NATIONAL GUARD BUREAU
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June 1, 2021

New York State Department of Environmental Conservation
Division of Environmental Remediation
Attn: Mr. Daniel R. Lanners, P.E.
625 Broadway
Albany, NY 12233-7014

Dear Mr. Lanners:

As the lead agent implementing the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response, the Army National Guard G9 (ARNG) in coordination with the New York Army National Guard, formally transmits the ARNG Final Supplemental Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum for Camp Smith, Cortlandt Manor, New York. This Supplemental Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum is a product of the ARNG program for responding to Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) impacted sites at ARNG installations nationwide.

The point of contact for this transmittal and subsequent work is Ms. Jennifer Li, who may be reached at 301-717-6939 or jennifer.j.li2.ctr@mail.mil. Please reach out to Ms. Li if there are any questions or concerns. We look forward to continuing to work with you.

Sincerely,

David M. Connolly
PFAS Program Manager, Cleanup Branch,
Army National Guard

Enclosure

cc:
Ms. Jennifer Li (ARNG)
Mr. James Freehart (NYARNG)
1LT Steves Vanderpool (NYARNG)
Mr. Sean Martin (NYARNG)

FINAL
Supplemental Site Inspection
Quality Assurance Project Plan Addendum
Camp Smith
Cortlandt Manor, New York

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

May 2021

Prepared for:

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

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Tables

Figures

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Acronyms and Abbreviations

%	percent
˚C	degrees Celsius
˚F	degrees Fahrenheit
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	area of interest
APP	Accident Prevention Plan
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	below ground surface
CAMP	Community Air Monitoring Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CoC	chain of custody
CPR	cardiopulmonary resuscitation
CSM	conceptual site model
D	deep
DA	Department of the Army
DL	detection limit
DO	dissolved oxygen
DoD	Department of Defense
DQO	data quality objectives
ELAP	Environmental Laboratory Accreditation Program
ERB	equipment rinsate blank
FRB	field reagent blank
GCAL	Gulf Coast Analytical Laboratories, LLC
gpm	gallons per minute
GPS	global positioning system
HA	Health Advisory
HAZWOPER	hazardous waste operations and emergency response
HDPE	high-density polyethylene
IDQTF	Intergovernmental Data Quality Task Force
IDW	investigation-derived waste
LC/MS/MS	liquid chromatography tandem mass spectrometry
LOD	limit of detection
LOQ	limit of quantitation
MS/MSD	matrix spike/ matrix spike duplicate
MAES	Multiple Award Environmental Services
µg/m^3	micrograms per cubic meter
µg/Kg	microgram per kilogram

mph	miles per hour
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NOAA	National Oceanic and Atmospheric Administration
NYARNG	New York Army National Guard
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDMNA	New York State Department of Military and Naval Affairs
NYSDOH	New York State Department of Health
ORP	oxidation-reduction potential
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
PM10	particulate matter with a diameter of 10 micrometers
PPE	personal protective equipment
PQAPP	Programmatic UFP-QAPP
PVC	poly-vinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
S	shallow
SC	specific conductivity
SDG	sample delivery group
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
TCRA	Time Critical Removal Action
TO	Task Order
TOC	total organic carbon
TPP	Technical Project Planning
UCMR 3	Unregulated Contaminant Monitoring Rule 3
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers

USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United State Geological Survey
VSI	visual site inspection

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1. Introduction

1.1 Project Authorization

This is the Installation-Specific Supplemental Site Inspection (SI) Addendum to the Army National Guard (ARNG) SI Programmatic Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP). This SI UFP-QAPP Addendum addresses specific Supplemental SI activities to be completed at Camp Smith in Cortlandt Manor, New York.

The ARNG G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities 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 (TO) W912DR17F0192, issued 11 August 2017. Programmatically, the ARNG is assessing the potential environmental impacts primarily from aqueous film forming foam (AFFF) and similar chemical releases suspected at their properties related to processes that used per- and polyfluoroalkyl substances (PFAS) (e.g., fire training, firefighting, and metal plating).

The SI project elements will be performed by AECOM in accordance 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 [CFR] 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 PFAS. The term PFAS will be used throughout this plan to encompass all PFAS 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 TO. This UFP-QAPP Addendum focuses on the SI phase of work specific to Camp Smith (also referred to as the “facility”) in Cortlandt Manor, New York and supplements the original UFP-QAPP Addendum dated October 2019.

