FINAL
Site Inspection Report
General Lucius D. Clay National Guard Center
Marietta, Georgia

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

April 2023

Prepared for:

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

UNCLASSIFIED

THIS PAGE INTENTIONALLY BLANK

Table of Contents

Appendices

Figures

Tables

THIS PAGE INTENTIONALLY BLANK

Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARB	Air Reserve Base
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DoD	Department of Defense
DO	dissolved oxygen
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
EDR™	Environmental Data Resources, Inc.™
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
FTA	Fire Training Area
GAARNG	Georgia Army National Guard
GPS	global positioning system
GRPS	Ground Penetrating Radar Systems
HA	Health Advisory
HDPE	high-density polyethylene
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
MIL-SPEC	military specification
MS	matrix spike
MSD	matrix spike duplicate
NAS	Naval Air Station
NELAP	National Environmental Laboratory Accreditation Program
NGC	National Guard Center
ng/L	nanograms per liter
NPDES	National Pollutant Discharge Elimination System
ORP	oxidation-reduction potential

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
RSL	Regional Screening Level
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCE	trichloroethylene
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
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 four Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for relevant compounds. This SI was completed at the General Lucius D. Clay National Guard Center (Clay NGC) in Marietta, Georgia and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)is warranted for AOI 1, AOI 2, AOI 3, and AOI 4. The Clay NGC will also be referred to as the "facility" throughout this document.

Clay NGC is located in Cobb County, approximately 1 mile south of Marietta, Georgia and approximately 20 miles northwest of Atlanta, Georgia. It is adjacent to the Dobbins Air Reserve Base (ARB) and Air Force Plant 6 (currently operated by Lockheed Martin). Clay NGC is constructed on a parcel of land that has been owned and operated by the Georgia ARNG (GAARNG) since 2009. From approximately 1943 to 2009, the property was owned by the US Navy and designated as Naval Air Station (NAS) Atlanta. Collocated, Dobbins ARB and Air Force Plant 6 began operations in the early 1940s. The NAS Atlanta property was transferred to the GAARNG, who established the Clay NGC at the location, in 2009. The southern portion of the Clay NGC is located south of the runway and includes several hangars, storage buildings, and administrative offices. The northern portion of the Clay NGC is located north of the runway and includes Building 555 at the location of the former GAARNG Army Aviation Support Facility (AASF). The former AASF operated from 1983 until 2011, and it is currently leased from Dobbins ARB to the GAARNG on an indefinite term.

The PA identified four AOIs for investigation during the SI phase. SI sampling results from the four AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation (RI) for AOI 1, AOI 2, AOI 3, and AOI 4.

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

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

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

Notes:
bgs = below ground surface; µg/kg = micrograms per kilogram; ng/L = nanograms per liter
a.) Assistant Secretary of Defense, 2022. Risk Based Screening Levels in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 6 July 2022.
b.) Of the six PFAS compounds presented in the 6 July 2022 OSD memorandum, HFPO-DA (commonly referred to as GenX) was not included as an analyte at the time of this SI. Based on the CSM developed during the PA and revised based on SI findings, the presence of HFPO-DA is not anticipated at the facility because HFPO-DA is generally not a component of MIL-SPEC AFFF and based on its history including distribution limitations that restricted use of GenX, it is generally not a component of other products the military used. In addition, it is unlikely that GenX would be an individual chemical of concern in the absence of other PFAS.

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Hangar 1/Ramp Area	◐	●	●	Proceed to RI
2	Hangar 300	●	●	●	Proceed to RI
3	Hangar 312	●	●	●	Proceed to RI
4	Building 555	◐	●	●	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 the General Lucius D. Clay National Guard Center (Clay NGC) in Marietta, Georgia. Clay NGC 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 Clay NGC (AECOM Technical Services, Inc. [AECOM], 2020) that identified four Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

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

THIS PAGE INTENTIONALLY BLANK

2. Facility Background

2.1 Facility Location and Description

Clay NGC is in Cobb County, approximately 1 mile south of Marietta, Georgia (**Figure 2-1**) and approximately 20 miles northwest of Atlanta, Georgia. Clay NGC is adjacent to the Dobbins Air Reserve Base (ARB) and Air Force Plant 6 (currently operated by Lockheed Martin). The facility is accessible from Halsey Avenue from the east, Richardson Road from the south, and Atlantic Avenue from the west.

Clay NGC is constructed on a parcel of land that has been owned and operated by the Georgia ARNG (GAARNG) since 2009. From approximately 1943 to 2009, the property was owned by the US Navy and designated as Naval Air Station (NAS) Atlanta. Collocated Dobbins ARB and Air Force Plant 6 began operations in the early 1940s. The NAS Atlanta property was transferred to the GAARNG, who established the Clay NGC at the location, in 2009. The southern portion of the Clay NGC is located south of the runway and includes several hangars, storage buildings, and administrative offices.

The northern portion of the Clay NGC is located north of the runway and includes Building 555, at the location of the former GAARNG Army Aviation Support Facility (AASF). The former AASF operated from 1983 until 2011, and it is currently leased from Dobbins ARB to the GAARNG on an indefinite term.

2.2 Facility Environmental Setting

Clay NGC lies within the Central Uplands district, which is characterized by low ridges and large, open valleys, with streams 150 to 200 feet below the ridge crests; the streams are generally transverse to the underlying geologic structure. Clay NGC is located on a rolling plateau, with streams and rivers throughout. The Rottenwood and Poorhouse Creeks are some of the predominant stream channels near the facility. The plateau is sloped gradually downward to the southeast (Aerostar SES LLC, 2018a and 2018b), and the elevation of the facility is approximately 1,082 feet above mean sea level (**Figure 2-2**).

2.2.1 Geology

Clay NGC is underlain by the Powers Ferry Formation, which consists of intercalated gneiss, schist, and amphibolites in decreasing abundance. The Powers Ferry Formation is estimated to be more than 3,290-feet thick and dates form the late Precambrian and early Paleozoic eras. More specifically, the geology in the region includes mafic gneiss that is primarily composed of iron-magnesium silicates, such as amphibolite, hornblende gneiss, and mafic hornblende; biotite gneiss is also found in the region. These crystalline rocks are composed of metamorphic rock that display gneissic banding, strong foliation, and relatively high biotite-mica content (Georgia Department of Natural Resources, 1977).

The surface soils have a sand-like consistency from micaceous silts and micaceous sandy silts originating from the weathering of underlying rock. The subsoils are characterized as a clay loam horizon. Overall, red-yellow podzolic soils persist, and in many areas, there are loose rock fragments scattered over the surface and outcrops of bedrock (Federal Emergency Management Agency, 2013). Local geologic units are shown on **Figure 2-3**.

Borings completed as a part of this SI were drilled to depths between 19 and 45 feet below ground surface (bgs) where groundwater was encountered. The geologic data collected from the boreholes indicate that the lithology of the unconsolidated sediments underlying Clay NGC ranges from lean and fat clays to silty/clayey sands to well-graded sands. Silts and clays were predominantly observed from surface to 10 feet bgs with underlying coarser grained sediments (sands). At the former AASF, no clay or silt units were observed and fines were only observed in minor amounts within the sand-dominated lithologies.

Many of the logs also reported weathered bedrock (saprolite) present near the groundwater table. Saprolite was encountered at depths ranging from 10 to 26 feet bgs on the Clay NGC southern property. Refusal due to bedrock was encountered at five out of eleven (11) borings across the facility ranging from 2 to 39 feet bgs.

2.2.2 Hydrogeology

Clay NGC is in the northern Piedmont Physiographic Province, which consists of surficial water tables and aquifers within the bedrock. Clay NGC is also within the Rottenwood Creek watershed, which drains into the Chattahoochee River. The Chattahoochee River flows generally to the south. The residual soil and fragmented bedrock below the ground surface provide the primary pathway for groundwater flow. The groundwater occurs within joints and fractures in the bedrock and in the pore spaces of the residual soils. Aquifer recharge is predominantly through infiltration of precipitation, although some recharge occurs from open water sources. Depth to groundwater ranges from 12 feet bgs in the eastern region of the province to 60 feet bgs in the western region of the province (Stell, 2012).

No potable water wells are located within the boundary of the Clay NGC northern and southern properties; however, US Geological Survey (USGS) wells and Georgia Department of Public Health wells exist within four miles of the facility (USGS, 2022) (**Figure 2-3**). No domestic or drinking well information was available during the PA, but Dobbins ARB personnel stated that wells within 1 mile of the facility are used for monitoring and irrigation. Drinking water for the Clay NGC is supplied by the Air Force Plant 6 drinking water distribution, which is supplied by the Cobb County-Marietta Water Authority. The Cobb County-Marietta Water Authority, which serves the area surrounding the Clay NGC, uses the Chattahoochee River and Lake Allatoona as its drinking water sources (Marietta Water, 2017). There is no groundwater or reclaimed water used for irrigation at the facility.

According to an Environmental Data Resources, Inc.™ (EDR™) report performed as part of SIs for PFAS at the Dobbins ARB and Air Force Plant 6, there is one public water supply well listed within 2 to 3 miles northwest of the Dobbins ARB; however, the well address listed is the mailing address of the well operator rather than the well itself (Aerostar SES LLC, 2018a and 2018b). Groundwater is not used as a drinking water source at Clay NGC or its surrounding areas.

Groundwater flow within the unconsolidated surficial aquifer at the facility is influenced by surface topography and surface water bodies. In general, surface topography across the former AASF slopes in the southeastern direction towards the facility boundary and to Big Lake. There is an approximately 15-foot drop in elevation from the Building 555 area to the eastern edge of the former AASF. The topographic slope and nearby Big Lake likely act as a draw on groundwater flow. On the facility's southern property, topography generally slopes north towards the runway on the northern half of the ramp area and slopes to the east and west at those respective ends of the ramp. At Hangar 312, there is an approximately 15-foot drop from the building area to the retention basin immediately to the west that likely acts as a draw on groundwater flow. On the southern half of the ramp area, topography generally slopes to the southeast, with an approximately 20-foot drop in elevation from the Hangar 300 building area to the retention basin at the southeastern facility boundary.

Synoptic groundwater measurements were recorded during the SI from the existing monitoring wells and installed temporary wells. The depth to groundwater across both the northern and southern properties ranged between approximately 10.52 to 33.18 feet bgs.

In the northern property (location of AOI 4), depth to groundwater ranged between 24.07 to 29.95 feet bgs. In the southern property (locations of AOI 1, AOI 2, AOI 3, and potentially upgradient monitoring wells CNGC-01 and CNGC-MW030), depth to groundwater ranged between approximately 10.52 to 33.18 feet bgs. The maximum depth to groundwater in the southern property was observed at existing monitoring well CNGC-MW030 located at the western boundary of the southern property. The minimum depth to groundwater was observed at CNGC-01, located in the north central portion of the southern property. Based on these observations, groundwater generally appeared to be shallower at the southern property at the time of synoptic gauging.

Within the vicinity of AOI 1 and 2 on the southern property, groundwater flows southeast, towards the retention basin in the southeast corner of the facility. At AOI 3, groundwater appears to flow west towards the retention basin located west of Hangar 312. On the western half of the Clay NGC southern property, groundwater flows east towards the retention basin located west of Hangar 312. Sample locations CNGC-01 and CNGC-MW030 were selected as upgradient locations for AOIs 1, 2, and 3; however, it is uncertain whether the sample locations are truly upgradient due to the convergence of groundwater flow towards the retention basin west of Hangar 312. At the former AASF north of the runway (AOI 4), groundwater flows east towards Big Lake. The observed groundwater flow directions reflect surface topography (**Figure 2-4**).

2.2.3 Hydrology

The Clay NGC southern property has a freshwater pond to the south and Poorhouse Creek to the east (**Figure 2-5**). Poorhouse Creek is located less than 1.5 miles east of the southern property. Poorhouse Creek is a tributary to the Chattahoochee River, which spans a total of 430 miles from the northernmost part of Georgia and down to the south, along the Alabama-Georgia border. The overland flow at the facility southern property is predominantly in the southeast direction. A drainage ditch runs along the eastern boundary of Clay NGC southern property and terminates into a retention basin with a storm drain that discharges into Poorhouse Creek, which ultimately discharges to the Chattahoochee River. The Chattahoochee River is approximately 4.3 miles to the east of the facility and flows from north to south.

In the eastern portion of the southern property, surface water runoff on the main ramp is divided between the northern and southern halves of the ramp area. On the northern half, runoff flows north and off the ramp, into a drainage ditch that channels runoff east, and then south towards the aforementioned retention basin in the southeastern corner of the facility. Surface water runoff on the southern half of the ramp flows south and east towards the retention basin. Another retention basin is located west of Hangar 312, off-facility. Runoff entering this retention basin predominantly flows north via an underground pipe beneath the runway and discharges into Big Lake, a water body located on Dobbins ARB property.

Surface water runoff in the former AASF north of the runway also drains to Big Lake, which is located 0.2 miles east of Building 555. Big Lake drains to Rottenwood Creek via Dobbins Spill Pond 4. Rottenwood Creek is located less than 1 mile of the northeast of the northern property.

2.2.4 Climate

The climate at Clay NGC consists of four clearly separated seasons, with predominant weather movement from west to east. Temperatures vary from average highs of 70.5 degrees Fahrenheit (°F) to average lows of 49.8 °F. The average annual temperature is 62.5 °F. Average precipitation is 54.4 inches of rain (World Climate, 2022).

2.2.5 Current and Future Land Use

The Clay NGC is a controlled access facility with public roads and is adjacent to the Dobbins ARB and Air Force Plant 6 . Reasonably anticipated future land use is not expected to change from the current land use; however, future infrastructure improvements, land acquisitions, and land use controls at Dobbins ARB and Air Force Plant 6 are unknown.

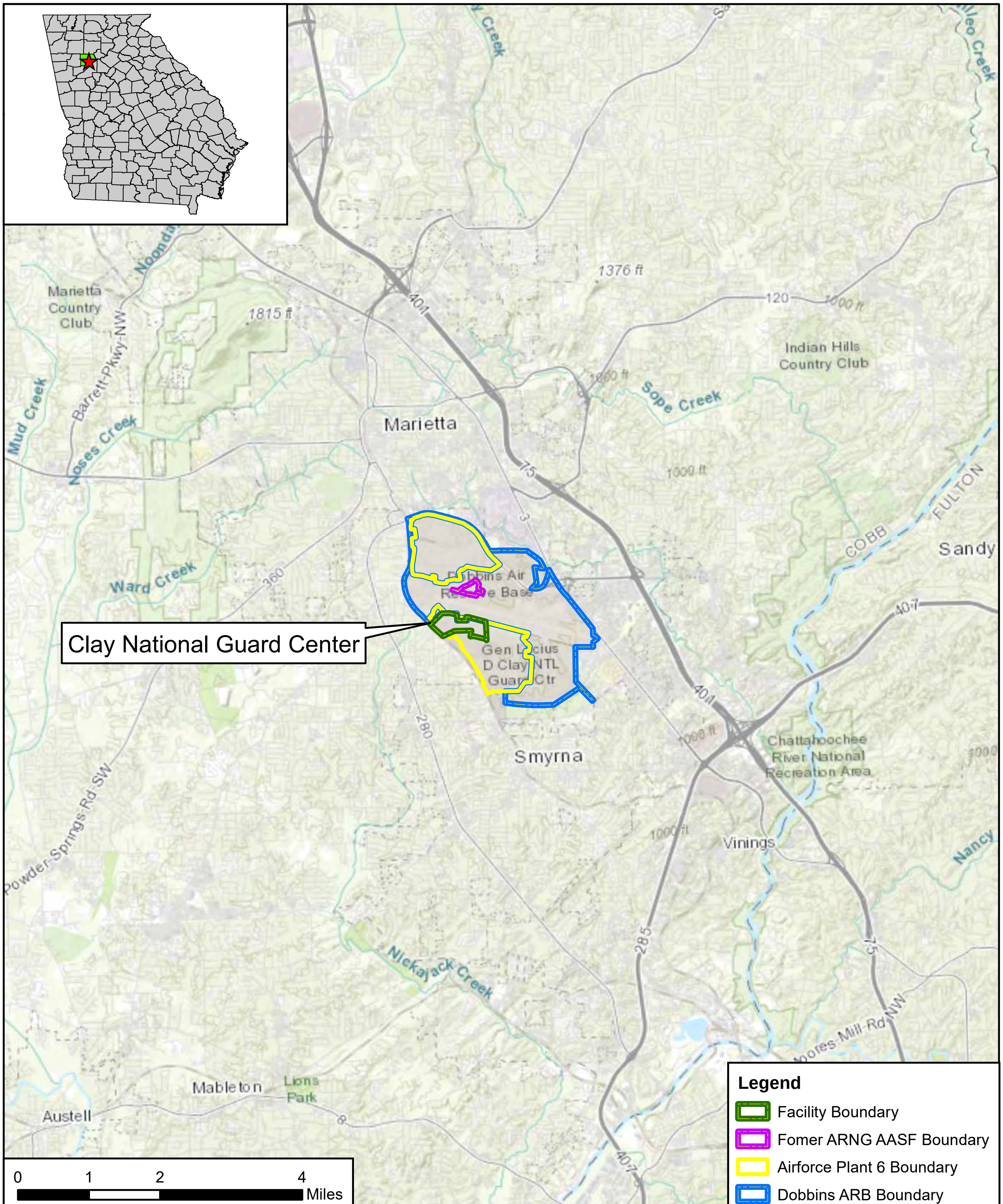
2.2.6 Sensitive Habitat and Threatened/ Endangered Species

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

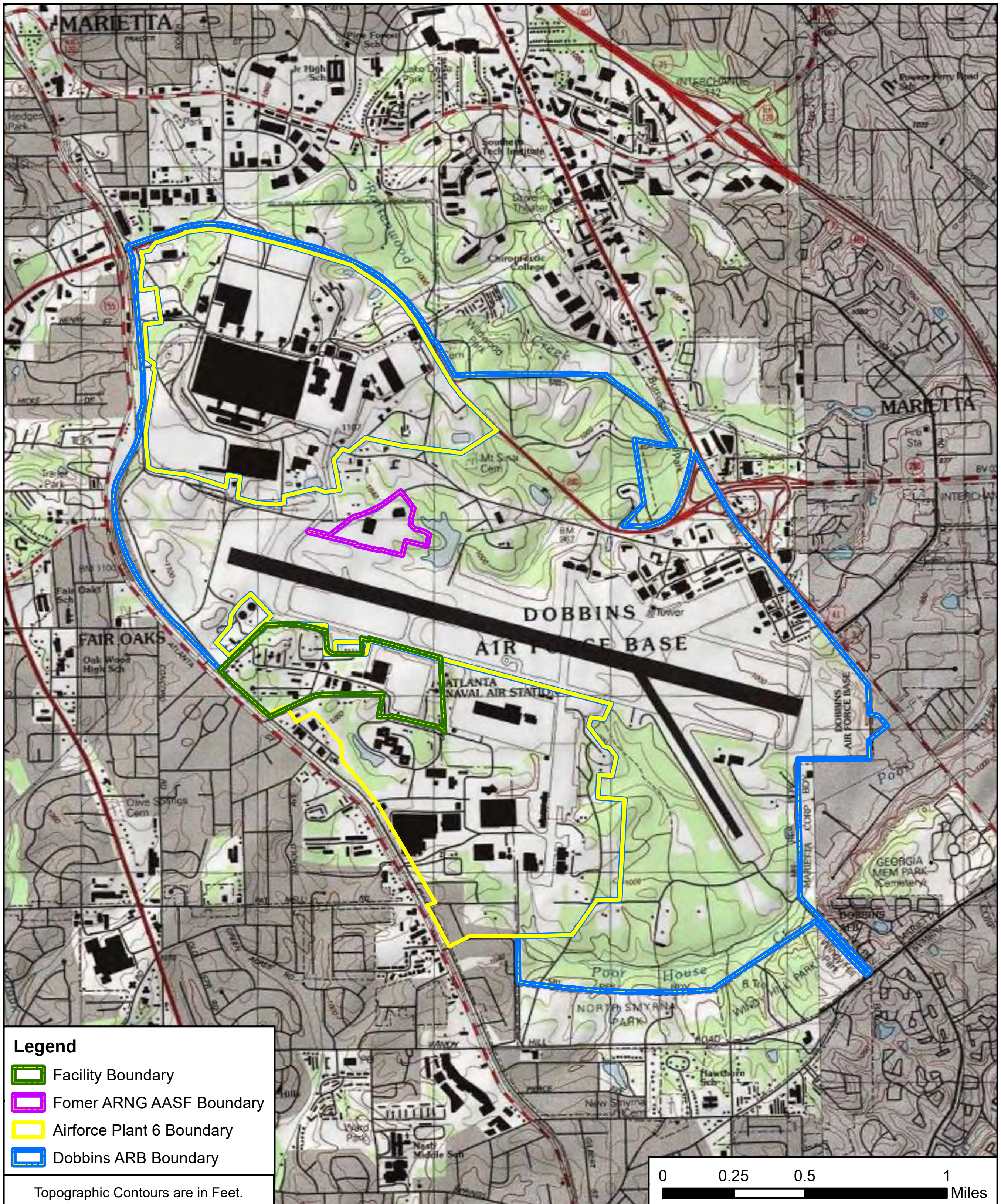
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)
- **Mammals**: Tricolored bat, *Perimyotis subflavus* (under review); Northern long-eared bat, *Myotis septrenionalis* (threatened); Little brown bat, Myotis lucifugus (under review)
- **Flowering plants:** Georgia aster, *Symphyotrichum georgianum* (resolved taxon); Michaux's sumac, *Rhus michauxii* (endangered); Little amphianthus, *Amphianthus pusillus* (threatened); White fringeless orchid, *Platanthera integrilabia* (threatened); Georgia rockress, *Arabis georgiana* (threatened)
- **Fishes:** Lake sturgeon, *Acipenser fulvescens* (under review); Cherokee darter, *Etheostoma scotti* (threatened)
- **Clams:** Delicate spike, *Elliptio arctata* (under review)

2.3 History of PFAS Use

PFAS were potentially released to soil and groundwater within the boundary of Clay NGC through releases from hangar fire suppression systems and wheeled fire extinguishers. Four AOIs were identified based on preliminary data and assumed groundwater flow directions (**Figure 2-4**). A description of the four AOIs is presented in **Section 3**. In addition to the identified AOIs, Clay NGC is surrounded on all sides by Dobbins ARB and the Air Force Plant 6 (currently operated by Lockheed Martin), which are a part of a much larger military complex. The industrial areas associated with the campuses of the Dobbins ARB and Air Force Plant 6 have been historically used for the manufacturing, maintenance and modification of military aircrafts (Aerostar, 2018a and 2018b). Numerous potential release areas associated with each campus have been identified upgradient and downgradient of Clay NGC. It is possible that PFAS from releases on these campuses are migrating onto Clay NGC property.



