-02		AOI01-03-SB-00-02		AOI01-04-SB-00-02		AOI01-05-SB-00-02	
Sample Date		11/11/2021		11/11/2021		11/11/2021		11/11/2021		11/11/2021	
Depth		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)											
PFBS	1900	0.490	J	ND	U	0.074	J	ND	U	0.151	J
PFHxS	130	5.22		0.095	J	0.635	J	0.041	J	2.31	
PFNA	19	0.058	J	0.025	J	ND	U	ND	U	0.302	J
PFOA	19	0.381	J	0.103	J	ND	U	ND	U	0.389	J
PFOS	13	6.75		0.604	J	ND	U	0.437	J	13.7	

Grey Fill Detected concentration exceeded OSD Screening Levels

ND = Analyte not detected above the LOD. LOD values are presented in Appendix F.

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, Building 835 Wendover Airport

Area of Interest		AOI01																			
Sample ID		AOI01-01-SB-03-05		AOI01-01-SB-07-09		AOI01-02-SB-03-05		AOI01-02-SB-05-07		AOI01-03-SB-03-05		AOI01-03-SB-06-08		AOI01-03-SB-06-08-D		AOI01-04-SB-03-05		AOI01-04-SB-03-05-D		AOI01-04-SB-06-08	
Sample Date		11/11/2021		11/11/2021		11/11/2021		11/11/2021		11/11/2021		11/12/2021		11/12/2021		11/11/2021		11/11/2021		11/11/2021	
Depth		3-5 ft		7-9 ft		3-5 ft		5-7 ft		3-5 ft		6-8 ft		6-8 ft		3-5 ft		3-5 ft		6-8 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
PFBS	25000	0.398	J	0.123	J	ND	U	ND	U	ND	U	ND	U	ND	U	0.037	J	0.065	J	ND	U
PFHxS	1600	1.81		1.62	J+	ND	U	ND	U	0.511	J	ND	UJ	0.050	J	0.047	J	0.060	J	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	0.117	J	ND	U	0.139	J	ND	U	0.102	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	0.254	J	0.774	J	0.492	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Grey Fill Detected concentration exceeded OSD Screening Levels

ND = Analyte not detected above the LOD. LOD values are presented in Appendix F.

References

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

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, Building 835 Wendover Airport

	Area of Interest	AOI01			
	Sample ID	AOI01-05-SB-03-05		AOI01-05-SB-07-09	
	Sample Date	11/11/2021		11/11/2021	
	Depth	3-5 ft		7-9 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)					
PFBS	25000	0.286	J	0.056	J
PFHxS	1600	5.62		0.764	J
PFNA	250	ND	U	ND	U
PFOA	250	0.511	J	ND	U
PFOS	160	0.575	J	2.01	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Building 835 Wendover Airport

Area of Interest		AOI01											
Sample ID		AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		AOI01-03-GW		AOI01-04-GW		AOI01-05-GW	
Sample Date		11/11/2021		11/11/2021		11/12/2021		11/12/2021		11/11/2021		11/12/2021	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)													
PFBS	601	8.78		13.4		5.73		0.978	J	13.9		14.6	
PFHxS	39	30.7	J	46.0	J	14.2		1.66	J	19.7		68.1	
PFNA	6	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	6	2.01	J	3.14	J	2.54	J	ND	U	2.06	J	4.12	J
PFOS	4	13.9		20.6		1.13	J	ND	U	ND	U	39.8	

Grey Fill Detected concentration exceeded OSD Screening Levels

ND = Analyte not detected above the LOD. LOD values are presented in Appendix F.