1.2 SI Purpose

The objective of this SI effort 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 PFOA, PFOS, and PFBS at or above screening levels (SLs) at the facility.

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 (i.e., Time Critical Removal Action [TCRA]; applies to drinking water only).
3) Collect or develop data to evaluate the release.
4) Collect additional data to develop the conceptual site model (CSM) in preparation for an effective Remedial Investigation (RI).

5) Collect data to determine whether the release is more than likely the result of activities associated with the Department of Defense (DoD).

In addition to the USEPA-identified goals of an SI, the ARNG SI effort will also 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).

1.3 QAPP Addendum Organization

Elements of every ARNG PFAS SI are addressed in the SI Programmatic UFP-QAPP (PQAPP) (AECOM, 2018). The PQAPP is comprehensive and is consistent with the USEPA's intent that the UFP-QAPP be the primary planning document for an entire project (Intergovernmental Data Quality Task Force [IDQTF], 2005a-c). This QAPP Addendum, in combination with the PQAPP elements, meets the requirements set forth in the UFP for QAPPs (IDQTF, 2005a-c) *and USEPA Requirements for Quality Assurance Project Plans* (USEPA, 2001).

This Supplemental SI QAPP Addendum was prepared to include the detailed information specific to the Supplemental SI at Camp Smith. Worksheets not covered in this Supplemental QAPP Addendum will be implemented as described in the original QAPP Addendum (AECOM, 2019b). **Table 1-1** below describes the components that are covered under this Supplemental QAPP Addendum.

Table 1-1: Comparison of PQAPP to Supplemental QAPP Addendum

QAPP Addendum Worksheets	Applicable Document
Worksheets #1 and #2- Title and Approval Page and QAPP Identifying Information	**Programmatic/Site-Specific**
Worksheet #10- Conceptual Site Model	**Site-Specific**
Worksheet #11- Project/ Data Quality Objectives	**Site-Specific**
Worksheets #14 and #16- Project Tasks and Schedule	**Site-Specific**
Worksheet #15- Screening Limits and Laboratory- Specific Detection/ Quantitation Limits	**Programmatic**
Worksheet #17- Sampling Design and Rationale	**Site-Specific**
Worksheet #18- Sampling Locations and Methods	**Site-Specific**
Worksheet #20- Field Quality Control Summary	**Programmatic/Site-Specific**

QAPP Worksheets #1 & #2: Title and Approval Page and QAPP Identifying Information

Site Name/Project Name: Army National Guard / Multiple Award Environmental Services (MAES) Delivery Order 00014/ Preliminary Assessments (PA) and Site Inspections (SI) for Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites, ARNG Installations, Nationwide

Installation: Camp Smith, Cortlandt Manor, New York

Contract Work Assignment Number: USACE Contract No. W912DR-12-D-0014; Delivery Order No. W912DR17F0192

Relevant Plans and Reports from Previous Investigations: Relevant plans and reports from previous investigations are identified in the references cited in the introductory text that precedes these worksheets and in subsequent worksheets, as appropriate.

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Investigative Organization Project Manager Printed Name / Organization	Signature / Date Claire Mitchell / AECOM Project Manager
	Gettier, Sarah — Digitally signed by Gettier, Sarah Date: 2021.05.11 16:03:46 -04'00'
Investigative Organization Quality Manager Printed Name / Organization	Signature / Date Sarah Gettier / AECOM Project QC Officer
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Army National Guard Printed Name / Organization	Signature / Date David Connolly / ARNG Program Manager
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New York Army National Guard Printed Name / Organization	Signature / Date 1LT Steves Vanderpool / Environmental Branch Chief
	PECK.TIMOTHY.JOSEPH.1252325553 — Digitally signed by PECK.TIMOTHY.JOSEPH.1252325553 Date: 2021.05.12 08:41:58 -04'00'
Contract Organization Project Manager Printed Name / Organization	Signature / Date Timothy Peck / USACE, Baltimore District

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QAPP Worksheet #10: Conceptual Site Model

The information presented in this section incorporates data gathered during initial SI sampling activities (i.e., Mobilization 1) conducted at Camp Smith (**Figure 10-1**). The SI Mobilization 1 sampling activities were completed from 9 to 12 December 2019 and included the following tasks:

- Fourteen (14) soil samples from six locations (soil borings and hand auger locations);
- Five (5) grab groundwater samples from temporary well locations;
- Eight (8) sediment samples; and
- Five (5) surface water samples that were co-located with five of the sediment samples.