CLIENT	ARNG				N	**Facility Location**
PROJECT	Site Inspection at Clay National Guard Center, GA					
REVISED	8/3/2022	GIS BY	MS	8/3/2022		AECOM 12420 Milestone Center Drive Germantown, MD 20876
SCALE	1:126,720	CHK BY	JW	8/3/2022		**Figure 2-1**
Base Map: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN,		PM	CM	8/3/2022		

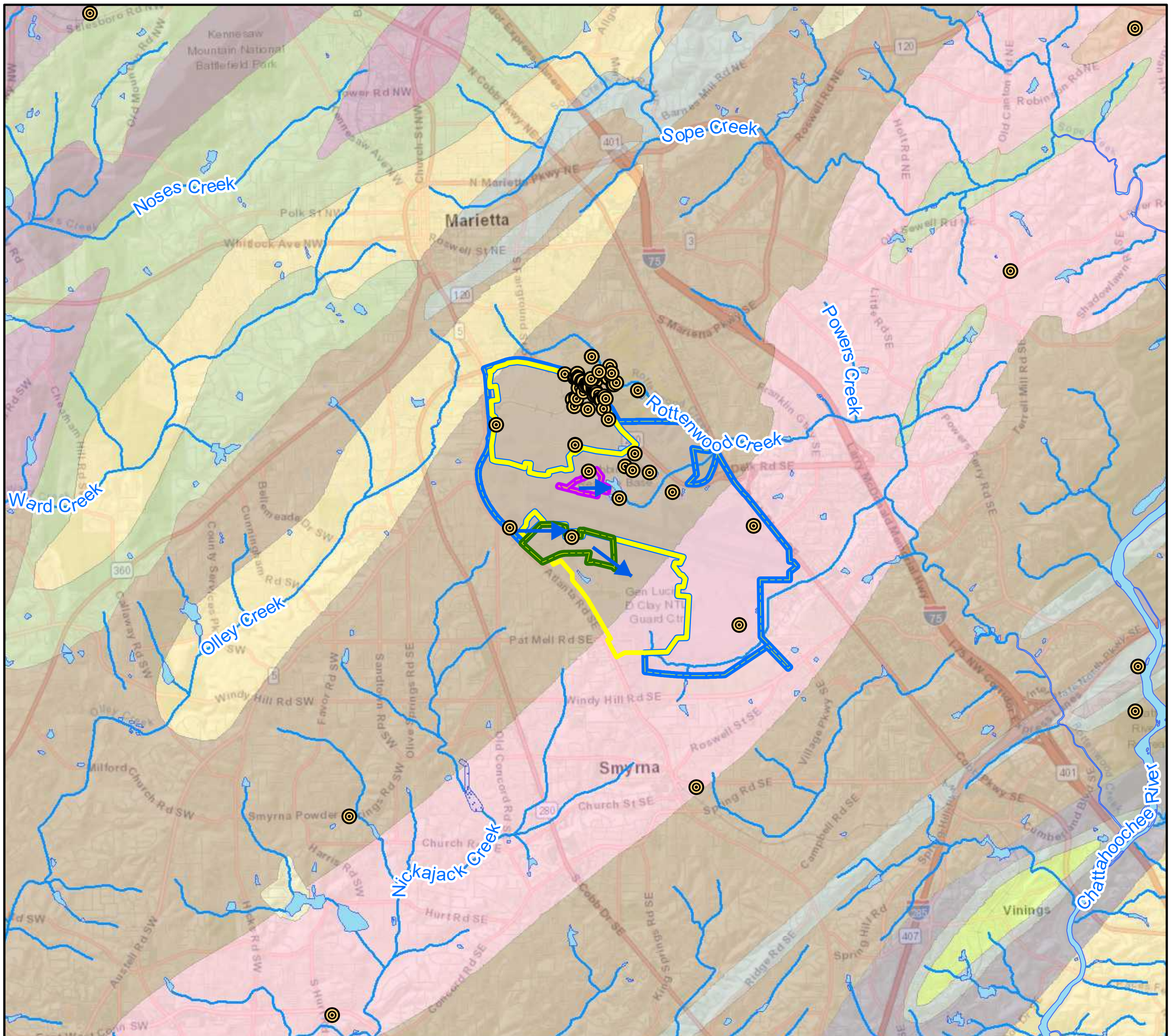


CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	10/10/2022	GIS BY	MS	10/10/2022
SCALE	1:31,680	CHK BY	JW	10/10/2022
Base Map: Copyright:© 2013 National Geographic Society, i-cubed		PM	CM	10/10/2022

Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



- Facility Boundary
- Fomer ARNG AASF
- Airforce Plant 6 Boundary
- Dobbins ARB Boundary
- Water Body
- Wetlands
- River/Stream
- Groundwater Flow Direction

Geology

- Ropes Creek Metabasalt; Informal unit of mixed metamorphic assemblage
- Informal unit of mixed metamorphic assemblage
- Informal migmatite of Kennesaw Mountain; Cider Gneiss
- Biotite-bearing gneiss of the Stonewall Gneiss; Informal unit of mixed metamorphic assemblage
- Undifferentiated hornblende-bearing gneiss
- Factory Shoal Formation
- Undifferentiated garnet-mica schist
- Amphibolite of Powers Ferry Formation
- Mica schist, gneiss, and amphibolite of Powers Ferry Formation
- Aluminous schist of Powers Ferry Formation
- Undifferentiated granitic gneiss
- Chattahoochee Palisades Quartzite; Chilhowee Group Quartzites

Wells

- USGS National Water Information System Well

0 3,750 7,500 15,000 Feet

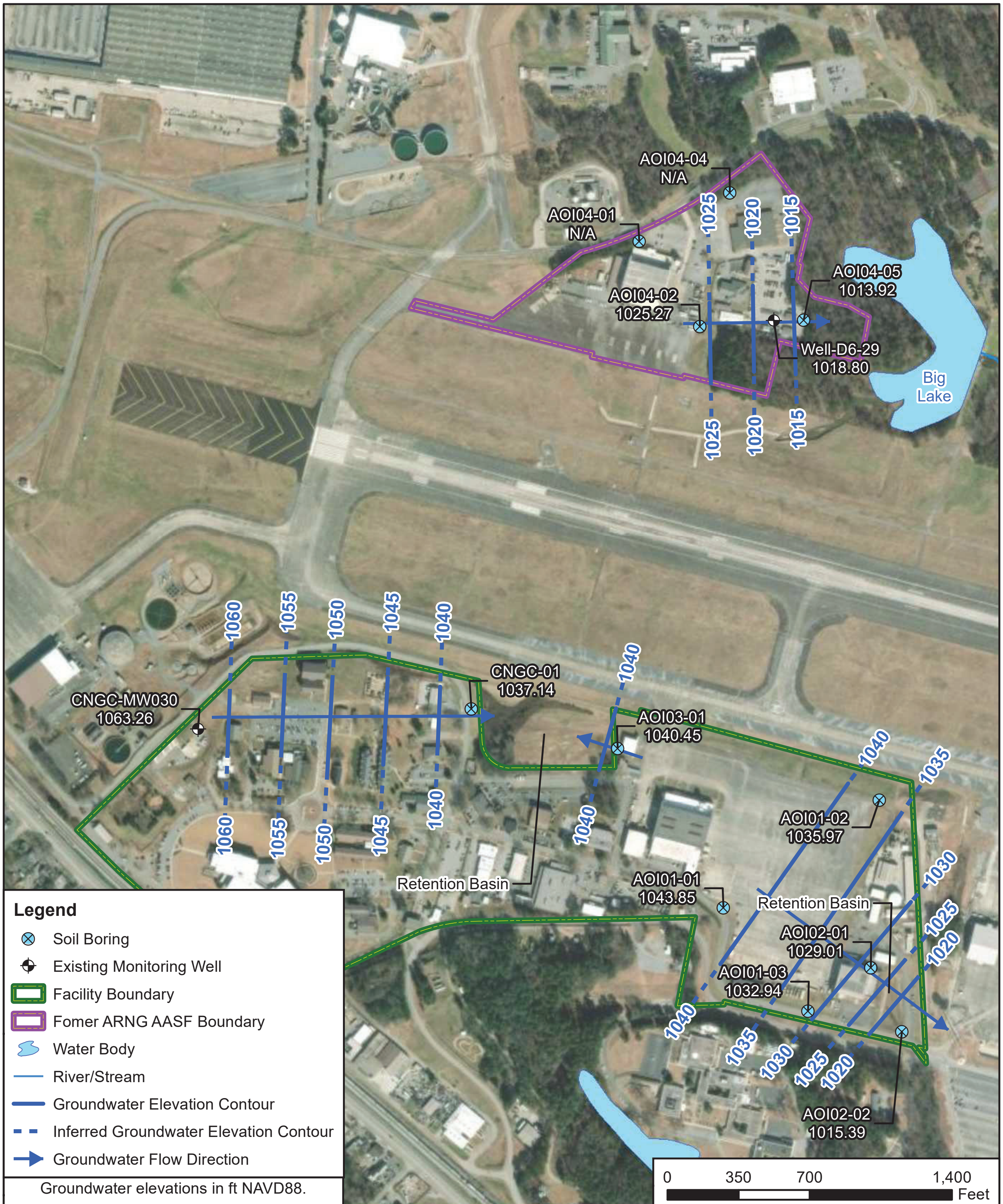
CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/3/2022	GIS BY	MS	8/3/2022
SCALE	1:90,000	CHK BY	JW	8/3/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/3/2022

N

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

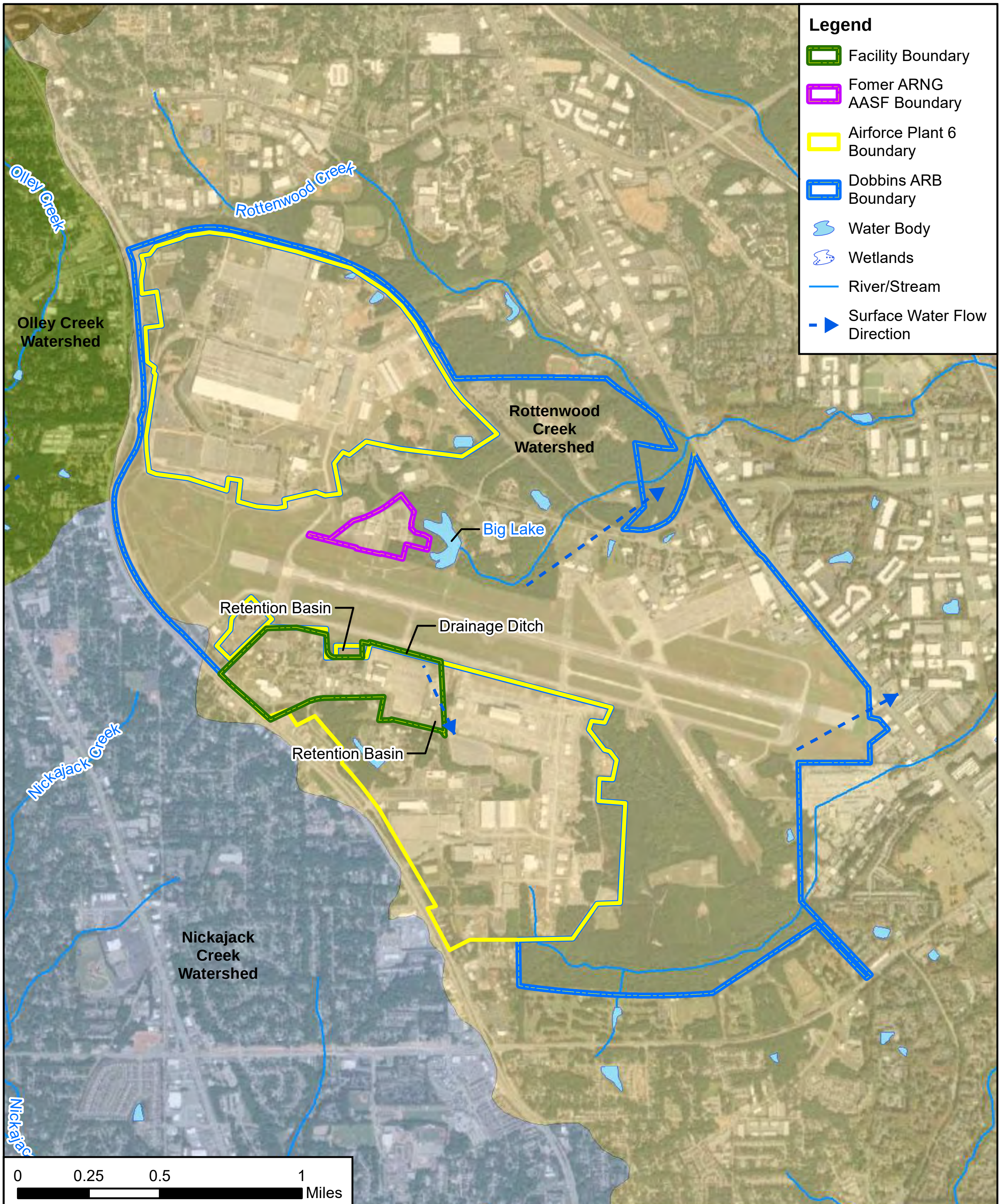


CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	10/20/2022	GIS BY	MS	10/20/2022
SCALE	1:8,400	CHK BY	JW	10/20/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/20/2022

Groundwater Elevation Contours July-October 2021

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/3/2022	GIS BY	MS	8/3/2022
SCALE	1:31,680	CHK BY	JW	8/3/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/3/2022

Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

THIS PAGE INTENTIONALLY BLANK

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, four potential release areas were identified at Clay NGC and grouped into four AOIs (AECOM, 2021a). The potential release areas are shown on **Figure 3-1**.

3.1 AOI 1 Hangar/Ramp Area

AOI 1 is the Hangar 1/Ramp Area at Clay NGC. Hangar 1 was constructed in 1959 and contains a fire suppression system that formerly consisted of eight 150-gallon tanks filled with 3% AFFF concentrate. There is no information available regarding when the AFFF fire suppression system was installed; however, the system was in place when the GAARNG took over the facility in 2009. The fire suppression system has been disabled, and the AFFF tanks intact with their AFFF contents were removed from the hangar during winter 2020. The tanks were transported from Hangar 1 to a hazardous waste storage building on the southeastern corner of the ramp area. The tanks are stored on secondary containment structures within the building to prevent spills or leaks from escaping. There is no information available on the fire suppression system installation, testing frequency of the system, or releases. The wash rack near Hangar 1 currently drains to the industrial WWTP and then to the sanitary WWTP. No information was available regarding historical activities at the wash rack or whether there were a different drain configuration in the past.

3.2 AOI 2 Hangar 300

AOI 2 is Hangar 300 at Clay NGC. Hangar 300 was built in the early 1990’s and contains a fire suppression system supplied by two 1500-gallon tanks filled with AFFF concentrate. The AFFF tanks and pumps that supply the fire suppression system are housed within the hangar. Two known releases of AFFF from the fire suppression system have occurred. Both releases occurred in the early to mid-2000s, prior to GAARNG assuming occupancy of the building. During both releases, foam was released in the hangar, pushed onto the ramp, and ultimately into the retention basin east of Hangar 300. The retention basin contains a storm drain that discharges into Poorhouse Creek, which is a tributary of Rottenwood Creek. The Rottenwood Creek discharges to the Chattahoochee River. The concentration of AFFF and volume of the releases are unknown. The hangar is outfitted with trench drains that drain to the industrial WWTP and then to the sanitary WWTP.

3.3 AOI 3 Hangar 312

AOI 3 is Hangar 312 at Clay NGC. Hangar 312 was built in 1998 and contains a fire suppression system supplied by a 300-gallon tank containing 3% of AFFF low expansion foam. The AFFF tank and pumps that supply the fire suppression system are housed in a room within the hangar that contains a floor drain that drains to the industrial WWTP and then the sanitary WWTP. During the PA site visit, evidence of corrosion down the side of the tank was observed, and the gasket between the tank and the outline piping appeared to have been replaced with a gasket not intended for the fitting and that stuck out on the sides.

If there were releases of AFFF at AOI 3, the concentration and volume would be unknown. Potential releases to surface soil may have migrated to groundwater via leaching and surface water. Based on groundwater and surface water flow direction, potential releases may have drained to a retention basin directly west of Hangar 312 then channeled to the north, beneath the runway, via an underground pipe before ultimately discharging to Big Lake on the Dobbins ARB property. Big Lake discharges to Rottenwood Creek via Dobbins Spill Pond 4, and the Rottenwood Creek discharges to the Chattahoochee River.

3.4 AOI 4 Building 555

AOI 4 is Building 555 and was the location of the former GAARNG AASF from 1983 until 2011. The former hangar did not have a fire suppression system, and no information was available regarding the use or presence of AFFF at the former GAARNG AASF. Historical aerial photographs show evidence of portable fire extinguisher units on the ramp, but it is unknown if the portable units contained AFFF. Dobbins ARB personnel stated that no reported AFFF releases were recorded by the Dobbins Fire Department for the former AASF, and that portable extinguishers used on flightline areas were usually 150-pound halon extinguishers. If there were releases of AFFF at AOI 4, the concentration and volume would be unknown. It is also possible that releases to adjacent areas discussed in **Section 3.5** and shown on **Figure 3-2** may have impacted environmental media at AOI 4. Potential releases to surface soil at AOI 4 may have migrated to groundwater via leaching and surface water. Based on the groundwater and surface water flow direction, potential releases may have ultimately drained to the body of water east of the former GAARNG AASF known as Big Lake. Big Lake drains to Rottenwood Creek via the Dobbins Spill Pond 4, and the Rottenwood Creek discharges to the Chattahoochee River.

3.5 Adjacent Source Information

In 2018, Aerostar SES LLC completed SIs for PFAS at the Air Force Plant 6 and Dobbins ARB (Aerostar, 2018a and 2018b). Thirty-one (31) off-site PFAS sources up- and downgradient of the Clay NGC were identified during the PFAS investigations of the Air Force Plant 6 and Dobbins ARB. PFAS were detected in surface soil, subsurface soil, surface water, and groundwater across the investigation areas, and 27 areas were recommended to proceed to Remedial Investigation (RI). **Table 3-1** summarizes the findings of the SIs completed at Air Force Plant 6 and Dobbins ARB. **Figure 3-2** presents the location of potential Clay NGC adjacent source areas.

Table 3-1: Adjacent Sources

Map ID	Area	Description	SI Findings[a,b]
1 & 2	Sanitary Wastewater Treatment Plant (WWTP)*	This WWTP is a collection point for all the sanitary sewage systems within the installation and an industrial WWTP effluent. The WWTP effluent discharges into the Nickajack Creek in an off-installation residential area.	PFAS levels in surface soil, groundwater, and surface water exceeded the 2016 USEPA Health Advisory (HA) screening criteria. Recommended to proceed to an RI.
3	Industrial WWTP*	A confirmed aqueous film forming foam (AFFF) release occurred at the former Industrial WWTP aeration pond. The industrial WWTP is used as a collection point for manufacturing wastewater treatment	PFAS levels in groundwater and surface water exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
4	Fire Prevention Headquarters (B-102)*	This facility has an AFFF fire suppression system and was originally used as a manufacturing facility.	PFAS levels in groundwater and surface soil exceeded the 2018 USEPA Regional Screening Level (RSL)/2016 HA screening criteria. Recommended to proceed to an RI.
5	Corporate Hangar (T-728)*	The hangar previously stored 55-gallon drums of AFFF, and there was a confirmed release of AFFF.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
6	Fire Station #1 (B-4)*	An active fire station that stores AFFF equipment and vehicles. An AFFF release inside the fire hall due to leaking equipment was reported.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
7	C-5 Fuel System Test Facility (B-96)*	The C-5 fuel system contains an AFFF fire suppression system that has had a confirmed release that leaked out of the facility.	PFAS levels in subsurface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
8	Outfall 1*	Outfall 1 is the surface water collection and National Pollutant Discharge Elimination System (NPDES) discharge point for Drainage Basin 1, which has reported AFFF releases.	PFAS not detected above the screening criteria. No further action recommended.