References

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

Interpreted Qualifiers

J = Estimated concentration

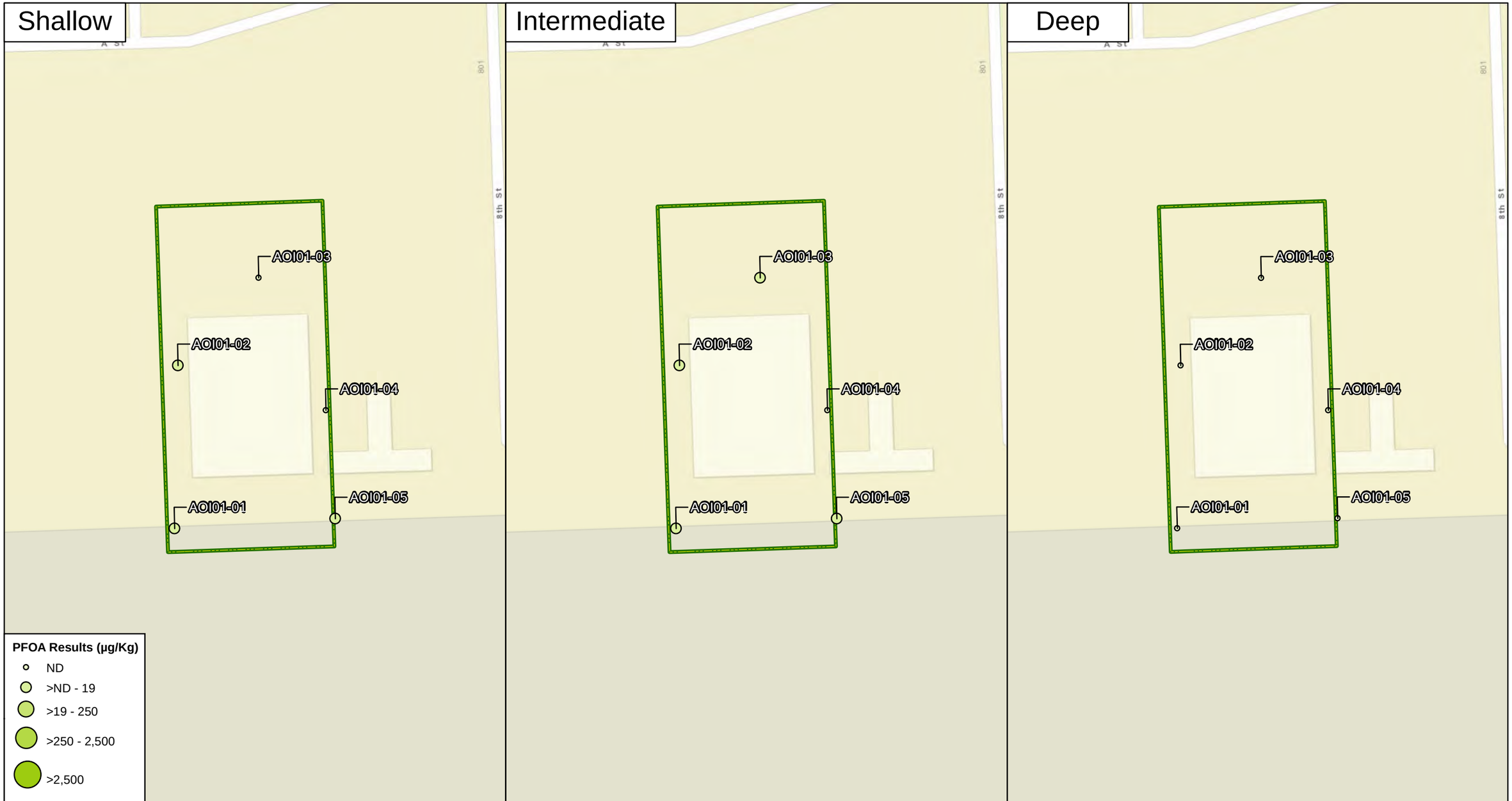
U = The analyte was not detected at a level greater than or equal to the adjusted DL

Chemical Abbreviations

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

Acronyms and Abbreviations

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



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PROJECT	Site Inspection at Wendover Airport, UT			
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SCALE		CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

Facility Boundary

0 50 100 200 Feet

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

N

PFOA Detections in Soil

AECOM
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Germantown, MD 20876

Figure 6-1

Shallow

Intermediate

Deep

AOI01-03
AOI01-02
AOI01-04
AOI01-01
AOI01-05

PFOS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

Facility Boundary

0 50 100 200 Feet

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

N

PFOS Detections in Soil

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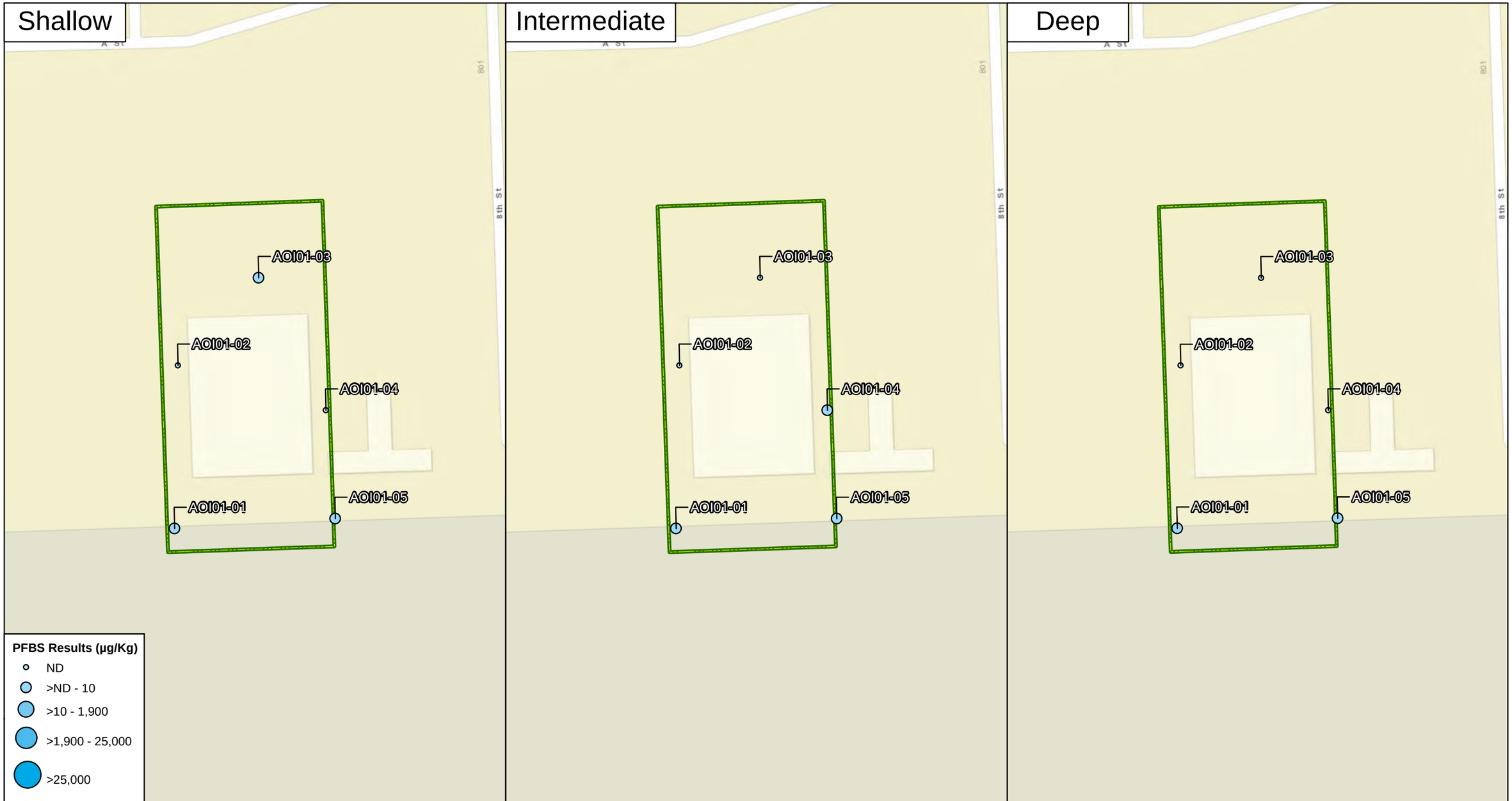
Germantown, MD 20876