Although certain information in this worksheet was provided in the original QAPP Addendum (AECOM, 2019b), **Worksheet #10** has been updated based on data gathered during the December 2019 investigation.

Facility Location and Description

Camp Smith is in Cortlandt Manor, Westchester County, New York (**Figure 10-1**). Camp Smith borders Putnam County to the north and the city of Peekskill to the east-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).

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. Two miles to the west, across the Hudson River, lies Iona Island and the Iona Island Component Hudson River National Estuarine Research Reserve. The site topography of Camp Smith is shown on **Figure 10-2**. The site geology and groundwater features are presented on **Figure 10-3**, and surface water features are presented on **Figure 10-4**.

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 10-3**.

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 and a variable layer of peat and organic clay (NYARNG, 2015). The majority of this southern portion is poorly drained Ipswich mucky peat (69.9%), well drained Riverhead loam (24.8%), and somewhat poorly drained Udorthents (1.4%).

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 facility (Eric et al., 1954; Klemic et al., 1959). Many of the drinking water wells in the Hudson Valley come from bedrock; however, they do not yield as much as unconsolidated sediments.

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 10-3**), 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 cantonment area of Camp Smith, Wells A and B, supply drinking water to the facility. The wells are located on the edge of the wetlands 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).

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.

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) 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 surface water intakes for New Windsor Consolidated Water District are located within 20 miles of the facility. As of 5 December 2014, PFOS and PFOA were detected at 128 and 21.5 nanogram per liter (ng/L), respectively (USEPA, 2017a).

Depth to groundwater was observed to range from 0.5 to 22.2 feet bgs in December 2019 during SI Mobilization 1 field activities.

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 Camp Smith eventually drains into the Hudson River.

Dickiebusch Lake is on the northeastern end of Camp Smith (**Figure 10-4**). 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 (**Figure 10-4**). This small bay/impoundment/tidal wetland was artificially created by a railroad berm.

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.

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 an NYARNG installation 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 sitting 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.

Areas of Interest and Conceptual Site Models

PFAS-containing materials were potentially released to soil and groundwater within the boundary of Camp Smith through fire training exercises and equipment washing/maintenance activities. Three AOIs were identified based on preliminary data and assumed groundwater flow directions. The AOIs are described below and presented on **Figure 10-5**.

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 toxicological study.

AOI 1 Former Fire Pit

AOI 1 includes the former fire pit training area and the eastern portion of Dickiebusch Lake. Potential PFAS releases to soil may have occurred during the monthly live fire training exercises; however, there are no documented reports of AFFF use during these training exercises. The former training area is less than 100 feet from the eastern side of Dickiebusch Lake and included in the AOI extent (**Figure 10-5**). Surface water runoff near the former pit drains into Dickiebusch Lake. The headwaters of Putnam Brook flow from Dickiebusch Lake and travel south. Potential PFAS releases at the western edge of the former pit may have flowed to the eastern portion of Dickiebusch Lake.

PFAS are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. Because potential AFFF releases to surface soil and localized runoff systems may have occurred at AOI 1, it is possible that potential PFAS contamination has migrated from the soil at AOI 1 to the nearby surface water bodies. Ground-disturbing activities to surface soil could result in site worker and construction worker exposure to PFAS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities to subsurface soil could also result in site worker and construction worker exposure via ingestion. Therefore, the exposure pathways for these receptors are considered potentially complete.

A previous investigation (NYARNG, 2015) indicates that there may be a clay confining layer separating surface water from the deeper aquifer. The deeper aquifer is used at Camp Smith as a drinking water source (Well A and B). This confining unit, which acts as a natural aquitard, may prevent the migration of potential PFAS contamination to the confined aquifer; however, the extent of the confining layer is unknown. Due to the detections of PFAS in Wells A and B, the pathway for PFAS contamination in groundwater is potentially complete for site workers and construction workers on-facility, along with trespassers and off-facility residents.

