FINAL
Site Inspection Report
Camp Smith Training Site
Cortlandt, New York

Perfluorooctanesulfonic Acid (PFOS) and
Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

June 2022

Prepared for:

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UNCLASSIFIED

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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonate
8:2 FTS	8:2 Fluorotelomer sulfonate
ACS	Admiral Conservation Services Underground Solutions
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AFSA	Academy of Fire Science Annex
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	below ground surface
Cascade	Cascade Technical Services, LLC
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFMO	Construction and Facilities Management Officer
CoC	chain of custody
CSM	conceptual site model
CSMS	Combined Support Maintenance Shop
DA	Department of the Army
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct push technology
DQI	data quality indicator
DQO	data quality objective
DUA	data usability assessment
DVR	data validation report
EIS	extraction internal standards
ELAP	Environmental Laboratory Approval Program
EM	Engineers Manual
ERB	equipment rinsate blank
FedEx	Federal Express
FRB	field reagent blank
gpm	gallons per minute
GPR	ground-penetrating radar
HA	Health Advisory
HDPE	high-density polyethylene
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control sample

LCSD	laboratory control sample duplicate
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
mph	miles per hour
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
NOAA	National Oceanic and Atmospheric Administration
NYARNG	New York Army National Guard
NYCRR	New York Codes, Rules, and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDMNA	New York State Department of Military and Naval Affairs
ORP	oxidation-reduction potential
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic 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
RPD	relative percent differences

SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCRA	Time Critical Removal Action
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
UCMR 3	Unregulated Contaminant Monitoring Rule
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
VSI	visual site inspection
WWTP	wastewater treatment plant

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Executive Summary

The Army National Guard (ARNG) G9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs). An SI was completed at the Camp Smith Training Site (Camp Smith) in Cortlandt, New York. Camp Smith will also be referred to as the “facility” throughout this document.

Camp Smith is in Cortlandt, Westchester County, New York. Camp Smith borders Putnam County to the north and the City of Peekskill to the southeast; the Hudson River lies west and south of Camp Smith. Camp Smith can be accessed directly from New York State (NYS) Route 6. Bear Mountain Bridge Road runs along the facility on the western and southern borders, and the United States (US) Military Academy at West Point is located across the Hudson River, approximately 10 miles north (NYS Department of Military and Naval Affairs [NYSDMNA], 2018).

Camp Smith comprises roughly 1,600 acres of training property for the New York ARNG (NYARNG). Approximately 94 percent of Camp Smith is rugged mountainous terrain, while the remaining 95-acre cantonment area consists of outdoor ranges, training simulation facilities, administrative buildings and a maintenance shop sitting on a plateau overlooking the Hudson River. Camp Smith has no air support facilities. Camp Smith is approximately 30 miles north of New York City and approximately 0.75 miles east of the Hudson River (NYSDMNA, 2018). The SI field activities were conducted in two mobilizations. The first mobilization included soil, grab groundwater sampling from temporary monitoring wells, surface water and sediment sampling from 9 to 12 December 2019. The second mobilization included the collection of soil and groundwater samples from permanent monitoring wells from 19 to 28 July 2021.

To fulfill the project Data Quality Objectives set forth in the approved SI Quality Assurance Project Plan Addenda (AECOM, 2019b; AECOM, 2021), samples were collected and analyzed for a subset of 18 PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual 5.3 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.8** of this Report.

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS.

Additionally, the US Environmental Protection Agency (USEPA) issued drinking water lifetime Health Advisories (HAs) for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient. The SLs are presented on **Table ES-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil, groundwater, sediment, and surface water contain or do not contain the 18 PFAS analyzed within the boundaries of the facility.

Sample chemical analytical concentrations were compared against the project SLs as described in **Table ES-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1, PFOA in groundwater exceeded the SL of 40 nanograms per liter (ng/L), with a maximum concentration of 58.4 ng/L at location AOI 1-GW3. Based on the results of the SI, further evaluation of AOI 1 is warranted in a Remedial Investigation (RI).
- At AOI 2 and 3, PFOS in groundwater exceeded the SL of 40 ng/L, with a maximum concentration of 147 ng/L at location CS-MW003S. Based on the results of the SI, further evaluation of AOI 2 and 3 is warranted in a RI.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs.
- PFOA, PFOS, and PFBS were not detected in surface water. PFOA and PFOS were detected in sediment samples. There are no established SLs for sediment; therefore, these results are presented for informational purposes only.

Table ES-2 summarizes the SI results for soil and groundwater. Based on the conceptual site models developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors caused by DoD activities at or adjacent to the facility.

Table ES-3 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the findings of this SI, ARNG will program and plan for an RI at areas exceeding OSD screening values, pending the availability of resources and assessed risk to human health.

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

Analyte	Residential (Soil) (µg/kg)[a,b] 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b] 2-15 feet bgs	Tap Water (Groundwater) (ng/L)[a,b]	USEPA HA (Groundwater representative of Drinking Water) (ng/L)[c,d]
PFOA	130	1,600	40	70
PFOS	130	1,600	40	70
PFBS	1,900	25,000	600	-

Notes:

a.) Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 September 2021.

b.) USEPA. 2016a. Drinking Water Health Advisory (HA) for Perfluorooctanoic Acid (PFOA). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-005. May 2016. / USEPA. 2016b. Drinking Water HA for Perfluorooctane Sulfonic Acid (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

c.) USEPA HAs apply to the PFOA and PFOS concentrations individually or combined.

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Former Fire Pit	◐	●	NA
2	Former Fire Station	◐	●	NA
3	Former Airfield	◐	●	NA
3	Former NYS AFSA	◐	●	NA

Legend:
N/A = not applicable
AFSA = Academy of Fire Science Annex
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table ES-3: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Former Fire Pit	Exceedances of the OSD screening levels in groundwater at AOI 1. No exceedances of OSD screening levels in soil.	Proceed to RI
2	Former Fire Station	Exceedances of the OSD screening levels in groundwater at AOI 2. No exceedances of OSD screening levels in soil.	Proceed to RI
3	Former Airfield	Exceedances of the OSD screening levels in groundwater at AOI 3. No exceedances of OSD screening levels in soil.	Proceed to RI
3	Former NYS AFSA	Exceedances of the OSD screening levels in groundwater at AOI 3. No exceedances of OSD screening levels in soil.	Proceed to RI

Legend:
AFSA = Academy of Fire Science Annex
NYS = New York State

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1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites, ARNG Installations, Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at the Camp Smith Training Site in Cortlandt, New York. The Camp Smith Training Site (or Camp Smith) is also referred to as the "facility" throughout this document.

The SI project elements were performed in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 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 including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and polyfluoroalkyl substances (PFAS). The term PFAS is used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

A PA was performed at Camp Smith (AECOM, 2019a) that identified four potential PFAS release areas at the facility, which were grouped into three Areas of Interest (AOIs). The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

As stated in the *Federal Facilities Remedial Site Inspection Summary Guide* (USEPA, 2005), an SI has five goals:

1. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment;
2. Determine the potential need for a removal action;
3. Collect or develop data to evaluate potential release;
4. Collect data to better characterize the release for more effective and rapid initiation of a Remedial Investigation (RI), if determined necessary; and
5. Collect data to determine whether the release is more than likely the result of activities associated with the DoD.

In addition to the USEPA-identified goals of an SI, the ARNG SI also identifies whether there are potential off-facility PFAS sources.

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2. Facility Background

2.1 Facility Location and Description

Camp Smith is in Cortlandt Manor, Westchester County, New York (**Figure 2-1**). Camp Smith borders Putnam County to the north, and the City of Peekskill to the southeast. The Hudson River lies west and south of Camp Smith. Camp Smith can be accessed directly from New York State (NYS) Route 6. Bear Mountain Bridge Road runs along the facility on the western and southern borders, and the US Military Academy at West Point is located across the Hudson River, approximately 10 miles north (NYS Department of Military and Naval Affairs [NYSDMNA], 2018).

Camp Smith comprises roughly 1,600 acres of training property for the New York ARNG (NYARNG). Approximately 94% of Camp Smith is rugged, mountainous terrain, while the remaining 95-acre cantonment area consists of outdoor ranges, training simulation facilities, administrative buildings, and maintenance shops sitting on a plateau overlooking the Hudson River. Camp Smith has no air support facilities. Camp Smith is approximately 30 miles north of New York City and approximately 0.75 miles east of the Hudson River (NYSDMNA, 2018).

2.2 Facility Environmental Setting

Westchester County is a predominately suburban area largely consisting of rolling hills in the Hudson Valley region of New York. The terrain of the facility is consistent with the majority of Westchester County. The county has a total of 430.5 square miles. The nearest residential properties to the facility are along the northern property line. The Camp Smith trail head is approximately 0.5 miles to the west of the facility. Iona Island and the Iona Island Component Hudson River National Estuarine Research Reserve lie two miles to the west of the facility, across the Hudson River. The site topography of Camp Smith is shown on **Figure 2-2**.

2.2.1 Geology

Camp Smith is east of the Hudson River, within the eastern geological region of the Hudson Highlands formation (NYARNG, 2015), a segment of the New England Uplands physiographic province. This region forms part of the Reading Prong, an extension of the Ridge and Valley province extending from Pennsylvania, through northern New Jersey and southern New York, and ending in Connecticut. The Hudson Highlands were formed as a result of periods of mountain building during Precambrian, Ordovician, and Devonian periods. These mountains were consequently scoured and leveled by glaciation events during the Pleistocene period.

Most of the 95-acre cantonment area lies in a shallow valley outwash plain. The majority of both the surface and underlying material of the northern section of Camp Smith are Pleistocene age unconsolidated glacial deposits, recent floodplain deposits, and lacustrine delta. These sediments consist of silts underlain by fine sands and gravels of variable thicknesses ranging between 40 to nearly 200 feet (Berkley et al., 1919; Isachsen et al., 2000). The Pleistocene age deposits overly Precambrian bedrock consisting of hornblende gneiss, which comprises two-thirds of all rock found at Camp Smith. The area geology is presented in **Figure 2-3**.

A previous NYARNG subsurface investigation indicated that the southern portion of Camp Smith contains intermixed layers of unconsolidated sand, silt, and clay, with variable amounts of gravel, peat, and organic clay (NYARNG, 2015). The majority of this southern portion is poorly drained Ipswich mucky peat (69.9 percent [%]), well-drained Riverhead loam (24.8%), and somewhat poorly drained Udorthents (1.4%). The topography in the southern portion of the facility (at the Main Gate) drops 80 to 100 feet in elevation compared to the rest of the cantonment area. As a result, the overburden is thinner here and the lithology is reflective of low energy river and wetland deposits from the adjacent Hudson River and Annsville Creek.

On the southernmost boundary of Camp Smith, near the Hudson River, is exposed (or within 3 feet of surface) Precambrian bedrock, which travels north along the western boundary of the training site (Eric et al., 1954). Many of the drinking water wells in the Hudson Valley come from bedrock; however, they do not yield as much as unconsolidated sediments.

2.2.2 Hydrogeology

Based on the USEPA's map of Sole Source Aquifers, a sole source aquifer does not lie beneath Camp Smith. The NYS Department of Environmental Conservation (NYSDEC) *Map of Principal and Primary Aquifers in New York State* indicates that a primary aquifer does not lie beneath the Camp Smith cantonment area (US Geological Survey [USGS], 1998). Unconsolidated aquifers make up over 60 acres of the 95-acre cantonment area. Infiltration of precipitation and runoff is the sole source of recharge for aquifers at Camp Smith (USGS, 1995).

Unconsolidated glacial deposits of thick sand and gravel underlie flood plains and terraces along tributaries to the Hudson River and occupy many valleys (Chazen, 2003), yielding the largest supply to wells in Westchester County. However, more than 70% of the drinking water wells in Westchester County are gneiss or schist bedrock wells with yields averaging 30 gallons per minute (gpm). If limestone is tapped, yields can range from 2 to as much as 450 gpm.

Groundwater in the Camp Smith cantonment area generally flows from north to south, towards the Hudson River (**Figure 2-3**), or towards various creeks and surface water features that run south to the Hudson River. A water quality assessment for groundwater under the influence of surface water was performed at Camp Smith in 2008. The assessment concluded that groundwater at Camp Smith is not influenced by surface water (Ecology and Environment, 2008). Two potable wells in the southern cantonment area of Camp Smith, Wells A and B, supply drinking water to the facility. The wells are located on the edge of the wetland area in the southern portion of Camp Smith. Well A is 80 feet deep, with a screen installed between 65 and 80 feet below ground surface (bgs), and Well B is 100 feet deep, with a screen installed between 82 and 100 feet bgs (NYARNG, 2015). Well logs for these potable wells were not available; however, boring logs from several nearby test borings indicate the top of bedrock ranges from 60 to 90 feet bgs in the general area. It is likely Wells A and B are screened within bedrock.

Borings from the wetland area in a previous NYARNG study indicate a thick organic clay confining unit that separates surface water from the confined aquifer below (NYARNG, 2015); the extent of this clay layer is not known. Wells A and B draw water from the confined aquifer. It is possible that the clay layer thins out and is not present further upgradient in the northern cantonment area. This trend would potentially allow upgradient surface water and groundwater to infiltrate the deeper aquifer, from where groundwater is drawn. One other potentially potable well at Camp Smith is used for lavatory purposes. There are no drinking water fountains connected to this potentially potable well.

Depth to groundwater was observed to range from 0.5 to 22.2 feet bgs in December 2019 during SI Mobilization 1 field activities and 7.19 to 79.76 feet bgs during the July 2021 SI Mobilization 2 field activities. The observed depth to water at CS-MW002D (79.76 feet bgs) is significantly deeper than the other depths to water measured in monitoring wells across the facility. This could be due to semi-confined conditions at depth; however, results from the SI could not confirm. Additional deep borings and monitoring wells would be needed to evaluate the hydrogeology of the facility further. The Groundwater contour maps from Mobilization 1 and 2 are provided in **Figure 2-4** and **Figure 2-5.**

2.2.3 Hydrology

Camp Smith is in the Lower Hudson River watershed, which is a part of the 13,300 square mile Hudson River basin. The main channel of the Hudson River spans nearly 1,000 feet of Camp Smith's western and southern boundaries and forms a deep gorge through the Hudson Highlands in this area (NYARNG, 2015). Surface water resources at Camp Smith include natural streams, rivers, and open water features. Several unnamed intermittent tributaries and numerous vernal pools and wetlands are scattered throughout the facility. Surface runoff from the facility eventually drains into the Hudson River.

Dickiebusch Lake is on the northeastern end of Camp Smith (**Figure 2-6**). Dickiebusch Lake covers approximately 6 acres and is connected to several streams, one of which is Putnam Brook. The headwaters of Putnam Brook flow into the northern-most portion of Dickiebusch Lake, which then drains south bordering Camp Smith on the west before draining into the Annsville Creek impoundment. Annsville Creek borders Camp Smith on the eastern side of the facility before turning southwest to border the southern portion.

The confluence of the Annsville Creek and Putnam Brook at the Annsville Creek impoundment is tidally influenced, as this impoundment is connected to the Hudson River. This small bay/impoundment/tidal wetland was artificially created by a railroad berm.

2.2.4 Climate

The climate at Camp Smith and the surrounding Westchester County is predominantly continental, with an average annual temperature of 52.45 degrees Fahrenheit (°F). Seasonally, temperatures vary from an average summer high of 61.2°F, to average winter lows of 26°F (National Oceanic and Atmospheric Administration [NOAA], 2018). The annual average wind speed is 8.9 miles per hour (mph), although winter months can have gusts up to 35 mph. The total mean annual precipitation is 42.3 inches. July is the driest month, with an average of 2.91 inches of precipitation, while August is the wettest month, with 4.49 inches of precipitation. Short, intense thunderstorms are the major sources of summer precipitation. The average annual snowfall is 55 inches.

2.2.5 Current and Future Land Use

Camp Smith is a private facility with one access point through a guarded security gate, off Route 202, that runs parallel to the Hudson River. The majority of the property is used for military training. Approximately 94% of Camp Smith is rugged, mountainous terrain. The remaining 95-acre cantonment area consists of outdoor ranges, training simulation facilities, administrative buildings, and maintenance shops that sit on a plateau overlooking the Hudson River (NYSDMNA, 2018). There are no current expansion plans for Camp Smith, and in general, the future use of the facility is not expected to change.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

The following species are listed as federally endangered, threatened, proposed, and/or candidate species in Westchester County, New York (US Fish and Wildlife Service [USFWS], 2021):

- **Mammals**: Northern Long-Eared bat, *Myotis septentrionalis* (threatened)**;** Indiana bat, *Myotis sodalist* (endangered)
- **Reptiles**: Bog turtle, *Clemmys muhlenbergii* (threatened)
- **Insects**: Monarch Butterfly, *Danaus plexippus* (candidate)

2.3 History of PFAS Use

Four potential PFAS release areas (grouped into three AOIs) where aqueous film forming foam (AFFF) may have been used or released historically were identified at Camp Smith during the PA (AECOM, 2019a). Overall, due to the lack of institutional knowledge, records, and documentation relating to AFFF, there is an uncertainty regarding the history of PFAS use at Camp Smith. Each potential release area identified in the PA Report identified a level of uncertainty either relating to usage of AFFF-containing PFAS, certainty of the dates of storage or use of AFFF onsite, or any recorded instances of usage of AFFF. At the Former Fire Pit, live fire training exercises occurred with some frequency. Presence or use of AFFF for these exercises could not be confirmed during the PA. At the Former Fire Station, firefighting equipment was mandated to be stored onsite and ready for use during refueling activities, but no firefighting equipment was observed during the PA. It is unknown if any of the training activities that occurred at the former airfield or former NYS Academy of Fire Science Annex (AFSA) included fire training with AFFF or other firefighting foams.

During Mobilization 2, additional information was obtained regarding the onsite wastewater treatment plant (WWTP) and former sludge drying beds. The WWTP and former sludge drying beds are located between the identified AOIs and Wells A and B. The sludge drying beds are no longer in use, but could be a potential secondary source given the presence of PFAS in the potable water source at the facility. There is no evidence to suggest the WWTP is a potential release area. At the time, the team agreed to proceed with finalizing the mobilization and SI phase and to investigate the former sludge drying bed as a potential new source during the RI.

2.4 Other PFAS Investigations

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data, it was indicated that PFAS were detected in the New Windsor Consolidated Water District public water system above the USEPA lifetime Health Advisories (HAs). The New Windsor Consolidated Water District is located approximately 11 miles north of the facility and the source of water for the district is the Ashokan Reservoir in Ulster County, New York, as well, as several potable extraction wells located within New Windsor, New York. As of 5 December 2014, PFOS and PFOA were detected in one of the potable extraction wells at 128 and 21.5 nanograms per liter (ng/L), respectively (USEPA, 2017a).

NYARNG began quarterly sampling of drinking water in April 2017 at Well A and Well B (approximate location shown on **Figure 2-3**). From April 2017 to April 2019, PFAS were consistently detected below the USEPA HA of 70 ng/L in both Well A and Well B. However, in the March 2020 sampling event, the combined concentrations of PFOA and PFOS were above the USEPA HA, at 72.2 ng/L (see **Table 2-1**). Due to this exceedance, the NYARNG took several actions in response. The facility installed granular activated carbon (GAC) filtered drinking water stations and labeled them “safe for drinking and cooking” and labeled unfiltered water points “not safe for drinking and cooking”. Additionally, the facility has communicated through leadership and posted signs informing the full-time workforce, part-time work force, contractors, and visitors of locations where water can be used for drinking and cooking. Quarterly sampling at random filtered drinking water stations has demonstrated values of less than 10 ng/L of PFOS or PFOA. Finally, an upgrade to the water treatment plant has been bid and awarded which will install a GAC filter to remove PFOA and PFOS. The upgraded is expected to be operational in September 2022..

Table 2-1
PFOA and PFOS Results from Wells A and B

Well ID	Date	PFOA	PFOS	Total PFOA+PFOS
Well A	4/24/2017	3.84	43.1	46.94
Well B	4/24/2017	3.48	42.8	46.28
Well A	8/8/2017	3.9	49.9	53.8
Well B	8/8/2017	3.44	49.6	53.04
Well A	11/8/2017	4.35	49.1	53.45
Well B	11/8/2017	3.76	48.3	52.06
Well A	2/20/2018	3.89	46.6	50.49
Well B	2/20/2018	3.47	46.7	50.17
Well A	1/10/2019	5.86	49.5	55.36
Well B	1/10/2019	4.6	47.2	51.8
Well A	4/18/2019	6.38	49.4	55.78
Well B	4/18/2019	4.56	45.4	49.96
Well A	7/11/2019	7.08	56.3	63.38
Well B	7/11/2019	6.16	56.7	62.86
Well A	3/11/2020	7.3	64.9	**72.2**
Well B	3/11/2020	5.35	62	67.35
Well A	4/2/2020	7.34	46.2	53.54
Well B	4/2/2020	6.39	46.6	52.99
Well A	10/21/2020	5.73	43.2	48.93
Well B	10/21/2020	4.88	43.9	48.78
Well A	2/22/2021	6.36	44.6	50.96
Well B	2/22/2021	5.24	42.1	47.34
Well A	3/15/2021	5.78	42.7	48.48
Well B	3/15/2021	5	41.8	46.8
Well A	7/6/2021	5.36	44.3	49.66
Well B	7/6/2021	4.8	44.7	49.5
Well A	10/14/2021	4.84	39.5	44.34
Well B	10/14/2021	4.19	39	43.19
Well A	11/9/2021	5.03	45.9	50.93
Well B	11/9/2021	3.96	45	48.96
Well A	12/10/2021	4.61	44	48.61
Well B	12/10/2021	4.02	43.2	47.22
Well A	2/3/2022	4.2	38.9	43.1
Well B	2/3/2022	3.63	35.9	39.53
Well A	3/2/2022	4.26	39.2	43.46
Well B	3/2/2022	3.53	39.3	42.83