Figure 6-2



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PROJECT	Site Inspection at Wendover Airport, UT			
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SCALE		CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

Facility Boundary

0 50 100 200 Feet

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

N

PFBS Detections in Soil

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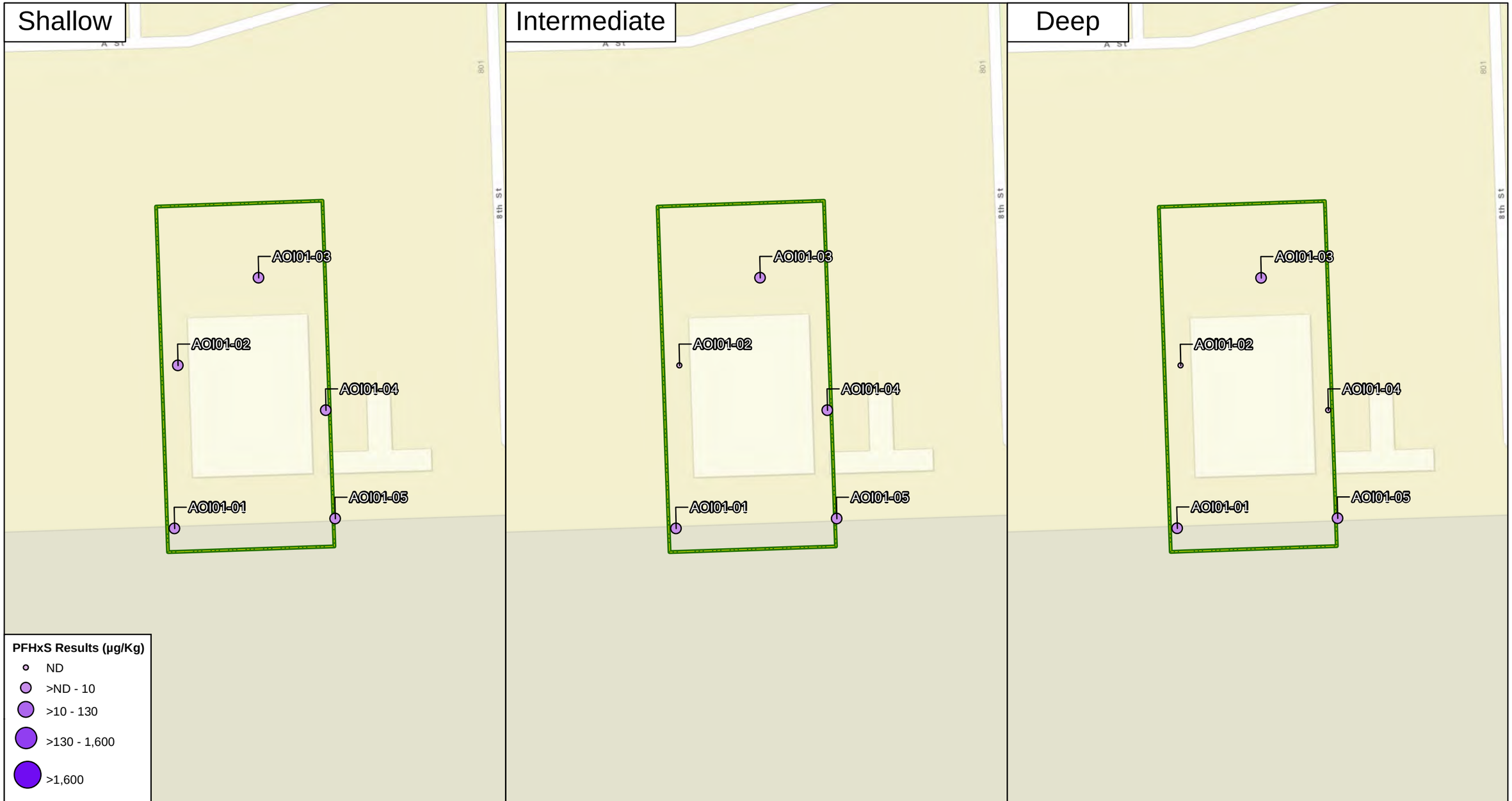
Germantown, MD 20876