Annsville Creek is southeast, Putnam Brook is west, and the Hudson River is south of all AOIs. It is possible that PFAS migrated to these surface water bodies. PFAS are water soluble and can migrate readily from soil to groundwater or surface water via leaching and run-off. Because recreational use of the surrounding surface water bodies is likely, the ingestion exposure pathway for surface water and sediment is considered potentially complete for off-post residents, trespassers and recreational users.

Soil and groundwater samples were collected at AOI 1 during the SI Mobilization 1 for analysis of 18 PFAS as specified in the original QAPP Addendum (AECOM, 2019b). The sample locations are shown in **Figure 10-6**.

Soil samples were collected from four depth intervals: 0.5 to 1 feet bgs, 1 to 2 feet bgs, 6 to 8 feet bgs, and 12 to 14 feet bgs from three boring locations, AOI 1-SB1 through AOI 1-SB3. PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than the SLs; PFBS was not detected. PFOA was not detected in the 0.5 to 1 feet bgs or 6 to 8 feet bgs intervals. PFOA was detected in one boring from the 1 to 2 feet bgs interval at 0.919 J micrograms per kilogram (µg/Kg). In the 0.5 to 1 feet bgs interval, PFOS was detected in two boring locations and ranged in concentration from 0.260 J µg/Kg to 0.345 J µg/Kg. In the 1 to 2 feet bgs interval, PFOS was detected in one boring location at a concentration of 0.339 J µg/Kg. PFOS was not detected in the 6 to 8 feet bgs or 12 to 14 feet bgs interval. The detections of PFOS and PFOA in soil are presented on **Figure 10-7** and **Figure 10-8**. The detected compounds in soil are summarized on **Table 10-1** through **Table 10-3**.

Groundwater samples were collected from temporary monitoring well locations AOI 1-1 through AOI 1-3. PFOA, PFOS, and PFBS were detected in the groundwater samples. The concentration of PFOA (58.4 ng/L) exceeded the SL (40 ng/L) at location AOI 1-GW3; the detections of PFOS and PFBS did not exceed the SLs. Also, the combined concentration of PFOA and PFOS (70.9 ng/L) exceeded the USEPA HA (70 ng/L). The PFOA concentrations ranged from 24 J- ng/L to 58.4 ng/L. PFOS was detected in all three wells, with concentrations ranging from 12.5 ng/L to 37.8 ng/L. PFBS was detected in two wells, with concentrations ranging from 2.87 J ng/L to 3.39 J ng/L. The ranges of detections for PFOS and PFOA in groundwater are presented on **Figure 10-9**. The detected compounds are summarized in **Table 10-4**.

Based on the results of the SI Mobilization 1, data gaps remain regarding the source of the PFOA exceedance at location AOI 1-GW3. No potential onsite or offsite, adjacent PFAS release areas were identified upgradient (north) of AOI 1-GW3. Therefore, the SI Mobilization 2 will conduct additional sampling upgradient of AOI 1-GW3 to refine the understanding of the potential source of the exceedance of the SL at AOI 1.

AOI 2 Former Fire Station

AOI 2 includes the former Fire Station building and the former CSMS building. Potential AFFF releases to soil may have occurred during the storage of materials and the washing of firefighting equipment; however, it is unknown exactly what type of firefighting equipment was stored or if any AFFF were spilled. The receptor pathways for AOI 2 are the same as described for AOI 1.

Soil samples were collected at AOI 2 during the SI Mobilization 1 for analysis of 18 PFAS as specified in the original QAPP Addendum (AECOM, 2019b). A temporary well was installed at location AOI2-GW1 to the depth of shallow bedrock refusal; however, the well was dry after a 48-hour recharge period. Therefore, no groundwater sample could be collected for AOI 2 during Mobilization 1. The sample locations are shown in **Figure 10-6**.

Soil samples were collected from three depth intervals at AOI 2-SB1: 0.5 to 1 feet bgs, 11 to 13 feet bgs, and 21 to 23 feet bgs. PFOS was detected in soil at concentrations several orders of magnitude lower than the SLs; PFOA and PFBS were not detected in soil. In the 0.5 to 1 feet bgs interval, PFOS was detected at 0.432 J µg/Kg. PFOS was not detected in the deeper intervals. The detections of PFOS and PFOA in soil are presented on **Figure 10-7** and **Figure 10-8**. The detected compounds in soil are summarized on **Table 10-1** through **Table 10-3**.