Map ID	Area	Description	SI Findings[a,b]
9	Outfall 2*	Outfall 2 is the surface water collection and NPDES discharge point for Drainage Basin 2, which has reported AFFF releases.	PFAS levels in surface water exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
10	Structural Fire Training Area (FTA) (B-64)*	This FTA was constructed in 2003 and uses liquid propane gas as a fuel source. The training exercises release 2 to 3 gallons of AFFF per event.	PFAS not detected above the screening criteria in soil. Recommended to proceed to an RI based on lack of groundwater sampling.
11	Fire Station #2 (B-69)*	This is an active fire station that stores AFFF-containing equipment and vehicles. An AFFF release inside the fire hall due to leaking equipment was reported.	PFAS not detected above the screening criteria. No further action recommended.
12	C-5 Engine Fire*	An unknown amount of AFFF was released to extinguish an engine fire.	PFAS levels in ground water, and surface water exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
13	AFFF Spray Test Area*	The spray test area was used for annual testing of AFFF containing equipment/vehicles where approximately 2,200 gallons of AFFF have been discharged each test. The total volume of AFFF released over time and the dates of testing are unknown.	PFAS levels in surface soil, ground water, and surface water exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
14	Outfall 5*	Outfall 5 is the surface water collection and NPDES discharge point for Drainage Basin 5, which has reported AFFF releases.	PFAS levels in surface water exceeded 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
15	Hangar 5**	The hangar has an AFFF fire suppression system that reported two releases in the 1990s, one release of 600 gallons of AFFF concentrate and one release of 5,000 gallons of AFFF/water mixture. Both releases occurred outside the hangar.	PFAS levels in surface soil exceeded the 2018 USEPA RSL screening criteria. Recommended to proceed to an RI.

Map ID	Area	Description	SI Findings[a,b]
16	Motor Pool Facility (Building 516)**	A release of 2 to 5 gallons of AFFF occurred outside building on pavement and may have migrated to a nearby wooded area.	PFAS levels in surface soil, subsurface soil, and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
17	Big Lake (OT-04)**	Visual confirmation of AFFF spilling into the Big Lake from Building 5 with an unknown volume of AFFF. Big Lake discharges directly into an unnamed tributary of Rottenwood Creek. Fish were confirmed dead following the release.	PFAS levels in surface water and groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
18	L-100-20 Hercules Crash**	A release of approximately 1,000 gallons of AFFF/water mixture was applied to several fires from a crash in February 1993.	PFAS levels in surface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
19	Former FTA FT-03**	This FTA was operational from 1974 to the late 1980s. Unknown quantities of AFFF were used. AFFF was introduced to the Air Force in 1970.	PFAS levels in surface soil, subsurface soil, and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
20	L-188CF Electra Crash**	An unknown quantity of AFFF was potentially applied to a crash that occurred in January 1985.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
21	Spill Pond 3**	Visual confirmation of an unknown type of foam spilling into the unlined pond from an unknown source. The depth to groundwater in the pond is 5 feet bgs. The pond discharges directly into a tributary of Rottenwood Creek. Fish were confirmed dead following the release.	PFAS levels in surface water and groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
22	Building 746 (Hangar)**	The hangar had an AFFF fire suppression system that reported a release of up to 1,500 gallons of AFFF that occurred between 1999 to 2004. The release flowed outside the hangar.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.

Map ID	Area	Description	SI Findings[a,b]
23	L-188CF Electra Crash Alternate Site**	An unknown quantity of AFFF was potentially applied to a crash that occurred in January 1985.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
24	Former FTA FT-02**	This FTA was operational from the early 1950s to 1974 and is constructed of an unlined, earthen pit. Potential unknown quantities of AFFF were used. AFFF was introduced to the Air Force in 1970.	PFAS levels in surface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
25	Current Fire Station (Building 745)**	A known release occurred during resupply activities outside the building. Prior to 1999, the potential AFFF release occurred during fire engine cleaning activities outside the building. The quantity of AFFF released is unknown.	PFAS levels in surface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
26	Spill Pond 4**	A quantity of up to 1,500 gallons of AFFF was released from Building 731 and flowed into the unlined pond. The depth to groundwater in the pond is 5 feet bgs. The pond discharges directly into an unnamed tributary of Rottenwood Creek. Fish were confirmed dead following the release.	PFAS levels in surface water, and groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.
27	Building 731**	This hangar formerly had an AFFF fire suppression system. A release of up to 1,500 gallons of AFFF occurred in 1999 and flowed outside the hangar toward grass areas. Another release of AFFF occurred in a mechanical room and spilled into the building drainage system.	PFAS levels in surface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
28	E-2 Tire Fire**	Approximately 50 to 100 gallons of AFFF/water mixture were used to extinguish a tire fire, and PFAS may have migrated to grassed areas nearby.	PFAS not detected above the screening criteria. No further action recommended.

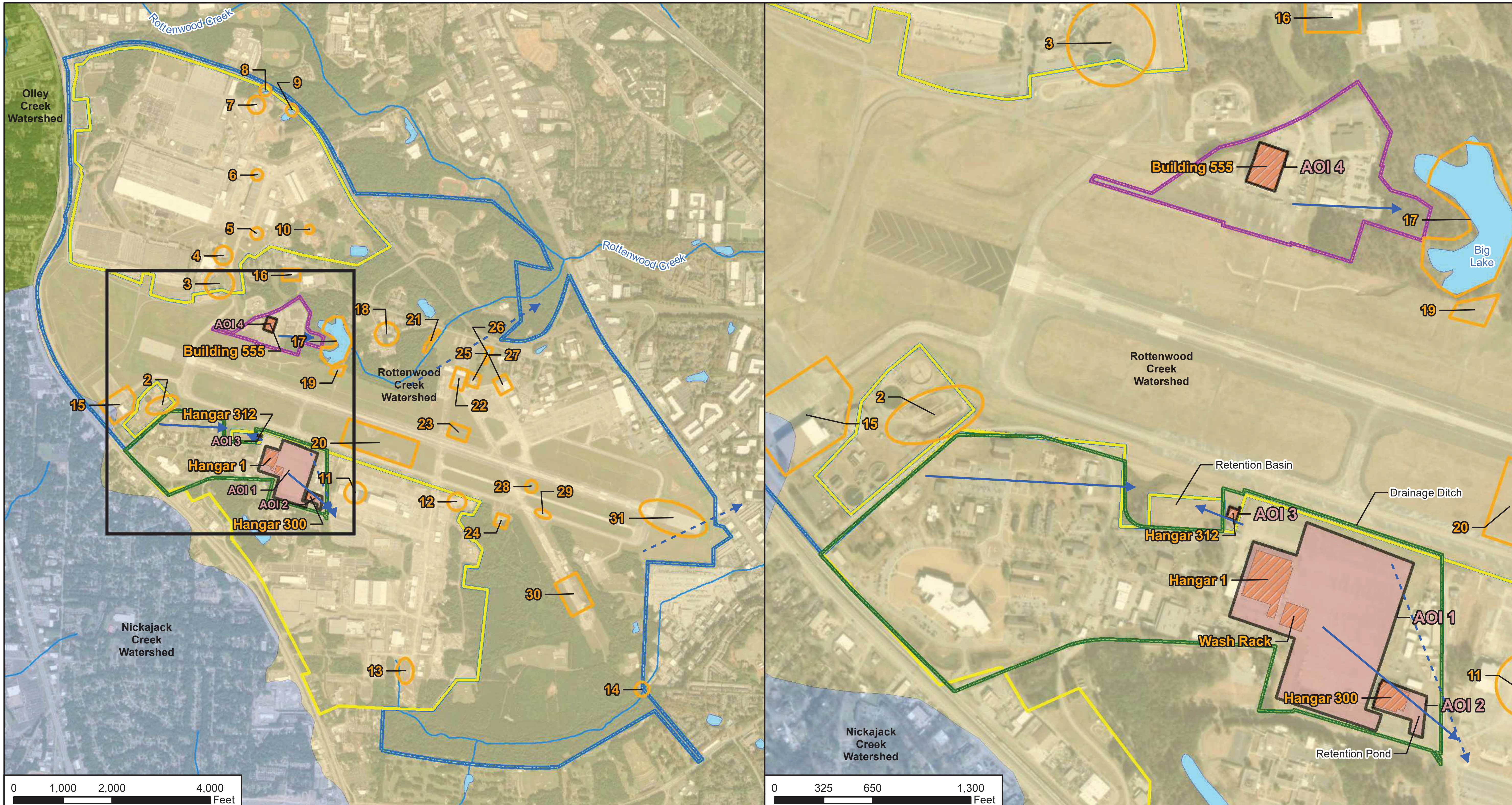
Map ID	Area	Description	SI Findings[a,b]
29	F-18 Tire Fire**	Approximately 100 gallons of AFFF/water mixture were used to extinguish a tire fire, and PFAS may have migrated to grassed areas nearby.	PFAS not detected above the screening criteria. No further action recommended.
30	AFFF Spray Test Area**	The spray test area was used for annual testing, where approximately 100 gallons of 3 percent (%) AFFF/water mixture were discharged per year. The total volume of AFFF released over time and dates of testing are unknown.	PFAS levels in surface soil and groundwater exceeded the 2018 USEPA RSL/2016 HA screening criteria. Recommended to proceed to an RI.
31	C-5A Galaxy Fire**	An unknown quantity of AFFF was potentially applied to a fire that occurred in October 1970.	PFAS levels in groundwater exceeded the 2016 USEPA HA screening criteria. Recommended to proceed to an RI.

* Area identified in Aerostar 2018a.
** Area identified in Aerostar 2018b.

a.) Aerostar SES LLC. 2018a. Final Site Inspections Report of Fire Fighting Foam Usage at Air Force Plant 6 Cobb County, Georgia. October.

b.) Aerostar SES LLC. 2018b. Final Site Inspections Report of Fire Fighting Foam Usage at Dobbins Air Reserve Base Cobb County, Georgia. October.

THIS PAGE INTENTIONALLY BLANK



CLIENT	ARNG		
PROJECT	Site Inspection at Clay National Guard Center, GA		
REVISED	8/30/2022	GIS BY MS	8/30/2022
SCALE	1:7,800	CHK BY JW	8/30/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM CM	8/30/2022

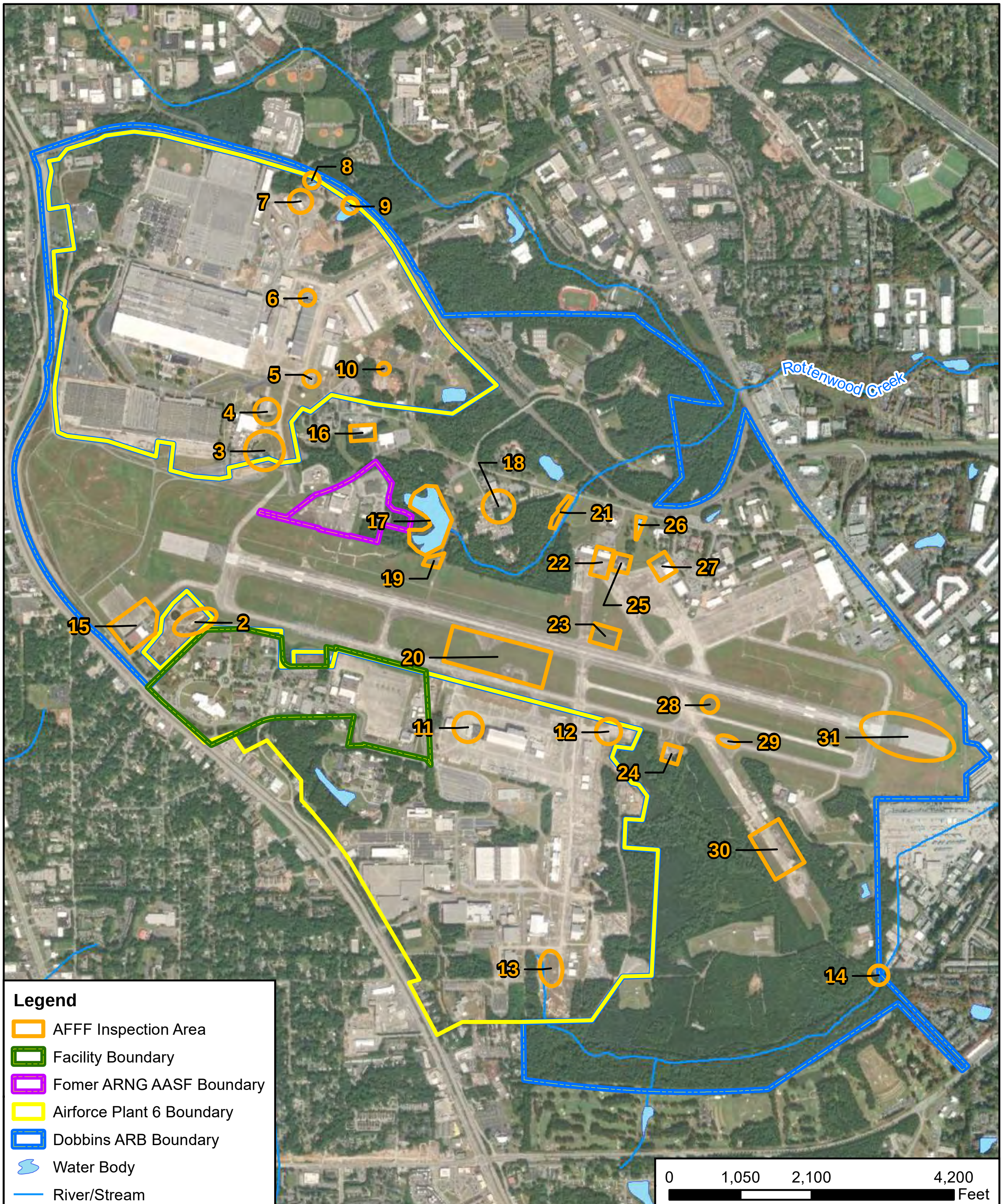
- Area of Interest
- AFFF Inspection Area
- Potential Release Area
- Facility Boundary
- Fomer ARNG AASF Boundary
- Airforce Plant 6 Boundary
- Dobbins ARB Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction
- Groundwater Flow Direction

N

Areas of Interest

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 3-1



CLIENT	ARNG					Adjacent Sources
PROJECT	Site Inspection at Clay National Guard Center, GA					
REVISED	10/10/2022	GIS BY	MS	10/10/2022	AECOM 12420 Milestone Center Drive Germantown, MD 20876	Figure 3-2
SCALE	1:25,200	CHK BY	SI	10/10/2022		
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/10/2022		

4. Project Data Quality Objectives

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

4.1 Problem Statement

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 Clay NGC, Georgia (AECOM, 2020);
- Analytical data collected as part of other environmental sampling efforts at Clay NGC;
- 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 current location of Clay NGC and the former GAARNG AASF north of the runway (**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).

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, General Lucius D. Clay National Guard Center, Georgia* dated February 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, General Lucius D. Clay National Guard Center, Georgia* dated April 2021 (AECOM, 2021a); and
- *Final Site Safety and Health Plan, General Lucius D. Clay National Guard Center, Georgia* dated July 2021 (AECOM, 2021b).

The SI field activities were conducted during two mobilizations: the first mobilization took place on 27 May 2021 and 12 July through 16 July 2021, while the second mobilization took place from 29 September through 1 October 2021 and 20 October 2021. Activities during the first mobilization consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying at the Clay NGC southern property. Permission to work on the former GAARNG AASF required a signed Dobbins ARB Civil Engineering Dig permit, which was not received until 27 July 2021. As a result, a second mobilization was necessary to complete direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying at AOI 4. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as noted in **Section 5.9**.

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:

- Thirty (30) soil samples from 11 boring locations;
- Eleven (11) grab groundwater samples from nine temporary well locations and two permanent monitoring wells;
- Twenty one (21) quality assurance (QA)/quality control (QC) samples.

Figure 5-1 provides the sample locations for all media across the facility. **Table 5-1** presents the list of samples collected for each media. Field documentation is provided in **Appendix B**. A Log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**, Field Change Request Forms are provided in **Appendix B3,** Nonconformance and Corrective Action Reports are provided in **Appendix B4**, land survey data are provided in **Appendix B5**, and investigation-derived waste (IDW) polygons are provided in **Appendix B6**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 23 February 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, GAARNG, USACE, and Georgia Environmental Protection Division. 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 after the field event to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM placed a ticket with the Georgia 811 “Call Before You Dig” utility clearance provider to notify them of intrusive work on 8 June 2021. Georgia 811 confirmed that no conflicts existed based on information provided by the one call center. The Georgia 811 ticket was updated throughout the duration of field work. Additionally, AECOM contracted Ground Penetrating Radar Systems, LLC. (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 12 July 2021 with input from the AECOM field team. General locating services and ground-penetrating radar were used to complete the clearance. The former GAARNG AASF north of the runway, which includes AOI 4, also required a signed Dobbins ARB Civil Engineering Dig permit to perform intrusive field activities. The signed dig permit was received on 27 July 2021 and was updated throughout the duration of the remaining SI field work. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

One potable water source at Clay NGC was sampled on 27 May 2021 to assess usability for decontamination of drilling equipment. Results of the samples collected (CNGC-DECON-01 and CNGC-DECON-02) confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water samples 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

Borings were installed in grass areas where applicable, to avoid disturbing concrete or asphalt surfaces. Soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021a). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top five 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**. Photographs of the soil cores are included in **Appendix C**.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table. In borings where refusal was encountered prior to reaching groundwater, fewer soil samples were collected per boring, in accordance with applicable field change requests (**Appendix B3**). Specifically, only one soil sample was collected at location AOI04-01, and only two soil samples were collected at location AOI04-04, for this reason.

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

Soil borings completed as a part of this SI were drilled to depths between 19 and 45 feet bgs where groundwater was encountered. The geologic data collected from the boreholes indicate that the lithology of the unconsolidated sediments underlying Clay NGC ranges from lean and fat clays to silty/clayey sands to well-graded sands. Silts and clays were predominantly observed from surface to 10 feet bgs with underlying coarser grained sediments (sands). At the former GAARNG AASF, no clay or silt units were observed and fines were only observed in minor amounts within the sand-dominated lithologies.

Many of the logs also reported weathered bedrock (saprolite) present near the groundwater table. Saprolite was encountered at depths ranging from 10 to 26 feet bgs on the Clay NGC southern property. Where refusal was encountered prior to reaching groundwater (AOI04-01 and AOI04-04), borings were advanced to depths of 2 and 10.5 feet bgs. Refusal due to bedrock was encountered at five out of eleven borings across the facility at depths ranging from 2 to 39 feet.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15, total organic carbon (TOC) (USEPA Method 9060A), and pH (USEPA Method 9045D) in accordance with the SI QAPP Addendum (AECOM, 2021a). Grain size analysis (ASTM D-422) was not performed because the sample collected for that analysis, sample GS-AOI02-01, was broken during shipment.

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. At location AOI04-02, the borehole was temporarily abandoned on 1 October 2021 using clean sand for the majority of the column, and bentonite from the surface to 5 feet bgs. The borehole was over-drilled on 20 October 2021 to remove the clean sand and replace it with bentonite in accordance with the SI QAPP Addendum (AECOM, 2021a). Borings were installed in grass and gravel areas to avoid disturbing concrete or asphalt surfaces.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Nine temporary wells were installed using a GeoProbe® 7822DT 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 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. At two locations, AOI04-02 and AOI04-05, a 10-foot section of 1-inch Schedule 40 PVC was used to improve the likelihood of groundwater recharge into the temporary wells. New PVC pipe and screen were used to avoid cross contamination between locations. The locations of the temporary wells are shown on **Figure 5-1** and **Figure 5-2**. The screen intervals for the temporary wells are provided in **Table 5-2**.

Following installation, the temporary wells were allowed to recharge prior to collection of groundwater samples. After the recharge period, groundwater samples were collected using a peristaltic pump with PFAS-free HDPE tubing or a QED Sample Pro® bladder pump with disposable PFAS-free, HDPE tubing. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected. Additionally, a subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there was 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 5.6**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with bentonite chips. At location AOI04-02, the borehole was temporarily abandoned using clean sand and bentonite as described in **Section 5.2**. The borehole was over-drilled and re-abandoned with bentonite, in accordance with the SI QAPP Addendum, shortly thereafter. Temporary wells were installed in grass and gravel areas to avoid disturbing concrete or asphalt.

5.4 Permanent Well Groundwater Sampling

During the SI, groundwater from two existing permanent monitoring wells was sampled. Well, CNGC-MW030, is located northwest and potentially upgradient of all known potential release areas within Clay NGC. The other well, D6-29, is located downgradient of the potential release area at AOI 4. The locations of the wells are shown on **Figure 5-1** and **Figure 5-2**. Samples were collected using a QED Sample Pro® bladder pump with disposable PFAS-free, HDPE tubing. New tubing was used at each well and the pumps were decontaminated between each well. The wells were purged at a rate determined in the field to reduce draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, DO, and ORP) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**). Water levels were measured to the nearest 0.01 inch and recorded. 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.

5.5 Synoptic Water Level Measurements

A groundwater gauging event was performed for locations sampled during the first SI field mobilization between 13 and 15 July 2021. Groundwater elevation measurements were collected from the seven new temporary monitoring wells, and two existing permanent monitoring wells sampled during the first mobilization. A second groundwater gauging event was held between 30 September 2021 and 1 October 2021 during the second SI field mobilization for the two remaining temporary wells, AOI04-02 and AOI04-05. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**, and groundwater elevation data are provided in **Table 5-2**.

Depth to water at the facility measured during the SI ranges from approximately 10.52 to 33.18 feet bgs. On the Clay NGC southern property, depth to water measured during the SI at the temporary wells installed at or near AOI 1, AOI 2 and AOI 3 ranged from 13.68 to 22.42 feet bgs. In general, depth to water was greater at the former AASF north of the runway (ranging from 24.07 feet bgs to 29.95 feet bgs). However, the deepest depth to water was measured at the western boundary of the Clay NGC southern property, at existing monitoring well CNGC-MW030 (33.18 feet bgs).