Figure 6-3



CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

Facility Boundary

0 50 100 200 Feet

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

N

PFHxS Detections in Soil

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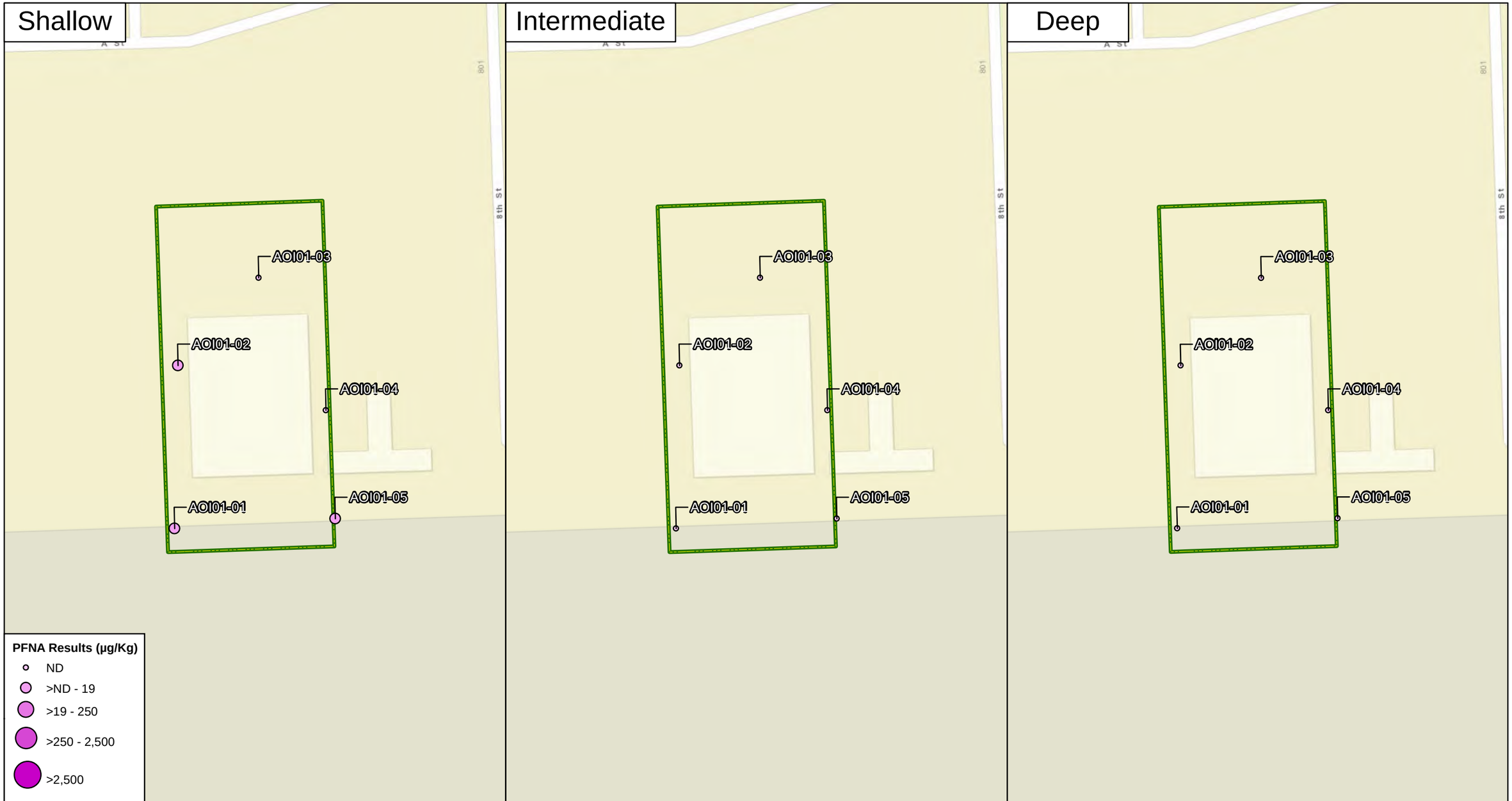
Germantown, MD 20876

Figure 6-4



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PROJECT	Site Inspection at Wendover Airport, UT			
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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