Because groundwater could not be obtained during the SI Mobilization 1, it is unclear whether a release of PFAS to groundwater occurred at AOI 2 and whether the suspected release at AOI 2 is the source of the detected concentrations of PFOS and PFOA in downgradient potable Wells A and B. Therefore, the SI Mobilization 2 will conduct additional sampling downgradient of AOI 2 in the bedrock aquifer, between the suspected release and potable Wells A and B, to determine whether a release to groundwater occurred from AOI 2.

AOI 3 Former Airfield/ Former NYS Fire Inspection Agency

AOI 3 includes the former Airfield and the former NYS Fire Inspection Agency. Potential AFFF releases to soil may have occurred during active use of the Former Airfield or during training activities at the Former NYS Fire Inspection Agency, although it is unknown if AFFF were released at either location. The receptor pathways for AOI 3 are the same as described for AOI 1.

Soil and groundwater samples were collected at AOI 3 during the SI Mobilization 1 analysis of 18 PFAS as specified in the original QAPP Addendum (AECOM, 2019b). The sample locations are shown in **Figure 10-6**.

Soil samples were collected from four intervals at locations AOI 3-SB1 and AOI 3-SB2: 0.5 to 1 feet bgs, 1 to 2 feet bgs, 7 to 9 feet bgs, and 15 to 17 feet bgs. PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than the SLs; PFBS was not detected in soil. In the 0.5 to 1 feet bgs interval, PFOA was detected at both boring locations at concentrations ranging from 0.172 J µg/Kg to 0.173 J µg/Kg. PFOA was not detected in the deeper intervals. In the 0.5 to 1 feet bgs interval, PFOS was detected at both boring locations at concentrations ranging from 0.194 J µg/Kg to 1.02 J µg/Kg. PFOS was not detected in the deeper intervals. The detections of PFOS and PFOA in soil are presented on **Figure 10-7** and **Figure 10-8**. The detected compounds in soil are summarized on **Table 10-1** through **Table 10-3**.

Groundwater samples were collected at AOI 3 from temporary monitoring well locations AOI 3-1 and AOI 3-2. PFOA, PFOS, and PFBS were detected in the samples at concentrations below SLs. The combined concentration of PFOA and PFOS did not exceed the USEPA HA. PFOA, PFOS, and PFBS were detected in all three wells, with concentrations ranging from 10.3 ng/L to 39.9 ng/L, 14.8 ng/L to 19.7 ng/L, and 2.66 J ng/L to 3.77 J ng/L, respectively. The ranges of detections for PFOS and PFOA in groundwater are shown on **Figure 10-9**. The detected compounds are summarized in **Table 10-4**.