Notes

Bolded values indicate an exceedance of the USEPA HA value of 70 ppt

HA = Health Advisory

PFOA = perfluorooctanoic acid

PFOS = perfluorooctane sulfonic acid

ppt = parts per trillion

USEPA = United States Environmental Protection Agency

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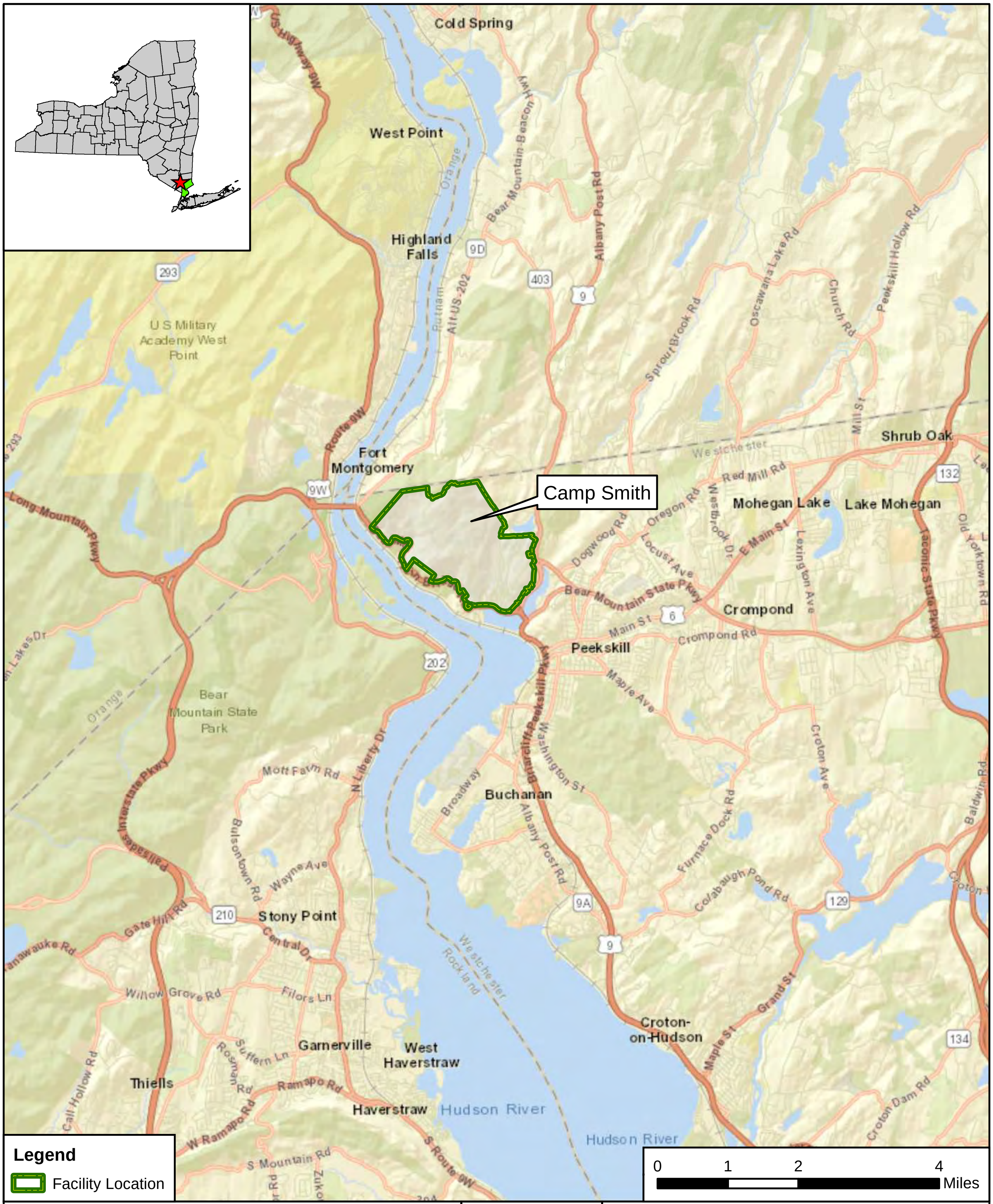

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
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SCALE	1:126,720	CHK BY	AB	10/22/2021
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	10/22/2021

N

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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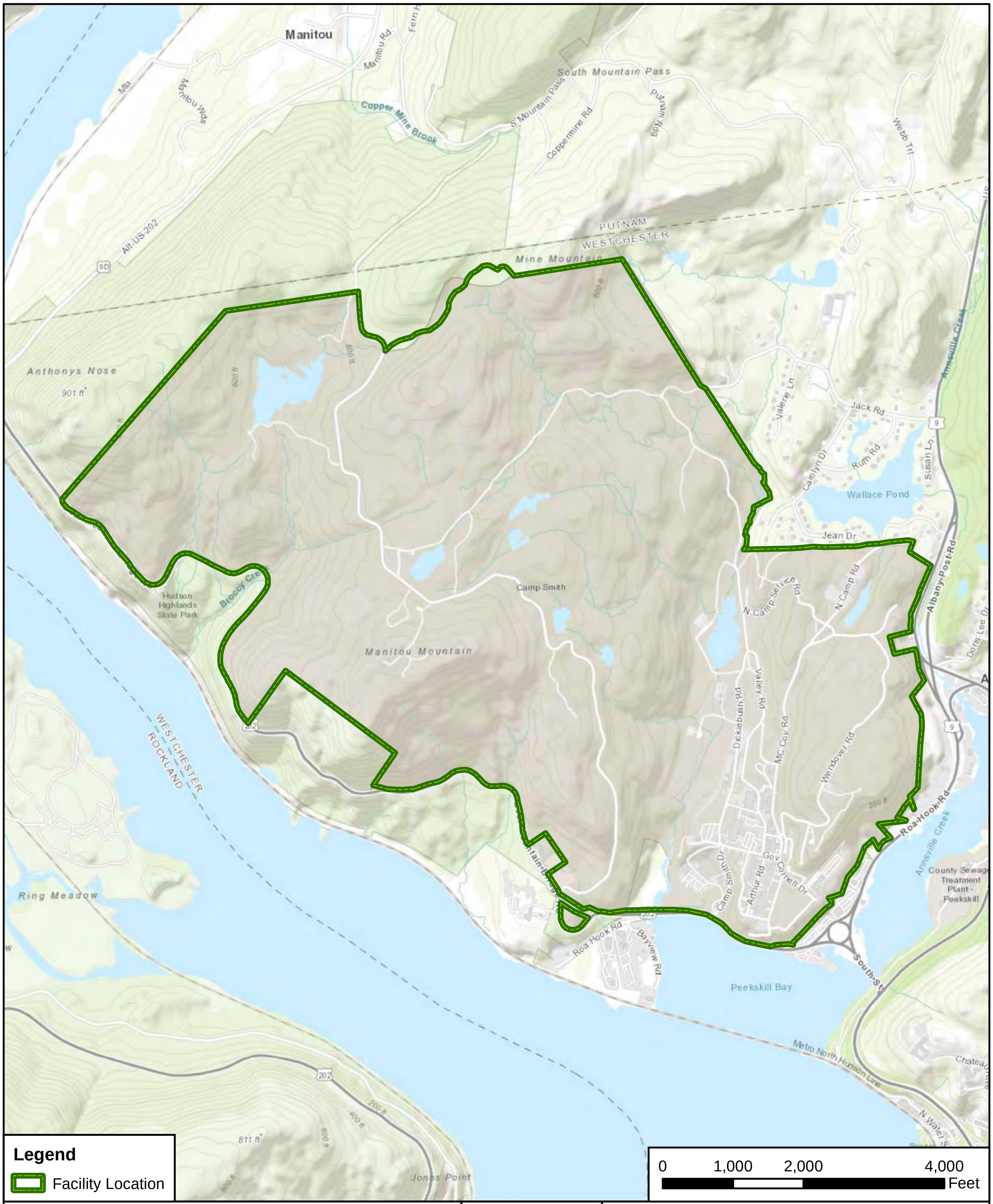

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
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SCALE	1:24,000	CHK BY	AB	10/22/2021
Base Map: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN,		PM	CM	10/22/2021

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Facility Topography

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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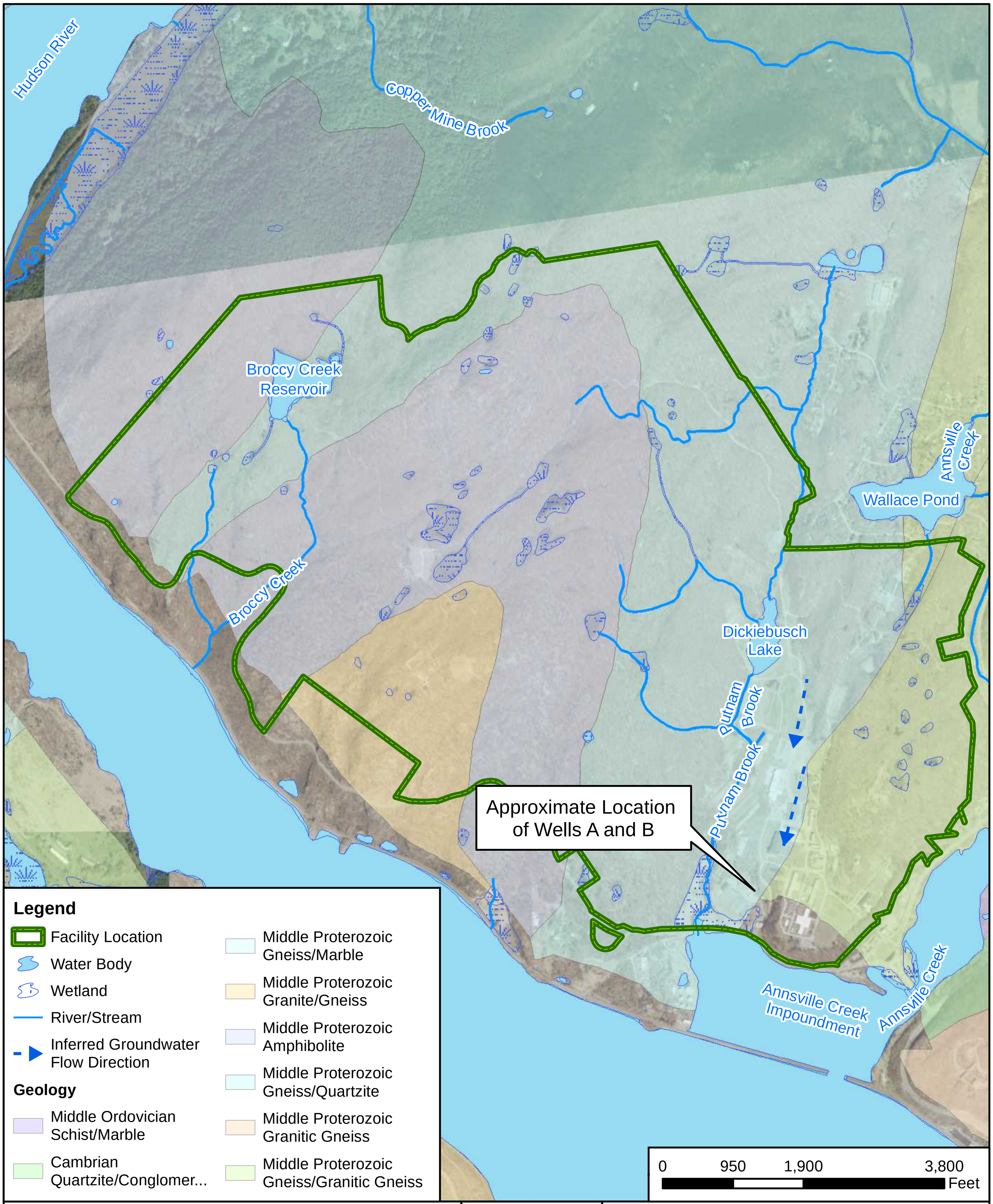

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/9/2021	GIS BY	MS	12/9/2021
SCALE	1:22,800	CHK BY	AB	12/9/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	CM	12/9/2021

Groundwater Features

AECOM
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Germantown, MD 20876

Figure 2-3

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CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	10/22/2021	GIS BY	MS	10/22/2021
SCALE	1:7,200	CHK BY	AB	10/22/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	CM	10/22/2021

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Groundwater Elevations, December 2019

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Figure 2-4

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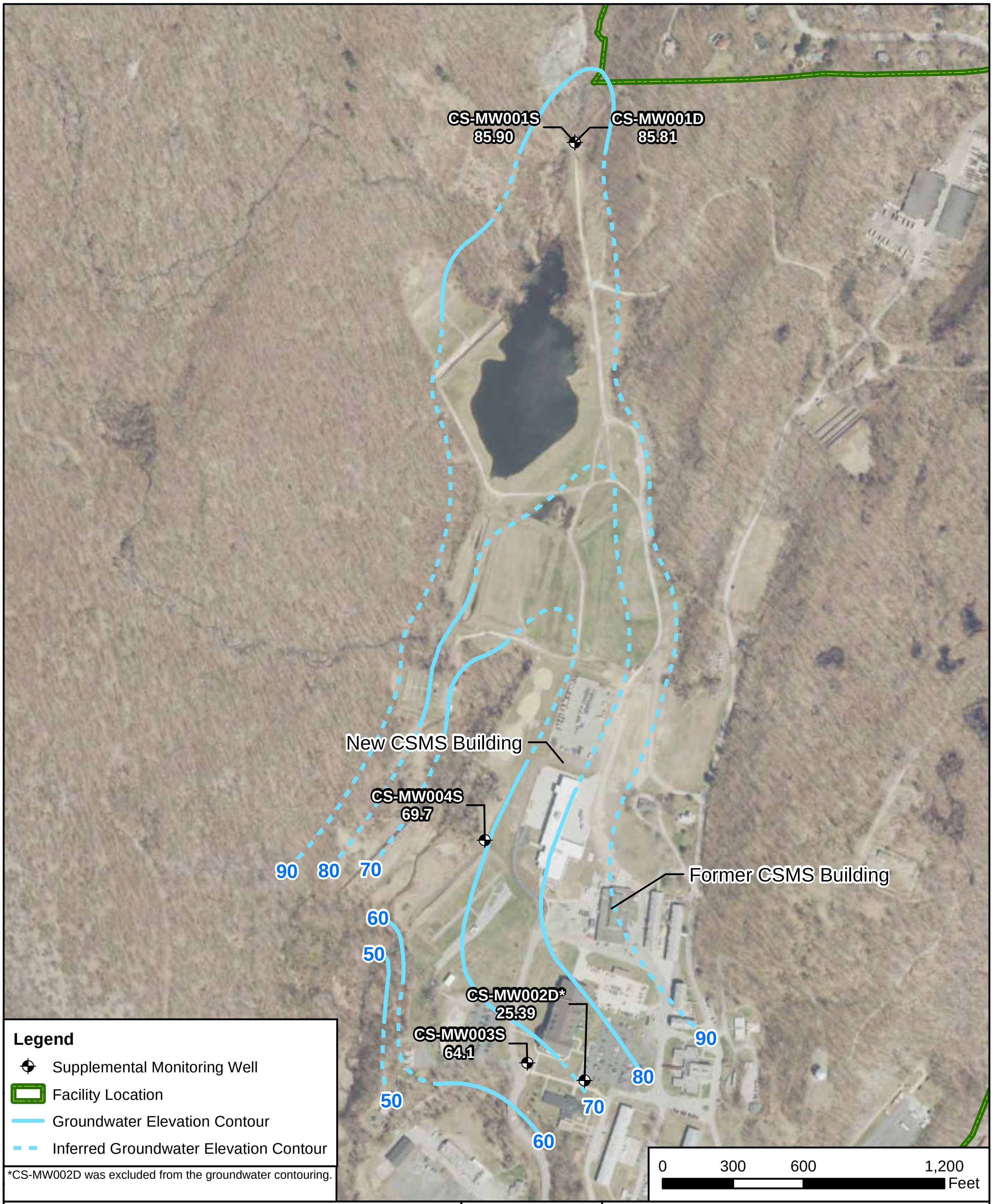

*CS-MW002D was excluded from the groundwater contouring.

CLIENT	ARNG
NOTES	Site Inspection for PFAS at Camp Smith, NY

REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:7,200	CHK BY	AB	12/8/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	12/8/2021

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Groundwater Elevations, July 2021

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Germantown, MD 20876

Figure 2-5

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CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:22,800	CHK BY	AB	12/8/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	CM	12/8/2021

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Surface Water Features

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Germantown, MD 20876

Figure 2-6

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3. Summary of Areas of Interest

This section presents a summary of each potential PFAS release area by AOI. Based on the PA findings, four potential PFAS release areas, the Former Fire Pit, Former Fire Station, and Former Airfield/NYS AFSA, were grouped into three AOIs. The potential PFAS release areas are shown on **Figure 3-1**.

3.1 AOI 1 Former Fire Pit

AOI 1 consists of one potential PFAS release area, the Former Fire Pit. The Former Fire Pit is on the northern end of the property, adjacent to Dickiebusch Lake, at geographic coordinates 41°18'36.96"N; 73°56'24.19"W. This area is approximately 184 feet long by 113 feet wide and is essentially a dirt expanse of sand and gravel on the eastern side of N. Camp Road.

During the visual site inspection (VSI) completed during the PA, a bare earthen patch was observed that appeared to have been smoothed and paved over multiple times in the past. Interviewees described patch as a former live fire training exercise area in which exercises occurred with some frequency, possibly once per month; however, the presence or use of AFFF for these exercises could not be confirmed during the VSI or interviews with NYARNG personnel.

The Former Fire Pit was the training ground for the Camp Smith fire fighters and emergency responders and was active between 1980 and 1996. If AFFF was used for fire training activities at this area, it may have contained PFAS; therefore, activities related to fire training at this AOI have the potential for PFAS releases.

3.2 AOI 2

AOI 2 consists of one potential PFAS release area, the Former Fire Station. Based on aerial photographs, the Former Fire Station was approximately 500 feet east of the southern end of the former airfield runway, at geographic coordinates 41°18'10.01"N; 73°56'21.34"W, and was active between 1980 and 1996. When operational, the VSI interviewee stated that two trucks were parked inside the Former Fire Station: an old Chevy half-deuce water truck and an old Ford that was not operational.

In the Former Fire Station’s last few years of operation, there were only civilian hourly employees onsite during the weekends. The interviewee indicated he was not aware of any AFFF use or storage at Camp Smith. After 1996, the former fire station was torn down and replaced with a parking lot. The two trucks were given to the Continental Village Fire Department, the municipal fire department for Westchester County, which provides emergency services for all major incidents at Camp Smith. Due to gaps in interviewee knowledge regarding use of AFFF on the firetrucks, the Former Fire Station is considered a potential PFAS release area.

3.3 AOI 3

AOI 3 consists of two potential PFAS release areas, the Former Airfield and the Former NYS AFSA. These areas are described in the subsections below.

3.3.1 Former Airfield

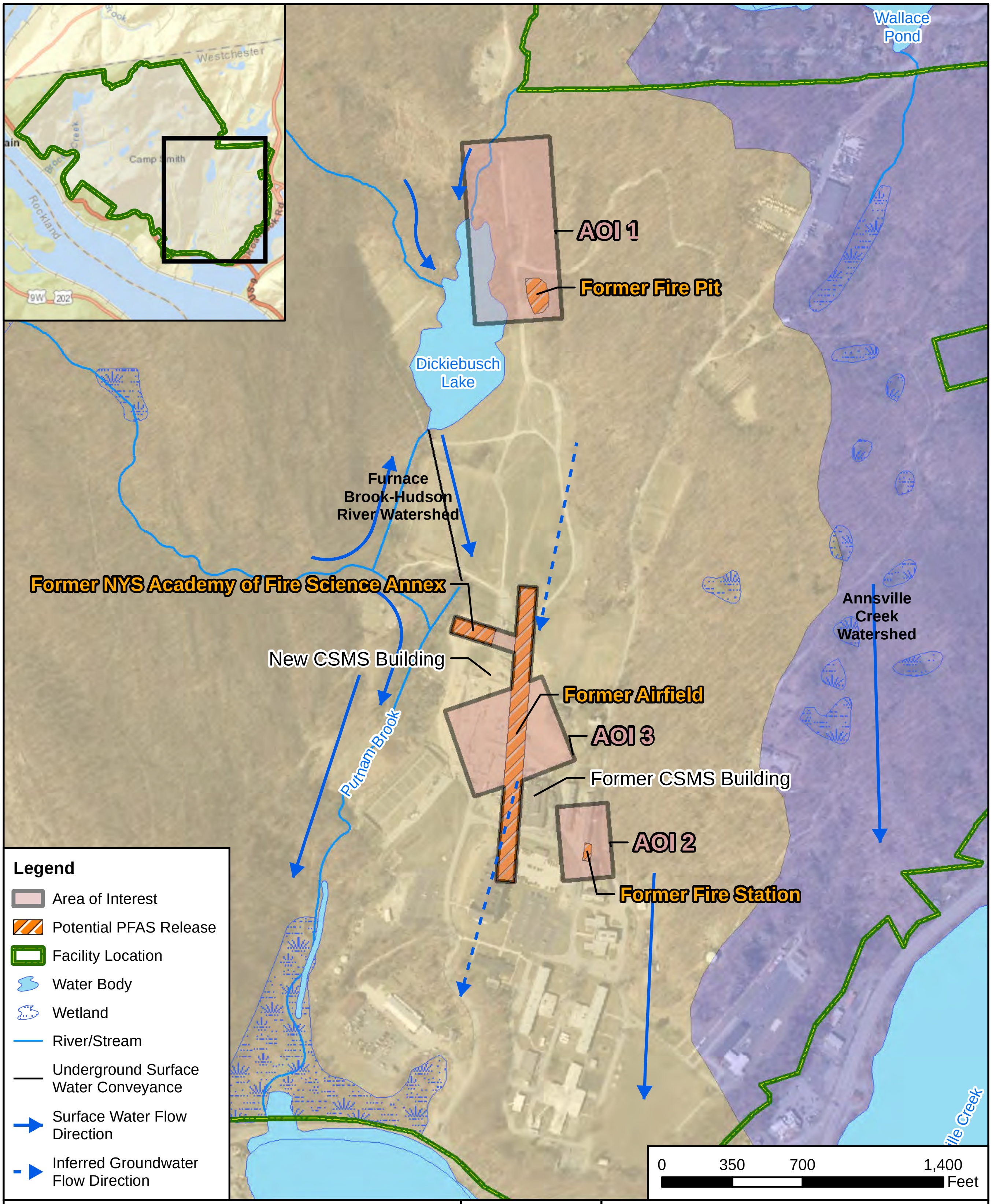
The Former Airfield is an area, as described during interviews during the VSI, that is located at the southeastern end of Dickiebusch Lake, at geographic coordinates 41°18'31.19"N; 73°56'24.87"W, and approximately 2,500 feet in length running north to south. Aerial photographs confirm a runway was constructed sometime after 1955, but before 1960, and was later removed in the late-1970s. The Camp Smith Maintenance Equipment Mechanic, who has been working at Camp Smith since 1988, stated that the Former Airfield was possibly active during parts of the Korean and Vietnam Wars, but he was unaware of any incidents that occurred and required the use of AFFF. However, because fire training activities have historically been frequently conducted at the edges of runways, the Former Airfield is considered a potential PFAS release area.

3.3.2 Former NYS AFSA

During the VSI, an interview with the Construction and Facilities Management Officer (CFMO) was performed at the NYARNG headquarters in Latham, New York. The CFMO stated that a "former NYS fire inspection agency" was formerly located on-post, located slightly northwest of the new Combined Support Maintenance Shop (CSMS) building, and was associated with a cluster of former buildings. The duration of occupancy of the buildings by the "former fire inspection agency" is unclear; however, historical aerials indicate that the buildings were built sometime between 1974 and 1984 and demolished sometime between October 2014 and April 2016.

Additional research after submission of the Final PA Report confirmed that the facility complex was the NYS AFSA. Activities at the former NYS AFSA were described as including classroom training, fire services, forensics, and arson investigation. Because personnel with first-hand knowledge of training activities that occurred at the AFSA were not available for interviews during the PA, there were gaps in knowledge of AFFF use and storage at this location. It is unknown if any of the training activities that occurred at the facility included fire training with AFFF or other firefighting foams. As such, PFAS may have been released at the former NYS AFSA; therefore, the former NYS AFSA is a potential PFAS release area. The former NYS AFSA operated beginning in the late-1990's and ceased operation in September 2006.

Following demolition of the buildings in approximately 2014, nearly 8 feet of fill from the general area of the former NYS AFSA was removed and transported for use in the foundation of the new CSMS building. Because of this removal, soil potentially impacted with PFAS may have been spread from the source location to below the new CSMS building.



CLIENT	ARNG			
NOTES	Site Investigation for PFAS at Camp Smith, NY			
REVISED	5/21/2020	GIS BY	MS	5/21/2020
SCALE	1:8,400	CHK BY	BP	5/21/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	5/21/2020

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Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

Project Data Quality Objectives (DQOs) are qualitative and quantitative statements that specify the quality of data and define the level of certainty required to support project decision-making process. The specific DQOs established for this facility are described below. These DQOs were developed in accordance with the USEPA's seven-step iterative process (USEPA, 2006).

4.1 Problem Statement

The following problem statement was developed during project planning:

The presence of PFAS, which may pose a risk to human health or the environment, in environmental media at the facility is currently unknown. PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. The regulatory framework for managing PFAS at both the federal and state level continues to evolve.