Facility Boundary

0 50 100 200 Feet

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

N

PFNA Detections in Soil

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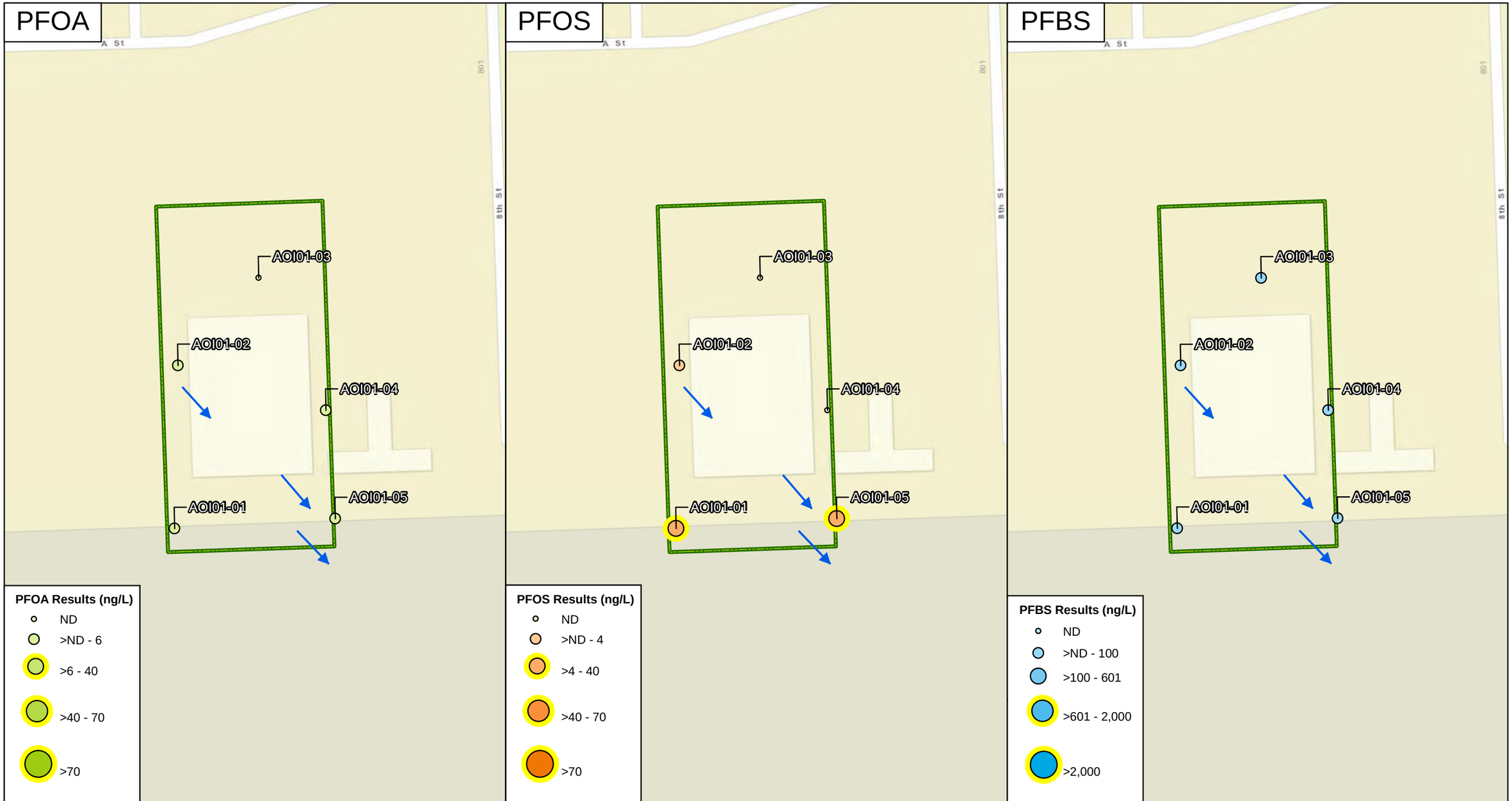
Germantown, MD 20876

Figure 6-5



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PROJECT	Site Inspection at Wendover Airport, UT			
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SCALE		CHK BY	AD	10/5/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	10/5/2022

Legend

Facility Boundary

Groundwater Flow Direction

0 50 100 200 Feet

N

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

PFOA, PFOS, and PFBS Detections in Groundwater

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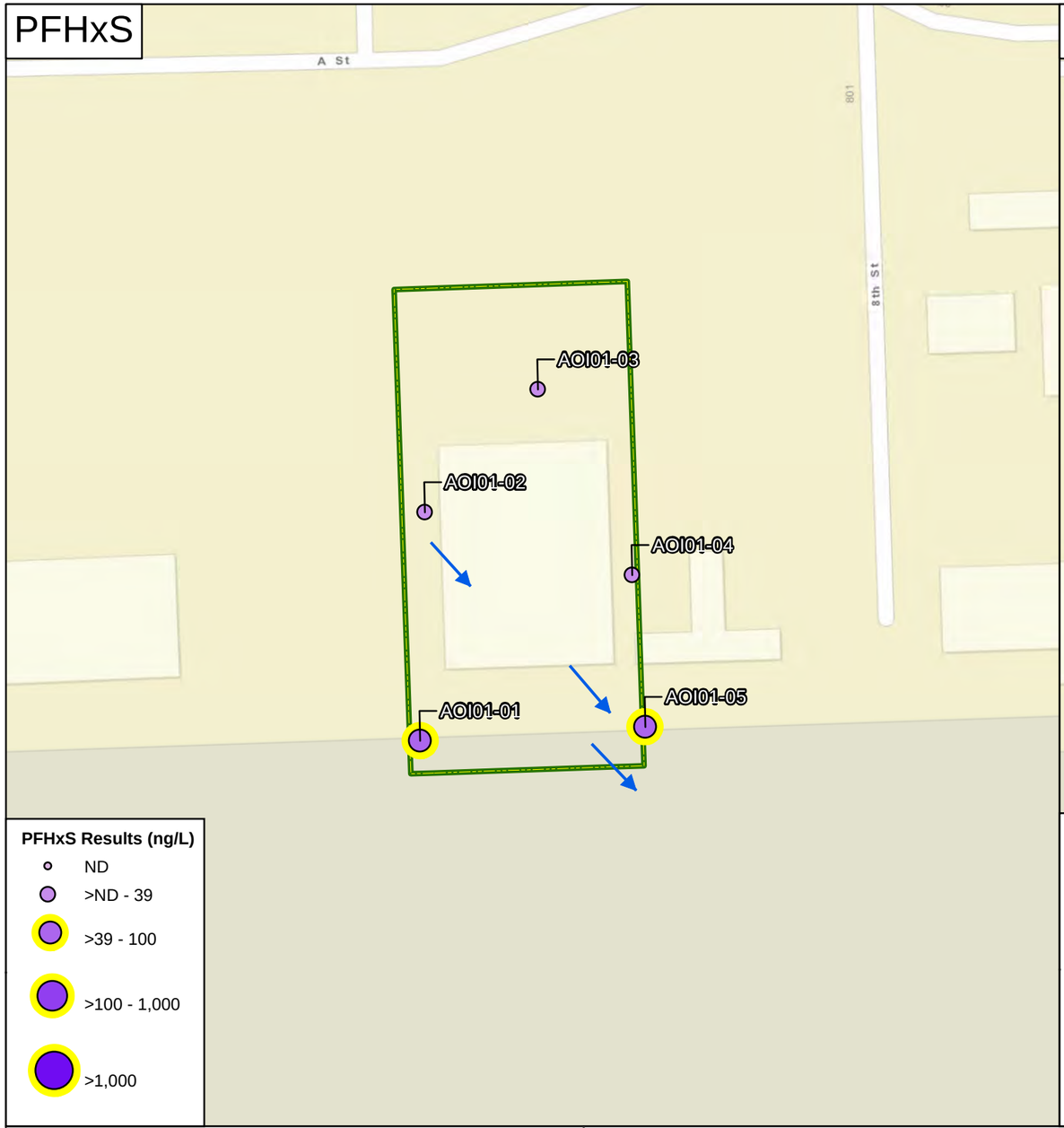
Germantown, MD 20876