Within the vicinity of AOI 1 and 2 on the southern property, groundwater flows southeast towards the retention basin in the southeast corner of the facility. At AOI 3, groundwater appears to flow west towards the retention basin located west of Hangar 312. On the western half of the Clay NGC southern property, groundwater flows east towards the retention basin located west of Hangar 312. At the former AASF north of the runway (AOI 4), groundwater flows east towards Big Lake. The observed groundwater flow directions reflect surface topography.

5.6 Surveying

The northern side of each well casing was surveyed by Georgia-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed and existing permanent monitoring wells sampled on the facility were collected on 16 July 2021 and 1 October 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 B5**.

5.7 Investigation-Derived Waste

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

Solid IDW (i.e., soil cuttings) generated during the SI activities were handled as directed by the GAARNG. At soil borings AOI02-01 and AOI02-02, solid IDW was containerized due to the presence of a known trichloroethylene (TCE) plume in the vicinity of the borings. At all AOI 4 boring locations, solid IDW was containerized because the former AASF area is a GAARNG enclave on the larger Dobbins ARB property. Containerized solid IDW was stored onsite in two 55-gallon steel drums and three HDPE food grade 5-gallon buckets. Solid IDW was left in place at the point of the source at all other boring locations. The soil cuttings were distributed on the ground surface on the downgradient side of the boring. The solid IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location. Based on laboratory results, containerized soil cuttings will be managed and disposed by ARNG, under a separate contract held by EA Engineering, Science, and Technology, Inc. (EA).

Liquid IDW generated during SI activities (i.e., purge water and decontamination fluids) was handled as directed by the GAARNG. At temporary wells AOI02-01 and AOI02-02, liquid IDW was containerized due to the presence the nearby TCE plume. Purge water from existing monitoring well CNGC-MW030 was also containerized due to the presence of a sheen on the water and the known presence of hydrocarbons in groundwater within the vicinity of the well. Containerized liquid IDW is stored onsite in one 15-gallon HDPE drum and one HDPE food grade 5-gallon bucket. Liquid IDW from all other temporary and existing monitoring wells was discharged directly to the ground surface slightly downgradient of the source. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location. Based on laboratory results, containerized liquid IDW will be managed and disposed by ARNG under a separate contract for Treating Liquid Investigation-Derived Material (Purge water, drilling water, and decontamination fluids) (EA, 2021).

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 B6**.

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 as non-hazardous solid waste to be transported to a licensed solid waste landfill.

5.8 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.

5.9 Deviations from SI QAPP Addendum

Several deviations from the SI QAPP Addendum (AECOM, 2021a) were identified during SI field activity and during review of the field documentation. The deviations are noted below and documented in Field Change Request Forms (**Appendix B3**) and Nonconformance and Corrective Action Reports (**Appendix B4**):

- During the utility locate site walk, two boring locations were relocated due to utility and accessibility restrictions (AOI02-02 and AOI04-02), and one boring was removed due to ongoing construction (AOI04-03). The original location for AOI04-02 was unintentionally placed beyond the GAARNG fence line. During the site walk, GAARNG advised moving the location to within the former AASF fence boundary. The revised location was very close to the original AOI04-03 location and in the same direction downgradient from the potential AOI 4 source area. Because of the close proximity between the revised AOI04-02 location and the AOI04-03 location, and the ongoing construction impeding access to the AOI04-03 location, sampling at AOI04-03 was not included during SI activities. The original location for AOI02-02 was determined to be too densely underlain with utilities for intrusive activities. A revised location for AOI02-02 within close proximity to the original location was selected after consultation with GAARNG. These actions were documented in a field change request form dated 7 July 2021 and are provided in **Appendix B3**.

- During SI field activity in July 2021, an existing monitoring well (D6-29) was gauged for synoptic water level measurement and sampled for a subset of 18 compounds that was not included in the original SI QAPP Addendum scope of work (AECOM, 2021a) to provide an assessment of potential migration from the AOI 4 source area in the downgradient direction towards the eastern property boundary. The well is located downgradient of the potential source area at AOI 4. During this mobilization, it was unknown whether Dobbins ARB would grant permission to advance borings and temporary wells at AOI 4, so monitoring well D6-29 was used to provide an assessment of the area. This action was documented in a field change request form dated 16 July 2021 and is provided in **Appendix B3**.

- During DPT drilling activities at AOI 1, surface soil was collected from location AOI01-02; however, the sample was only analyzed for TOC and pH due to chain of custody discrepancy. No PFOA, PFOS, PFBS, PFHxS, or PFNA analysis was performed on surface soil at AOI01-02, although the SI QAPP Addendum prescribed that analysis at that boring location. Subsurface soil samples and groundwater collected and analyzed for a subset of 18 compounds from location AOI01-02 were used to provide an assessment of location AOI01-02. Additionally, all AOI01-02 soil and groundwater samples, as well as soil and groundwater samples collected from other AOI 1 locations (AOI01-01 and AOI01-03), were used to provide an assessment of the entire AOI 1. These actions were documented in a nonconformance and corrective action report dated 29 March 2022 and are provided in **Appendix B4**.

- During DPT drilling activities, refusal was encountered prior to encountering groundwater at boring locations AOI04-01 and AOI04-04. Rock outcroppings observed near the two locations suggested site conditions may not allow for DPT or hollow stem auger drilling to reach groundwater in that area. As a result, only soil samples were collected from the two locations. At soil boring location AOI04-01, one surface soil sample was collected, and at location AOI04-04, one surface soil and one shallow subsurface soil sample were collected. These actions were documented in a field change request form dated 1 October 2021 and are provided in **Appendix B3**.

- During DPT drilling activities at AOI 4, subsurface soil samples were collected from the mid-points of borings at location AOI04-02 and AOI04-05; however, the mid-point samples were collected below 15 feet bgs based on the total boring depths. The approved SI QAPP Addendum states that mid-point subsurface soil samples would be collected from 13 to 15 feet bgs if total boring depth exceeded 30 feet bgs. The total boring depths at both locations exceeded 30 feet bgs, and the mid-point samples were inadvertently collected at depths greater than 15 feet bgs. These actions were documented in a nonconformance and corrective action report dated 29 March 2022 and are provided in **Appendix B4**.

- During well abandonment on 1 October 2021, the temporary well at location AOI04-02 was abandoned using clean sand and a 5-foot bentonite seal at the ground surface. The temporary well was not abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a). On 20 October 2021, the sand used to temporary abandon the well was over-drilled and removed. The over-drilled boring was abandoned using bentonite in accordance with the SI QAPP Addendum (AECOM, 2021a). These actions were documented in a nonconformance and corrective action report dated 21 October 2021 and are provided in **Appendix B4**.

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, General Lucius D. Clay National Guard Center, Georgia

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-0-2	7/14/2021 7:45	0 - 2	x				
AOI01-01-SB-0-2-D	7/14/2021 7:45	0 - 2	x				FD
AOI01-01-SB-6-8	7/14/2021 8:05	6 - 8	x				
AOI01-01-SB-14-16	7/14/2021 8:15	14 - 16	x				
AOI01-01-SB-14-16-D	7/14/2021 8:15	14 - 16	x				FD
AOI01-02-SB-0-2	7/13/2021 13:00	0 - 2		x	x		
AOI01-02-SB-0-2-D	7/13/2021 13:00	0 - 2		x			FD
AOI01-02-SB-0-2-MS	7/13/2021 13:00	0 - 2		x			MS
AOI01-02-SB-0-2-MSD	7/13/2021 13:00	0 - 2		x			MSD
AOI01-02-SB-11-13	7/13/2021 13:30	11 - 13	x				
AOI01-02-SB-23-25	7/13/2021 13:40	23 - 25	x				
AOI01-03-SB-0-2	7/12/2021 15:30	0 - 2	x				
AOI01-03-SB-0-2-MS	7/12/2021 15:30	0 - 2	x				MS
AOI01-03-SB-0-2-MSD	7/12/2021 15:30	0 - 2	x				MSD
AOI01-03-SB-12-14	7/13/2021 9:15	12 - 14	x				
AOI01-03-SB-25-27	7/13/2021 9:30	25 - 27	x				
AOI02-01-SB-0-2	7/14/2021 9:45	0 - 2	x				
AOI02-01-SB-10-12	7/14/2021 10:15	10 - 12	x				
AOI02-01-SB-10-12-D	7/14/2021 10:15	10 - 12	x				FD
AOI02-01-SB-20-22	7/14/2021 10:25	20 - 22	x	x	x		
GS-AOI02-01	7/14/2021 10:35	20 - 22				x	Received broken
AOI02-02-SB-0-2	7/14/2021 11:25	0 - 2	x				
AOI02-02-SB-12-14	7/14/2021 11:50	12 - 14	x				
AOI02-02-SB-20-22	7/14/2021 12:00	20 - 22	x				
AOI03-01-SB-0-2	7/13/2021 14:25	0 - 2	x	x	x		
AOI03-01-SB-10-12	7/13/2021 14:50	10 - 12	x				
AOI03-01-SB-19-21	7/13/2021 15:00	19 - 21	x				
AOI04-01-SB-0-2	10/1/2021 8:30	0 - 2	x				
AOI04-02-SB-0-2	9/29/2021 13:35	0 - 2	x				
AOI04-02-SB-18-20	9/29/2021 14:10	18 - 20	x				
AOI04-02-SB-37-39	9/29/2021 14:20	37 - 39	x	x	x		
AOI04-04-SB-0-2	9/29/2021 12:50	0 - 2	x				
AOI04-04-SB-8-10	9/29/2021 13:10	8 - 10	x				
AOI04-05-SB-0-2	9/30/2021 13:55	0 - 2	x				
AOI04-05-SB-0-2-FD	9/30/2021 13:55	0 - 2	x				FD
AOI04-05-SB-20-22	9/30/2021 14:30	20 - 22	x				
AOI04-05-SB-38-40	9/30/2021 14:40	38 - 40	x				
CNGC-01-SB-0-2	7/13/2021 11:00	0 - 2	x	x	x		
CNGC-01-SB-0-2-MS	7/13/2021 11:00	0 - 2	x				MS
CNGC-01-SB-0-2-MSD	7/13/2021 11:00	0 - 2	x				MSD
CNGC-01-SB-12-14	7/13/2021 11:30	12 - 14	x				
CNGC-01-SB-23-25	7/13/2021 11:45	23 - 25	x				

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, General Lucius D. Clay National Guard Center, Georgia

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
Groundwater Samples							
AOI01-01-GW	7/14/2021 12:18	NA	x				
AOI01-01-GW-D	7/14/2021 12:18	NA	x				FD
AOI01-02-GW	7/14/2021 9:30	NA	x				
AOI01-03-GW	7/13/2021 13:32	NA	x				
AOI02-01-GW	7/14/2021 14:04	NA	x				
AOI02-01-GW-MS	7/14/2021 14:04	NA	x				MS
AOI02-01-GW-MSD	7/14/2021 14:04	NA	x				MSD
AOI02-02-GW	7/14/2021 15:30	NA	x				
AOI03-01-GW	7/14/2021 11:09	NA	x				
AOI04-02-GW	9/30/2021 15:35	NA	x				
AOI04-02-GW-FD	9/30/2021 15:35	NA	x				FD
AOI04-05-GW	10/1/2021 9:50	NA	x				
D6-29-GW	7/15/2021 14:40	NA	x				
CNGC-01-GW	7/13/2021 15:17	NA	x				
CNGC-MW030-GW	7/15/2021 10:31	NA	x				
Quality Control Samples							
CNGC-DECON-01	5/27/2021 9:10	NA	x				Collected from spigot
CNGC-DECON-02	5/27/2021 10:30	NA	x				Collected from spigot via hose
CNGC-ERB-01	7/14/2021 9:50	NA	x				Collected from hand auger
CNGC-ERB-02	7/14/2021 12:25	NA	x				Collected from drill rig rod
CNGC-ERB-02*	9/29/2021 14:50	NA	x				Collected from hand auger
CNGC-FRB-01	9/29/2021 15:15	NA	x				

Notes:
ASTM = American Society for Testing and Materials
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency
* = Field team mistakenly gave the same name to two ERB samples collected during separate mobilizations

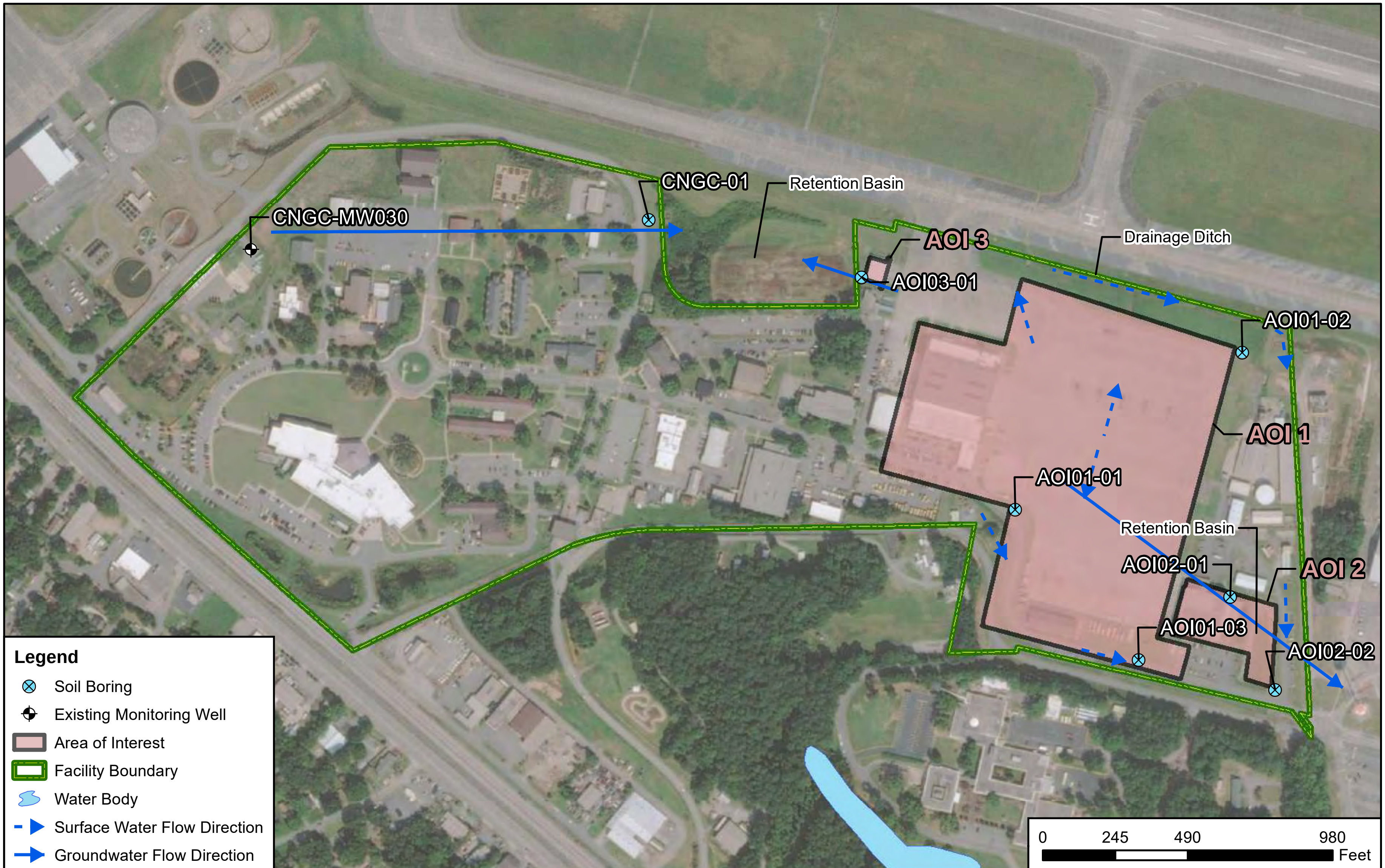
Table 5-2
Soil Boring Depths, Monitoring Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, General Lucius D. Clay National Guard Center, Georgia

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	19	14 - 19	1060.758	1059.208	16.91	15.36	1043.85
	AOI01-02	25	18 - 23	1060.090	1058.390	24.12	22.42	1035.97
	AOI01-03	35	27 - 32	1054.989	1052.009	22.05	19.07	1032.94
2	AOI02-01	30	22 - 27	1045.523	1042.693	16.51	13.68	1029.01
	AOI02-02	30	18 - 23	1034.368	1032.348	18.98	16.96	1015.39
3	AOI03-01	21	16 - 21	1059.919	1055.019	19.47	14.57	1040.45
	CNGC-MW030*	NA	NA	1095.986	1096.437	32.73	33.18	1063.26
	CNGC-01	35	21 - 26	1051.705	1047.665	14.56	10.52	1037.14
4	AOI04-01	2	NA	NA	1058.050	NA	NA	NA
	AOI04-02	39	29 - 39	1055.580	1055.220	30.31	29.95	1025.27
	AOI04-04	10.5	NA	NA	1048.660	NA	NA	NA
	AOI04-05	45	35 - 45	1042.750	1039.910	28.83	25.99	1013.92
	D6-29*	NA	NA	1042.612	1042.873	23.81	24.07	1018.80

Notes:

bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988
* = existing permanent monitoring well

THIS PAGE INTENTIONALLY BLANK



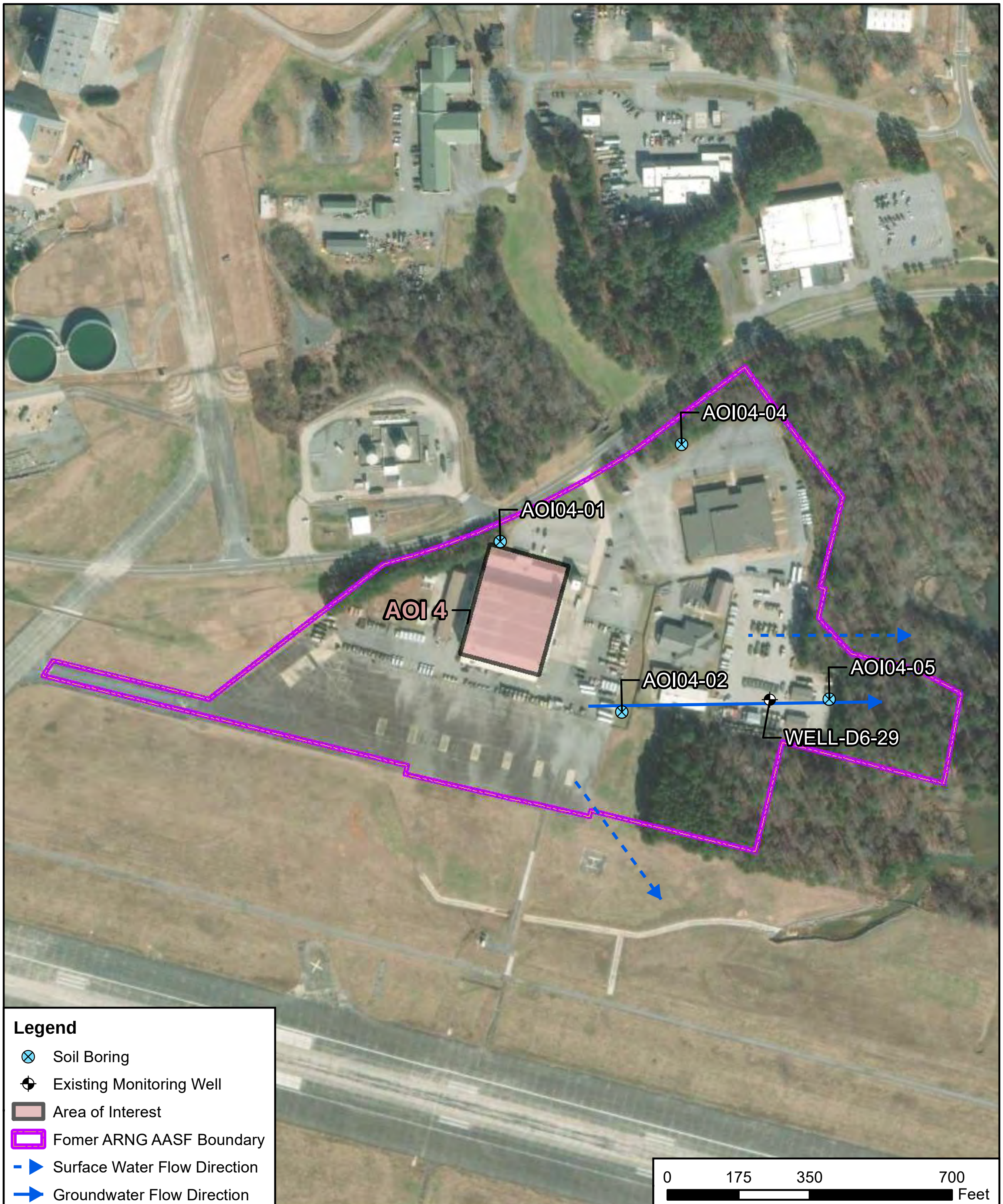
CLIENT	ARNG
PROJECT	Site Inspection at Clay National Guard Center, GA

REVISED	8/3/2022	GIS BY	MS	8/3/2022
SCALE	1:5,880	CHK BY	JW	8/3/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/3/2022

Site Inspection
Sample Locations - South Property

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	10/10/2022	GIS BY	MS	10/10/2022
SCALE	1:4,200	CHK BY	JW	10/10/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/10/2022

Sample Locations - North Property

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-2

6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Section 6.3** through **Section 6.6**. **Table 6-2** through **Table 6-5** present results in soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 6 July 2022 (Assistant Secretary of Defense, 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA, the RI phase. The SLs established in the OSD memorandum apply to the five compounds presented in **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, and pH, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC and pH sampling; grain size analysis was not performed because the sample collected for that analysis, sample GS-AOI02-01, was broken during shipment.