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 Office of the Secretary of Defense (OSD) dated 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS.

Additionally, the USEPA issued drinking water lifetime HAs for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient. The SLs are presented in **Section 6.1** of this Report.

The following quotes from the DA policy documents form the basis for this project (DA, 2016; DA, 2018):

- "The Army will research and identify locations where PFOS- and/or PFOA-containing products, such as AFFF, are known or suspected to have been used. Installations shall coordinate with installation/facility fire response or training offices to identify AFFF use or storage locations. The Army will consider FTAs, AFFF storage locations, hangars/buildings with AFFF suppression systems, fire equipment maintenance areas, and areas where emergency response operations required AFFF use as possible source areas. In addition, metal plating operations, which used certain PFOS-containing mist suppressants, shall be considered possible source areas.".
- "Based on a review of site records…determine whether a CERCLA PA is appropriate for identifying PFOS/PFOA release sites. If the PA determines a PFOS/PFOA release may have occurred, a CERCLA SI shall be conducted to determine presence/absence of contamination.".
- "Identify sites where perfluorinated compounds are known or suspected to have been released, with the priority being those sites within 20 miles of the public systems that tested above USEPA HA levels." (USEPA, 2016a; USEPA, 2016b).

4.2 Goals of the Study

The following goals were established for this SI:

1. Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.
2. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
3. Determine the potential need for a Time Critical Removal Action (TCRA) (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.
4. Collect data to better characterize the release areas for more effective and rapid initiation of a RI (if determined necessary).
5. If PFOA, PFOS, and PFBS are determined to be present, aim to evaluate whether the concentrations can be attributed to on-facility or off-facility sources that were identified within 4 miles of the installation as part of the PA (e.g., fire stations, major manufacturers, other DoD facilities).
6. Determine whether a potentially complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.

4.3 Information Inputs

Primary information inputs included:

- The PA for Camp Smith (AECOM, 2019b);
- Analytical data from groundwater, soil, surface water, and sediment samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addenda (AECOM, 2021; AECOM, 2019b); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s).

4.5 Analytical Approach

Samples were analyzed for PFAS by LC/MS/MS compliant with Table B-15 of DoD QSM 5.3 (QSM 5.1 during Mobilization 1) by Pace Analytical Gulf Coast, accredited under the DoD Environmental Laboratory Accreditation Program (DoD ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs and decision rules as defined in the SI QAPP Addenda (AECOM, 2019b, 2021). These rules governed response actions based on the results of the SI sampling effort.

The decision rules described in the **Worksheet #11** of the SI QAPP Addenda identify actions based on the following:

Groundwater:

- Is there a human receptor within 4 miles of the facility?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release areas?
- What is the concentration of PFOA, PFOS, and PFBS at the facility boundary upgradient and downgradient of the potential release areas?
- What does the conceptual site model (CSM) suggest in terms of source, pathway and receptor?

Soil:

- What is the concentration of PFOA, PFOS, and PFBS in shallow surface soil (0 to 2 feet bgs)?
- What is the concentration of PFOA, PFOS, and PFBS in deep soil (i.e., capillary fringe)?
- What does the CSM suggest in terms of source, pathway, and receptor?

Soil and groundwater samples were collected from each of the potential release areas. During Mobilization 1, groundwater was encountered at approximately 0.5 to 22.2 feet bgs. During Mobilization 2, groundwater was encountered at 7.19 to 79.76 feet bgs.

4.6 Data Usability Assessment

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

Data Quality Indicators (DQIs) (Precision, Accuracy, Representativeness, Comparability, Completeness and Sensitivity) are important components in assessing data usability. These DQIs were evaluated in the subsequent sections and demonstrate that the data presented in this SI report are of high quality. Although the SI data are considered reliable, some degree of uncertainty can be associated with the data collected. Specific factors that may contribute to the uncertainty of the data evaluation are described below. The Data Validation Report (DVR) (**Appendix A**) presents explanations for all qualified data in greater detail.

4.6.1 Precision

Precision is the degree of agreement among repeated measurements of the same characteristic on the same sample or on separate samples collected as close as possible in time and place. Field sampling precision is measured with the field duplicate relative percent differences (RPD); laboratory precision is measured with calibration verification, internal standard recoveries, laboratory control sample (LCS) and matrix spike (MS) duplicate RPD.

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several field samples displayed EIS area counts less than the lower quality control (QC) limit of 50%. The positive field sample results associated with EIS area counts less than the QC limit, but greater than 20%, were qualified “J+”, while non-detects were qualified “UJ”. The qualified results should be considered usable as estimated values with a positive bias. The field sample results associated with area counts less than 20% were qualified “X” for positive field sample results and “UX” for non-detect field sample results. The qualified field sample results associated with EIS area counts less than 20%, but greater than 10%, are recommended for use as estimated values with a positive bias, and they are reported with interpreted qualifiers of “J+” for the positive associated field sample results and “UJ” for the associated non-detect field sample results. Additionally, the positive field sample results associated with EIS area counts less than 10% are recommended for use as estimated values with a positive bias and are reported with interpreted qualifiers of “J+”. The project team determined these qualified results were usable for project purposes. The non-detect field sample results associated with the remaining EIS area counts less than 10% were qualified “UX”. The data points flagged X/UX were non-detect results for perfluorotetradecanoic acid (PFTeDA) and perfluorotridecanoic acid (PFTrDA), while these compounds were detected in other samples, no site decisions were made based on the presence or absence of these two compounds.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. All calibration verifications were within the project established precision limits presented in the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021).

LCS/LCS duplicate (LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. The LCS/LCSD samples were within the project established precision limits presented in the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021).

MS/MS duplicate (MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. Several MS/MSD samples displayed RPD greater than the upper QC limit of 30%. The positive associate parent sample results were previously qualified due to MS/MSD percent recovery anomalies, as discussed in **Section 4.6.2**; therefore, no further data qualifying action was required.

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate samples were within the project established precision limits presented in the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021).

4.6.2 Accuracy

Accuracy is a measure of confidence in a measurement. The smaller the difference between the measurement of a parameter and its "true" or expected value, the more accurate the measurement. The more precise or reproducible the result, the more reliable or accurate the result. Accuracy is measured through percent recoveries in the LCS/LCSD, MS/MSD, and surrogates.

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis, with one exception. The LCS/LCSD pairs prepared in batches 673520, 672387, 659305, and 660319 displayed percent recoveries greater than the upper QC limit of 130% for several analytes. The positive associated field sample results were qualified “J+” and should be considered usable as estimated values with a positive bias.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with a limited number of exceptions. Several MS/MSD pairs displayed percent recoveries outside the QC limits. The positive parent sample results associated with the positive biases were qualified “J+” and should be considered usable as estimated values with a positive bias. The parent sample results associated with the 0% recoveries were non-detect and were qualified “UX”. These “UX”-flagged results were non-detect for PFTeDA and PFTrDA. While these compounds were detected in other samples, no site decisions were made based on the presence or absence of these two compounds. The parent sample results associated with the remaining negative biases were positive and were qualified “J-”, while non-detects were qualified “UJ”. The qualified field sample results should be considered usable as estimated values with a negative bias. The positive parent sample result associated with the combination of high and low percent recoveries for PFOA was qualified “J” and should be considered usable as an estimated value with an indeterminate bias.

4.6.3 Representativeness

Representativeness qualitatively expresses the degree to which data accurately reflect facility conditions. Factors that affect the representativeness of analytical data include appropriate sample population definitions, proper sample collection and preservation techniques, analytical holding times, use of standard analytical methods, and determination of matrix or analyte interferences.

Several field samples were re-extracted outside the holding time requirement of 14 days due to internal standard failures in the initial extraction with similar results. The positive associated field sample results were qualified “J”, while non-detects were qualified “UJ”. The qualified field sample results should be considered usable as estimated values. For all samples with re-extracted results, the data reviewer recommended one usable result from either the initial or re-extracted analysis based on professional judgement of data quality. Additionally, the holding time for pH analysis is ‘immediate’; all field samples analyzed for pH were qualified “J”.

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15 (QSM 5.1 during Mobilization 1). The use of this method included the specific preparation requirements (i.e. ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified in Table B-15 were monitored, standards that contained both branched and linear isomers when available were used, and isotopically labeled standards were used for quantitation.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory, with the exception of the re-extracted field samples previously discussed. The laboratory used approved standard methods in accordance with the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Several PFAS instrument blanks and method blanks displayed detections greater than the detection limit for multiple target analytes. In total, 98 field sample results were qualified “U” during data validation due to associated detections in instrument and/or method blanks. The reported field sample result values were adjusted to be equal to the limit of detection (LOD); the

LOD was elevated to the concentration of the blank detection in instances where the blank concentration was greater than the LOD. The results are usable as qualified but should be considered false positives and treated as non-detect.

Two field reagent blanks (FRB) were collected during the event (Mobilization 1 and 2). Equipment rinsate blanks (ERBs) were also collected for groundwater, soil, and sediment samples. Several ERBs displayed detections greater than the detection limit. In total, 17 field sample results were qualified “U” during data validation due to associated FRB and/or ERB detections. The reported field sample result values were adjusted to be equal to the LOD, and the LOD was elevated to the concentration of the blank detections. The results are usable as qualified but should be considered as false positives and treated as non-detect.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The decontamination sample, EB-SPIGOT, displayed a detection for perfluorohexanesulfonic acid (PFHxS) greater than the detection limit. The associated field sample results that were within 5 times the blank concentration were previously qualified due to detections in ERBs FQC-EB-050219-BP, EB-042519-HA, and EB-042519-SS. Since the associated field sample results were already qualified due to FRB and ERB detections of PFHxS, no further data qualifying action was required. It should be noted that PFHxS is not a compound of interest in this investigation (i.e., PFOA, PFOS, or PFBS).

Overall, the data are usable for evaluating the presence or absence of PFAS at the facility. Sufficient usable data were obtained to meet the objectives of the SI.

4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations. It should be noted that the QSM Method changed from 5.1 to 5.3 between Mobilization 1 and 2; however, the data sets are still comparable.

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows and reflects the exclusion of “X/UX” flagged data, although the project team has retained these results in the data set:

- PFAS in groundwater by LC/MS/MS compliant with QSM 5.1/5.3 Table B-15 at 98%;
- PFAS in soil by LC/MS/MS compliant with QSM 5.1/5.3 Table B-15 at 94%;
- PFAS in surface water by LC/MS/MS compliant with QSM 5.1/5.3 Table B-15 at 100%;
- PFAS in sediment by LC/MS/MS compliant with QSM 5.1/5.3 Table B-15 at 100%;
- pH in soil by USEPA Method 9045D at 100%; and
- Total organic carbon (TOC) by USEPA Method 9060 at 100%.

Certain soil samples were unable to be collected due to groundwater elevation being higher than anticipated at certain soil boring locations. This is described further in **Section 5.2**.

4.6.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit (MDL) study, and calibration standards at the limit of quantitation (LOQ). In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021). The laboratory provided the requested MDL studies and provided applicable calibration standards at the LOQ. In order to achieve the DQOs for sensitivity outlined in the SI QAPP Addenda (AECOM, 2019b; AECOM 2021), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the DL were reported and qualified “J” as estimated values by the laboratory.

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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 Preliminary Assessment Report, Camp Smith, Cortlandt, New York* dated June 2019 (AECOM, 2019a);
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Camp Smith, Cortlandt, New York* dated October 2019 (AECOM, 2019b);
- *Final Supplemental Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Camp Smith, Corlandt, New York* dated May 2021 (AECOM, 2021).
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b); and
- *Final Site Safety and Health Plan, Camp Smith, Cortlandt, New York* dated December 2019 (AECOM, 2019c).

The SI field activities were conducted in two mobilizations. The first mobilization was conducted from 9 to 12 December 2019 and consisted of utility clearance, direct push boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and surface water and sediment sample collection. The second mobilization was conducted from 19 to 28 July 2021 and consisted of utility clearance, soil boring and soil sample collection via sonic drilling technology, permanent monitoring well installation, monitoring well development, low-flow groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addenda (AECOM, 2019; AECOM, 2021), except as noted in **Section 5.9**.

The following samples were collected during the SI. These samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 to fulfill the project DQOs (QSM 5.1 was used for Mobilization 1 samples):

Mobilization 1 –

- Fourteen (14) soil samples from six locations (soil borings or hand auger locations);
- Five grab groundwater samples from temporary well locations;
- Eight sediment samples;
- Five surface water samples, all of which were co-located with five of the sediment samples; and

Mobilization 2 –

- Fifteen (15) soil samples from eight locations (soil boring and hand auger locations); and
- Five low-flow groundwater samples from permanent monitoring well locations.

Figure 5-1 and **Figure 5-2** provide 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 and is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2**, Field Change

Request Forms are provided in **Appendix B3**, and land survey data are provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

The 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 quantitative and qualitative DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 10 July 2019, 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, NYARNG, USACE, NYSDEC, and NYS Department of Health familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2019).

A combined TPP Meeting 3 and TPP 1 and 2 for Mobilization 1 and 2 was held on 1 January 2021 to discuss the results of Mobilization 1 and the approach for Mobilization 2. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC (Cascade), contacted the “Dig Safely New York, Inc.” one-call utility clearance contractor to notify them of intrusive work at Camp Smith. However, because Camp Smith is a private facility, Dig Safely NY, Inc. contractors do not enter the facility. Therefore, AECOM contracted Admiral Conservation Services Underground Solutions (ACS), a private utility location service, to perform utility clearance at the facility. ACS performed utility clearance of the proposed boring locations on 9 December 2019 and 12 July 2021 with input from the AECOM field team and Camp Smith facility staff. General locating services and ground-penetrating radar (GPR) were used to complete the clearance. During the 12 July 2021 utility clearing, a concrete GPR was used to identify the location of rebar underlying proposed sampling locations at AOI 2. 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 PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be PFAS-free prior to the start of field activities. Because the potable water source at Camp Smith is known to contain PFAS, an offsite source of potable water was identified. During Mobilization 1, a sample from a potable water source at the office of AECOM's drilling subcontractor, Cascade Technical Services, LLC, was collected on 21 November 2019, and analyzed for PFAS by LC/MS/MS Compliant with QSM 5.1 Table B-15. The results of the potable well sample are provided in **Appendix F**. A discussion of the results is presented in **Section 4.6.3**. During Mobilization 2, a sample from a potable water source at the office of Tam Enterprises was collected on 5 April 2021 and analyzed for PFAS by LC/MS/MS Compliant with QSM 5.3 Table B-15. The results of the potable well sample are provided in **Appendix F**, and a discussion of the results is presented in **Section 4.6.3**.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the QAPP Addendum (AECOM, 2019b). Prior to the start of field work each day, a PFAS Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Soil borings and sampling were performed during both Mobilization 1 and 2.

Mobilization 1

During Mobilization 1, soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2019b). 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 5 feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-1**.

Three discrete soil samples were collected for chemical analysis from each soil boring, with the exception of locations AOI1-SB2, which had only one soil sample collected due to encountering shallow groundwater; and AOI1-SB3 and AOI3-SB1, which only had two soil samples collected due to encountering shallow groundwater. Refer to **Section 5.9** for additional details on deviations from the SI QAPP Addendum (AECOM, 2019b). At locations other than AOI1-SB2, AOI1-SB3, and AOI3-SB1, one surface soil sample (0 to 1 feet bgs) and two subsurface soil samples (one approximately 1 foot above the groundwater table and one at the mid-point between the surface and the groundwater table) were collected from each boring. At AOI1-SB2, groundwater was encountered at 0.5 feet bgs, and soil was sampled at one interval (0.5 to 1 feet bgs). At AOI1-SB3, groundwater was encountered at 2.0 feet bgs, and soil was sampled at two intervals (0.5 to 1 feet bgs; 1 to 2 feet bgs). At AOI3-SB1, groundwater was encountered at 2.5 feet bgs. Soil was sampled at two intervals (0.5 to 1 feet bgs; 1 to 2 feet bgs). Sediment samples were collected in nearby surface water locations downgradient of locations AOI1-SB2, AOI1-SB3, and AOI3-SB1 as replacement samples, since all proposed subsurface soil samples could not be obtained at these locations. Refer to **Section 5.4** for additional details regarding sediment sampling.

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 for PFAS (LC/MS/MS compliant with QSM 5.1 Table B-15 (QSM 5.1 for Mobilization 1), TOC (USEPA Method 9060A), and pH (USEPA Method 9045D), in accordance with the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021).

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. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, ERBs 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

Mobilization 2

During Mobilization 2, soil samples were collected via sonic drilling technology, in accordance with the SI QAPP Addendum (AECOM, 2021). A sonic drill rig was used to collect continuous soil cores to the target depth. Surface soil samples were collected from CS-MW001S/D, CS-MW004S, and four hand auger locations at AOI 2 via hand auger and subsurface soil samples were collected at CS-MW001S/D, CS-MW002D, CS-MW003S, and CS-MW004S via sonic drilling technologies. Four additional subsurface soil samples were collected via hand auger at AOI 2. The soil boring locations are shown on **Figure 5-2**, and depths are provided **Table 5-1**

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

Soil borings completed during the two mobilizations found a heterogenous mix of gravel, sand, silt, and clay, which is consistent with glacial deposits found throughout New England. The predominant grain size fraction was sand, which ranged from fine to coarse and did not show any particular fining up/down trends consistent with a particular depositional environment. At CS-MW001S/D and CS-MW004S, borings were advanced to the top of bedrock. This bedrock interface was encountered at 20 feet bgs at CS-MW001S/D and 54 feet bgs at CS-MW004S, and it was consistent with gneiss found in the surrounding area.

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 FedEx under standard chain of custody (CoC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15 (QSM 5.1 for Mobilization 1), TOC (USEPA Method 9060A), and pH (USEPA Method 9045D), in accordance with the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021). Additionally, one grain size sample (American Society for Testing and Materials [ASTM] D422) was collected from boring CS-MW002S from a clay lens at least three feet in thickness, as outlined in the SI QAPP Addendum (AECOM, 2021). Field duplicates, MS/MSDs, and other QC samples were collected at the same frequency as during Mobilization 1.

DPT borings were converted to temporary wells during Mobilization 1, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2019b) using bentonite chips at completion of sampling activities. Sonic borings were converted into permanent wells during Mobilization 2. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

5.3 Monitoring Well Installation and Groundwater Sampling

Monitoring wells were constructed and groundwater samples were collected during both Mobilization 1 and 2.

Mobilization 1

During Mobilization 1, temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Once the borehole was advanced to the desired depth, when conditions allowed, a temporary well was constructed of a 10-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**. Due to lack of groundwater observation at refusal at AOI2-SB1, two step-off locations were attempted. Each step-off location was shallower than the original, and no groundwater was detected. The temporary well was placed in the deepest-advanced boring for AOI2-SB1.

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

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2021).

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 FRB 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.

Temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2019b) by removing the PVC and backfilling the hole with bentonite chips. Temporary wells were installed in grass areas to avoid disturbing concrete or asphalt.

<u>Mobilization 2</u>

During Mobilization 2, permanent wells were installed using sonic drilling technologies. The monitoring wells were constructed with 2-inch Schedule 40 PVC flush threaded 10-foot sections of riser, 0.010-inch slotted well screen, 10-foot screens (except for CS-MW002D, which was installed with a 20-foot screen), and a threaded bottom cap. A filter pack of #0 silica sand was installed in the annulus around the well screen to a minimum of 2-foot above the well screen. A 2-foot thick bentonite seal was placed above the filter sand and hydrated with distilled water. Bentonite chips were placed in the well annulus from the top of the bentonite seal to ground surface. The bentonite was allowed to set for 24 hours prior to well completion in accordance with the SI QAPP Addendum (AECOM, 2021). All monitoring wells were completed with flush mount well vaults, with the exception of CS-MW001S/D and CS-MW004S, which have a stick-up completion. The screen interval of each of the groundwater monitoring wells is provided in **Table 5-2**.

Development and sampling of wells was completed in accordance with the SI QAPP Addendum (AECOM, 2021). The newly installed monitoring wells were developed no sooner than 24 hours following installation by pumping and surging using a variable speed submersible pump. Samples were collected no sooner than 24 hours following development via low-flow sampling methods 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, ORP, and turbidity) 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 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 for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2021). Field duplicates, MS/MSDs, and other QC samples were collected at the same frequency as during Mobilization 1.

5.4 Surface Water and Sediment Sampling

Co-located surface water and sediment samples were collected from tributaries flowing to and from Dickiebusch Lake and along Putnam Brook, at multiple locations downgradient of AOIs 1, 2, and 3. Additionally, three stand-alone sediment samples (CS-SD06, CS-SD07, and CS-SD08) were collected as replacement samples downgradient of soil boring locations where subsurface soil samples could not be obtained.

Surface water samples were collected from a single point in the waterbody by dipping the laboratory-supplied bottle into the water, approximately two-thirds up from the bottom of the water body. For the co-located surface water and sediment samples, the surface water sample was collected before the co-located sediment sample. Sampling was performed deliberately and methodically to minimize disturbance of bottom sediments and as quickly as possible to ensure a representative sample was collected. Additionally, a subsample of each surface water sample was collected in a separate container, and a shaker test was completed to identify if there were any foaming. No foaming was noted on any of the surface water samples.

After collection of the surface water sample, a sediment coring device (hand auger) was used to collect the sediment sample from the first 1 foot of sediment. The sediment was transferred to a Ziploc bag, where the sample was homogenized, and stones in excess of 1 centimeter were removed prior to collection in a laboratory-supplied, PFAS-free HDPE bottle. After collection of the surface water and sediment samples from each location, general water quality parameters (i.e., temperature, pH, conductivity, DO, ORP, and turbidity) were collected with a water quality meter and recorded on the field sampling form (**Appendix B2**). The surface water and sediment sample locations are shown on **Figure 5-1**, and sample depths are provided **Table 5-1**.

Each surface water and sediment 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 for analysis of PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15. Sediment samples were also analyzed for TOC (USEPA Method 9060A) and pH (USEPA Method 9045D), in accordance with the SI QAPP Addendum (AECOM, 2019b).

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. In instances when non-dedicated sampling equipment was used, ERB samples 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°C during shipment.

5.5 Synoptic Water Level Measurements

No synoptic gauging was performed during Mobilization 1; however, depth to water measurements recorded during sampling were used to create the contours provided in **Figure 2-5**. A synoptic groundwater gauging event was performed during Mobilization 2 on 2 August 2021. Depth to water measurements were collected from the five new permanent monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-6**. Groundwater elevation data for Mobilization 1 and 2 are provided in **Table 5-2**.

5.6 Surveying

The northern side of each well casing was surveyed by New York-licensed land surveyors that followed guidelines provided in the SOPs included in the SI QAPP Addenda (AECOM, 2019b; AECOM, 2021). Survey data from the temporary/permanent wells on the facility were collected on 12 December 2019 and 2 August 2021, respectively, in the applicable Universal Transverse Mercator zone projection, with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B4**.

5.7 Investigation-Derived Waste

As of the date of this report, the disposal of PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (AECOM, 2019b) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Soil IDW (i.e., soil cuttings) and liquid IDW (i.e., purge water, development water, and decontamination fluids) generated during Mobilization 1 activities were containerized in properly labeled 55-gallon drums. The soil and liquid IDW were not sampled and assume the PFAS characteristics of the associated samples collected from that source location. At the end of the field event, the 55-gallon drums were staged at a location on NYARNG property specified by the Camp Smith Environmental Manager. ARNG will coordinate waste profiling, transportation, and disposal of the IDW.