Figure 6-6

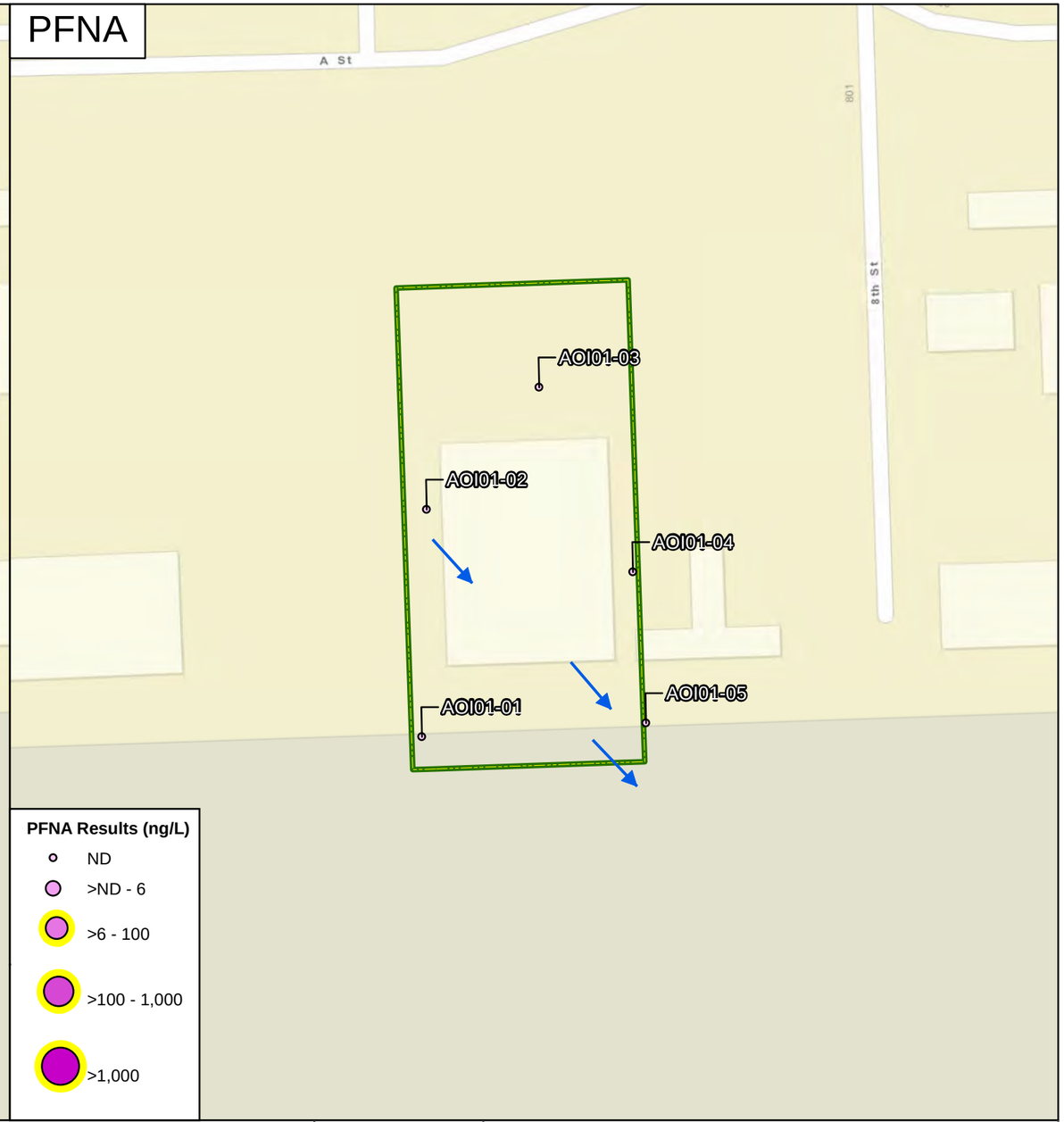
PFHxS



PFHxS Results (ng/L)

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

PFNA



PFNA Results (ng/L)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Wendover Airport, UT			
REVISED	8/22/2022	GIS BY	MS	8/22/2022
SCALE		CHK BY	AD	8/22/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	8/22/2022

Legend

- Facility Boundary
- Groundwater Flow Direction

0 50 100 200 Feet

N

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

PFHxS and PFNA Detections in Groundwater

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Germantown, MD 20876

Figure 6-7

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7. Exposure Pathways

The CSM for AOI 1, revised based on the SI findings, are presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with an incomplete pathway generally warrant no further action. However, the pathway is considered potentially complete if the relevant compounds are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of relevant compounds above the SLs. Areas with an identified potentially complete pathway that have detections of the relevant compounds above the SLs may warrant further investigation. Although the CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in a Remedial Investigation (RI) or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

In general, the potential routes of exposure to the relevant compounds are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the facility include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers, residents outside the facility boundary, and recreational users outside of the facility boundary.