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: the Hangar 1/Ramp Area. The soil and groundwater results are summarized on **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.3.1 AOI 1 Soil Analytical Results

Table 6-2 through **Table 6-4** summarize the soil results. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil.

Soil was sampled from three intervals at boring locations AOI01-01, AOI01-02 and AOI01-03; however, surface soil at boring location AOI01-02 was not analyzed for PFOA, PFOS, PFBS, PFHxS, or PFNA as described in **Section 5.9**. Samples were collected from 2-foot intervals in surface soil (0 to 2 feet bgs), shallow subsurface soil (6 to 14 feet bgs), and deep subsurface soil intervals (14 to 27 feet bgs). PFOA, PFOS, and PFHxS were detected at concentrations below the respective SLs in surface soil; PFBS and PFNA were not detected in surface soil. PFOA was detected in surface soil at location AOI01-03, with a concentration of 0.155 J (estimated) micrograms per kilogram (µg/kg). PFOS was detected at locations AOI01-01 and AOI01-03, with concentrations of 1.02 J µg/kg (Duplicate) and 0.683 J µg/kg, respectively. PFHxS was detected at locations AOI01-01 and AOI01-03, with concentrations of 0.261 J µg/kg and 0.127 J µg/kg, respectively. PFBS and PFNA were not detected in surface soil at AOI 1.

In shallow subsurface soil, PFHxS was detected at concentrations below the SL at two of the three locations, with concentrations of 0.048 J µg/kg at AOI01-02 and 0.682 J µg/kg at AOI01-03. PFOA, PFOS, PFBS, and PFNA were not detected in shallow subsurface soil at AOI 1.

In deep subsurface soil, PFOA, PFOS, PFBS, and PFHxS were detected at AOI 1; PFNA was not detected. PFOA was detected at location AOI01-01, with a concentration of 0.116 J µg/kg (Duplicate). PFOS was detected at location AOI01-02, with a concentration of 0.128 J µg/kg. PFBS was detected at location AOI01-03, with a concentration of 0.044 J µg/kg. PFHxS was detected at all three locations, with concentrations ranging from 0.075 J µg/kg (AOI01-02) to 0.587 J µg/kg (AOI01-03).

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI01-01, AOI01-02, and AOI01-03. PFOA was detected above the SL of 6 nanograms per liter (ng/L) at all three well locations, with concentrations ranging from 13.1 ng/L at AOI01-02 to 99.2 ng/L at AOI01-01. PFHxS was detected above the SL of 39 ng/L at all three well locations, with concentrations ranging from 57.1 ng/L at AOI01-02 to 317 ng/L at AOI01-03. PFBS was detected below the SL of 601 ng/L at all three locations, with concentrations ranging from 6.72 ng/L at AOI01-02 to 23.3 ng/L at AOI01-03. PFOS and PFNA were not detected at any of the AOI 1 temporary well locations.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, PFBS, and PFHxS were detected in soil below their respective SLs, while PFNA was not detected at all. PFOA and PFHxS were detected in groundwater at concentrations above their respective SLs, and PFBS was detected below its SL. PFOS and PFNA were not detected in groundwater at AOI 1. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2: Hangar 300. The results in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.4.1 AOI 2 Soil Analytical Results

Table 6-2 through **Table 6-4** summarize the soil results. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil.

Soil was sampled from three intervals at boring locations AOI02-01 and AOI02-02. Samples were collected from 2-foot intervals in surface soil (0 to 2 feet bgs), shallow subsurface soil (10 to 14 feet bgs), and deep subsurface soil (20 to 22 feet bgs). PFOS was detected at concentrations above the SL of 13 µg/kg in surface soil; PFOA, PFBS, PFHxS, and PFNA were detected in surface soil at concentrations below their respective SLs. PFOA was detected at locations AOI02-01 and AOI02-02, with concentrations of 0.926 J µg/kg and 0.243 J µg/kg, respectively. PFOS exceeded the SL of 13 µg/kg in surface soil at locations AOI02-01 and AOI02-02, with concentrations of 19.9 µg/kg and 43.9 J µg/kg, respectively. PFBS was detected at locations AOI02-01 and AOI02-02, with concentrations of 9.63 µg/kg and 0.028 J µg/kg, respectively. PFHxS was detected at locations AOI02-01 and AOI02-02, with concentrations of 39.3 µg/kg and 1.39 µg/kg, respectively. PFNA was detected at locations AOI02-01 and AOI02-02, with concentrations of 0.047 J µg/kg and 0.055 J µg/kg, respectively.

In shallow subsurface soil, PFOS was detected above the SL of 160 µg/kg, with a concentration of 609 µg/kg at AOI02-02. PFOS was also detected at a concentration of 0.179 J µg/kg (Duplicate) at AOI02-01. PFBS and PFHxS were detected in shallow subsurface soil at concentrations below their respective SLs. PFBS was detected in shallow subsurface soil at location AOI02-01, with a concentration of 0.094 J µg/kg. PFHxS was detected in shallow subsurface soil at locations AOI02-01 and AOI02-02, with concentrations of 0.091 J µg/kg (Duplicate) and 1.64 J µg/kg, respectively. PFOA and PFNA were not detected in shallow subsurface at AOI 2.

In deep subsurface soil, PFOA, PFOS, PFBS, and PFHxS were detected at AOI 2; PFNA was not detected. PFOA was detected at location AOI02-01, with a concentration of 0.467 J µg/kg. PFOS was detected at locations AOI02-01 and AOI02-02, with concentrations of 27.3 µg/kg and 22.6 µg/kg, respectively. PFBS was detected at locations AOI02-01 and AOI02-02, with concentrations of 1.10 J µg/kg and 0.086 J µg/kg, respectively. PFHxS was detected at locations AOI02-01 and AOI02-02, with concentrations of 7.70 µg/kg and 0.840 J µg/kg, respectively.

6.4.2 AOI 2 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring well locations AOI02-01 and AOI02-02 at AOI 2. PFOA was detected above the SL of 6 ng/L at AOI02-01 and AOI02-02, with concentrations of 3,650 ng/L and 58.6 J ng/L, respectively. PFOS was detected above the SL of 4 ng/L at AOI02-01 and AOI02-02, with concentrations of 320,000 J ng/L and 39,200 ng/L, respectively. PFBS was detected above the SL of 601 ng/L at AOI02-01, with a concentration of 9,430 J- (estimated concentration biased low) ng/L. PFBS was detected below the SL of 601 ng/L at AOI02-02, with a concentration of 149 J ng/L. PFHxS was detected above the SL of 39 ng/L at AOI02-01 and AOI02-02, with concentrations of 63,100 ng/L and 2,030 ng/L, respectively. PFNA was not detected in groundwater at AOI 2.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOS was detected at concentrations above its SL in soil, and PFOA, PFBS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs. PFOA, PFOS, PFBS, and PFHxS were detected at concentrations above their respective SLs in groundwater, and PFNA was not detected in groundwater. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 2 is warranted.

6.5 AOI 3

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3: Hangar 312. The results in soil and groundwater are presented in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.5.1 AOI 3 Soil Analytical Results

Table 6-2 through **Table 6-4** summarize the soil results. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil.

Soil was sampled from three intervals at boring location AOI03-01. Samples were collected from 2-foot intervals in surface soil (0 to 2 feet bgs), shallow subsurface soil (10 to 12 feet bgs), and deep subsurface soil (19 to 21 feet bgs). PFOS was detected above the SL of 13 µg/kg in surface soil at AOI03-01 with a concentration of 14.4 µg/kg. PFOA, PFBS, PFHxS, and PFNA were detected in soil at concentrations below their respective SLs. PFOA was detected in surface soil, with a concentration of 0.851 J µg/kg; PFBS was detected in surface soil, with a concentration of 0.042 J µg/kg; PFHxS was detected in surface soil, with a concentration of 0.661 J µg/kg; and PFNA was detected in surface soil, with a concentration of 2.94 µg/kg.

In shallow subsurface soil, PFOA, PFOS, and PFHxS were detected below their respective SLs at AOI03-01; PFBS and PFNA were not detected. PFOA was detected with a concentration of 2.11 µg/kg, PFOS was detected with a concentration of 0.164 J µg/kg, and PFHxS was detected with a concentration of 1.03 J µg/kg.

In deep subsurface soil, PFOA, PFOS, and PFHxS were also detected at location AOI03-01; PFBS and PFNA were not detected in deep subsurface soil. PFOA was detected with a concentration of 0.748 J µg/kg, PFOS was detected with a concentration of 0.197 J µg/kg, and PFHxS was detected with a concentration of 0.164 µg/kg.

Soil was also sampled from three intervals at boring location CNGC-01 to assess the area potentially upgradient of AOI 3. Samples were collected from surface soil (0 to 2 feet bgs), shallow subsurface soil (12 to 14 feet bgs), and deep subsurface soil (23 to 25 feet bgs). PFOS and PFHxS were detected in surface soil, at concentrations below their respective SLs, with concentrations of 0.716 J µg/kg and 0.461 J µg/kg, respectively. PFOA, PFBS, and PFNA were not detected in surface soil.

In shallow subsurface soil, PFHxS was detected below the SL of 1,600 µg/kg at CNGC-01, with a concentration of 0.210 J µg/kg. PFOA, PFOS, PFBS, and PFNA were not detected in shallow subsurface soil. PFHxS was also detected in deep subsurface soil at CNGC-01, with a concentration of 0.059 J µg/kg. PFOA, PFOS, PFBS, and PFNA were not detected in deep subsurface soil.

6.5.2 AOI 3 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring well location AOI03-01 at AOI 3. PFOA was detected above the SL of 6 ng/L, with a concentration of 1,590 ng/L. PFOS was detected above the SL of 4 ng/L, with a concentration of 468 ng/L. PFHxS was detected above the SL of 39 ng/L, with a concentration of 329 ng/L. PFNA was detected above the SL of 6 ng/L, with a concentration of 16.5 ng/L. PFBS was detected below the SL of 601 ng/L, with a concentration of 22.7 ng/L.

Groundwater was also sampled from temporary monitoring well location CNGC-01 and existing monitoring well location CNGC-MW030 to assess the area potentially upgradient of AOI 3. Due to the convergence of groundwater flow on the retention basin located west of Hangar 312; however, it is uncertain whether locations CNGC-01 and CNGC-MW030 are upgradient of AOI 3. PFOA, PFOS, and PFHxS were detected above their respective SLs at both potentially upgradient locations. PFOA was detected at both locations above the SL of 6 ng/L, with concentrations ranging from 10.2 ng/L (CNGC-01) to 27.9 ng/L (CNGC-MW030). PFOS was detected at both locations above the SL of 4 ng/L, with concentrations ranging from 21.4 (CNGC-MW030) to 56.3 ng/L (CNGC-01). PFHxS was detected at both locations above the SL of 39 ng/L, with concentrations ranging from 172 ng/L (CNGC-01) to 433 ng/L (CNGC-MW030). PFBS was detected below the SL of 601 ng/L at both locations, with concentrations of ranging from 25.1 ng/L (CNGC-01) to 179 ng/L (CNGC-MW030). PFNA was not detected in groundwater at either location potentially upgradient of AOI 3.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOS was detected in soil above the SL. PFOA, PFBS, PFHxS, and PFNA were also detected in soil below their respective SLs. PFOA, PFOS, PFHxS, and PFNA were detected in groundwater at concentrations above their respective SLs, and PFBS was detected in groundwater below its SL. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 3 is warranted.

6.6 AOI 4

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 4: Building 555. The results in soil and groundwater are presented in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.6.1 AOI 4 Soil Analytical Results

Table 6-2 through **Table 6-4** summarize the soil results. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil.

Soil was sampled from three intervals at boring locations at AOI 4. Samples were collected from 2-foot intervals in surface soil (0 to 2 feet bgs), shallow subsurface soil (8 to 10 feet bgs), and deep subsurface soil (18 to 40 feet bgs). PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at concentrations below their respective SLs; PFBS was not detected in surface soil at AOI 4. PFOA was detected in surface soil at location AOI04-04, with a concentration of 0.232 J µg/kg. PFOS was detected in surface soil at locations AOI04-01, AOI04-02, and AOI04-04, with concentrations ranging from 0.116 J µg/kg to 0.401 J µg/kg. PFHxS was detected in surface soil at locations AOI04-02 and AOI04-04, with concentrations of 0.163 J µg/kg and 0.096 J, respectively. PFNA was detected in surface soil at location AOI04-01, with a concentration of 0.025 J µg/kg.

In shallow subsurface soil, PFOS and PFHxS were detected below their respective SLs. PFOA, PFBS, and PFNA were not detected in shallow subsurface soil at AOI 4. PFOS was detected in shallow subsurface soil at location AOI04-04, with a concentration of 0.882 J µg/kg. PFHxS was detected in shallow subsurface soil at location AOI04-04, with a concentration of 0.068 J µg/kg.

In deep subsurface soil, PFOA and PFOS were detected at location AOI04-02, with concentrations of 0.108 J µg/kg, and 0.133 J µg/kg, respectively. PFOA and PFOS were not detected at any other deep subsurface soil sample locations. PFBS and PFNA were not detected in deep subsurface soil at AOI 4. PFHxS was detected in deep subsurface soil at location AOI04-02, with a concentration of 0.289 J µg/kg.

6.6.2 AOI 4 Groundwater Analytical Results

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

During the first mobilization in July 2021, drilling was not permitted at AOI 4. Groundwater was collected from existing permanent monitoring well D6-29. PFOA was detected above the SL of 6 ng/L, with a concentration of 23.8 ng/L, and PFOS was detected above the SL of 4 ng/L, with a concentration of 22.7 ng/L. PFBS was detected below the SL of 601 ng/L, with a concentration of 7.45 ng/L. PFHxS was also detected below the SL of 39 ng/L, with a concentration of 38.4 ng/L. PFNA was not detected. Sampling of monitoring well D6-29 was included to assess the area downgradient of AOI 4 in lieu of drilling temporary wells until Dobbins ARB approved drilling operations. This action was documented in a field change request provided in **Appendix B**.

Upon receiving approval to drill at AOI 4 from Dobbins ARB, a second mobilization commenced in September 2021, and two temporary wells were installed, AOI04-02 and AOI04-05. Temporary well AOI04-03 was removed from the SI sampling program due to construction area access issues, and temporary wells at AOI04-01 and AOI04-04 were not installed due to encountering refusal prior to reaching groundwater at those locations. These actions are documented in a field change request provided in **Appendix B**.

PFOA was detected above the SL of 6 ng/L at AOI04-02 and AOI04-05, with concentrations of 41.6 ng/L (Duplicate) and 64.1 ng/L, respectively. PFOS was detected above the SL of 4 ng/L at AOI04-02 and AOI04-05, with concentrations of 138 ng/L and 20.3 ng/L, respectively. PFBS was detected below the SL of 601 ng/L at locations AOI04-02 and AOI04-05, with concentrations of 11 ng/L and 33.5 ng/L, respectively. PFHxS was detected above the SL of 39 ng/L at AOI04-02 and AOI04-05, with concentrations of 53.7 ng/L and 121 ng/L, respectively. PFNA was not detected in groundwater at AOI 4.

6.6.3 AOI 4 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, and PFNA were detected in soil below their respective SLs, and PFBS was not detected. PFOA, PFOS, and PFHxS were detected in groundwater at concentrations above their respective SLs, and PFBS was detected in groundwater below its SL. PFNA was not detected in groundwater. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 4 is warranted

THIS PAGE INTENTIONALLY BLANK

Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Clay National Guard Center

	Area of Interest	AOI01						AOI02				AOI03				AOI04							
	Sample ID	AOI01-01-SB-0-2		AOI01-01-SB-0-2-D		AOI01-03-SB-0-2		AOI02-01-SB-0-2		AOI02-02-0-2		AOI03-01-SB-0-2		CNGC-01-SB-0-2		AOI04-01-SB-0-2		AOI04-02-SB-0-2		AOI04-04-SB-0-2		AOI04-05-SB-0-2	
	Sample Date	07/14/2021		07/14/2021		07/12/2021		07/14/2021		07/14/2021		07/13/2021		07/13/2021		10/01/2021		09/29/2021		09/29/2021		09/30/2021	
	Depth	0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																							
PFBS	1900	ND	U	ND	U	ND	U	9.63		0.028	J	0.042	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.261	J	0.251	J	0.127	J	39.3		1.39		0.661	J	0.461	J	ND	U	0.163	J	0.096	J	ND	U
PFNA	19	ND	U	ND	U	ND	U	0.047	J	0.055	J	2.94		ND	U	0.025	J	ND	U	ND	U	ND	U
PFOA	19	ND	U	ND	U	0.155	J	0.926	J	0.243	J	0.851	J	ND	U	ND	U	ND	U	0.232	J	ND	U
PFOS	13	0.605	J	1.02	J	0.683	J	19.9		43.9	J	14.4		0.716	J	0.212	J	0.116	J	0.401	J	ND	U

Grey Fill: Detected concentration exceeded OSD Screening Levels

References
a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on 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
CNGC	Clay National Guard Center
D/FD	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 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Clay National Guard Center

	Area of Interest	AOI04			
	Sample ID	AOI04-05-SB-0-2		AOI04-05-SB-0-2-FD	
	Sample Date	09/30/2021		09/30/2021	
	Depth	0-2 ft		0-2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)					
PFBS	1900	ND	U	ND	U
PFHxS	130	ND	U	ND	U
PFNA	19	ND	U	ND	U
PFOA	19	ND	U	ND	U
PFOS	13	ND	U	ND	U

Grey Fill	Detected concentration exceeded OSD Screening Levels

References
a. Assistant Secretary of Defense, July 2022. Risk Based Screening Levels Calculated for PFOA, PFOS, PFBS, PFHxS, and PFNA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1, May 2022. Soil screening levels based on 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
CNGC	Clay National Guard Center
D/FD	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, Clay National Guard Center

	Area of Interest	AOI01						AOI02						AOI03				AOI04	
	Sample ID	AOI01-01-SB-6-8		AOI01-02-SB-11-13		AOI01-03-SB-12-14		AOI02-01-SB-10-12		AOI02-01-SB-10-12-D		AOI02-02-SB-12-14		AOI03-01-SB-10-12		CNGC-01-SB-12-14		AOI04-04-SB-8-10	
	Sample Date	07/14/2021		07/13/2021		07/13/2021		07/14/2021		07/14/2021		07/14/2021		07/13/2021		07/13/2021		09/29/2021	
	Depth	6-8 ft		11-13 ft		12-14 ft		10-12 ft		10-12 ft		12-14 ft		10-12 ft		12-14 ft		8-10 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																			
PFBS	25000	ND	U	ND	U	ND	U	0.094	J	0.082	J	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	0.048	J	0.682	J	0.090	J	0.091	J	1.64	J	1.03	J	0.210	J	0.068	J
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	2.11		ND	U	ND	U
PFOS	160	ND	U	ND	U	ND	U	ND	UJ	0.179	J	609		0.164	J	ND	U	0.882	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Clay National Guard Center

Area of Interest	AOI01								AOI02				AOI03				AOI04			
Sample ID	AOI01-01-SB-14-16		AOI01-01-SB-14-16-D		AOI01-02-SB-23-25		AOI01-03-SB-25-27		AOI02-01-SB-20-22		AOI02-02-SB-20-22		AOI03-01-SB-19-21		CNGC-01-SB-23-25		AOI04-02-SB-18-20		AOI04-02-SB-37-39	
Sample Date	07/14/2021		07/14/2021		07/13/2021		07/13/2021		07/14/2021		07/14/2021		07/13/2021		07/13/2021		09/29/2021		09/29/2021	
Depth	14-16 ft		14-16 ft		23-25 ft		25-27 ft		20-22 ft		20-22 ft		19-21 ft		23-25 ft		18-20 ft		37-39 ft	
Analyte	**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	ND	U	ND	U	ND	U	0.044	J	1.10	J	0.086	J	ND	U	ND	U	ND	U	ND	U
PFHxS	0.204	J	0.183	J	0.075	J	0.587	J	7.70		0.840	J	0.164	J	0.059	J	ND	U	0.289	J
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	UJ	0.116	J	ND	U	ND	U	0.467	J	ND	U	0.748	J	ND	U	ND	U	0.108	J
PFOS	ND	U	ND	U	0.128	J	ND	U	27.3		22.6		0.197	J	ND	U	ND	U	0.133	J

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Clay National Guard Center

Area of Interest	AOI04			
Sample ID	AOI04-05-SB-20-22		AOI04-05-SB-38-40	
Sample Date	09/30/2021		09/30/2021	
Depth	20-22 ft		38-40 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)				
PFBS	ND	U	ND	U
PFHxS	ND	U	ND	U
PFNA	ND	U	ND	U
PFOA	ND	U	ND	U
PFOS	ND	U	ND	U

Interpreted Qualifiers
J = Estimated concentration
U = The analyte was not detected at a level greater than or equal to the adjusted DL