During Mobilization 2, soil IDW (i.e.: soil cuttings) were left in place at the point of the source. The soil cuttings were distributed on the ground surface on the downgradient side of the boring. The soil IDW was not sampled and assumes the PFAS characteristics of the associated soil samples collected from that source location. Solids generated during drilling suspended in the drilling fluid and liquid IDW (i.e., purge water, development water, and decontamination fluids) were containerized in a 55-gallon drum and staged at a location on NYARNG property specified by the Camp Smith Environmental Manager. One solid IDW sample was collected from the solid material containerized to assist in the waste profiling, transportation, and disposal of that IDW. The results of the IDW sample are provided in **Appendix F**. The location where soil IDW was returned to the ground surface is provided in **Appendix B5**.

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

5.8 Laboratory Analytical Methods

Samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 (QSM 5.1 for Mobilization 1 data set) Table B-15 at Pace Analytical Gulf Coast in Baton Rouge, Louisiana, a DoD ELAP- and NELAP-certified laboratory. The 18 PFAS analyzed as part of the ARNG SI program include the following:

- 6:2 fluorotelomer sulfonic acid (6:2 FTS)
- 8:2 fluorotelomer sulfonic acid (8:2 FTS)
- N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)
- N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)
- Perfluorobutyrate (PFBA)
- Perfluorobutanesulfonic acid (PFBS)
- Perfluorodecanoic acid (PFDA)
- Perfluorododecanoic acid (PFDoA)
- Perfluoroheptanoic acid (PFHpA)
- Perfluorohexanoic acid (PFHxA)
- Perfluorohexanesulfonic acid (PFHxS)
- Perfluorononanoic acid (PFNA)
- Perfluorooctanoic acid (PFOA)
- Perfluorooctanesulfonic acid (PFOS)
- Perfluoropentanoic acid (PFPeA)
- Perfluorotetradecanoic acid (PFTeDA)
- Perfluorotridecanoic acid (PFTrDA)
- Perfluoroundecanoic acid (PFUdA)

Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by USEPA Method 9045D.

5.9 Deviations from SI QAPP Addenda

Deviations from the SI QAPP Addendums during Mobilization 1 and 2 were identified after review of the field documentation. The deviations are noted below and are documented in the Field Change Request Forms (**Appendix B3**):

- During Mobilization 1, depth to water in soil boring AOI 1-SB2 was encountered at 0.5 feet bgs. As a result, soil was sampled in one interval (0.5 to 1 feet bgs) instead of three intervals, as proposed in the SI QAPP Addendum (AECOM, 2019b); therefore, an additional sediment sample was taken at a nearby surface water location, downgradient of AOI 1.

- During Mobilization 1, depth to water in soil boring AOI 1-SB3 was encountered at 2.0 feet bgs. As a result, soil was sampled in two intervals (0.5 to 1 and 1 to 2 feet bgs) instead of three intervals, as proposed in the SI QAPP Addendum (AECOM, 2019b); therefore, an additional sediment sample was taken at a nearby surface water location, downgradient of AOI 1.

- During Mobilization 1, depth to water in soil boring AOI 3-SB1 was encountered at 2.5 feet bgs. As a result, soil was sampled in two intervals (0.5 to 1 and 1 to 2 feet bgs) instead of three intervals, as proposed in the SI QAPP Addendum (AECOM, 2019b); therefore, an additional sediment sample was taken at a nearby surface water location, downgradient of AOI 3.

- During Mobilization 1, the temporary monitoring well installed at AOI 2-SB1 was dry at refusal depth (26.5 feet bgs). Two additional step-outs were attempted in order to reach groundwater. Each attempt resulted in shallower refusal depth than the originally attempted boring location. A temporary monitoring well was placed at the deepest refusal depth and was allowed to recharge for 48 hours after installation. However, after the recharge period, the temporary well was dry; therefore, a groundwater sample could not be collected. Based on the CSM, there is shallow underlying bedrock at this location, thus shallow groundwater likely does not occur here. No additional monitoring well was installed associated with this AOI, due to underlying shallow geology and hydrology at this location.

- During Mobilization 2, new information regarding the CSM and thickness of the overburden was obtained during installation of CS-MW002D and CS-MW003D. To capture the approximate pathway between potential releases at AOI 2 and the screen intervals at Potable Wells A and B, the screen interval for CS-MW002D was set from 90-110 feet bgs (within overburden). A 20-foot screen interval was used, rather than a 10-foot screen interval, to increase the likelihood of capturing the potential migration pathway. This approach differed from the proposed plan of installing a bedrock well as documented in the SI QAPP Addendum (AECOM, 2021). Additionally, given the apparent thickness of the overburden aquifer in the vicinity, CS-MW003D was changed to CS-MW003S to target the top of the shallow groundwater table.

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Table 5-1
Samples by Medium
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Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by 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							
AOI 1-SB1-0.5-1	12/11/2019 0950	0.5 - 1	x	x	x		
AOI 1-SB1-12-14	12/11/2019 1100	12 - 14	x	x	x		
AOI 1-SB1-6-8	12/11/2019 1055	6 - 8	x	x	x		
AOI 1-SB2-0.5-1	12/11/2019 1115	0.5 - 1	x	x	x		
AOI 1-SB3-0.5-1	12/11/2019 0845	0.5 - 1	x	x	x		
AOI 1-SB3-1-2	12/11/2019 0915	1 - 2	x	x	x		
AOI 2-SB1-0.5-1	12/10/2019 1040	0.5 - 1	x				
AOI 2-SB1-11-13	12/10/2019 1215	11 - 13	x				
AOI 2-SB1-21-23	12/10/2019 1210	21 - 23	x				
AOI 2-SB1-21-23MS	12/10/2019 1210	21 - 23	x				MS
AOI 2-SB1-21-23MSD	12/10/2019 1210	21 - 23	x				MSD
AOI 3-SB1-0.5-1	12/10/2019 1410	0.5 - 1	x				
AOI 3-SB1-1-2	12/10/2019 1430	1 - 2	x				
AOI 3-SB1-1-2-FD	12/10/2019 1430	1 - 2	x				Field Duplicate
AOI 3-SB2-0.5-1	12/10/2019 0850	0.5 - 1	x				
AOI 3-SB2-15-17	12/10/2019 1015	15 - 17	x				
AOI 3-SB2-7-9	12/10/2019 1010	7 - 9	x				
AOI2-SB2-00-02	7/24/2021 1000	0 - 2	x				
AOI2-SB2-02-04	7/24/2021 1010	2 - 4	x				
AOI2-SB3-00-02	7/24/2021 1040	0 - 2	x				
AOI2-SB3-02-04	7/24/2021 1050	2 - 4	x				
AOI2-SB4-00-02	7/24/2021 1100	0 - 2	x	x	x		
AOI2-SB4-00-02-MS	7/24/2021 1100	0 - 2	x	x	x		MS
AOI2-SB4-00-02-MSD	7/24/2021 1100	0 - 2	x	x	x		MSD
AOI2-SB4-02-04	7/24/2021 1110	2 - 4	x				
AOI2-SB5-00-02	7/24/2021 1125	0 - 2	x				
AOI2-SB5-02-04	7/24/2021 1130	2 - 4	x				
AOI2-SB5-02-04-MS	7/24/2021 1130	2 - 4	x				MS
AOI2-SB5-02-04-MSD	7/24/2021 1130	2 - 4	x				MSD
CS-MW001D-SB-08-10	7/20/2021 1415	8 - 10	x				
CS-MW001S-SB-00-02	7/20/2021 1315	0 - 2	x	x	x		
CS-MW001S-SB-00-02-D	7/20/2021 1315	0 - 2	x	x	x		Field Duplicate
CS-MW002D-SB-39-41	7/23/2021 1050	39 - 41	x				
CS-MW002D-SB-62-63	7/23/2021 1130	62 - 63				x	
CS-MW003S-40-42	7/25/2021 0955	40 - 42	x	x	x		
CS-MW003S-40-42-D	7/25/2021 0955	40 - 42	x	x	x		Field Duplicate
CS-MW004S-SB-00-02	7/19/2021 1100	0 - 2	x				
CS-MW004S-SB-07-09	7/19/2021 1115	7 - 9	x				
CS-ST-04S-072621	7/26/2021 1200	---	x				Solid IDW sample
Groundwater Samples							
AOI 1-GW1	12/11/2019 1130	15 - 20	x				
AOI 1-GW2	12/11/2019 1225	0 - 5	x				
AOI 1-GW2MS	12/11/2019 1225	0 - 5	x				MS
AOI 1-GW2MSD	12/11/2019 1225	0 - 5	x				MSD
AOI 1-GW3	12/11/2019 0920	0 - 5	x				

Table 5-1
Samples by Medium
Site Inspection Report, Camp Smith

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by 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
AOI 3-GW1	12/10/2019 1455	0 - 5	x				
AOI 3-GW1-FD	12/10/2019 1455	0 - 5	x				Field Duplicate
AOI 3-GW2	12/10/2019 1045	18 - 23	x				
CS-MW001D-GW	7/24/2021 1320	20 - 30	x				
CS-MW001S-GW	7/24/2021 1045	7 - 17	x				
CS-MW001S-GW-D	7/24/2021 1045	7 - 17	x				Field Duplicate
CS-MW002D-GW	7/28/2021 0930	90 - 110	x				
CS-MW003S-GW	7/27/2021 1145	40 - 50	x				
CS-MW004S-GW	7/22/2021 1350	7 - 17	x				
CS-MW004S-GW-MS	7/22/2021 1350	7 - 17	x				MS
CS-MW004S-GW-MSD	7/22/2021 1350	7 - 17	x				MSD
Surface Water Samples							
CS-SW01	12/12/2019 0830	---	x				
CS-SW02	12/12/2019 0940	---	x				
CS-SW03	12/12/2019 1040	---	x				
CS-SW04	12/12/2019 1120	---	x				
CS-SW05	12/11/2019 1525	---	x				
Sediment Samples							
CS-SD01-0-1	12/12/2019 0835	0 - 1	x				
CS-SD02-0-1	12/12/2019 0945	0 - 1	x				
CS-SD03-0-1	12/12/2019 1050	0 - 1	x				
CS-SD04-0-1	12/12/2019 1130	0 - 1	x				
CS-SD05-0-1	12/11/2019 1540	0 - 1	x				
CS-SD06-0-1	12/12/2019 1215	0 - 1	x				
CS-SD07-0-1	12/12/2019 1235	0 - 1	x				
CS-SD08-0-1	12/12/2019 1320	0 - 1	x				
Quality Control Samples							
ERB-121119HA	12/11/2019 1235	---	x				ERB
ERB-121119WL	12/11/2019 1240	---	x				ERB
ERB-121219SS	12/12/2019 1400	---	x				ERB
FRB-121119	12/11/2019 1245	---	x				FRB
ERB-121019CS	12/10/2019 0845	---	x				ERB
CASCADE-DECONWATER 11/21	11/21/2019 1145	---	x				Decon Water
CS-Decon Water	7/10/2019 1449	---	x				Decon Water
CS-ERB-01	7/22/2021 1520	---	x				ERB
CS-ERB-02	7/24/2021 1145	---	x				ERB
CS-ERB-03	7/24/2021 0815	---	x				ERB
CS-FRB-01	7/25/2021 0845	---	x				FRB
CS-DECON-072521	7/25/2021 0915	---	x				Decon Water - drillers hose/tank

Notes:
FD/D = Field Duplicate
ERB = equipmrnet rinsate blank
FRB = field reagent blank
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Borings Depths, Monitoring Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Camp Smith

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Well Screen Interval (feet bgs)	Top of Casing Elevation (feet amsl)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth of Water (feet bgs)	Groundwater Elevation (feet amsl)
AOI 1	AOI1-SB1	20	15 - 20*	93.746	---	8.48	---	85.266
	AOI1-SB2	5	0 - 5*	83.038	---	0.50	---	82.538
	AOI1-SB3	5	0 - 5*	91.166	---	4.57	---	86.596
	CS-MW001S	18	7 - 17	96.36	93.37	10.46	7.47	85.90
	CS-MW001D	30	20 - 30	96.36	93.37	10.55	7.56	85.81
AOI 2	AOI2-SB1	26.5	NA	NA	---	NA	NA	NA
	AOI2-SB2	4	NA	NA	101.55	NA	NA	NA
	AOI2-SB3	4	NA	NA	101.63	NA	NA	NA
	AOI2-SB4	4	NA	NA	101.63	NA	NA	NA
	AOI2-SB5	4	NA	NA	101.91	NA	NA	NA
AOI 3	AOI3-SB1	5	0 - 5*	77.485	---	1.74	---	75.745
	AOI3-SB2	25	18 - 23*	98.103	---	22.2	---	75.903
	CS-MW004S	55	07 - 17	76.93	73.97	7.19	4.23	69.74
AOI 2 and 3	CS-MW002D	140	90 - 110	105.15	105.15	79.76	79.76	25.39
	CS-MW003S	50	40 - 50	102.31	102.31	38.21	38.21	64.10

Notes:

amsl = above mean sea level

bgs = below ground surface

btoc = below top of casing

NA = not applicable

* = Mobilization 1 temporary well

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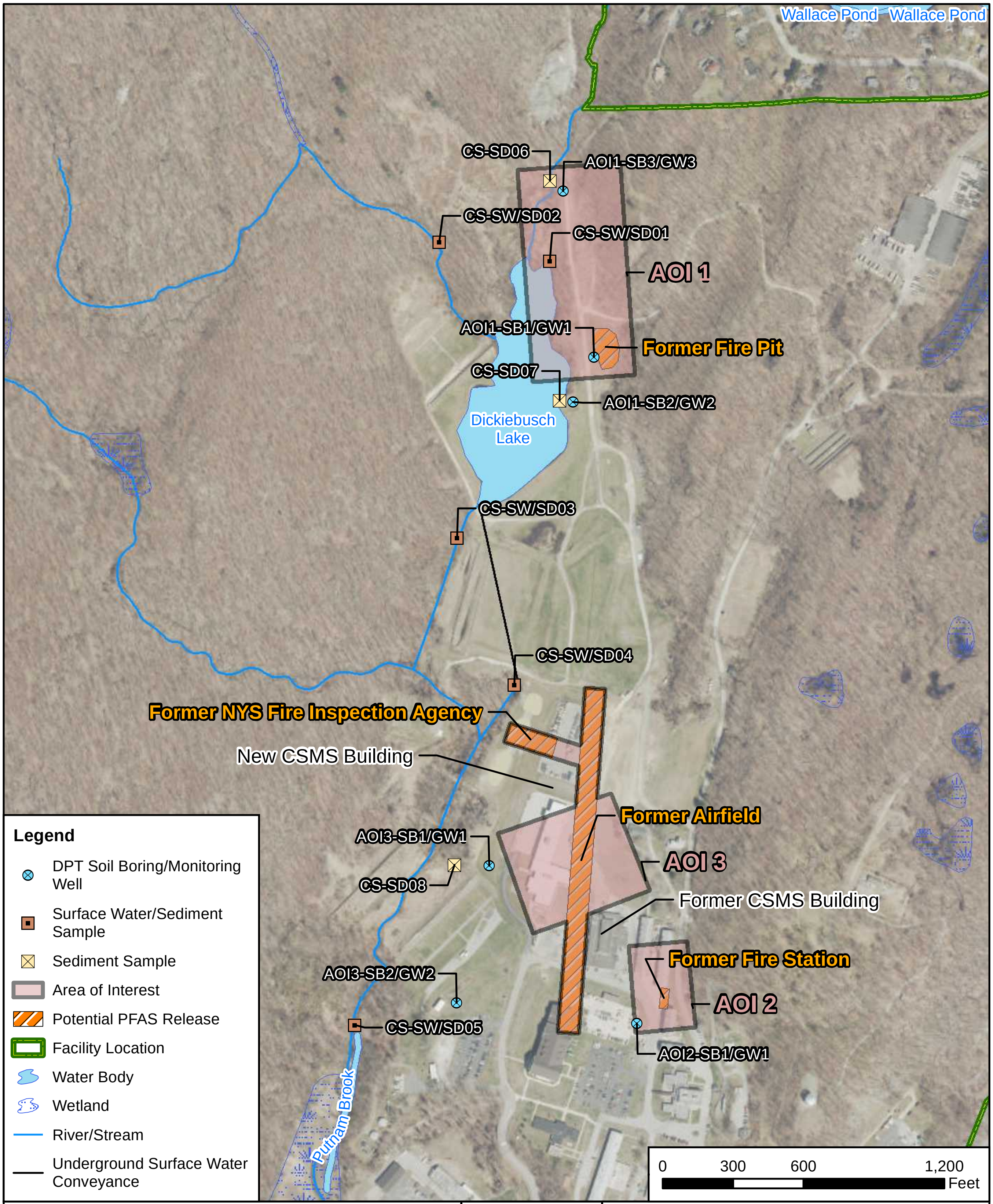

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:7,200	CHK BY	AB	12/8/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	CM	12/8/2021

N

Site Inspection Sample Locations, Mobilization 1

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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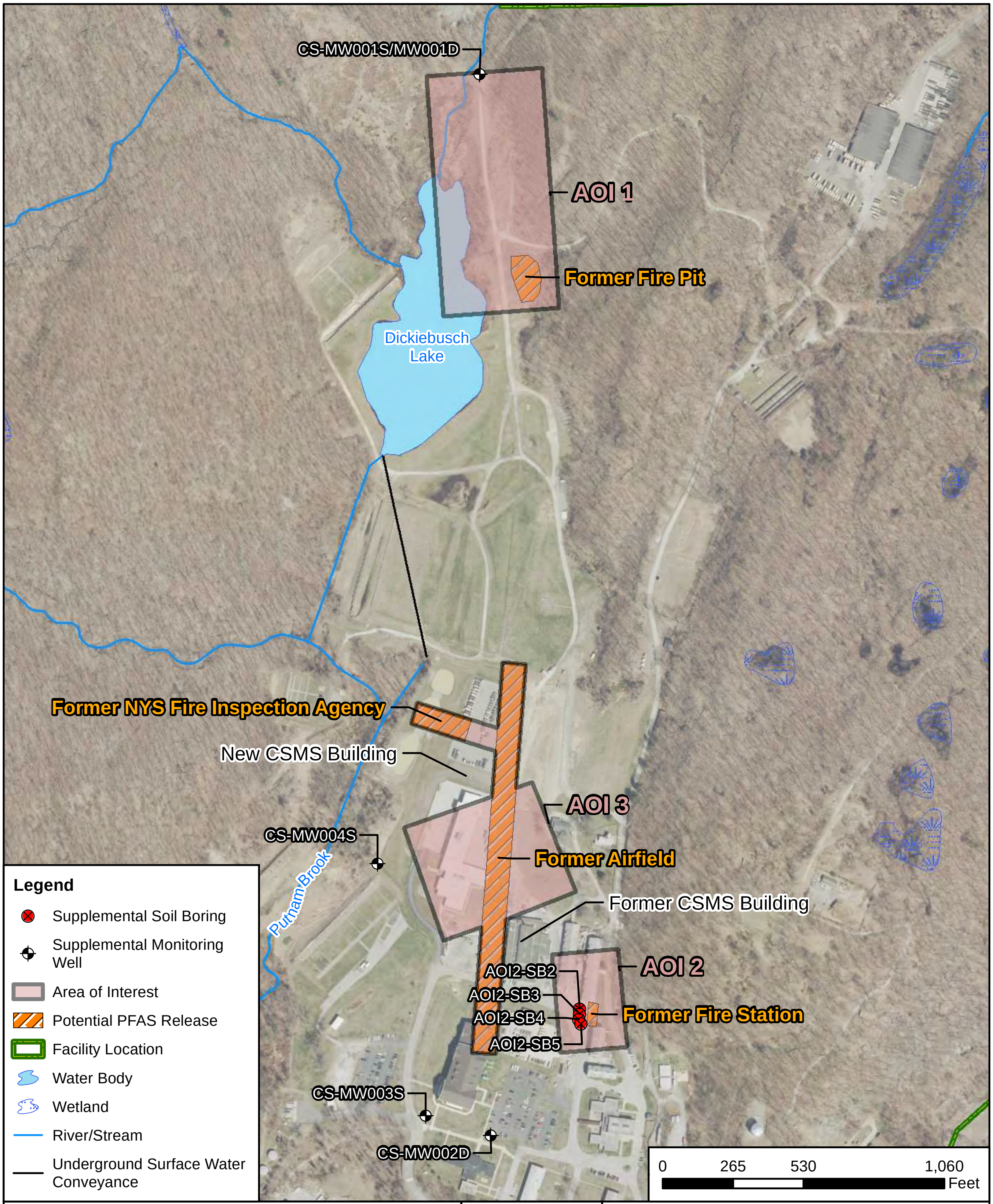

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:6,360	CHK BY	AB	12/8/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	CM	12/8/2021

N

Site Inspection Sample Locations, Mobilization 2

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-2

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Section 6.3** through **Section 6.6**. **Table 6-2** through **Table 6-7** present PFAS results for samples with detections in soil, sediment, surface water, or groundwater; only constituents detected in one or more samples are included. 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 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS.

Additionally, the USEPA issued drinking water lifetime HAs for PFOA and PFOS in May 2016 (USEPA 2016a; USEPA, 2016b). The USEPA HAs may also be used as SLs for groundwater samples collected at the facility boundary where off-facility drinking water wells are present downgradient. The SLs are presented on **Table 6-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain PFAS within the boundaries of the facility.

Table 6-1: Screening Levels (Soil and Groundwater)

Analyte	Residential (Soil) (µg/kg)[a,b] 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b] 2-15 feet bgs	Tap Water (Groundwater) (ng/L)[a,b]	USEPA HA (Groundwater representative of Drinking Water) (ng/L)[c,d]
PFOA	130	1,600	40	70
PFOS	130	1,600	40	70
PFBS	1,900	25,000	600	-

Notes:

a.) Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 September 2021.

b.) USEPA. 2016a. Drinking Water HA for PFOA. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-005. May 2016. / USEPA. 2016b. Drinking Water HA for PFOS. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

c.) USEPA HAs apply to the PFOA and PFOS concentrations individually or combined.

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the site: 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. Additionally, one grain size sample (ASTM D422) was collected from boring CS-MW002S from a clay lens at least three feet in thickness as outlined in the SI QAPP Addendum (AECOM, 2021). **Appendix F** contains the results of the TOC, pH sampling, and grain size.

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions and are therefore relatively mobile in groundwater (Xiao et al., 2015) but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy 2006; Guelfo and Higgins, 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (K_{oc} values) can help in evaluating transport potential, though other geochemical factors (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, which includes one potential PFAS release area: the Former Fire Pit. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-8**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the one potential PFAS release areas: Former Fire Pit. **Figure 6-1** though **Figure 6-6** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** through **Table 6-4** summarize the detected compounds in soil.

At the Former Fire Pit, soil was sampled from surface soil (0.5 to 2 feet bgs) and shallow subsurface soil (6 to 14 feet bgs) from boring locations AOI 1-SB1, AOI 1-SB2, AOI 1-SB3, and CS-MW001S/D during Mobilizations 1 and 2. PFOA, PFOS, and PFBS were detected in soil at concentrations several orders of magnitude lower than the SLs. In the surface soil, PFOA was detected two of the four locations, with concentrations ranging from 0.627 J micrograms per kilogram (µg/kg) (CS-MW001S-SB-00-02-D) to 0.919 J µg/kg (AOI 1-SB3-1-2). PFOS was detected in all four locations, with concentrations ranging from 0.260 J µg/kg (AOI 1-SB1-0.5-1) to 0.396 J µg/kg (CS-MW001S-SB-00-02). PFBS was detected in one of the four locations, with a detected concentration of 0.034 J µg/kg (CS-MW001S-SB-00-02).