7.1 Soil Exposure Pathway

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

7.1.1 AOI 1

Two approximately 120-gallon mobile fire extinguisher tanks were brought onsite in 2014 and were reportedly never discharged, filled, or serviced, and they were not intended for use at the facility. However, it is possible that the tanks discharged or leaked AFFF at or near the facility, unbeknownst to interviewed personnel.

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface soil and subsurface soil at AOI 1. PFOS was detected in surface soil above the SL at AOI01-05. Site workers, future construction workers, and trespassers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers, future construction workers, and trespassers is potentially complete. No active construction was present at the facility, but future construction workers could contact constituents in subsurface soil via incidental ingestion, and therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

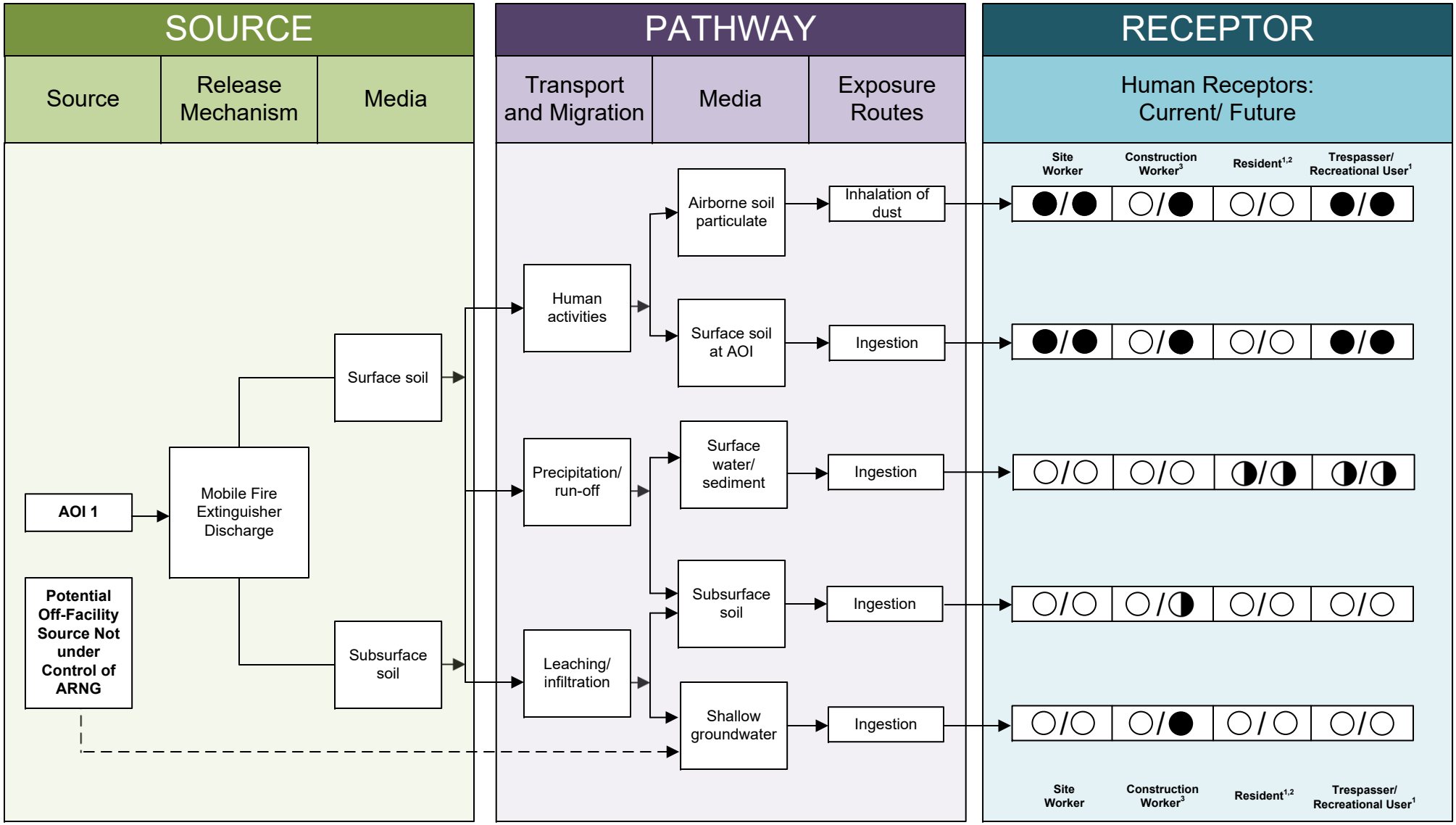
PFOS and PFHxS were detected above their respective SLs in groundwater samples collected at AOI 1. Drinking water supplies for Wendover, Utah and the facility come from developed springs located near Pilot Peak, which is approximately 35 miles north of Wendover, Utah (MWH, 2014); therefore, the ingestion exposure pathway for site workers and trespassers is considered incomplete. No potable wells are present within or downgradient of AOI 1. Therefore, the ingestion exposure pathway for groundwater is incomplete for off-facility residents and recreational users. Depths to water measured during the SI in November 2021 ranged from 11.02 to 12.30 feet below top of casing. Therefore, shallow groundwater may be encountered during construction activities and the ingestion exposure pathway for future construction workers is considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.3 Surface Water and Sediment Exposure Pathway