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Clay National Guard Center

	Area of Interest	AOI01								AOI02				AOI03					
	Sample ID	AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		AOI01-03-GW		AOI02-01-GW		AOI02-02-GW		AOI03-01-GW		CNGC-01-GW		CNGC-MW030-GW	
	Sample Date	07/14/2021		07/14/2021		07/14/2021		07/13/2021		07/14/2021		07/14/2021		07/14/2021		07/13/2021		07/15/2021	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/L)																			
PFBS	601	14.1		12.4		6.72		23.3		9430	J-	149	J	22.7		25.1		179	
PFHxS	39	303		276		57.1		317		63100		2030		329		172		433	
PFNA	6	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	16.5		ND	U	ND	U
PFOA	6	99.2		89.0		13.1		26.8		3650		58.6	J	1590		10.2		27.9	
PFOS	4	ND	U	ND	U	ND	U	ND	U	320000	J	39200		468		56.3		21.4	

Grey Fill	Detected concentration exceeded OSD Screening Levels

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

Interpreted Qualifiers
J = Estimated concentration
J- = Estimated concentration, biased low
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
CNGC	Clay National Guard Center
D/FD	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

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Clay National Guard Center

	Area of Interest	AOI04							
	Sample ID	AOI04-02-GW		AOI04-02-GW-FD		AOI04-05-GW		D6-29-GW	
	Sample Date	09/30/2021		09/30/2021		10/01/2021		07/15/2021	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/L)									
PFBS	601	11.0		11.0		33.5		7.45	
PFHxS	39	53.7		52.6		121		38.4	
PFNA	6	ND	U	ND	U	ND	U	ND	U
PFOA	6	41.5		41.6		64.1		23.8	
PFOS	4	138		136		20.3		22.7	

Grey Fill — Detected concentration exceeded OSD Screening Levels

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

Interpreted Qualifiers
J = Estimated concentration
J- = Estimated concentration, biased low
U = The analyte was not detected at a level greater than or equal to the adjusted DL

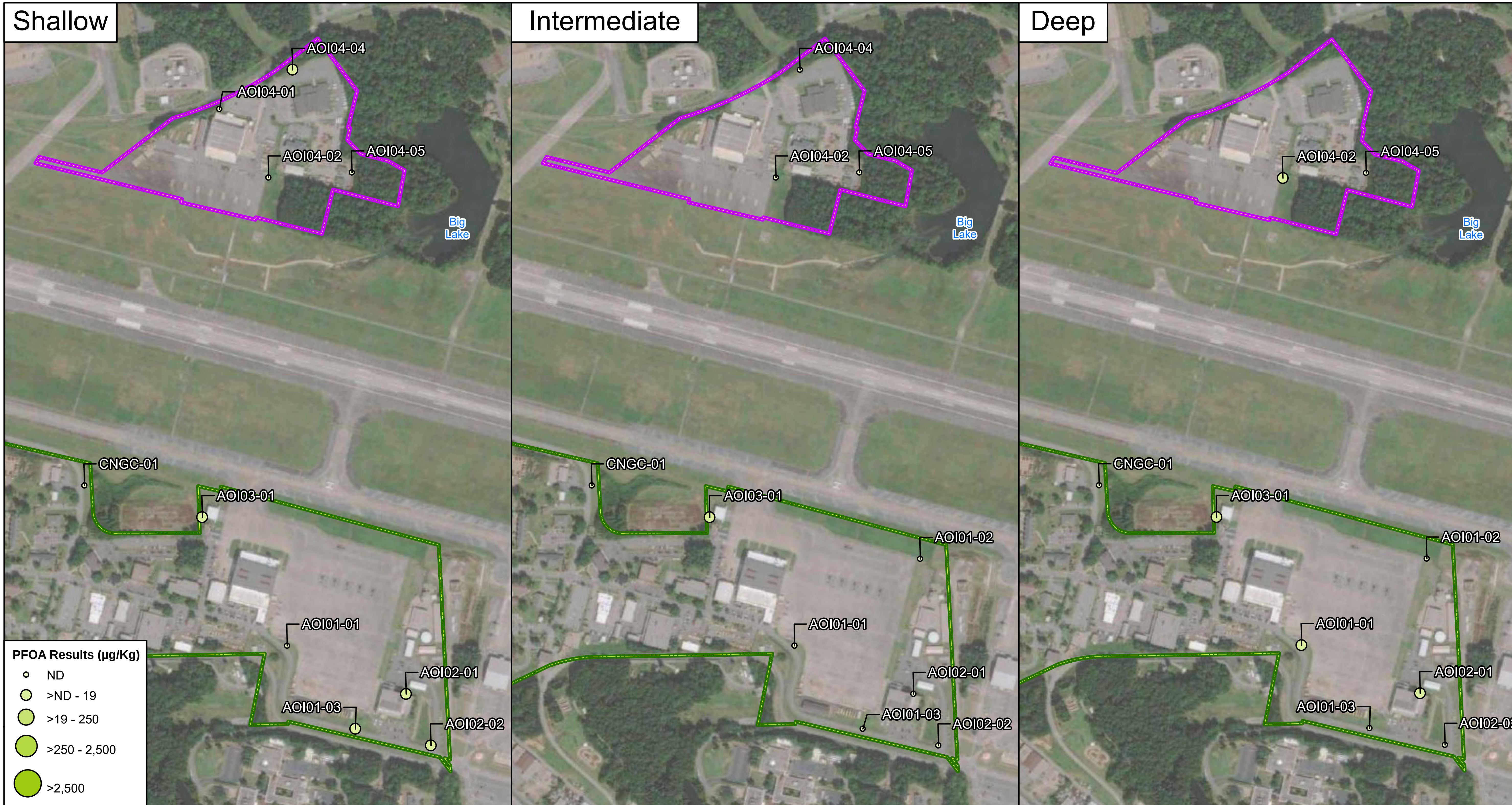
Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
CNGC	Clay National Guard Center
D/FD	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

THIS PAGE INTENTIONALLY BLANK



CLIENT	ARNG				
PROJECT	Site Inspection at Clay National Guard Center, GA				
REVISED	8/11/2022	GIS BY	MS	8/11/2022	
SCALE	1:7,214	CHK BY	JW	8/11/2022	
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/11/2022	

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 300 600 1,200 Feet

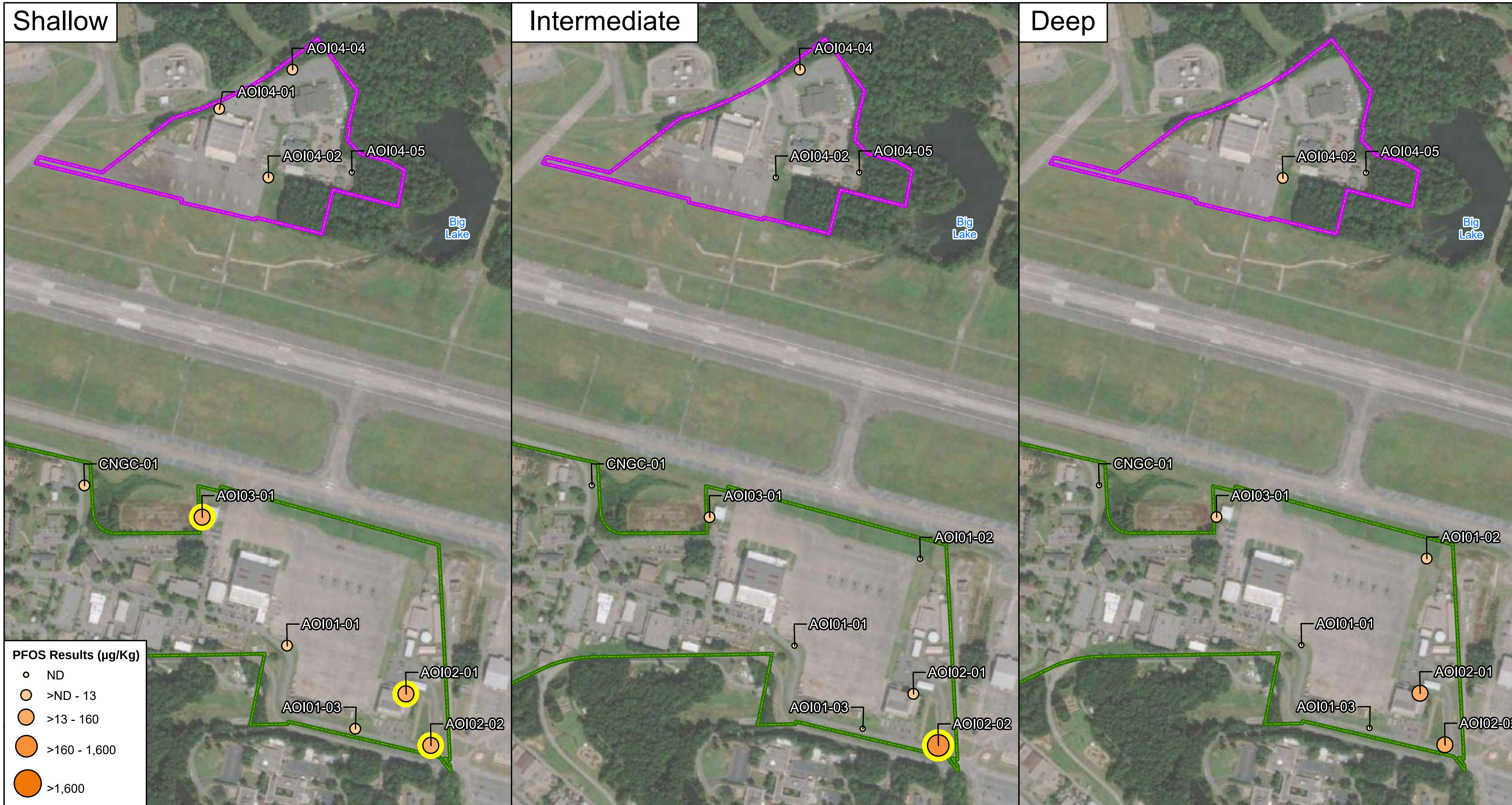
N

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

PFOA Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/11/2022	GIS BY	MS	8/11/2022
SCALE	1:7,214	CHK BY	JW	8/11/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/11/2022

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 300 600 1,200 Feet

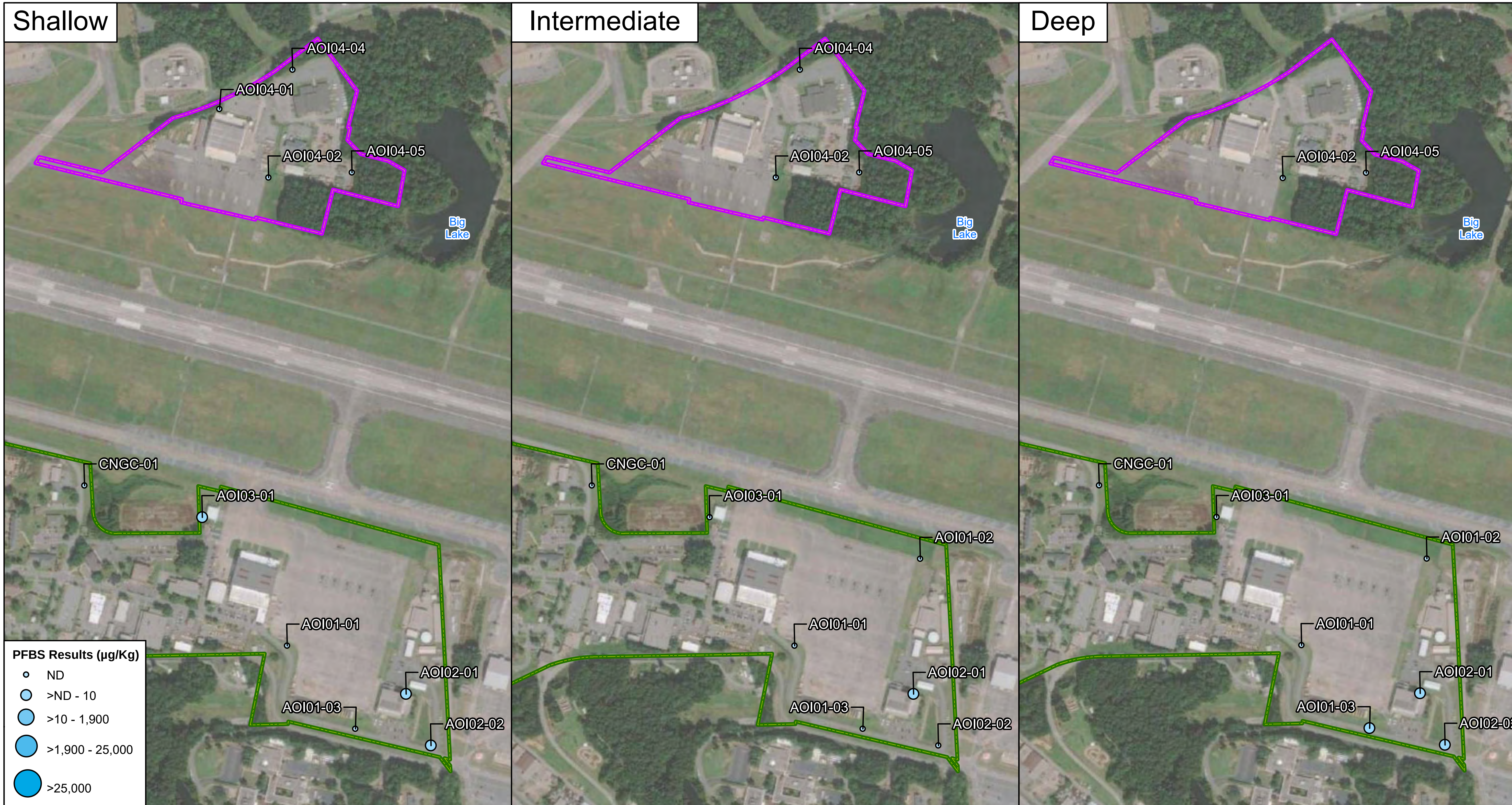
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

PFOS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-2



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/11/2022	GIS BY	MS	8/11/2022
SCALE	1:7,214	CHK BY	JW	8/11/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/11/2022

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 300 600 1,200 Feet

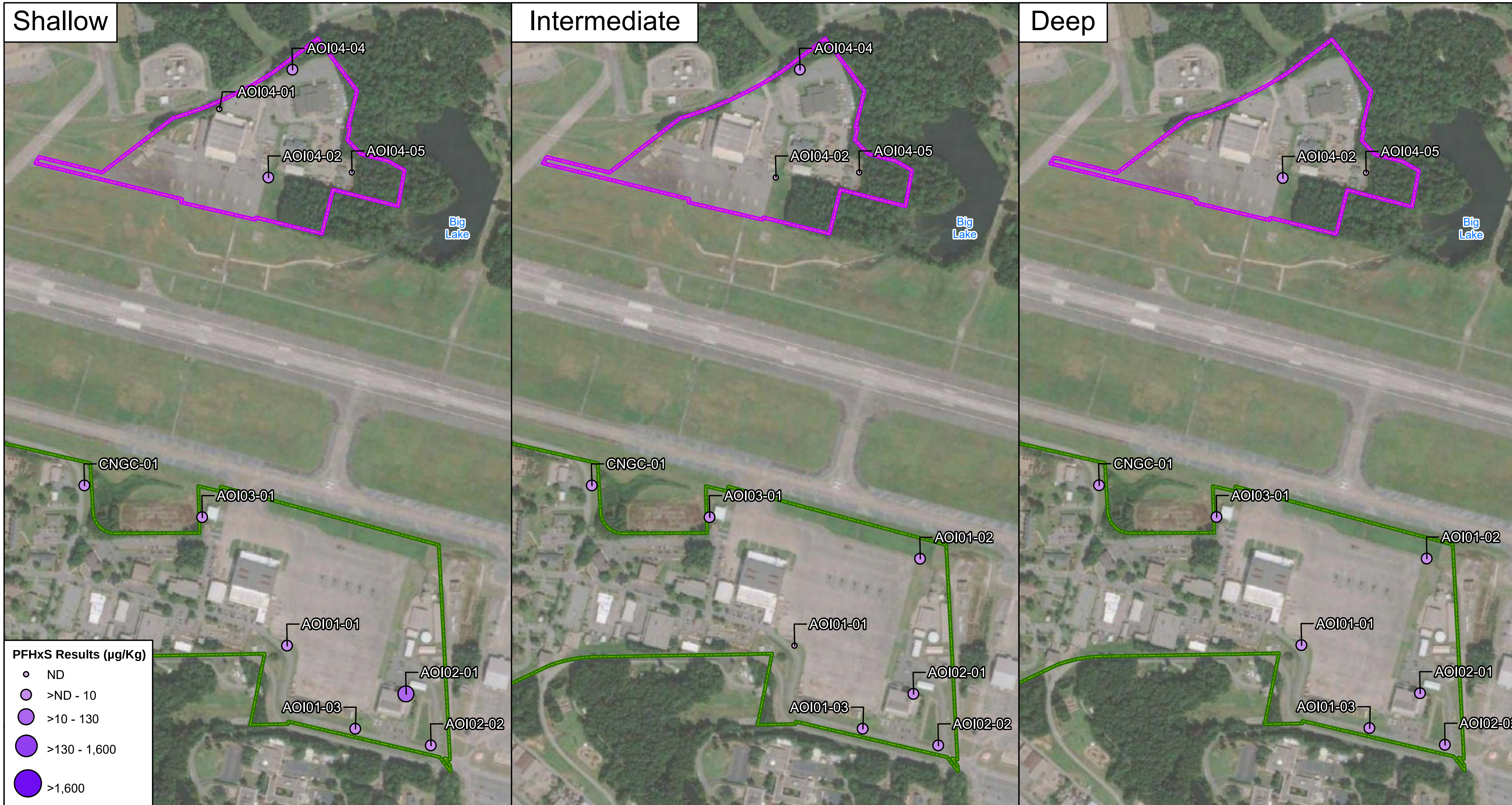
N

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

PFBS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-3



CLIENT	ARNG				
PROJECT	Site Inspection at Clay National Guard Center, GA				
REVISED	8/11/2022	GIS BY	MS	8/11/2022	
SCALE	1:7,214	CHK BY	JW	8/11/2022	
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/11/2022	

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 300 600 1,200 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.

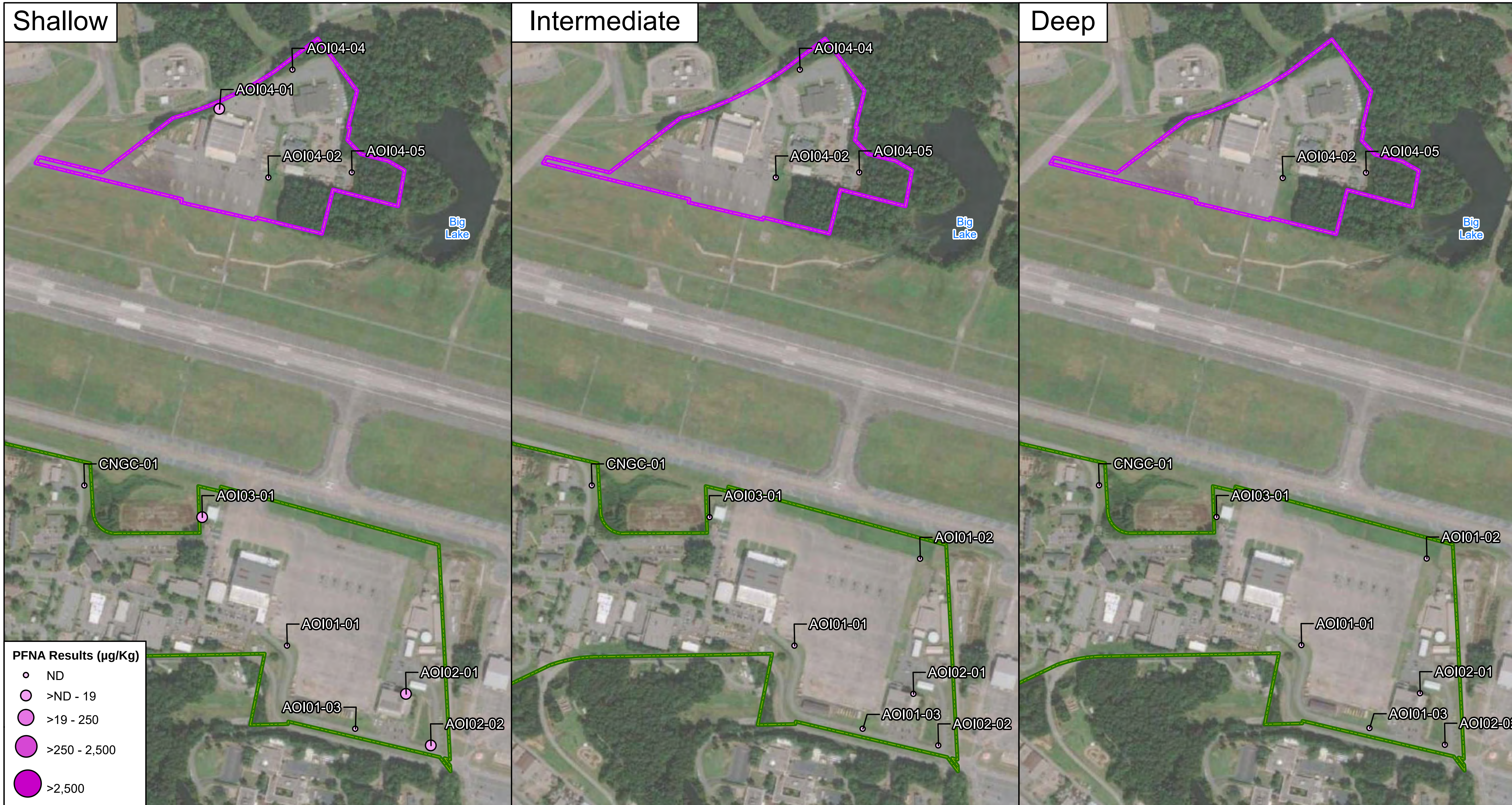
N

PFHxS Detections in Soil

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/11/2022	GIS BY	MS	8/11/2022
SCALE	1:7,214	CHK BY	JW	8/11/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/11/2022