In the shallow subsurface, PFOA was detected in one of the three locations, with a detected concentration of 0.129 J µg/kg (CS-MW001S-SB-08-10). PFOS was detected in one of the three locations, with a detected concentration of 0.117 J µg/kg (CS-MW001S-SB-08-10). PFBS was detected in one of the three locations, with a detected concentration of 0.025 J µg/kg (CS-MW001S-SB-08-10).

6.3.2 AOI 1 Groundwater Analytical Results

PFOA in groundwater exceeded its SL at one location within the AOI: Former Fire Pit. Additionally, the combined PFOA and PFOS in groundwater exceeded the USEPA HAs. However, individually, PFOS and PFBS did not exceed the SL at AOI 1. **Figure 6-7** and **Figure 6-8** present the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-5** summarizes the detected compounds in groundwater.

Within the Former Fire Pit potential PFAS release area, groundwater was sampled from three temporary monitoring well locations, AOI 1-GW1 through AOI 1-GW3, and two permanent wells, CS-MW001S and CS-MW001D. The SL of 40 ng/L for PFOA and 70 ng/L for the combined PFOA and PFOS were exceeded at AOI 1-GW3, with a maximum concentration of 58.4 ng/L PFOA and 70.9 ng/L for the combined PFOA and PFOS. PFOA was additionally detected in all four of the other monitoring wells, with concentrations ranging from 14.3 ng/L (CS-MW001S) to 29 ng/L (AOI 1-GW1). PFOS was detected in four of the five monitoring wells sampled, with concentrations ranging from 10.8 ng/L (CS-MW001D) to 37.8 ng/L (AOI 1-GW1). PFBS was detected in two of the five monitoring wells sampled, with concentrations ranging from 2.87 J ng/L (AOI 1-GW1) to 3.39 J ng/L (AOI 1-GW3).

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations were several orders of magnitude lower than the soil SLs. At location AOI 1-GW3, PFOA was detected in groundwater at concentrations that exceeded the SL of 40 ng/L and the combined SL of 70 ng/L for PFOA and PFOS. PFOS and PFBS were detected in groundwater at concentrations below the SL. Based on the exceedance of the SL for PFOA and combined PFOA and PFOS 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, which includes one potential PFAS release area: the Former Fire Station. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-8**. Please note, results for CS-MW002D and CS-MW003S are discussed in this section as they are associated with AOI 2 and AOI 3. However, both sampling locations are located downgradient of the AOI 2 and AOI 3 boundaries.

6.4.1 AOI 2 Soil Analytical Results

PFOA, PFOS, PFBS were detected but did not exceed the SLs in soil attributed to the one potential PFAS release area: Former Fire Station. **Figure 6-1** though **Figure 6-6** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** through **Table 6-4** summarize the detected compounds in soil.

At the Former Fire Station, soil was sampled from surface soil (0.5 to 2 feet bgs), shallow subsurface soil (2 to 13 feet bgs), and deep subsurface (21-42 feet bgs) from eight boring locations during Mobilizations 1 and 2. PFOA, PFOS, and PFBS were detected in soil at a range of concentrations. In the surface soil, PFOA was detected at one of five locations, at a concentration of 0.126 J µg/kg (AOI2-SB3-00-02). PFOS was detected in all five locations, with concentrations ranging from 0.099 J µg/kg (AOI2-SB5-00-02) to 34.2 µg/kg (AOI2-SB3-00-02). PFBS was not detected in any of the five locations.

In the shallow subsurface, PFOA was detected one of five locations, with a detected concentration of 0.588 J µg/kg (AOI2-SB3-02-04). PFOS was detected in four of the five locations, with concentrations ranging from 1.42 J- µg/kg (AOI2-SB5-02-04) to 191 µg/kg (AOI2-SB3-02-04). PFBS was not detected in any of the five locations.

In the deep subsurface, PFOA and PFBS were not detected in any of the three locations. PFOS was detected in two of the three locations, with concentrations ranging from 0.101 J µg/kg (CS-MW003S-SB-40-42-D) to 0.151 J µg/kg (CS-MW002D-SB-39-41).

6.4.2 AOI 2 Groundwater Analytical Results

PFOS in groundwater exceeded its SL at one location associated with the AOI: Former Fire Station. Additionally, the combined PFOA and PFOS in groundwater exceeded the USEPA HAs. However, individually, PFOA did not exceed the SL, and PFBS was not detected at AOI 2. **Figure 6-7** and **Figure 6-8** present the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-5** summarizes the detected compounds in groundwater.

Within the Former Fire Station potential PFAS release area, groundwater was sampled from two permanent wells CS-MW002D and CS-MW003S. The SL of 40 ng/L for PFOS and 70 ng/L for the combined PFOA and PFOS were exceeded at CS-MW003S, with a maximum concentration of 147 ng/L PFOS and 168 ng/L for the combined PFOA and PFOS. PFOA was detected in one of the two locations, at a concentration of 21.2 ng/L (CS-MW003S). PFOS was detected in both locations, with concentrations ranging from 37.7 ng/L (CS-MW002D) to 147 ng/L (CS-MW003S). PFBS was not detected in either of the two locations.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 2. At location CS-MW003S, PFOS was detected in groundwater, at concentrations exceeding the SL of 40 ng/L and the combined SL of 70 ng/L for PFOA and PFOS. PFOA was detected in groundwater at concentrations below the SL, and PFBS was not detected in either of the two locations. Based on the exceedance of the SL for PFOS in 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, which includes two potential PFAS release areas: the Former Airfield and the Former NYS AFSA. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-8**. Please note, results for CS-MW002D and CS-MW003S are discussed in this section as they are associated with AOI 2 and AOI 3. However, both sampling locations are located downgradient of the AOI 2 and AOI 3 boundaries.

6.5.1 AOI 3 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the two potential PFAS release areas: the Former Airfield and the Former NYS AFSA. **Figure 6-1** though **Figure 6-6** present the range of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** through **Table 6-4** summarize the detected compounds in soil.

At AOI 3, soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (7 to 9 feet bgs), and deep subsurface (15-17 feet bgs) from five borings during Mobilization 1 and 2. PFOA, PFOS, and PFBS were detected in soil, at concentrations several orders of magnitude lower than the SLs. In the surface soil, PFOA was detected in all three locations, at concentrations ranging from of 0.110 J µg/kg (CS-MW004S-SB-00-02) to 0.173 J µg/kg (AOI 3-SB-0.5-1). PFOS was detected in all three locations, at concentrations ranging from of 0.194 J µg/kg (AOI 3-SB1-0.5-1) to 1.02 J µg/kg (AOI 3-SB2-0.5-1). PFBS was not detected in any of the five locations. In the shallow subsurface, PFOA, PFOS, and PFBS were not detected in any of the three borings.

In the deep subsurface, PFOA and PFBS were not detected in any of the three locations. PFOS was detected in two of the three locations, with concentrations ranging from 0.101 J µg/kg (CS-MW003S-SB-40-42-D) to 0.151 J µg/kg (CS-MW002D-SB-39-41).

6.5.2 AOI 3 Groundwater Analytical Results

PFOS in groundwater exceeded its SL at one location with the AOI: the Former Airfield and the Former NYS AFSA. Additionally, the combined PFOA and PFOS in groundwater exceeded the USEPA HAs. However, individually, PFOA did not exceed the SL at AOI 3, and PFBS was not detected in any location. **Figure 6-6** and **Figure 6-8** present the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-5** summarizes the detected compounds in groundwater.

Within the Former Airfield and the Former NYS AFSA potential PFAS release area, groundwater was sampled from two temporary wells, AOI 3-GW1 and AOI 3-GW2, and three permanent wells: CS-MW002D, CS-MW003S, and CS-MW004S. The SL of 40 ng/L for PFOS and 70 ng/L for the combined PFOA and PFOS exceeded at CS-MW003S, with a maximum concentration of 147 ng/L PFOS and 168 ng/L for the combined PFOA and PFOS. PFOA was detected in the three of five locations and ranged in concentrations from 10.3 ng/L (AOI 3 GW-2) to 39.9 ng/L (AOI 3 GW-1). PFOS was detected in three of the five locations, with concentrations ranging from 14.8 ng/L (AOI 3 GW-1) to 147 ng/L (CS-MW003S). PFBS was detected in two of the five locations, with concentrations ranging from 2.66 ng/L (AOI 3 GW-2) to 3.77 ng/L (AOI 3 GW-1).

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 3; however, the detected concentrations were several orders of magnitude lower than the soil SLs. At location CS-MW003S, PFOS was detected in groundwater, at concentrations exceeding the SL of 40 ng/L and the combined SL of 70 ng/L for PFOA and PFOS. PFOA and PFBS were detected in groundwater, at concentrations below the SL. Based on the exceedance of the SL for PFOS in groundwater, further evaluation at AOI 3 is warranted.

6.6 Facility-Wide Surface Water and Sediment

This section presents the analytical results for surface water and sediment sampling at Camp Smith. Surface water and sediment samples were collected from tributaries flowing to and from Dickiebusch Lake and along Putnam Brook. Sampling locations within these water bodies are downgradient of all three AOIs, except in cases noted. The detected compounds are summarized in **Table 6-6** and **Table 6-7** and on **Figure 6-9** and **Figure 6-10**.

6.6.1 Sediment Analytical Results

Sediment samples were collected from eight locations (CS-SD01 through CS-SD08) in the tributaries flowing to and from Dickiebusch Lake and along Putnam Brook. **Table 6-6** summarizes the detected compounds in sediment. **Figure 6-9** presents the ranges of detections for PFOA, PFOS, and PFBS in sediment.

PFOA was detected in two of eight locations, with concentrations ranging from 0.283 J µg/kg (CS-SD05) to 1.07 J µg/kg (CS-SD02). PFOS was detected in five of eight locations, with concentrations ranging from 1.14 J µg/kg (CS-SD05) to 3.77 µg/kg (CS-SD06). The maximum detection was the PFOS concentration at location CS-SD06, which was the most upgradient location in the tributary leading into Dickiebusch Lake. PFBS was not detected in any of the eight locations. The most frequently detected compound was PFOS, which was detected in all five sediment samples where PFAS were detected. The occurrence and concentration of individual PFAS varied between sampling location.

6.6.2 Surface Water Analytical Results

Surface water samples were collected from five locations (CS-SW01 through CS-SW05) in the tributaries flowing to and from Dickiebusch Lake and along Putnam Brook. **Table 6-7** summarizes the detected compounds in surface water. **Figure 6-10** presents the ranges of detections PFOA, PFOS, and PFBS in surface water. No PFOA, PFOS, and PFBS were detected in surface water at locations CS-SW01 (surface water at the northern-most point of Dickiebusch Lake), CS-SW02 (surface water flowing into the northwest portion of Dickiebusch Lake), CS-SW03 (surface water flowing into the southwestern portion of Dickiebusch Lake),CS-SW04 (surface water from the underground surface water conveyance that flows out of the southeastern portion of Dickiebusch Lake), and CS-SW05 (surface water in Putnam Brook).

6.6.3 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in sediment at several locations across the facility. There are no established SLs for sediment; therefore, these results are presented for informational purposes only. PFBS was not detected in sediment, and PFOA, PFOS, and PFBS were not detected in surface water.

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Camp Smith

Area of Interest		AOI1												AOI2					
Sample ID		AOI 1-SB1-0.5-1		AOI 1-SB2-0.5-1		AOI 1-SB3-0.5-1		AOI 1-SB3-1-2		CS-MW001S-SB-00-02		CS-MW001S-SB-00-02-D		AOI 2-SB1-0.5-1		AOI2-SB2-00-02		AOI2-SB3-00-02	
Sample Date		12/11/2019		12/11/2019		12/11/2019		12/11/2019		07/20/2021		07/20/2021		12/10/2019		07/24/2021		07/24/2021	
Depth		0.5 - 1 ft		0.5 - 1 ft		0.5 - 1 ft		1 - 2 ft		0 - 2 ft		0 - 2 ft		0.5 - 1 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
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)†																			
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND		0.460	J
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		0.077	J	7.65	
PFBA	-	ND		ND		0.146	J	0.325	J	0.224	J	0.207	J	0.143	J	ND		ND	
PFBS	1900	ND		ND		ND		ND		0.034	J	0.034	J	ND		ND		ND	
PFDA	-	ND		ND		ND		ND		0.093	J	0.085	J	ND		ND		0.111	J
PFDoA	-	ND		ND		ND		ND		0.032	J	0.030	J	ND		0.025	J	ND	
PFHpA	-	ND		ND		ND		ND		0.134	J	0.126	J	ND		ND		0.061	J
PFHxA	-	ND		ND		ND		ND		0.123	J	0.113	J	ND		ND		0.033	J
PFHxS	-	ND		ND		ND		ND		ND		ND		ND		0.053	J	0.150	J
PFNA	-	ND		ND		ND		ND		0.217	J	0.197	J	ND		ND		0.071	J
PFOA	130	ND		ND		ND		0.919	J	0.669	J	0.627	J	ND		ND		0.126	J
PFOS	130	0.260	J	0.345	J	ND		0.339	J	0.396	J	0.334	J	0.432	J	4.56		34.2	
PFPeA	-	ND		ND		ND		ND		0.129	J	0.110	J	ND		ND		0.021	J
PFUnDA	-	ND		ND		ND		ND		0.073	J	0.072	J	ND		0.027	J	0.021	J

Grey Fill	Detected concentration exceeded OSD Screening Levels

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

References

a. Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 September 2021. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D/FD	duplicate
ft	feet
HQ	hazard quotient
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
-	not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Camp Smith

	Area of Interest	AOI 2				AOI3									
	Sample ID	AOI2-SB4-00-02		AOI2-SB5-00-02		AOI 3-SB1-0.5-1		AOI 3-SB1-1-2		AOI 3-SB1-1-2-FD		AOI 3-SB2-0.5-1		CS-MW004S-SB-00-02	
	Sample Date	07/24/2021		07/24/2021		12/10/2019		12/10/2019		12/10/2019		12/10/2019		07/19/2021	
	Depth	0 - 2 ft		0 - 2 ft		0.5 - 1 ft		1 - 2 ft		1 - 2 ft		0.5 - 1 ft		0 - 2 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)†															
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	0.065	J	ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		0.270	J	0.304	J	0.207	J	0.301	J	0.059	J
PFBS	1900	ND		ND		ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		0.030	J	ND		ND		ND		ND		0.033	J
PFHxA	-	ND		0.095	J	ND		ND		ND		ND		0.042	J
PFHxS	-	0.067	J	ND		ND		ND		ND		ND		0.048	J
PFNA	-	ND		0.032	J	ND		ND		ND		0.130	J	ND	
PFOA	130	ND		ND		0.172	J	ND		ND		0.173	J	0.110	J
PFOS	130	1.25		0.099	J	0.194	J	ND		ND		1.02	J	0.283	J
PFPeA	-	ND		0.095	J	ND		ND		ND		ND		0.040	J
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND	

▨ Grey Fill	Detected concentration exceeded OSD Screening Levels

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

References

a. Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 September 2021. Soil screening levels based on residential scenario for direct ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D/FD	duplicate
ft	feet
HQ	hazard quotient
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
-	not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Camp Smith

	Area of Interest	AOI1						AOI2										AOI3			
	Sample ID	AOI 1-SB1-6-8		AOI 1-SB1-12-14		CS-MW001D-SB-08-10		AOI 2-SB1-11-13		AOI2-SB2-02-04		AOI2-SB3-02-04		AOI2-SB4-02-04		AOI2-SB5-02-04		AOI 3-SB2-7-9		CS-MW004S-SB-07-09	
	Sample Date	12/11/2019		12/11/2019		07/20/2021		12/10/2019		07/24/2021		07/24/2021		07/24/2021		07/24/2021		12/10/2019		07/19/2021	
	Depth	6 - 8 ft		12 - 14 ft		8 - 10 ft		11 - 13 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		2 - 4 ft		7 - 9 ft		7 - 9 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)†																					
6:2 FTS	-	ND		ND		ND		ND		ND		3.10		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		0.670	J	30.2		2.08		0.426	J	ND		ND	
PFBA	-	0.313	J	0.257	J	ND		0.299	J	ND		0.050	J	ND		ND		0.274	J	ND	
PFBS	25000	ND		ND		0.025	J	ND		ND		ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		0.066	J	0.199	J	ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		0.025	J	ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		ND		0.031	J	0.195	J	0.022	J	ND		ND		ND	
PFHxA	-	ND		ND		0.034	J	ND		0.033	J	0.198	J	ND		0.033	J	ND		ND	
PFHxS	-	ND		ND		ND		ND		0.168	J	0.860	J	0.079	J	0.213	J	ND		ND	
PFNA	-	ND		ND		ND		ND		0.046	J	0.285	J	ND		ND		ND		ND	
PFOA	1600	ND		ND		0.129	J	ND		ND		0.588	J	ND		ND		ND		ND	
PFOS	1600	ND		ND		0.117	J	ND		24.4		191		17.6		1.42	J-	ND		ND	
PFPeA	-	ND		ND		ND		ND		ND		0.121	J	0.025	J	ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		0.037	J	0.028	J	0.022	J	ND		ND		ND	

▨ Grey Fill	Detected concentration exceeded OSD Screening Levels

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

References

a. Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 September 2021. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D	duplicate
ft	feet
HQ	hazard quotient
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
-	not applicable

Table 6-4
PFAS Detections in Deep Subsurface Soil
Site Inspection Report, Camp Smith

Area of Interest	AOI2		AOI 2/3						AOI3	
Sample ID	AOI 2-SB1-21-23		CS-MW002D-SB-39-41		CS-MW003S-SB-40-42		CS-MW003S-SB-40-42-D		AOI 3-SB2-15-17	
Sample Date	12/10/2019		07/23/2021		07/25/2021		07/25/2021		12/10/2019	
Depth	21 - 23 ft		39 - 41 ft		40 - 42 ft		40 - 42 ft		15 - 17 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)†										
PFBA	0.347	J	ND		ND		ND		0.234	J
PFHxA	ND		ND		0.026	J	ND	UJ	ND	
PFOS	ND		0.151	J	0.131	J	0.101	J	ND	

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

Interpreted Qualifiers

J = Estimated concentration

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

PFBA	perfluorobutanoic acid
PFHxA	perfluorohexanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

AOI	Area of Interest
D	duplicate
ft	feet
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
PFAS Detections in Groundwater
Site Inspection Report, Camp Smith

		Area of Interest	AOI1												AOI 2/3				AOI 3	
		Sample ID	AOI 1-GW1		AOI 1-GW2		AOI 1-GW3		CS-MW001D-GW		CS-MW001S-GW		CS-MW001S-GW-D		CS-MW002D-GW		CS-MW003S-GW		CS-MW004S-GW	
		Sample Date	12/11/2019		12/11/2019		12/11/2019		07/24/2021		07/24/2021		07/24/2021		07/28/2021		07/27/2021		07/22/2021	
Analyte	**OSD Screening Level [a]**	**USEPA HA [b]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)†																				
6:2 FTS	-	-	2.10	J	ND		ND		ND		9.15		8.61		10.1		12.6		224	J-
PFBA	-	-	7.28	J	4.73	J	35.4		ND		ND		ND		ND		14.3		ND	
PFBS	600	-	2.87	J	ND		3.39	J	ND		ND		ND		ND		ND		ND	
PFDA	-	-	1.68	J	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	-	4.77	J	3.50	J	9.51	J	3.00	J	1.74	J	1.85	J	2.75	J	27.0		ND	
PFHxA	-	-	9.81	J	3.42	J	11.4		ND		ND		ND		ND		43.2		ND	
PFHxS	-	-	14.6		3.45	J	10.2		7.05		3.81	J	3.80	J	17.9		64.1		ND	
PFNA	-	-	4.18	J	4.23	J	5.17	J	ND		ND		ND		ND		1.70	J	ND	
PFOA	40	70	29.0		24.0	J-	58.4		16.1		14.3		14.5		ND		21.2		ND	
PFOS	40	70	37.8		13.2	J+	12.5		10.8		ND		ND		37.7		**147**		ND	
PFPeA	-	-	ND		ND		ND		ND		ND		ND		ND		48.5		ND	
Total PFOA+PFOS	-	70	66.8		37.2		**70.9**		26.9		14.3		14.5		37.7		**168**		ND	

Grey Fill	Detected concentration exceeded OSD Screening Levels
Bold Font	Detected concentration exceeded USEPA HA Screening Levels

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

References

a. Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 September 2021. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

b. USEPA, 2016. Drinking Water Health Advisory for PFOA. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for PFOS. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D/FD	duplicate
GW	groundwater
HA	Health Advisory
HQ	hazard quotient
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
-	not applicable

Table 6-5
PFAS Detections in Groundwater
Site Inspection Report, Camp Smith

		Area of Interest	AOI3					
		Sample ID	AOI 3-GW1		AOI 3-GW1-FD		AOI 3-GW2	
		Sample Date	12/10/2019		12/10/2019		12/10/2019	
Analyte	**OSD Screening Level [a]**	**USEPA HA [b]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)†								
6:2 FTS	-	-	ND		ND		2.60	J
PFBA	-	-	12.9		12.5		4.50	J
PFBS	600	-	3.77	J	3.69	J	2.66	J
PFDA	-	-	ND		ND		ND	
PFHpA	-	-	8.83	J	8.09	J	ND	
PFHxA	-	-	22.0		21.3		4.49	J
PFHxS	-	-	6.19	J	5.93	J	ND	
PFNA	-	-	3.57	J	4.25	J	ND	
PFOA	40	70	35.5		39.9		10.3	
PFOS	40	70	15.3		14.8		19.7	
PFPeA	-	-	21.9		22.2		ND	
Total PFOA+PFOS	-	70	50.8		54.7		30.0	

Grey Fill	Detected concentration exceeded OSD Screening Levels
Bold Font	Detected concentration exceeded USEPA HA Screening Levels

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

References

a. Assistant Secretary of Defense, 2021. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 September 2021. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

b. USEPA, 2016. Drinking Water Health Advisory for PFOA. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-005. May 2016. / EPA. 2016. Drinking Water Health Advisory for PFOS. Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. EPA Document Number: 822-R-16-004. May 2016.