Surface water and sediment samples were not collected at AOI 1, but the SI results for PFOA, PFOS, and PFBS in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 AOI 1

PFAS are water soluble and can migrate readily from soil to surface water via leaching and runoff. PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil and groundwater at AOI 1; therefore, it is possible that those compounds may have migrated from soil and groundwater to surface waters. There are no surface water features on-facility. Surface water runoff during the wet season may reach the evaporation ponds to the east that are used to produce potash used for fertilizer, which could potentially be used on food. Therefore, the pathway for potential exposure to surface water and sediment via ingestion is potentially complete for off-facility residents and recreational users. The CSM for AOI 1 is presented on **Figure 7-1**.



LEGEND

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

Notes:

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

Figure 7-1
Conceptual Site Model, AOI 1
Building 835, Wendover

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted on 12 October and from 11 to 12 November 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as previously noted in **Section 5.8**.

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

- Fifteen (15) soil samples from five borings;
- Five grab groundwater samples from five temporary wells; and
- Thirteen (13) QA/QC samples.

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOI 1 to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. Additionally, the CSM was refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOI, which are described in **Section 7**.

8.2 Outcome

Based on the results of this SI, further evaluation under CERCLA is warranted in an RI for AOI 1 (see **Table 8-1**). Based on the CSM developed and revised in light of the SI findings, there is no potential for exposure to drinking water receptors from AOI 1 from sources on the facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1:
    - PFOS was detected in surface soil above the SL of 13.0 µg/kg at AOI01-05 at a concentration of 13.7 µg/kg. The detected concentrations of PFOA, PFOS, PFHxS, PFNA and PFBS in surface and subsurface soil at all other locations at AOI 1 were below their respective SLs.
    - PFOS and PFHxS in groundwater exceeded their SLs. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 39.8 ng/L at location AOI01-05. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 68.1 ng/L at location AOI01-05. Based on the results of the SI, further evaluation of AOI 1 is warranted in an RI.

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

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

Table 8-1 Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Building 835	●	●	●	Proceed to RI

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

9. References

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

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

AECOM. 2020. *Final Preliminary Assessment Report, Building 835, Wendover Airport, Utah*. August.

AECOM. 2021a. *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Building 835, Wendover, Utah, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide.* July.

AECOM. 2021b. *Final Site Safety and Health Plan, Army Aviation Support Facility, Building 835, Wendover, Utah, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide*. August.

Assistant Secretary of Defense. 2022. *Investigation Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program*. United States Department of Defense. 15 September.

Bedinger, M.S., K.A. Sargent, and W .H. Langer. 1990. *Studies of Geology and Hydrology in the Basin and Range Province, Southwestern United States, For isolation of High-Level Radioactive WasteCharacterization of the Bonneville Region, Utah and Nevada. U.S. Geological Survey Professional Paper 1370-G*.

DA. 2018. *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances.* 4 September.

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

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

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

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

ITRC. 2018. *Environmental Fate ant Transport for Per- and Polyfluoroalkyl Substances*. March.

MWH Americas, Inc. 2014. *Phase I Environmental Site Assessment, Wendover Airport, 345 Airport Apron, Wendover, Utah 84083, Lease of Buildings 807, 835, & 1831*. August 14.

National Oceanic and Atmospheric Administration. 2019. *National Centers for Environmental Information*. Accessed December 2019 at https://www.ncdc.noaa.gov/.

Prudic, David E., James R. Harrill, and Thomas J. Burbey. 1993. *Conceptual Evaluation of Regional Ground-Water Flow in the Carbonate-Rock Province of the Great Basin, Nevada,* Utah, and Adjacent States. USGS Open-File Report 93-170.

Qua Engineering, Inc., 2004. C*ulinary Water and Wastewater Systems Master Plan.* City of West Wendover. October, 2004.

Radian. 1996. *Preliminary Assessment/Site Investigation, Wendover Air Force Auxiliary Field, Hill Air Force Range.* March.

Science Applications International Corporation (SAIC), 1989. *Final Preliminary Assessment Report for Chemical Disposal Pit No. 4 at Oasis Site, Utah Test and Training Range North, Utah*. August.

Stephens, J. C. 1974*. Hydrologic Reconnaissance of the Northern Great Salt Lake Desert, State of Utah Department of Natural Resources.* USGS Technical Publication 42.

Tooele County. 2019. *Tooele County Geographic Information Systems Interactive Map*. Accessed December 2019 at http://206.197.88.246/flexviewers/TC_Interactive/.

URS, 2015. *OU SR-2 Site 292 Feasibility Study. Utah Test and Training Range, Hill Air Force Base, Utah*. September.

USACE. 2016. *Technical Project Planning Process*, EM-200-1-2. 26 February.

USEPA. 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*.

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

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

USEPA. 2017. *National Functional Guidelines for Organic Superfund Data Review*. OLEM 9355.0-136, EPA-540-R-2017-002. Office of Superfund Remediation and Technology Innovation. January.

USFWS. 2021. *National Wetlands Inventory.* Accessed December 2021 at https://www.fws.gov/wetlands/

USFWS. 2022. *Species by County Report, County: Tooele, Utah.* Environmental Conservation Online System. Accessed 28 March 2022 at https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=49045.

Xiao, F., Simcik, M. F., Halbach, T. R., and Gulliver, J. S. 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.