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 300 600 1,200 Feet

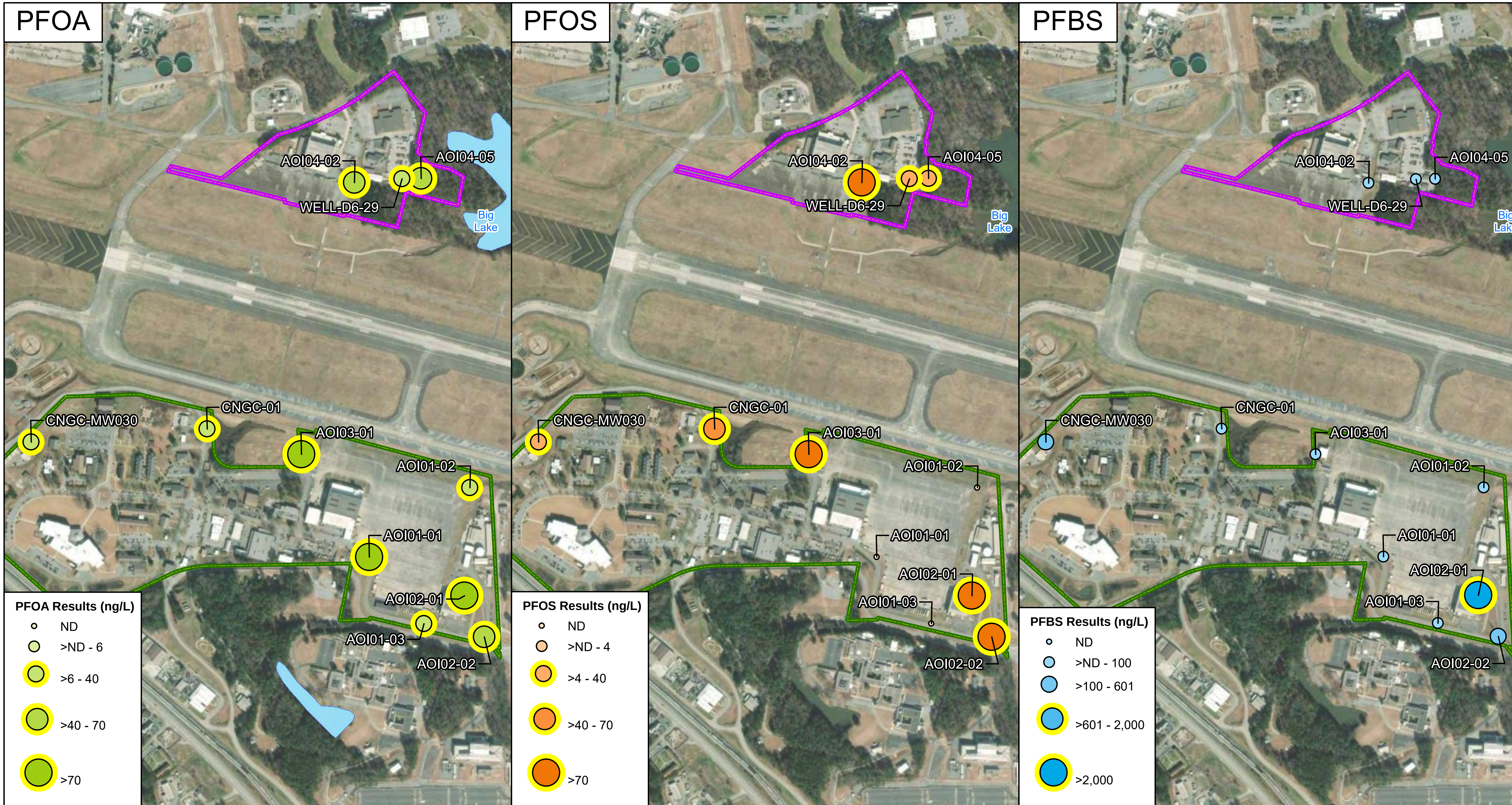
N

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

PFNA Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-5



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	10/10/2022	GIS BY	MS	10/10/2022
SCALE	1:9,017	CHK BY	JW	10/10/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/10/2022

Legend

Facility Boundary

Fomer ARNG AASF Boundary

0 375 750 1,500 Feet

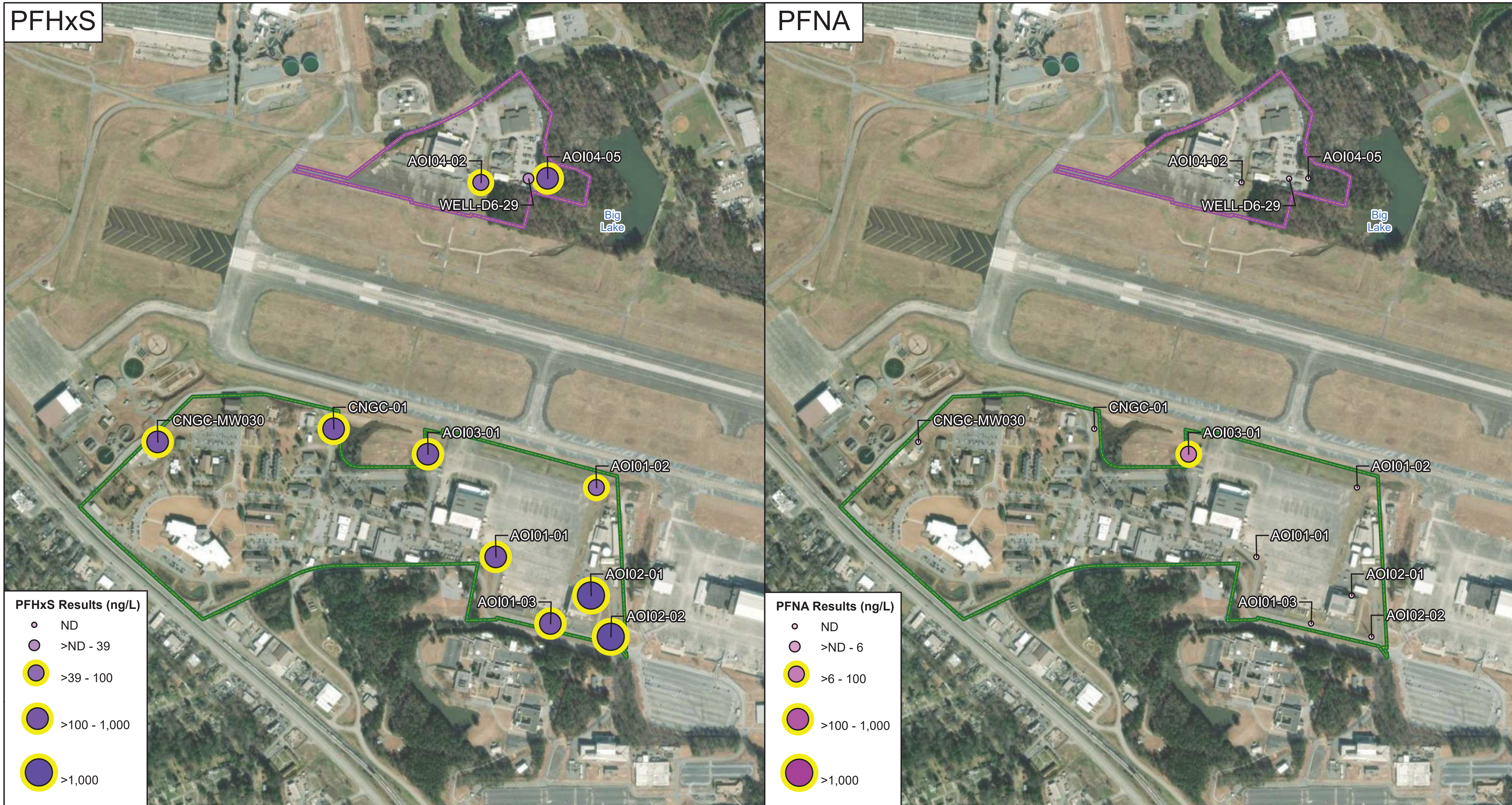
Exceedances of the OSD SL are depicted with a yellow halo.

N

PFOA, PFOS, and PFBS Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-6



CLIENT	ARNG			
PROJECT	Site Inspection at Clay National Guard Center, GA			
REVISED	8/26/2022	GIS BY	MS	8/26/2022
SCALE	1:9,000	CHK BY	JW	8/26/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/26/2022

Legend

- Facility Boundary
- Fomer ARNG AASF Boundary

0 375 750 1,500 Feet

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

N

PFHxS and PFNA Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-7

THIS PAGE INTENTIONALLY BLANK

7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented in **Figure 7-1** through **Figure 7-4**. 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 an RI or no action at this time is based on the comparison of the SI analytical results for the relevant compounds to the SLs.

In general, the potential routes of exposure to the relevant compounds are ingestion and inhalation. Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the facility include site workers (e.g., facility staff and visiting soldiers), construction workers, 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 AOI 1 through AOI 4 based on the aforementioned criteria.

7.1.1 AOI 1

Hangar 1 previously contained a fire suppression system that used 3% AFFF concentrate. The fire suppression system has been disabled, and the AFFF tanks were removed from the hangar during winter 2020 intact with their AFFF contents. The tanks were transported from Hangar 1 to a hazardous waste storage building on the southeastern corner of the ramp area. The wash rack near Hangar 1 currently drains to the industrial WWTP and then to the sanitary WWTP. There are no known releases of AFFF at AOI 1, but undocumented releases are possible as a result of AFFF storage.

PFOA, PFOS, and PFHxS were detected below the SLs in surface soil at AOI 1; PFBS and PFNA were not detected. Therefore, ground-disturbing activities could potentially result in site worker and future construction worker exposure to constituents in soil via inhalation of dust or ingestion of surface soil. PFOS, PFBS, and PFHxS were also detected below the SLs in subsurface soil. Therefore, ground-disturbing activities could potentially result in future construction worker exposure to constituents in soil via ingestion of subsurface soil. No current construction activities are occurring at AOI 1. The CSM for AOI 1 is presented in **Figure 7-1**.

7.1.2 AOI 2

AFFF was released from the Hangar 300 fire suppression system twice in the early to mid-2000s, prior to GAARNG assuming occupancy of the building. During both releases, AFFF was released in the hangar, pushed onto the ramp to the west, then north and east around the hangar, and ultimately into the retention basin east of Hangar 300. The retention basin contains a storm drain that discharges into Poorhouse Creek.

PFOA, PFBS, PFHxS, and PFNA were detected below the SLs, and PFOS was detected above the SL in surface soil at AOI 2. Therefore, ground-disturbing activities could potentially result in site worker and future construction worker exposure to constituents in soil via inhalation of dust or ingestion of surface soil. PFOS was detected above the SL and PFOA, PFBS, and PFHxS were detected below the SLs, and in subsurface soil at AOI 2. Therefore, ground-disturbing activities could also potentially result in future construction worker exposure to constituents in soil via ingestion of subsurface soil. No current construction activities are occurring at AOI 2. The CSM for AOI 2 is presented in **Figure 7-2**.

7.1.3 AOI 3

Hangar 312 contains a fire suppression system supplied 3% AFFF low expansion foam. The AFFF tank and pumps that supply the fire suppression system are housed in a room within the hangar that contains a floor drain that drains to the industrial WWTP and then the sanitary WWTP. During the PA site visit, evidence of corrosion down the side of the tank was observed, and the gasket between the tank and the outline piping appeared to have been replaced with an ill-fitting gasket that stuck out on the sides.

PFOA, PFBS, PFHxS, and PFNA were detected below the SLs, and PFOS was detected above the SL in surface soil at AOI 3. Therefore, ground-disturbing activities could potentially result in site worker and future construction worker exposure to constituents in soil via inhalation of dust or ingestion of surface soil. PFOA, PFOS, and PFHxS were detected below SLs in subsurface soil at AOI 3. Therefore, ground-disturbing activities could also potentially result in future construction worker exposure to constituents in soil via ingestion of subsurface soil. No current construction activities are occurring at AOI 3.

In the area potentially upgradient of AOI 3, PFOS and PFHxS were detected below the SLs in surface soil, and PFHxS was detected below the SL. The CSM for AOI 3 is presented in **Figure 7-3**.

7.1.4 AOI 4

There are no documented releases of AFFF at Building 555, the former AASF. The building did not have a fire suppression system; however, historical aerial photographs show evidence of portable fire extinguishers that could have contained AFFF on the ramp. If AFFF-containing fire extinguishers were present on the ramp area at AOI 4, then undocumented releases could have occurred to the ground surface.

PFOA, PFOS, PFHxS, and PFNA were detected below the SLs in surface soil at AOI 4; PFBS was not detected. Therefore, ground-disturbing activities could potentially result in site worker and construction worker exposure to constituents in soil via inhalation of dust or ingestion of surface soil. PFOA, PFOS, and PFHxS were detected below the SLs in subsurface soil at AOI 4. Therefore, ground-disturbing activities could also potentially result in construction worker exposure to constituents in soil via ingestion of subsurface soil. Construction activities were observed at AOI 4 during SI field activities. The CSM for AOI 4 is presented in **Figure 7-4**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

PFOA and PFHxS were detected above their respective SLs, and PFBS was detected below its SL in groundwater samples collected at AOI 1. PFOS and PFNA were not detected in groundwater. No potable water wells are located at the facility. Drinking water for the Clay NGC is supplied by the Air Force Plant 6 drinking water distribution, which is supplied by the Cobb County-Marietta Water Authority. The Cobb County-Marietta Water Authority uses the Chattahoochee River and Lake Allatoona as its drinking water sources (Marietta Water, 2017). As a result, the ingestion exposure pathway for site workers to groundwater is considered incomplete. Depths to water at AOI 1 measured in July 2021 during the SI ranged from 15.36 to 22.42 feet bgs. Conservatively, it is anticipated that intrusive construction activities may reach groundwater at these depths. Therefore, groundwater may be encountered during construction activities, and the ingestion exposure pathway for future construction workers is considered potentially complete. Groundwater at AOI 1 flows southeast towards the facility boundary. There are no known drinking water wells downgradient from AOI 1; therefore, the ingestion exposure pathway for groundwater is considered incomplete for off-facility residents. The CSM for AOI 1 is presented in **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, PFBS, and PFHxS were detected above their respective SLs in groundwater samples collected at AOI 2. PFNA was not detected in groundwater. As described in Section 7.2.1, drinking water is provided to the facility and the exposure pathway for site workers to groundwater is considered incomplete. Depths to water at AOI 2 measured in July 2021 during the SI ranged from 13.68 to 16.96 feet bgs. Therefore, groundwater may be encountered during construction activities, and the ingestion exposure pathway for future construction workers is considered potentially complete. Groundwater at AOI 2 flows southeast towards the facility boundary. There are no known drinking water wells downgradient from AOI 2; therefore, the ingestion exposure pathway for groundwater is considered incomplete for off-facility residents. The CSM for AOI 2 is presented in **Figure 7-2**.

7.2.3 AOI 3

PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs, and PFBS was detected below its SL in groundwater samples collected at AOI 3. As described in Section 7.2.1, drinking water is provided to the facility and the exposure pathway for site workers to groundwater is considered incomplete. Depths to water at AOI 3 and its potentially upgradient area measured in July 2021 during the SI ranged from 10.52 to 32.73 feet bgs. Therefore, groundwater may be encountered during construction activities, and the ingestion exposure pathway for future construction workers is considered potentially complete. Groundwater flow at AOI is to the west towards a facility retention basin. There are no known potable wells downgradient from AOI 3; therefore, the ingestion exposure pathway for groundwater is considered incomplete for off-facility residents.

PFOA, PFOS, and PFHxS were also detected above their respective SLs, and PFBS was detected below its SL in the area potentially upgradient of AOI 3. The CSM for AOI 3 is presented in **Figure 7-3.**

7.2.1 AOI 4

PFOA, PFOS, and PFHxS were detected in above their respective SLs, and PFBS was detected below its SL in groundwater samples collected at AOI 4. PFNA was not detected in groundwater. As described in Section 7.2.1, drinking water is provided to the facility and the exposure pathway for site workers to groundwater is considered incomplete. Depth to water at AOI 4 measured in July 2021 and September/October 2021 during the SI ranged from 23.81 to 29.76 feet bgs. Therefore, groundwater is not expected to be encountered during construction activities, and the ingestion exposure pathway for future construction workers is considered incomplete. Groundwater at AOI 4 flows east towards Big Lake There are no known potable wells downgradient from AOI 4; therefore, the ingestion exposure pathway for groundwater is considered incomplete for off-facility residents. The CSM for AOI 4 is presented in **Figure 7-4**.

7.3 Surface Water and Sediment Exposure Pathway

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

7.3.1 AOI 1

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. AOI 1 includes the Hangar 1 area, ramp area, and wash rack. The wash rack currently drains to the industrial WWTP and then to the sanitary WWTP. Surface water runoff on the main ramp is divided between the northern and southern halves of the ramp area. On the northern half, runoff flows north and off of the ramp into a drainage ditch that channels runoff east and then south towards the retention basin in the southeastern corner of the facility. Surface water runoff on the southern half of the ramp flows south and east towards the retention basin. The retention basin includes a storm drain that discharges into Poorhouse Creek, which ultimately discharges to the Chattahoochee River. The Chattahoochee River is 6 miles to the east of the facility.

Because PFOA, PFOS, PFBS, and PFHxS were detected in soil; and PFOA, PFBS, and PFHxS were detected in groundwater, it is possible that those compounds may have migrated from soil and groundwater at AOI 1 to the retention basin in the southeast corner of the facility’s southern property via groundwater discharge or surface water runoff. Therefore, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. Due to potential recreational use of Poorhouse Creek, the surface water and sediment ingestion exposure pathway for off-facility recreational users is also considered potentially complete. The CSM for AOI 1 is presented in **Figure 7-1**.

7.3.2 AOI 2

Surface water runoff at AOI 2 flows into retention basin in the southeastern corner of the facility and continues southeast off-facility to Poorhouse Creek. Because PFOA, PFOS, PFBS, PFHxS and PFNA were detected in soil and PFOA, PFOS, PFBS, and PFHxS were detected in groundwater, it is possible that those compounds may have migrated from soil and groundwater to Poorhouse Creek via groundwater discharge or stormwater runoff. Therefore, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. The surface water and sediment ingestion exposure pathway for off-facility recreational users of Poorhouse Creek is also considered potentially complete. The CSM for AOI 2 is presented in **Figure 7-2**.

7.3.3 AOI 3

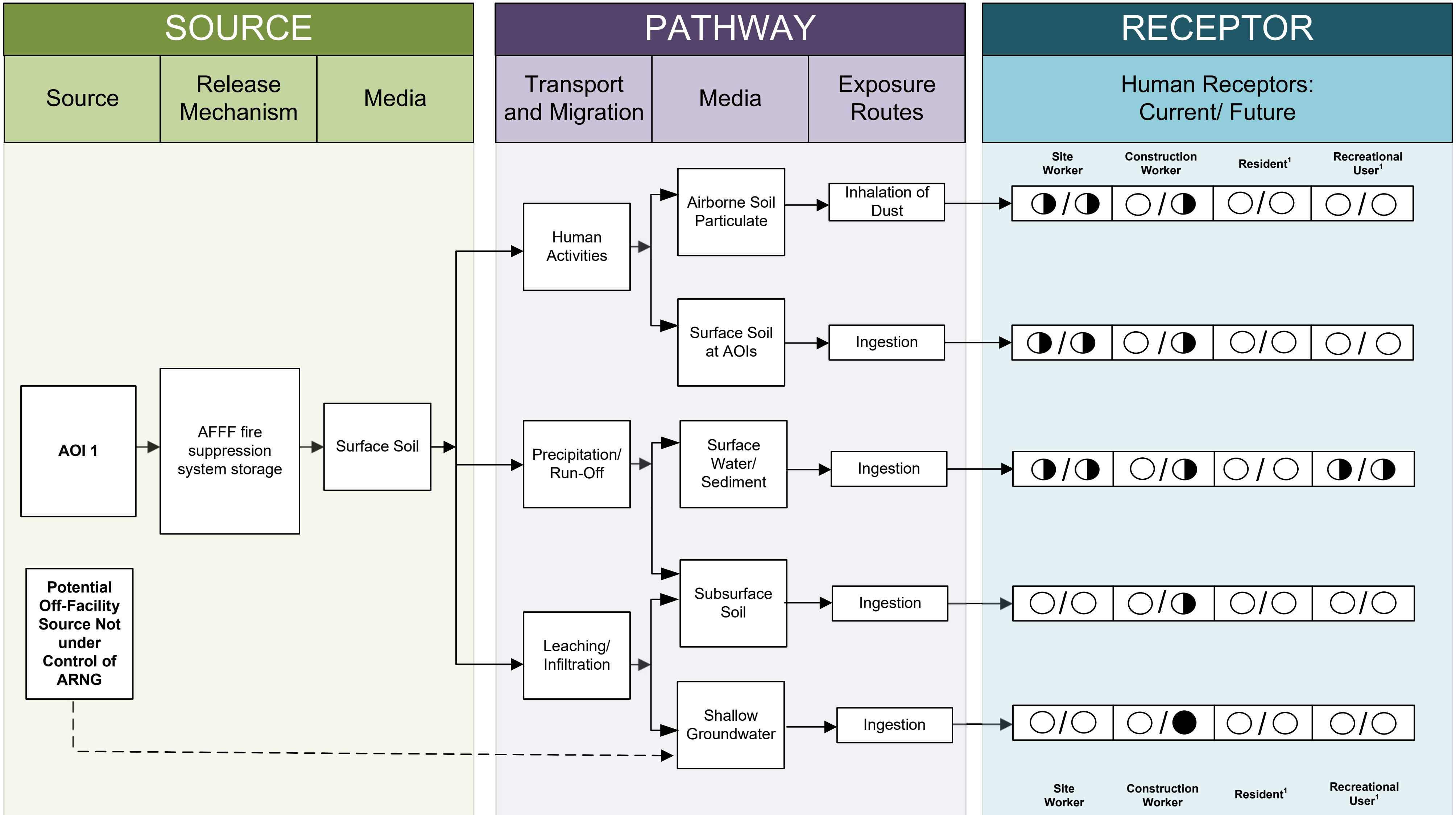
Surface water runoff at AOI 3 flows west towards the retention basin located behind Hangar 312. Runoff entering this retention basin predominantly flows north via an underground pipe beneath the runway and discharges into Big Lake, a water body located on Dobbins ARB property. Ultimately, Big Lake drains to Rottenwood Creek.