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D/FD	duplicate
GW	groundwater
HA	Health Advisory
HQ	hazard quotient
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
-	not applicable

Table 6-6
PFAS Detections in Sediment
Site Inspection Report, Camp Smith

Area of Interest	Camp Smith															
Sample ID	CS-SD01-0-1		CS-SD02-0-1		CS-SD03-0-1		CS-SD04-0-1		CS-SD05-0-1		CS-SD06-0-1		CS-SD07-0-1		CS-SD08-0-1	
Sample Date	12/12/2019		12/12/2019		12/12/2019		12/12/2019		12/11/2019		12/12/2019		12/12/2019		12/12/2019	
Depth	0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 1 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Sediment, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)†																
PFBA	ND		0.402	J	ND		ND		ND		ND		ND		ND	
PFHxA	ND		0.353	J	ND		ND		ND		ND		ND		ND	
PFHxS	ND		ND		ND		ND		ND		0.199	J	ND		ND	
PFNA	ND	UJ	0.192	J	ND		ND		ND		ND		ND		ND	
PFOA	ND		1.07	J	ND		ND		0.283	J	ND		ND		ND	
PFOS	2.14	J+	3.24		ND		ND		1.14	J	3.77		ND		2.13	J
PFUnDA	ND	UJ	0.299	J	ND	UJ	ND		ND		ND		ND		ND	UJ

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

PFBA	perfluorobutanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

ft	feet
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
SD	sediment
µg/kg	micrograms per kilogram

Table 6-7
PFAS Detections in Surface Water
Site Inspection Report, Camp Smith

Area of Interest	Camp Smith									
Sample ID	CS-SW01		CS-SW02		CS-SW03		CS-SW04		CS-SW05	
Sample Date	12/12/2019		12/12/2019		12/12/2019		12/12/2019		12/11/2019	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)†										
PFDoA	ND	UJ	ND	UJ	ND	UJ	ND	UJ	2.64	J-

†Samples collected during Mobilization 1 were analyzed by QSM 5.1 (which was the most current version at the time of the event)

Interpreted Qualifiers

J- = Estimated concentration, biased low

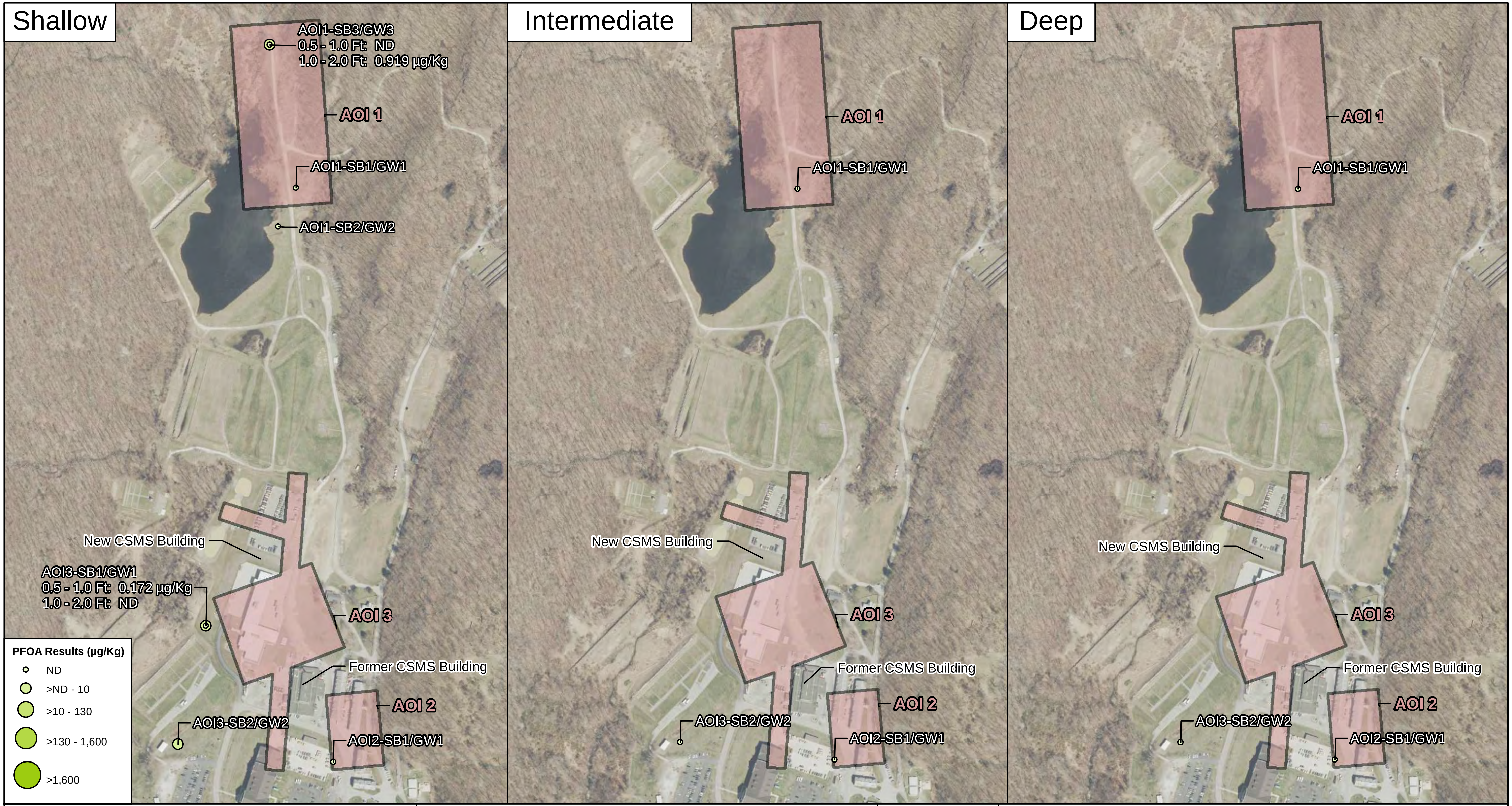
UJ = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL). However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

PFDoA	perfluorododecanoic acid

Acronyms and Abbreviations

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
ng/l	nanogram per liter
SW	surface water



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:5,795	CHK BY	AB	12/8/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/8/2021

Legend

▭ Area of Interest

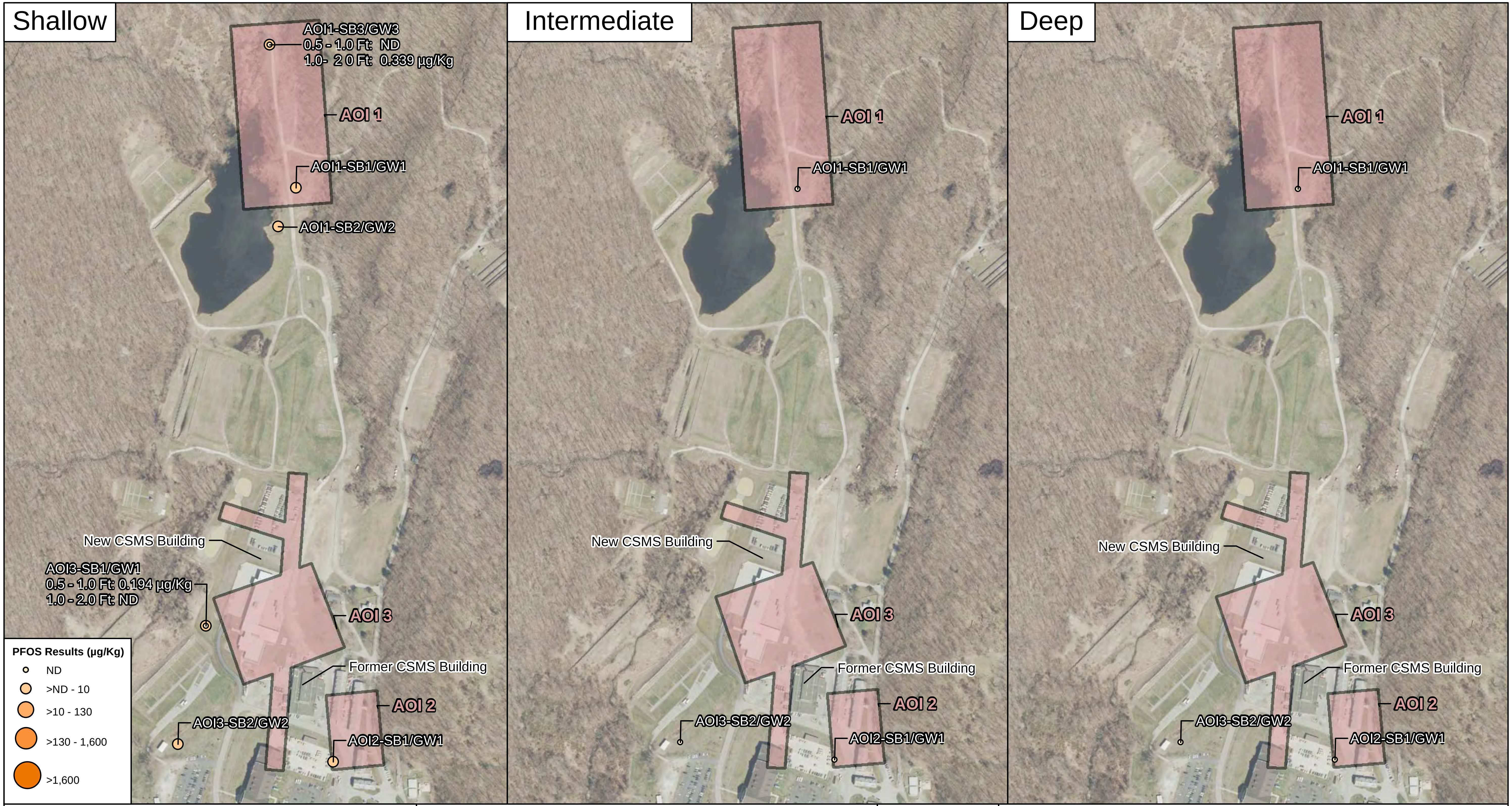
🟩 Facility Location

PFOA Detections in Soil, Mobilization 1

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-1_Camp_Smith_SI_Soil_PFOA_Results.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/8/2021	GIS BY	MS	12/8/2021
SCALE	1:5,795	CHK BY	AB	12/8/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/8/2021

Legend

▭ Area of Interest

🟩 Facility Location

0 240 480 960
Feet

N

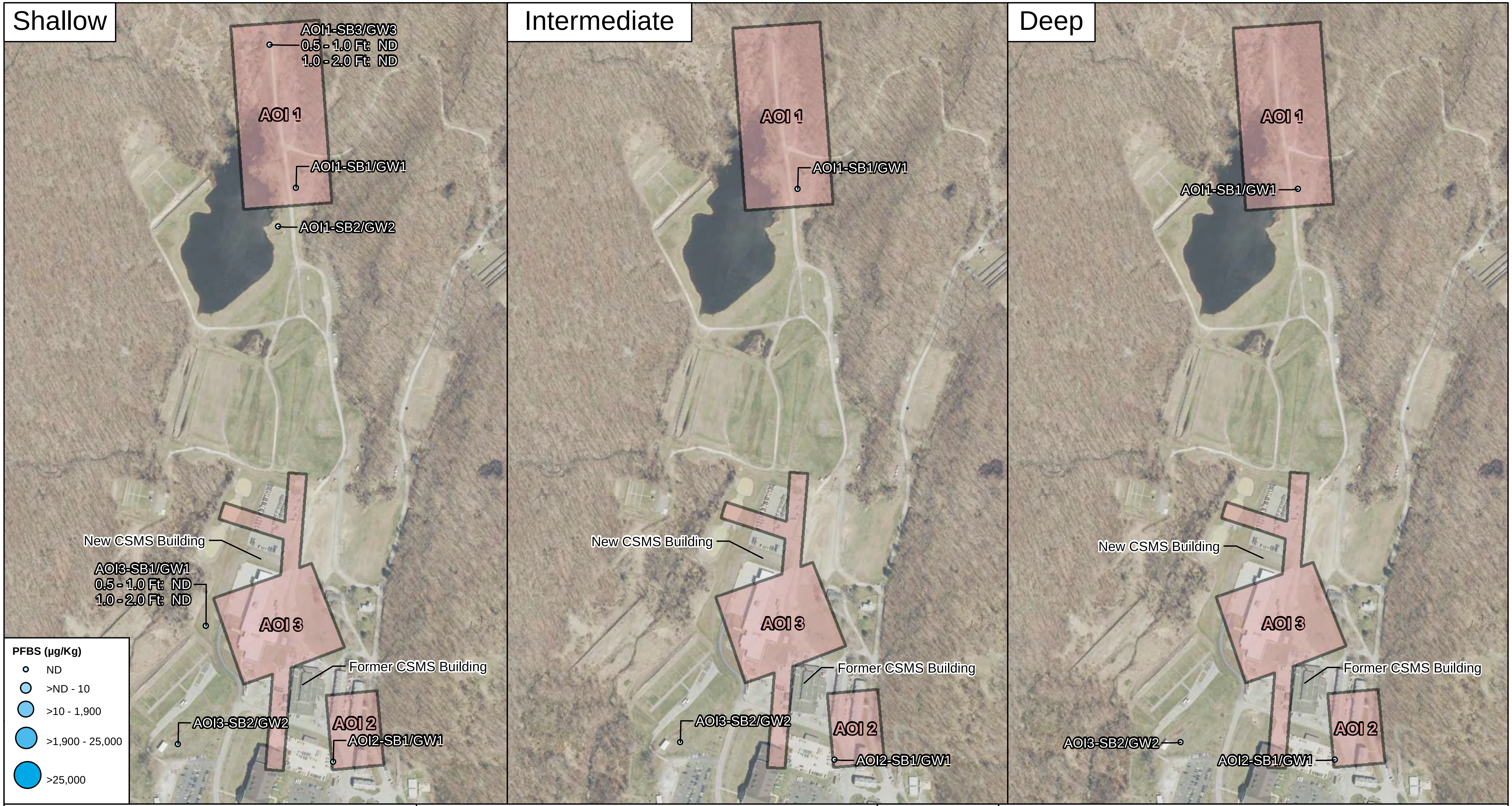
PFOS Detections in Soil, Mobilization 1

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-2

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-2_Camp_Smith_SI_Soil_PFOS_Results.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/9/2021	GIS BY	MS	12/9/2021
SCALE	1:5,795	CHK BY	AB	12/9/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	MS	12/9/2021

Legend

🟩 Facility Location

▨ Area of Interest

0 240 480 960 Feet

N

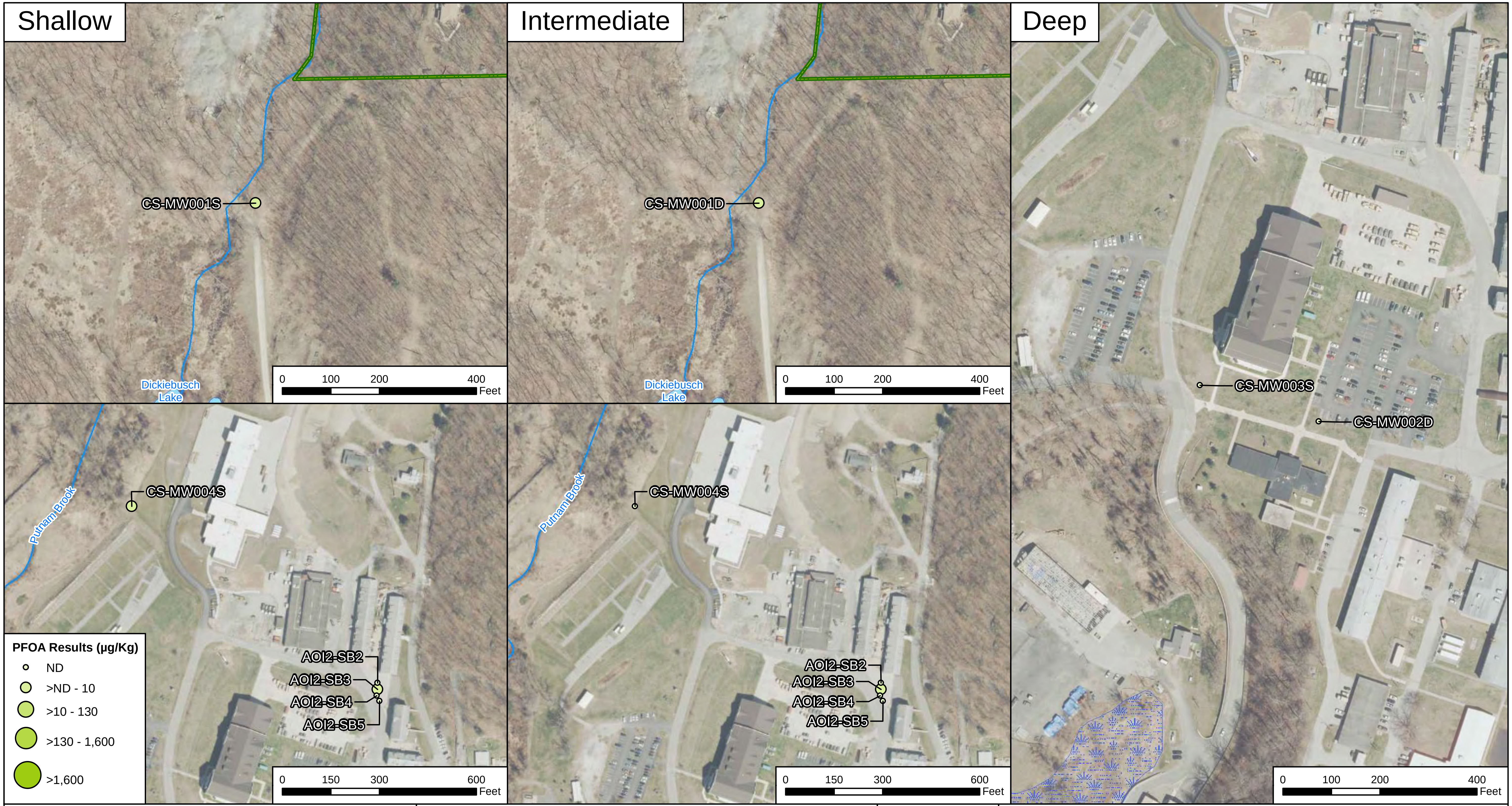
PFBS Detections in Soil, Mobilization 1

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-3

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-3_Camp_Smith_SI_Soil_PFBS_Results.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/9/2021	GIS BY	MS	12/9/2021
SCALE	1:2,400	CHK BY	AB	12/9/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/9/2021

Legend

🟩 Facility Location

Water Body

Wetland

— River/Stream

N

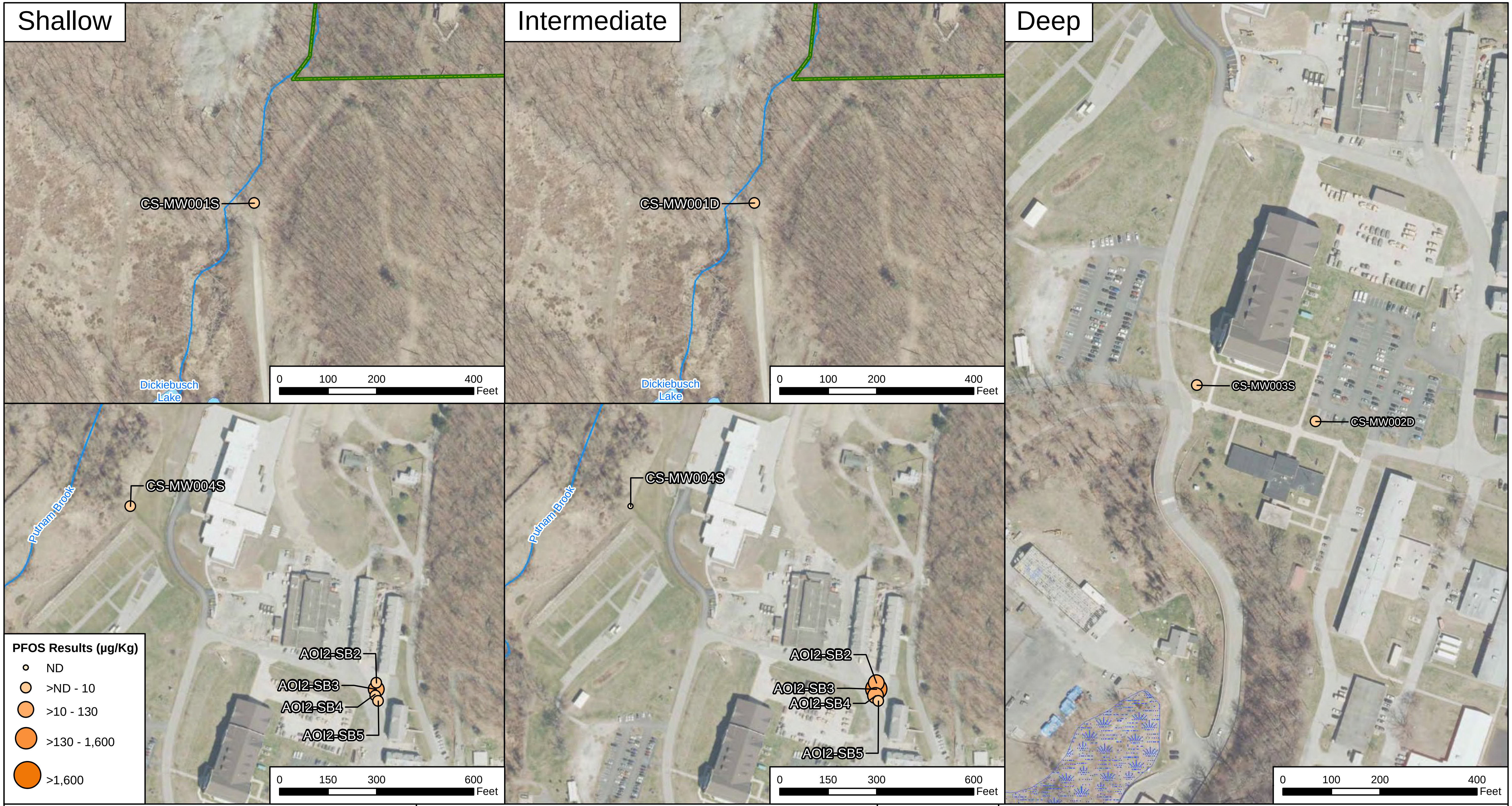
PFOA Detections in Soil, Mobilization 2

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-4_Camp_Smith_SSI_Soil_PFOA_Results_Mob2.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/9/2021	GIS BY	MS	12/9/2021
SCALE	1:2,402	CHK BY	AB	12/9/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/9/2021

Legend

- 🟩 Facility Location
- Water Body
- Wetland
- River/Stream

N

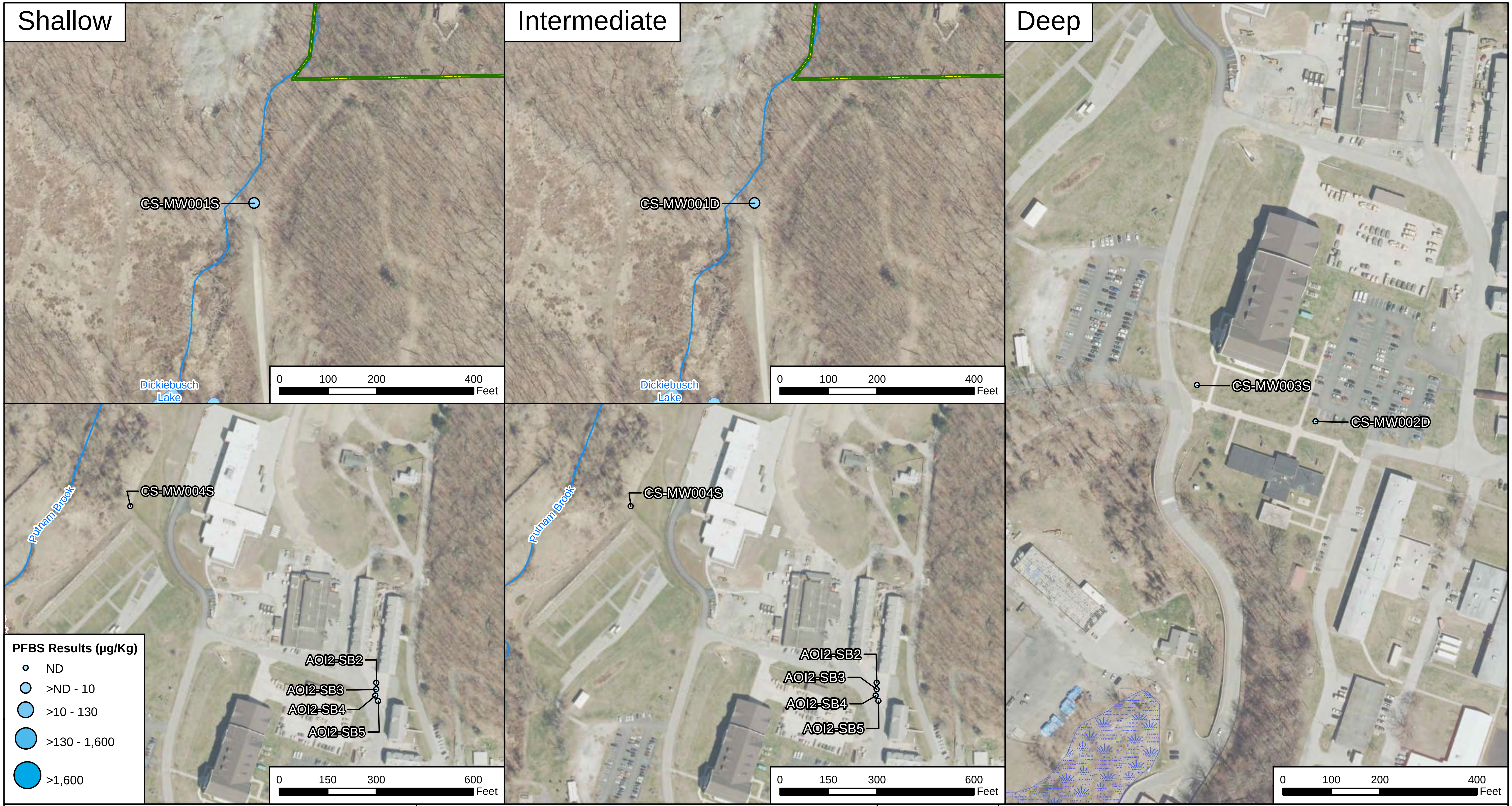
PFOS Detections in Soil, Mobilization 2

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-5

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-5_Camp_Smith_SSI_Soil_PFOS_Results_Mob2.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	12/9/2021	GIS BY	MS	12/9/2021
SCALE	1:2,400	CHK BY	AB	12/9/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/9/2021