Because PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil and groundwater at AOI 3 and its potentially upgradient area, it is possible that those compounds may have migrated from soil and groundwater to the drainage retention basin and ultimately to Big Lake via groundwater discharge or stormwater runoff. Therefore, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. Because surface water flows from AOI 3 to Rottenwood Creek, which may be used for recreational activities, the surface water and sediment ingestion exposure pathway for off-facility recreational users is also considered potentially complete. The CSM for AOI 3 is presented in **Figure 7-3**.

7.3.4 AOI 4

Surface water runoff at AOI 4 flows to the body of water east of the former AASF known as Big Lake, which drains to Rottenwood Creek via the Dobbins Spill Pond 4. Because PFOA, PFOS, PFHxS, and PFNA were detected in soil, and PFOA, PFOS, PFBS, and PFHxS were detected in groundwater, it is possible that those compounds may have migrated from soil and groundwater to Big Lake and to Rottenwood Creek via groundwater discharge and surface water runoff. Therefore, the surface water and sediment ingestion exposure pathway for site workers and construction workers is considered potentially complete. Because Rottenwood Creek may be used for recreational purposes, the surface water and sediment ingestion exposure pathway for off-facility recreational users is also considered potentially complete. The CSM for AOI 4 is presented in **Figure 7-4**.

THIS PAGE INTENTIONALLY BLANK



LEGEND

Flow-Chart Stops

Flow-Chart Continues

Partial / Possible Flow

Incomplete Pathway

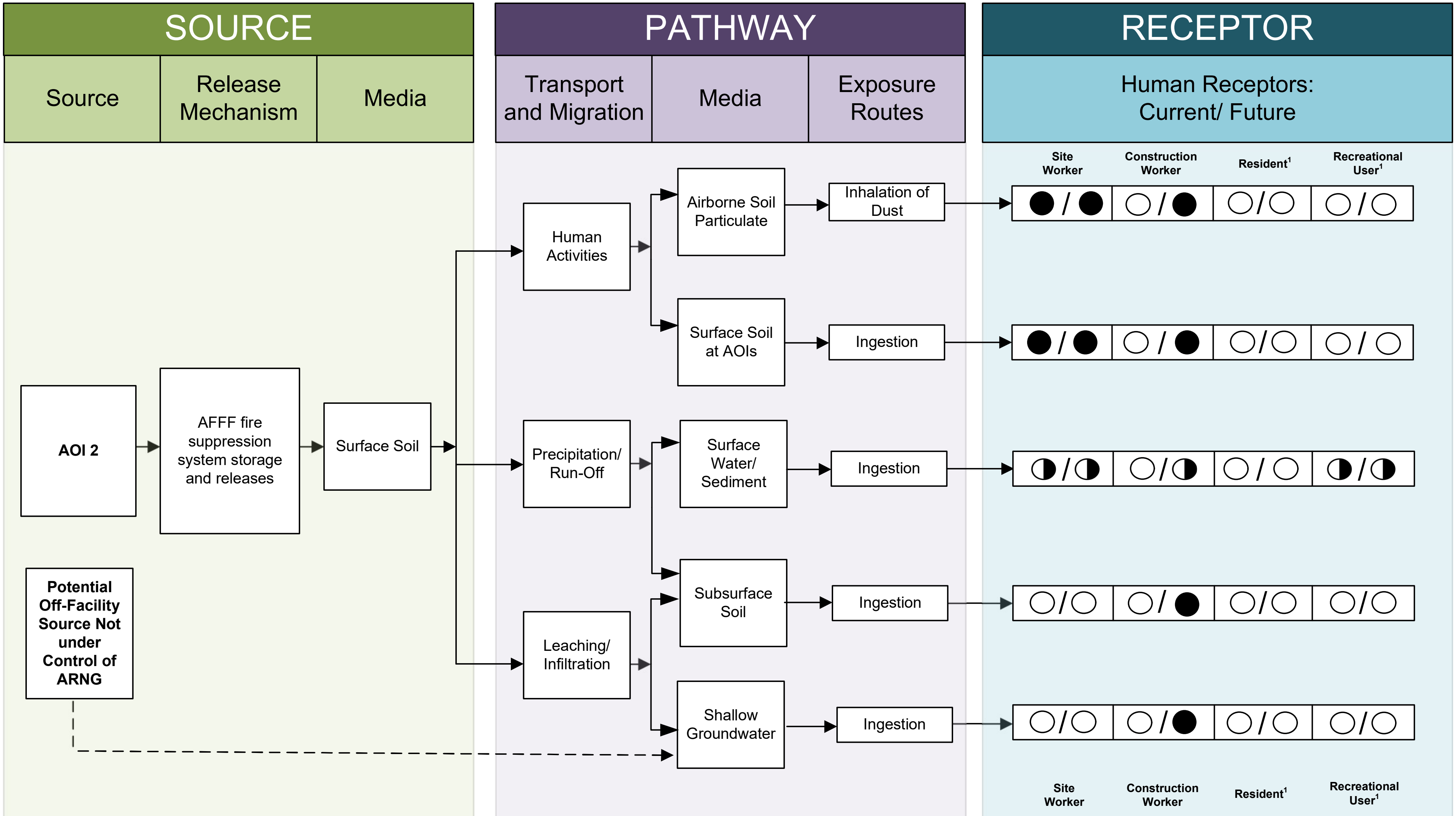
Potentially Complete Pathway

Potentially Complete Pathway with Exceedance of SL

NOTES

1. The resident and recreational users refer to off-site receptors.

Figure 7-1
Conceptual Site Model, AOI 1
Clay NGC



LEGEND

Flow-Chart Stops

Flow-Chart Continues

Partial / Possible Flow

Incomplete Pathway

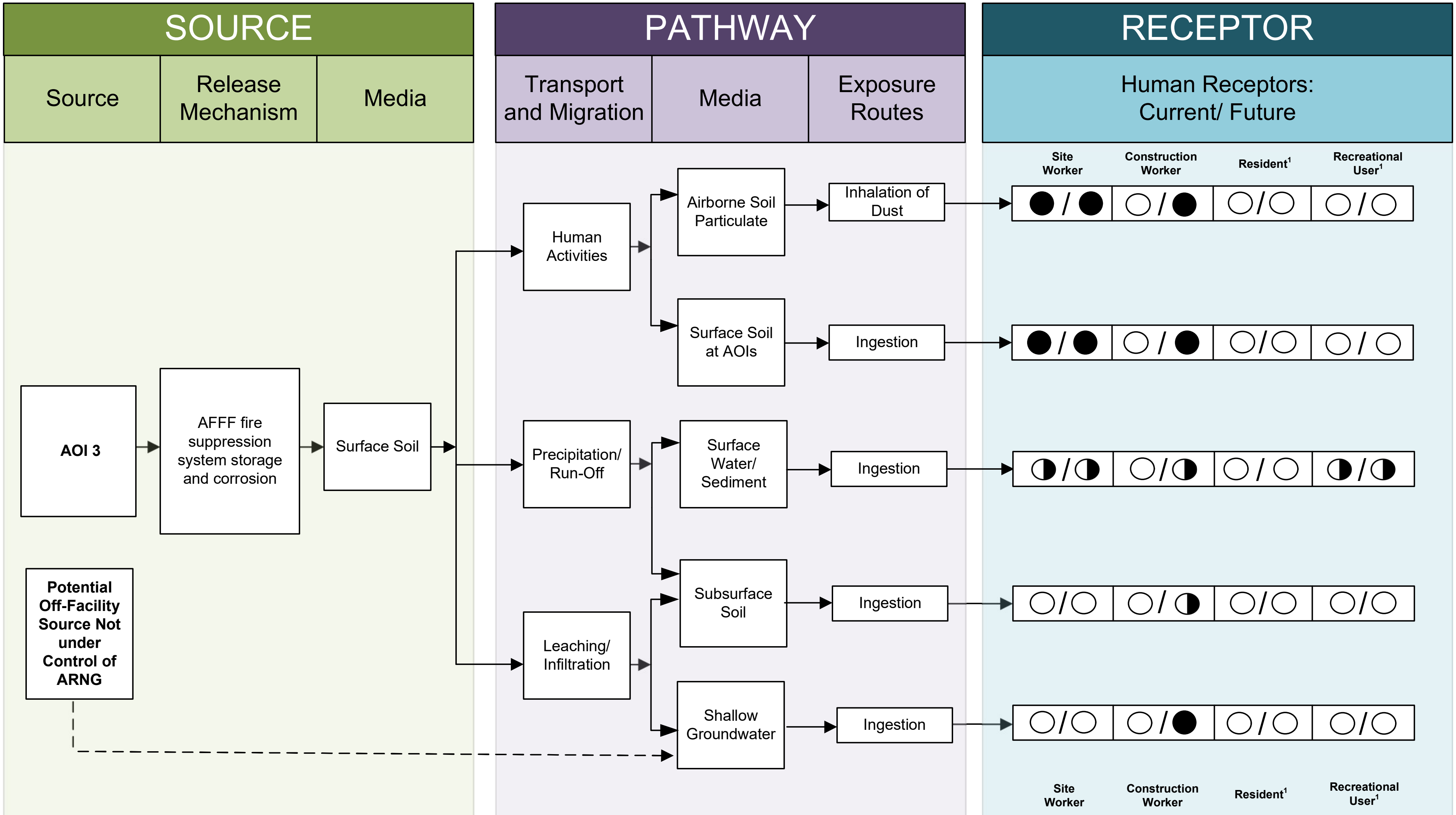
Potentially Complete Pathway

Potentially Complete Pathway with Exceedance of SL

NOTES

1. The resident and recreational users refer to off-site receptors.

Figure 7-2
Conceptual Site Model, AOI 2
Clay NGC



LEGEND

Flow-Chart Stops

Flow-Chart Continues

Partial / Possible Flow

Incomplete Pathway

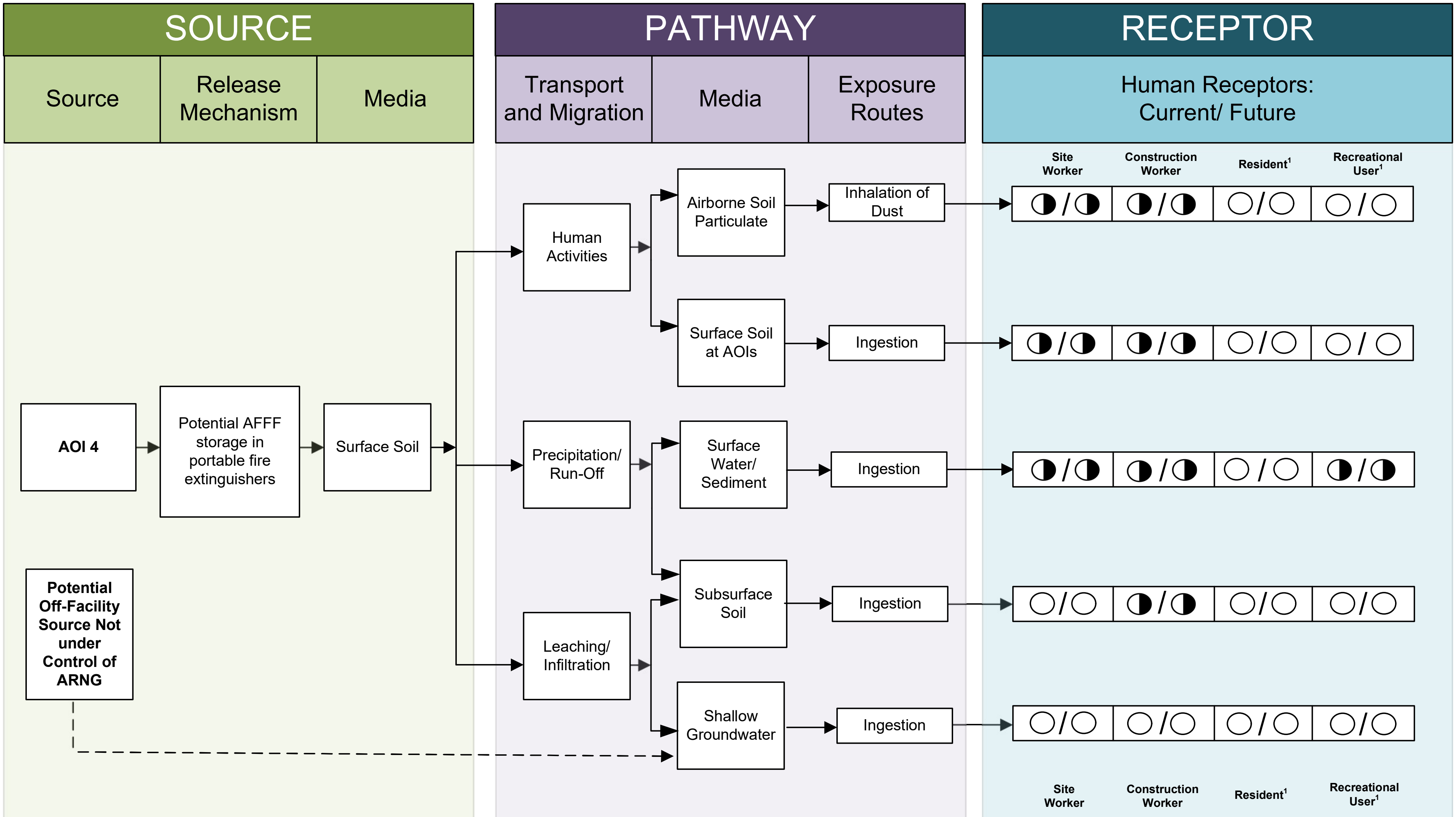
Potentially Complete Pathway

Potentially Complete Pathway with Exceedance of SL

NOTES

1. The resident and recreational users refer to off-site receptors.

Figure 7-3
Conceptual Site Model, AOI 3
Clay NGC



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.

Figure 7-4
Conceptual Site Model, AOI 4
Clay NGC

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 during two mobilizations: the first mobilization took place on 27 May 2021 and 12 July through 16 July 2021, while the second mobilization took place from 29 September through 1 October 2021 and 20 October 2021. Activities during the first mobilization consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying at the Clay NGC southern property. Permission to work on the former GAARNG AASF required a signed Dobbins ARB Civil Engineering Dig permit, which was not received until 27 July 2021. As a result, a second mobilization was necessary to complete direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying at AOI 4. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a), except as previously noted in **Section 5.9**.

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.

- Thirty (30) soil samples from 11 boring locations;
- Eleven (11) grab groundwater samples from nine temporary well locations and two permanent monitoring wells;
- Twenty one (21) QA/QC samples.

An SI is conducted when the PA determines an AOI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. Additionally, the 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 is warranted in an RI for AOI 1: Hangar 1/Ramp Area, AOI 2: Hangar 300, AOI 3: Hangar 312 and AOI 4: Building 555. Based on the CSMs developed and revised in light of the SI findings, the pathway for exposure to drinking water receptors from historical DoD activities at AOI 1 through AOI 4 is considered incomplete. Sample analytical concentrations collected during the SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1:
    - PFOA and PFHxS in groundwater exceeded their respective SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 99.2 ng/L at location AOI01-01. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 317 ng/L at

location AOI01-03. PFBS was detected below its SL, and PFOS and PFNA were not detected. Based on the results of the SI, further evaluation of AOI 1 is warranted in an RI.

- The detected concentrations of PFOA, PFOS, PFBS, and PFHxS in soil at AOI 1 were below their respective SLs. PFNA was not detected.

- At AOI 2:
  - PFOA, PFOS, PFBS, and PFHxS in groundwater exceeded their respective SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 3,650 ng/L at AOI02-01. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 320,000 J ng/L at location AOI02-01. PFBS exceeded the SL of 601 ng/L, with a maximum concentration of 9,430 J- ng/L at location AOI02-01. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 63,100 ng/L at location AOI02-01. PFNA was not detected. Based on the results of the SI, further evaluation of AOI 2 is warranted in an RI.
  - PFOS in surface soil exceeded the SL of 13 µg/kg, with a maximum concentration of 43.9 J µg/kg at location AOI02-02. PFOS in subsurface soil also exceeded the SL of 160 µg/kg, with a maximum concentration of 609 µg/kg at location AOI02-02. The detected concentrations of PFOA, PFBS, PFHxS, and PFNA in soil were below their respective SLs.

- At AOI 3:
  - PFOA, PFOS, PFHxS, and PFNA in groundwater exceeded their respective SLs. PFOA exceed the SL of 6 ng/L, with a maximum concentration of 1,590 ng/L at location AOI03-01. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 468 ng/L at AOI03-01. PFHxS exceed the SL of 39 ng/L, with a maximum concentration of 329 ng/L at AOI03-01. PFNA exceed the SL of 6 ng/L, with a maximum concentration of 16.5 ng/L at location AOI03-01. PFBS was detected below its SL at AOI 3. Additionally, PFOA, PFOS, and PFHxS exceeded their respective SLs at the potentially upgradient locations CNGC-01 and CNGC-MW030. PFOA, PFOS, and PFHxS exceeded the SLs at both upgradient locations, with maximum concentrations of 27.9 ng/L at CNGC-MW030, 56.3 ng/L at CNGC-01, and 433 ng/L at CNGC-MW030, respectively. PFBS was detected below its SL, and PFNA was not detected at the potentially upgradient locations. Based on the results of the SI, further evaluation of AOI 3 is warranted in an RI.
  - PFOS in surface soil exceeded the SL of 13 µg/kg at AOI03-01, with a concentration of 14.4 µg/kg. The detected concentrations of PFOA, PFBS, PFHxS, and PFNA in soil were below their respective SLs.

- At AOI 4:
  - PFOA, PFOS, and PFHxS in groundwater exceeded their respective SLs. PFOA exceed the SL of 6 ng/L, with a maximum concentration of 64.1 ng/L at location AOI04-05. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 138 ng/L at AOI04-02. PFHxS exceed the SL of 39 ng/L with a maximum concentration of 121 ng/L at location AOI04-05. PFBS was detected below its SL, and PFNA was not detected. Based on the results of the SI, further evaluation of AOI 4 is warranted in an RI.
  - The detected concentrations of PFOA, PFOS, and PFHxS in soil at AOI 4 were below their respective SLs. PFBS and PFNA were not detected.

Due to the convergence of groundwater flow on the retention basin located west of Hangar 312, it is uncertain whether locations CNGC-01 and CNGC-MW030 are upgradient of AOI 3. Based on groundwater flow, these locations may not be representative of areas unaffected by potential releases at Clay NGC.

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

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

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Hangar 1/Ramp Area	◐	●	●	Proceed to RI
2	Hangar 300	●	●	●	Proceed to RI
3	Hangar 312	●	●	●	Proceed to RI
4	Building 555	◐	●	●	Proceed to RI

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

THIS PAGE INTENTIONALLY BLANK

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, Lucius D. Clay National Guard Center, Georgia*. February.

AECOM. 2021a. *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Lucius D. Clay National Guard Center, Georgia, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide.* April.

AECOM. 2021b. *Final Site Safety and Health Plan, General Lucius D. Clay National Guard Center, Georgia, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide*. July.

Aerostar SES LLC. 2018a. *Final Site Inspections Report of Fire Fighting Foam Usage at Air Force Plant 6 Cobb County, Georgia.* October.

Aerostar SES LLC. 2018b. *Final Site Inspections Report of Fire Fighting Foam Usage at Dobbins Air Reserve Base Cobb County, Georgia.* October.

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

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.

Federal Emergency Management Agency. 2013. *Flood Insurance Study for Cobb County, Georgia.* March.

Georgia Department of Natural Resources. 1977. *Geologic Map of Georgia*. Geologic and Water Resources Division, Georgia Geological Survey.

Guelfo, J.L. and Higgins, C.P. 2013. *Subsurface Transport Potential of Perfluoroalkyl Acids at 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.

Marietta Water. 2017. *Annual Water Quality Report.* January.

Stell Environmental Enterprises. 2012. *Final Environmental Assessment Addressing a Proposed Commissary at Dobbins Aire Reserve Base, Georgia*. November.

Southern Georgia Regional Commission. 2022. *WelSTROM, Well and Septic Tank Referencing and Online Mapping***.** https://www.welstrom.com/. May.

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, 2022. *Environmental Conservation Online System*. https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=13067. September.

USGS. 2022. *USGS Water-Quality Daily Data for Georgia.* https://waterdata.usgs.gov/ga/nwis/qw. May.

World Climate. 2022. Available at http://www.worldclimate.com/cgi-bin/data.pl?ref=N33W084+1200+0051089G2 (Accessed July 1, 2022).

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.