Legend

🟩 Facility Location
Water Body
Wetland
— River/Stream

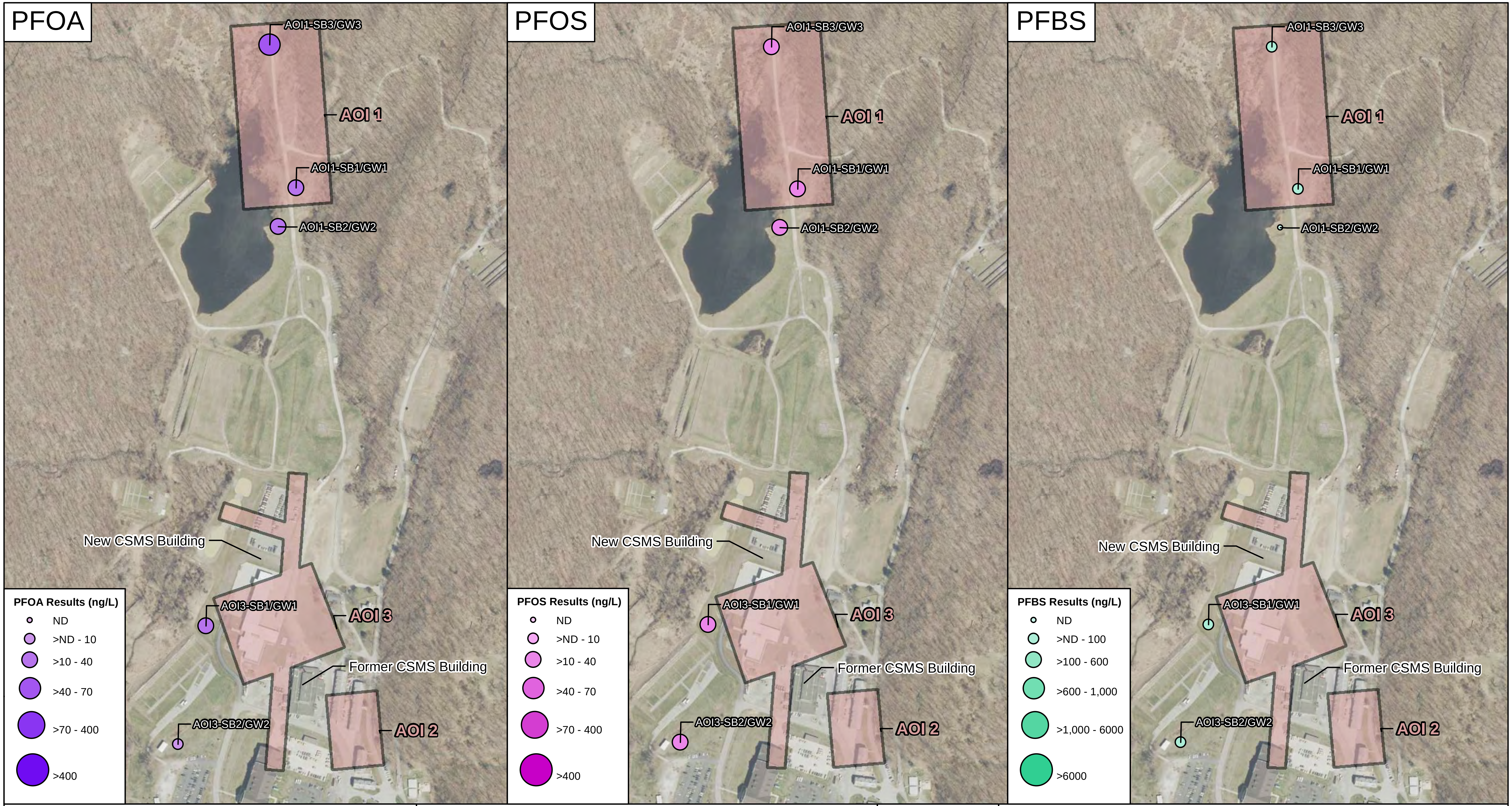
N

PFBS Detections in Soil, Mobilization 2

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-6

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-6_Camp_Smith_SSI_Soil_PFBS_Results_Mob2.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	10/22/2021	GIS BY	MS	10/22/2021
SCALE	1:5,795	CHK BY	AB	10/22/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	10/22/2021

Legend

- ▭ Area of Interest
- 🟩 Facility Location

0 240 480 960 Feet

N

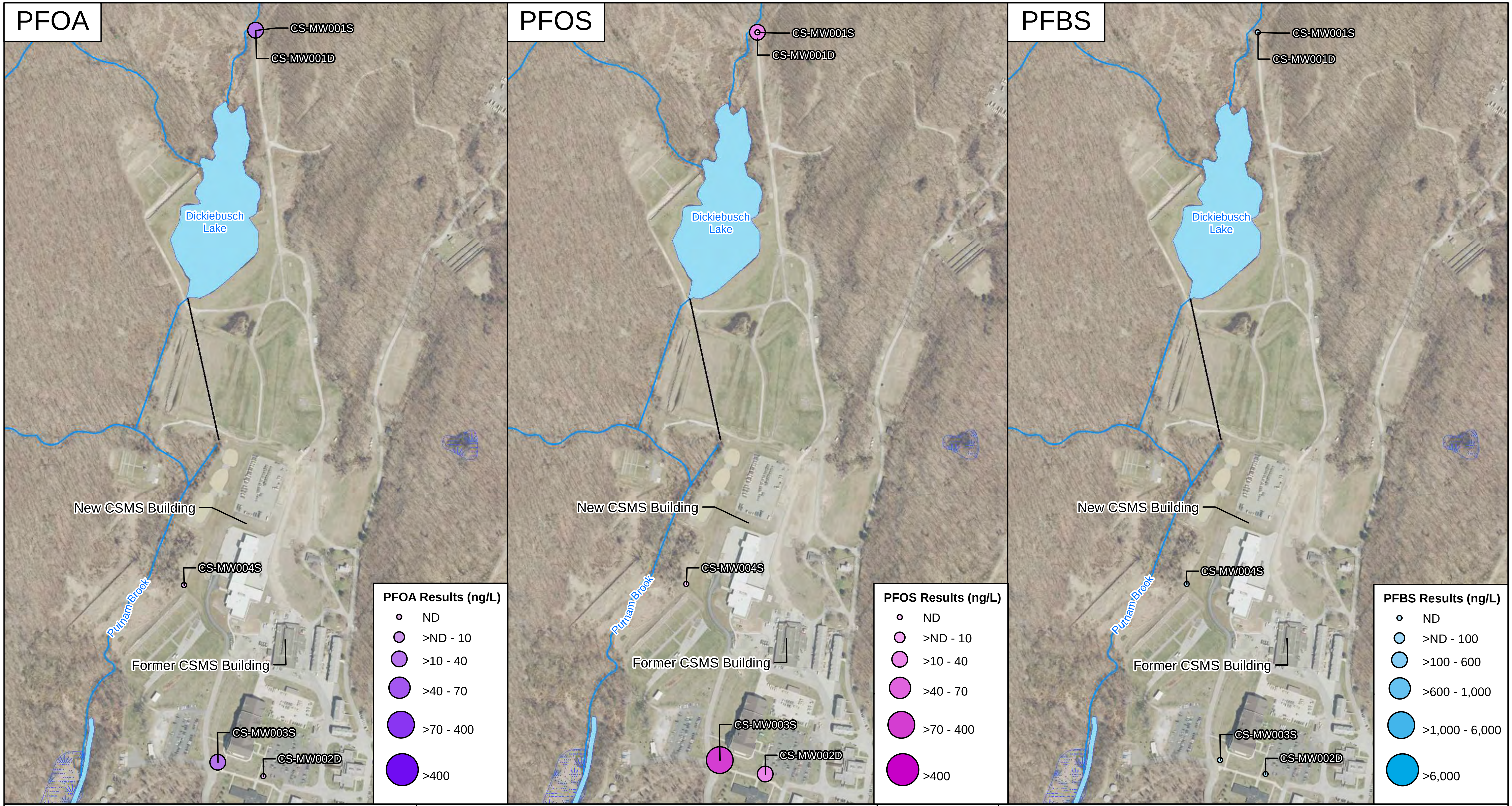
PFOA, PFOS, and PFBS Detections in Groundwater, Mobilization 1

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-7

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-7_Camp_Smith_SI_GW_Results_Mob1.mxd



CLIENT	ARNG				
PROJECT	Site Inspection for PFAS at Camp Smith, NY				
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SCALE	1:6,278	CHK BY	AB	10/22/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	10/22/2021

Legend

- 🟩 Facility Location
- Water Body
- Wetland
- River/Stream
- Underground Surface Water Conveyance

0 260 520 1,040 Feet

N

PFOA, PFOS, and PFBS Detections in Groundwater, Mobilization 2

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-8

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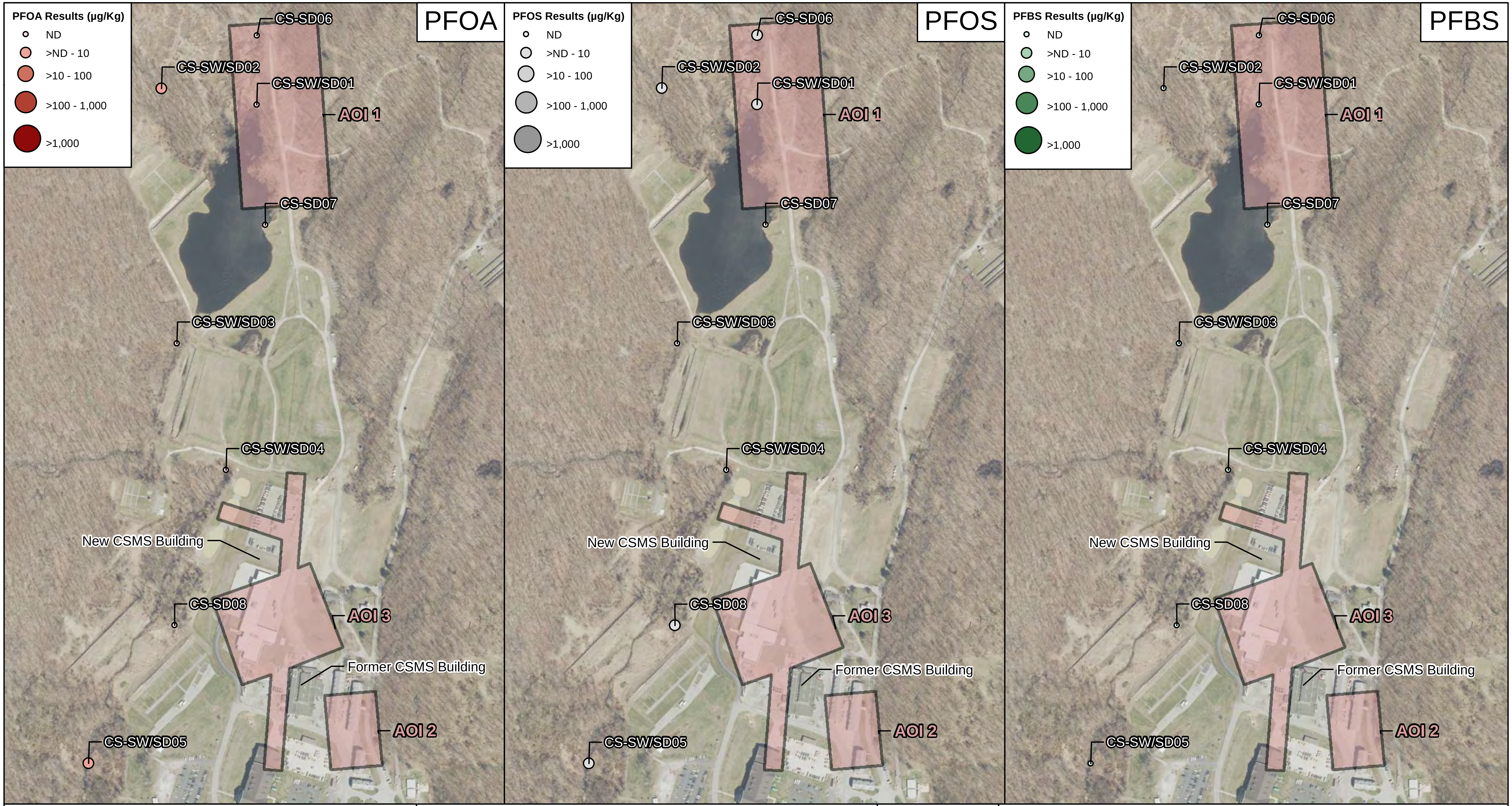

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
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SCALE	1:5,758	CHK BY	AB	10/22/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	10/22/2021

Legend

- ▭ Area of Interest
- 🟩 Facility Location

0 240 480 960 Feet

N

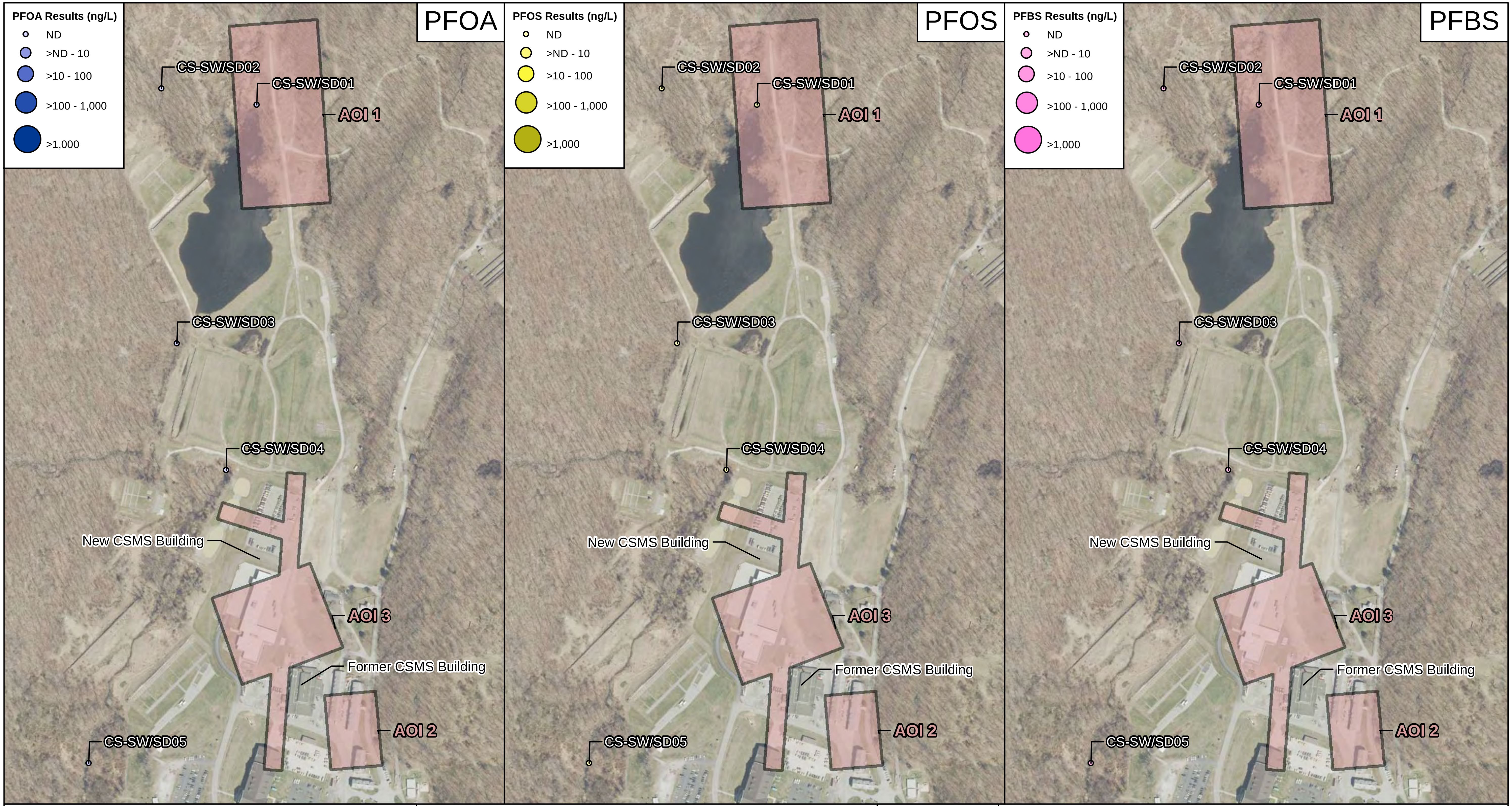
PFOA, PFOS, and PFBS Detections in Sediment

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-9

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-9_Camp_Smith_SI_Sediment_Results.mxd



CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
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SCALE	1:5,760	CHK BY	AB	10/22/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	10/22/2021

Legend

▭ Area of Interest

🟩 Facility Location

0 240 480 960 Feet

N

PFOA, PFOS, and PFBS Detections in Surface Water

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-10

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\NY\Camp_Smith_Figures\Camp_Smith_SI_Figures\SI_Report\Fig_6-10_Camp_Smith_SI_Surface_Water_Results.mxd

7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-3**. 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 PFOA, PFOS, or PFBS 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 PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway may warrant further investigation.

In general, the potential routes of exposure to PFAS 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 PFAS toxicological study. The receptors evaluated are consistent with those listed in USEPA guidance for risk screening (USEPA, 2001). Receptors at the facility include site workers (e.g., facility staff and visiting soldiers), construction workers, trespassers (though unlikely due to restricted access), residents outside the facility boundary, and recreational users outside of the facility boundary.

7.1 Soil Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOIs based on the aforementioned criteria.

7.1.1 AOI 1

From approximately 1980 to 1996, PFAS may have been released to soil at the potential release area of the Former Fire Pit. The Former Fire Pit was used as a live fire training ground for the fire fighters and emergency responders, where fire training occurred with some frequency, possibly once a month. The use of this area as a fire training ground during this time period could have resulted in potential releases of PFAS to soil.

Based on the results of the SI in AOI 1, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could also potentially result in site worker, construction worker, or trespasser exposure via ingestion of surface soil. Lastly, ground-disturbing activities could also potentially result in construction worker exposure to PFOA, PFOS, and PFBS in subsurface soil via ingestion. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

The Former Fire Station was active between 1980 and 1996. While operational, two firetrucks were housed at the Former Fire Station, though no known AFFF was used in either truck or stored within the building. Due to the uncertainty of use or storage of AFFF at this location, there is potential for a release of PFAS to soil.

Based on the results of the SI in AOI 2, site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could also potentially result in site worker, construction worker, or trespasser exposure via ingestion of surface soil. Lastly, ground-disturbing activities could also potentially result in construction worker exposure to PFOA, PFOS, and PFBS in subsurface soil via ingestion. The CSM for AOI 2 is presented on **Figure 7-2**.

7.1.3 AOI 3

The Former Airfield was constructed sometime between 1955 and 1960 and was removed in the late 1970s. There is uncertainty whether there were AFFF usage at the Former Airfield while it was active. The former NYS AFSA operated beginning in the late 1990’s and ceased operation in September 2006. Activities at the former NYS AFSA were described as including classroom training, fire services, forensics, and arson investigation. It is unknown if any of the training activities that occurred at the facility included fire training with AFFF or other firefighting foams. Due to the uncertainty of use or storage of AFFF at these locations at AOI 3, there is potential for a release of PFAS to soil.

Based on the results of the SI in AOI 3, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust. Ground-disturbing activities could also potentially result in site worker, construction worker, or trespasser exposure via ingestion of surface soil. Additionally, ground-disturbing activities could potentially result in construction worker exposure via ingestion of subsurface soil. The CSM for AOI 3 is presented on **Figure 7-3**.

7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOIs, based on the aforementioned criteria.

7.2.1 AOI 1

PFOA exceeded the SLs in one temporary monitoring well at AOI 1. PFOA, PFOS, and PFBS were detected in groundwater from other temporary and permanent monitoring wells at AOI 1, but the detections were below SLs. It is known that PFOA and PFOS concentrations have exceeded the USEPA HAs in onsite drinking water wells; therefore, the ingestion exposure pathway for site workers is potentially complete. Depths to water measured in AOI 1 during Mobilization 2 ranged from 7.47 to 7.57 feet bgs; therefore, groundwater may be encountered during construction activities, and the ingestion exposure pathway for construction workers is considered potentially complete. The exact fate and transport of PFOA, PFOS, and PFBS from the facility to potential off-site receptors are not fully known at this point. However, based on the results of the PA and SI, there doesn’t appear to be any off-facility residential wells immediately downgradient of the facility. Given the location of the releases on the facility, the observed groundwater flow direction, and the close proximity of the Annsville Creek/Hudson River to the southern facility boundary, it is unlikely any future off-facility residential wells would be installed downgradient of the facility. Therefore, the pathway is incomplete between the source and off-facility residential receptors. This pathway is also incomplete for trespassers and recreational users given that the site is a secure facility and the depth to groundwater. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOS exceeded the SLs at monitoring well CS-MW003S in AOI 2. The detected concentrations of PFOA and PFOS at CS-MW003S were approximately twice the highest detections observed from potable wells with concentrations of 7.3 ng/L PFOA and 64.9 ng/L PFOS in March 2020 versus 21.2 ng/L PFOA and 147 ng/L PFOS in CS-MW003S in July 2021. Since quarterly sampling began in 2017, concentrations of PFOA and PFOS have not been detected at the level of concentrations observed in CS-MW003S. It is known that PFOA and PFOS concentrations have exceeded the USEPA HAs in onsite drinking water wells; therefore, the ingestion exposure pathway for site workers is potentially complete. Groundwater was not observed to be present at a depth shallower than 15 feet bgs within the AOI during Mobilization 1 or downgradient of the AOI during Mobilization 2; therefore, groundwater is not likely to be encountered during construction activities, and the ingestion exposure pathway for construction workers is not complete. The exact fate and transport of PFOA, PFOS, and PFBS from the facility to potential off-site receptors are not fully known at this point. However, based on the results of the PA and SI, there doesn’t appear to be any off-facility residential wells immediately downgradient of the facility. Given the location of the releases on the facility, the observed groundwater flow direction, and the close proximity of the Annsville Creek/Hudson River to the southern facility boundary, it is unlikely any future off-facility residential wells would be installed downgradient of the facility. Therefore, the pathway is incomplete between the source and off-facility residential receptors. This pathway is also incomplete for trespassers and recreational users given that the site is a secure facility and the depth to groundwater. The CSM for AOI 2 is presented on **Figure 7-2**.

7.2.3 AOI 3

PFOS exceeded the SLs at monitoring well CS-MW003S in AOI 3. The detected concentrations of PFOA and PFOS at CS-MW003S were approximately twice the highest detections observed from potable wells with concentrations of 7.3 ng/L PFOA and 64.9 ng/L PFOS in March 2020 versus 21.2 ng/L PFOA and 147 ng/L PFOS in CS-MW003S in July 2021. Since quarterly sampling began in 2017, concentrations of PFOA and PFOS have not been detected at the level of concentrations observed in CS-MW003S. It is known that PFOA and PFOS concentrations have exceeded the USEPA HAs in onsite drinking water wells; therefore, the ingestion exposure pathway for site workers is potentially complete. Depths to water measured in AOI 3 during Mobilization 2 were as shallow as 4.23 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The exact fate and transport of PFOA, PFOS, and PFBS from the facility to potential off-site receptors is not fully known at this point. However, based on the results of the PA and SI, there doesn’t appear to be any off-facility residential wells immediately downgradient of the facility. Given the location of the releases on the facility, the observed groundwater flow direction, and the close proximity of the Annsville Creek/Hudson River to the southern facility boundary, it is unlikely any future off-facility residential wells would be installed downgradient of the facility. Therefore, the pathway is incomplete between source and off-facility residential receptors. This pathway is also incomplete for trespassers and recreational users given that the site is a secure facility and the depth to groundwater. The CSM for AOI 3 is presented on **Figure 7-3**.

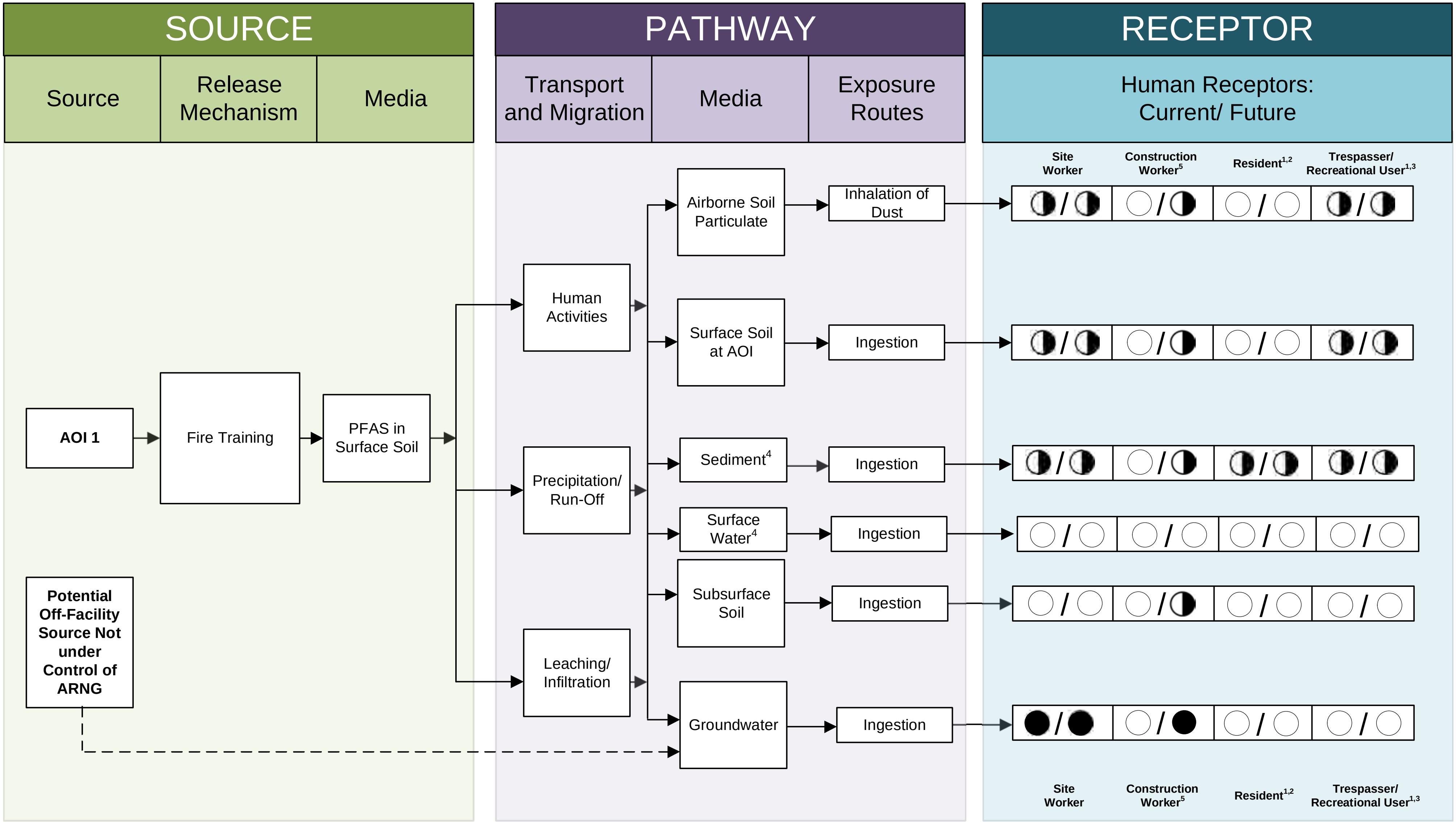
7.3 Surface Water and Sediment Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in surface water and sediment were used to determine whether a potentially complete pathway exists between the source and potential receptors at the facility, based on the aforementioned criteria. At AOIs where surface water and sediment samples were not collected, data from downgradient AOIs or the SI results for PFOA, PFOS, and PFBS in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 Facility-Wide Surface Water and Sediment

Numerous unnamed tributaries and wetlands, along with Dickiebusch Lake and Putnam Brook, are located within Camp Smith. These freshwater features drain southward, towards the Hudson River. Dickiebusch Lake is on the northeastern end of Camp Smith; it covers approximately 6 acres and is connected to several streams, one of which is Putnam Brook. The headwaters of Putnam Brook flow into the northern-most portion of Dickiebusch Lake, which then drain south, bordering Camp Smith on the west, before draining into the Annsville Creek impoundment. Annsville Creek borders Camp Smith on the eastern side of the facility before turning southwest to border the southern portion. The confluence of the Annsville Creek and Putnam Brook at the Annsville Creek impoundment is tidally influenced, as this impoundment is connected to the Hudson River. This small bay/impoundment/tidal wetland was artificially created by a railroad berm.

PFOA and PFOS were detected in sediment at the facility, and no PFOA, PFOS, or PFBS were detected in surface water at the facility. Surface water and sediment screening levels for PFOA and PFOS are not established; therefore, the ingestion exposure pathways for PFOA and PFOS in sediment are considered potentially complete for site workers, construction workers, and trespassers. PFOA and PFOS were detected in sediment at CS-SD05 (representing the furthest downgradient sediment sample before exiting the facility boundaries); therefore, the ingestion exposure pathways for PFOA and PFOS in sediment are considered potentially complete for nearby offsite residents and recreational users. No PFOA, PFOS, or PFBS were detected in surface water; therefore, the ingestion exposure pathways for surface water are considered incomplete for site workers, construction workers, trespassers, and, offsite residents and recreational users. The CSM is presented in **Figure 7-1** through **Figure 7-3**.



Media	Exposure Routes	Site Worker	Construction Worker[5]	Resident[1,2]	Trespasser/ Recreational User[1,3]
Airborne Soil Particulate	Inhalation of Dust	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Surface Soil at AOI	Ingestion	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Sediment[4]	Ingestion	◐ / ◐	○ / ◐	◐ / ◐	◐ / ◐
Surface Water[4]	Ingestion	○ / ○	○ / ○	○ / ○	○ / ○
Subsurface Soil	Ingestion	○ / ○	○ / ◐	○ / ○	○ / ○
Groundwater	Ingestion	● / ●	○ / ●	○ / ○	○ / ○

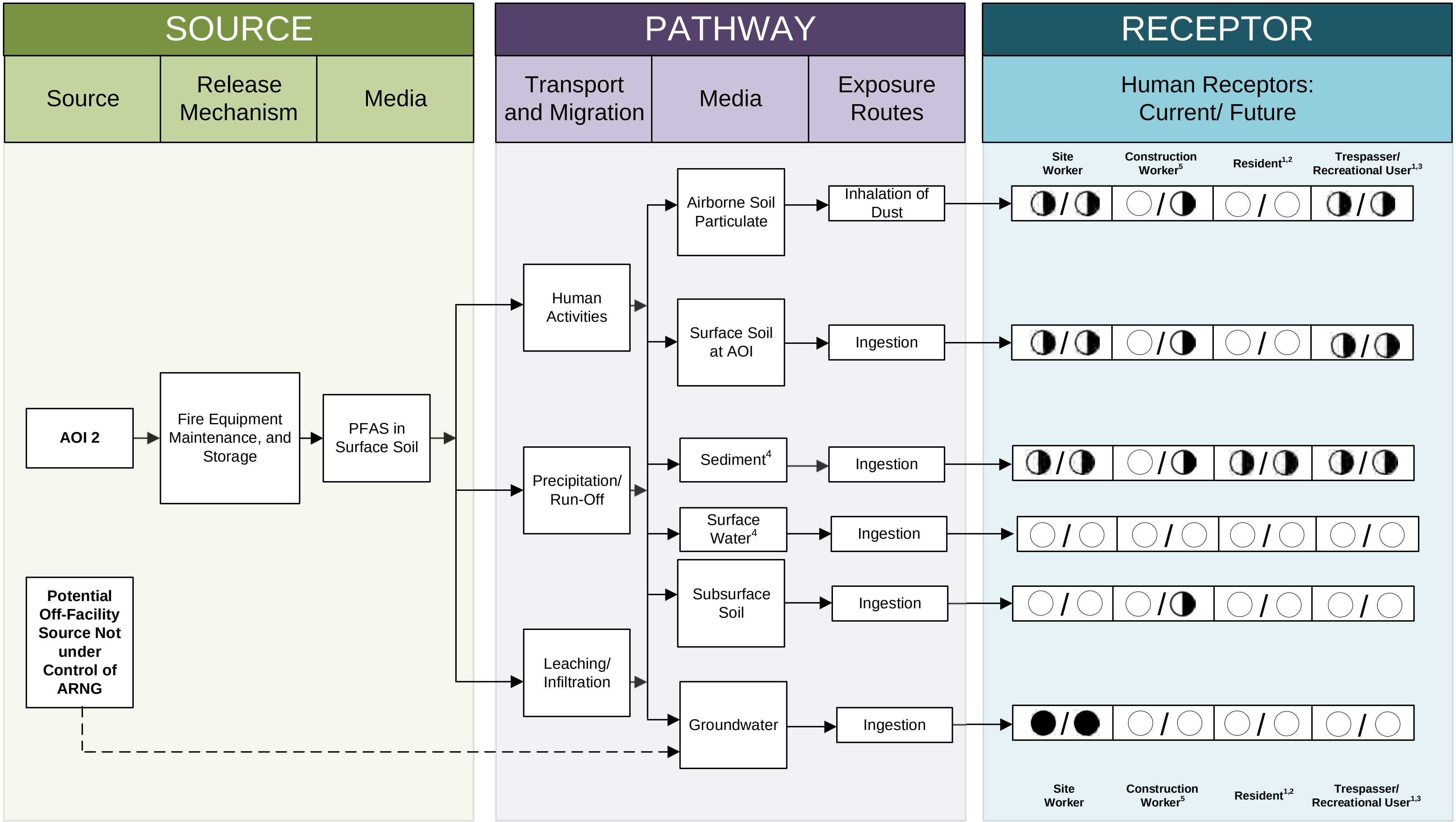
LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.
4. Surface water and sediment pathways shown here represent facility-wide results.
5. No active construction was occurring during the SI field work.

Figure 7-1
Conceptual Site Model, AOI 1
Camp Smith



Media	Exposure Routes	Site Worker	Construction Worker^{5}	Resident^{1,2}	Trespasser/ Recreational User^{1,3}
Airborne Soil Particulate	Inhalation of Dust	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Surface Soil at AOI	Ingestion	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Sediment^{4}	Ingestion	◐ / ◐	○ / ◐	◐ / ◐	◐ / ◐
Surface Water^{4}	Ingestion	○ / ○	○ / ○	○ / ○	○ / ○
Subsurface Soil	Ingestion	○ / ○	○ / ◐	○ / ○	○ / ○
Groundwater	Ingestion	● / ●	○ / ○	○ / ○	○ / ○

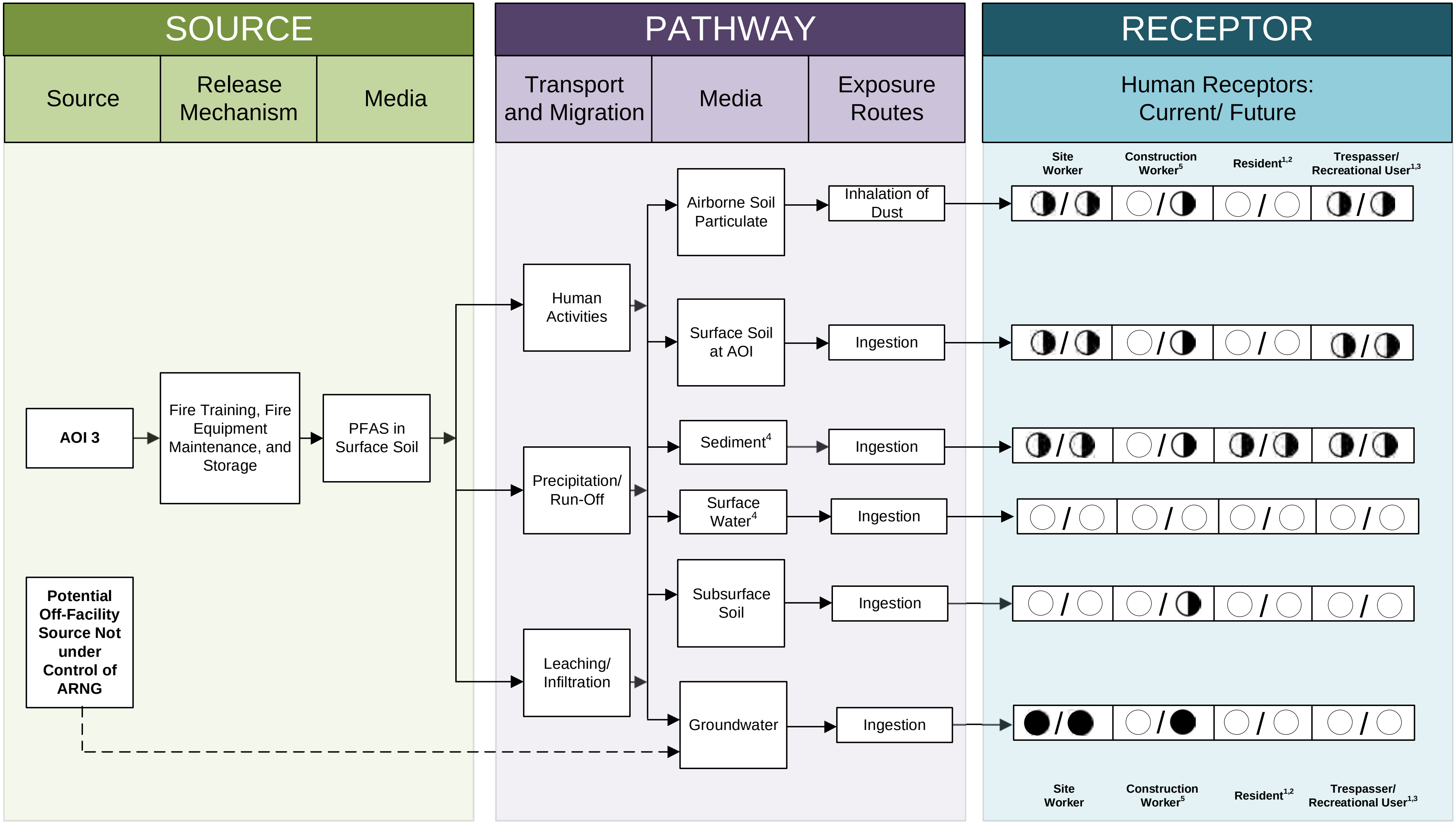
LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.
4. Surface water and sediment pathways shown here represent facility-wide results.
5. No active construction was occurring during the SI field work.

Figure 7-2
Conceptual Site Model, AOI 2
Camp Smith



Exposure Routes	Site Worker	Construction Worker⁵	Resident¹˒²	Trespasser/ Recreational User¹˒³
Inhalation of Dust (Airborne Soil Particulate)	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Ingestion (Surface Soil at AOI)	◐ / ◐	○ / ◐	○ / ○	◐ / ◐
Ingestion (Sediment⁴)	◐ / ◐	○ / ◐	◐ / ◐	◐ / ◐
Ingestion (Surface Water⁴)	○ / ○	○ / ○	○ / ○	○ / ○
Ingestion (Subsurface Soil)	○ / ○	○ / ◐	○ / ○	○ / ○
Ingestion (Groundwater)	● / ●	○ / ●	○ / ○	○ / ○

LEGEND

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

NOTES

1. The resident and recreational users refer to off-site receptors.
2. Inhalation of dust for off-site receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.
4. Surface water and sediment pathways shown here represent facility-wide results.
5. No active construction was occurring during the SI field work.

Figure 7-3
Conceptual Site Model, AOI 3
Camp Smith

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted in two mobilizations. The first mobilization was conducted from 9 to 12 December 2019 and consisted of utility clearance, direct push boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and surface water and sediment sample collection. The second mobilization was conducted from 19 to 28 July 2021 and consisted of utility clearance, soil boring and soil sample collection via sonic drilling technology, permanent monitoring well installation, monitoring well development, low-flow groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addenda (AECOM, 2019; AECOM, 2021), except as noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved SI QAPP Addenda (AECOM, 2019; AECOM, 2021), samples were collected and analyzed for a subset of PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (QSM 5.1 for Mobilization 1 data set), as follows. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.8** of this Report.

Mobilization 1 –

- Fourteen (14) soil samples from six locations (soil borings or hand auger locations);
- Five grab groundwater samples from five temporary well locations;
- Eight sediment samples;
- Five surface water samples, all of which were co-located with five of the sediment samples; and
- Thirteen (13) quality assurance (QA) samples.

Mobilization 2 –

- Fifteen (15) soil samples from eight locations (soil boring and hand auger locations);
- Five low-flow groundwater samples from five permanent monitoring well locations; and
- 15 QA samples.

The information gathered during this investigation was used to determine if PFOA, PFOS, and/or PFBS were present at or above SLs. Additionally, the CSMs were refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure to PFOA, PFOS, and PFBS at the AOIs, which are described in **Section 7**.

8.2 SI Goals Evaluation

As described in **Section 4.2**, the SI activities were designed to achieve six main goals or DQOs. This section describes the SI goals and the conclusions that can be made for each based on the data collected during this investigation.

1. *Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.*

PFOA, PFOS, and PFBS were detected at the facility in soil, groundwater, and sediment. PFOA, PFOS, and PFBS were detected at the source areas, as well as, downgradient between the source areas and facility drinking water wells. PFOA in groundwater at AOI 1 exceeded the SL of 40 ng/L (AOI 1-GW3), and PFOS in groundwater at AOIs 2 and 3 exceeded the SL of 40 ng/L (CS-MW003S). PFBS groundwater concentrations did not exceed the SL of 600 ng/L. The detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs.

2. *Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.*

Based on the results of the two SI mobilizations, there is not enough information to eliminate a potential release area from further consideration.

3. *Determine the potential need for a TCRA (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.*

Based on the data collected during this SI, there doesn't appear to be any off-facility residential wells immediately downgradient of the facility; therefore, the pathway is incomplete between the source and off-facility residential receptors.

4. *Collect data to better characterize the release areas for more effective and rapid initiation of a RI (if determined necessary).*

The geological data collected as part of the SI indicate an environment with variable permeability and conductivity at Camp Smith. Soils range from well-graded gravel with sand to silts and clays (low conductivity). Sand-dominated beds range up to 50 feet in thickness, whereas soils with lower conductivity are deposited in thicknesses ranging up to 5 feet. These slight variations in grain size could have an impact on the vertical distribution of PFOA, PFOS, and PFBS in the subsurface and likely will impact fate and transport.

Depth to water at the facility ranges from approximately 0.5 to 79.76 feet bgs; however, this range in depths may be reflective of confined and semi-confided water bearing units. Groundwater flow direction is primarily to the south towards the Hudson River. Due to the shape of the valley, the unconsolidated aquifer underlying the facility is thickest in the center of the valley. The aquifer likely thins and becomes non-existent close to the margins of the valley (as the overburden thins out). Information gathered during the SI was limited for these areas, particularly with respect to groundwater flow. These geologic and hydrogeologic observations will inform development of DQOs and the technical approach for the RI.

5. *If PFOA, PFOS, and PFBS are determined to be present, aim to evaluate whether the concentrations can be attributed to on-facility or off-facility sources that were identified within 4 miles of the installation as part of the PA (e.g., fire stations, major manufacturers, other DoD facilities)*

Based upon the evaluation of groundwater and soil results in comparison to SLs, in combination with the groundwater flow direction analysis, the results of the SI indicate that the source of detected concentrations of PFOA, PFOS, and PFBS at the facility is likely attributable to ARNG activities.

6. *Determine whether a potentially complete pathway exists between the source and potential receptors and whether ARNG is the likely source of the contamination.*

Detections of PFOA, PFOS, and PFBS in soil and groundwater at source areas and downgradient of source area, in combination with known PFOA, PFOS, and PFBS detections in downgradient potable well samples on the facility, indicate there is a potentially complete pathway between source and receptor.

8.3 Outcome

Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1, AOI 2, and AOI 3 from sources at the facility having resulted from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs for PFOA, PFOS, and PFBS 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 in groundwater exceeded the SL of 40 ng/L, with a maximum concentration of 58.4 ng/L at location AOI 1-GW3. Based on the results of the SI, further evaluation of AOI 1 is warranted in a RI.
- At AOI 2 and 3, PFOS in groundwater exceeded the SL of 40 ng/L, with a maximum concentration of 147 ng/L at location CS-MW003S. Based on the results of the SI, further evaluation of AOI 2 and 3 is warranted in a RI.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs for the respective intervals.
- PFOA, PFOS, and PFBS were not detected in surface water. PFOA and PFOS were detected in sediment samples. There are no established SLs for sediment; therefore, these results are presented for informational purposes only.

Table 8-1 summarizes the SI results for soil and groundwater. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors caused by DoD activities at or adjacent to the facility.

Table 8-2 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1, AOI 2, and AOI 3.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Former Fire Pit	◐	●	NA
2	Former Fire Station	◐	●	NA
3	Former Airfield	◐	●	NA
3	Former NYS AFSA	◐	●	NA

Legend:
N/A = Not applicable
● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table 8-2: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Former Fire Pit	Exceedances of the SLs in groundwater at AOI 1. No exceedances of SLs in soil.	Proceed to RI
2	Former Fire Station	Exceedances of the SLs in groundwater at AOI 2. No exceedances of SLs in soil.	Proceed to RI
3	Former Airfield	Exceedances of the SLs in groundwater at AOI 3. No exceedances of SLs in soil.	Proceed to RI
3	Former NYS AFSA	Exceedances of the SLs in groundwater at AOI 3. No exceedances of SLs in soil.	Proceed to RI

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