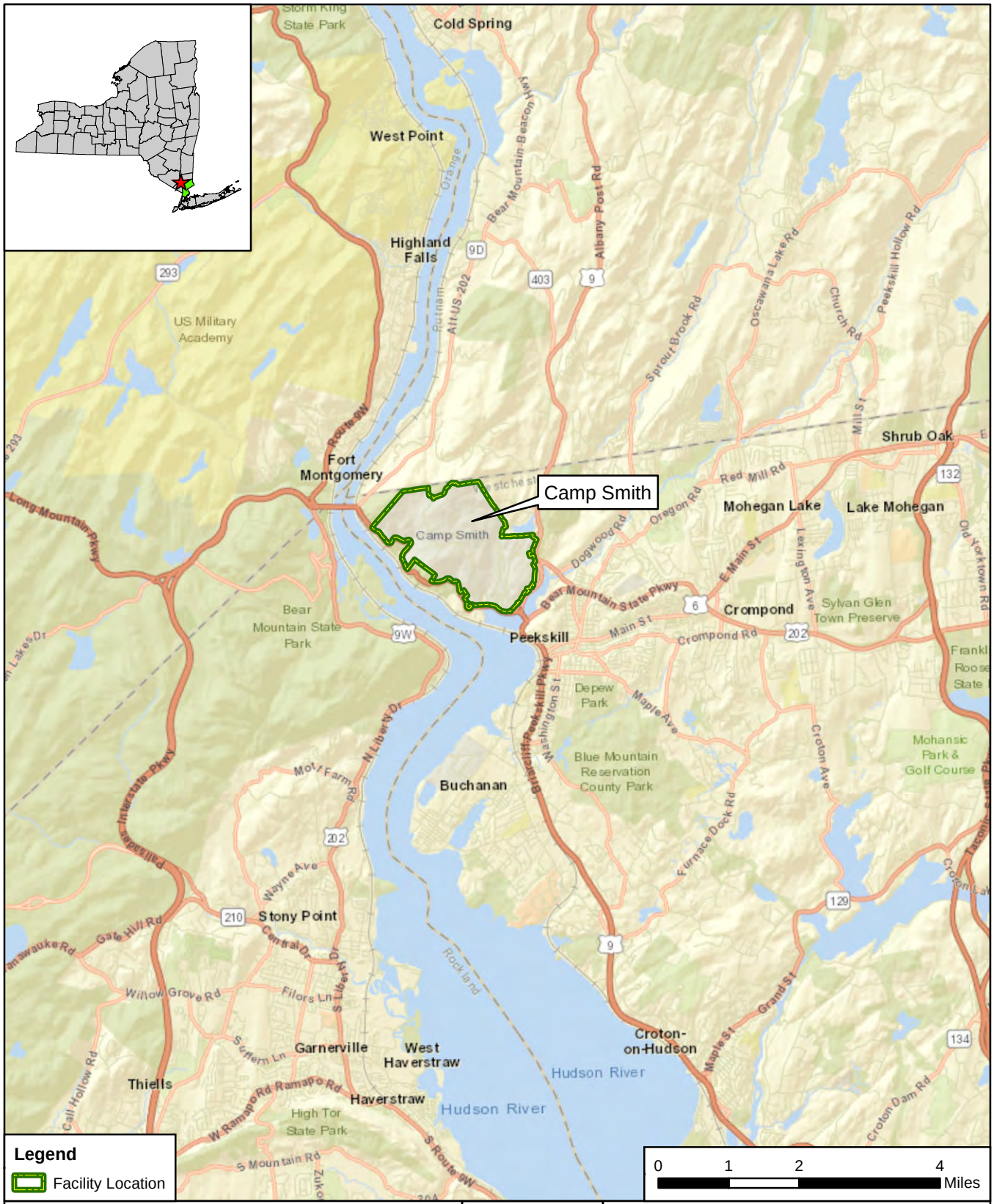
Based on the results of the SI Mobilization 1, it is unclear whether the release of PFAS at AOI 3 is the source of the detected concentrations of PFOS and PFOA in downgradient potable Wells A and B. Therefore, the SI Mobilization 2 will conduct additional sampling downgradient of AOI 3 in the bedrock aquifer, between the suspected release and potable Wells A and B, to determine whether a PFAS release from AOI 3 may be impacting potable Wells A and B.

Facility-Wide Surface Water and Sediment

Surface water and sediment samples were collected during the SI Mobilization 1 from tributaries flowing to and from Dickiebusch Lake and along Putnam Brook. Sampling locations within the water bodies are shown in **Figure 10-10** and **Figure 10-11**. The detected compounds are summarized in **Table 10-5** and **Table 10-6**.

PFOA was detected at two of the eight sediment sample locations (CS-SD01 through CS-SD08), with concentrations ranging from 0.283 J µg/Kg to 1.07 J µg/Kg. PFOS was detected at five of the eight locations, with concentrations ranging from 1.14 J µg/Kg to 3.77 µg/Kg. The maximum detection was PFOS at location CS-SD06, which was the most upgradient location in the tributary leading into Dickiebusch Lake. PFBS was not detected in sediment at any location. The most frequently detected compound was PFOS, which was detected at five of the eight sample locations.

Surface water samples were collected at five locations (CS-SW01 through CS-SW05) from tributaries flowing to and from Dickiebusch Lake and along Putnam Brook. PFOA, PFOS, and PFBS were not detected in any surface water samples.



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	8/31/2020	GIS BY	MS	8/31/2020
SCALE	1:126,720	CHK BY	AG	8/31/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	8/31/2020

Facility Location

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Figure 10-1

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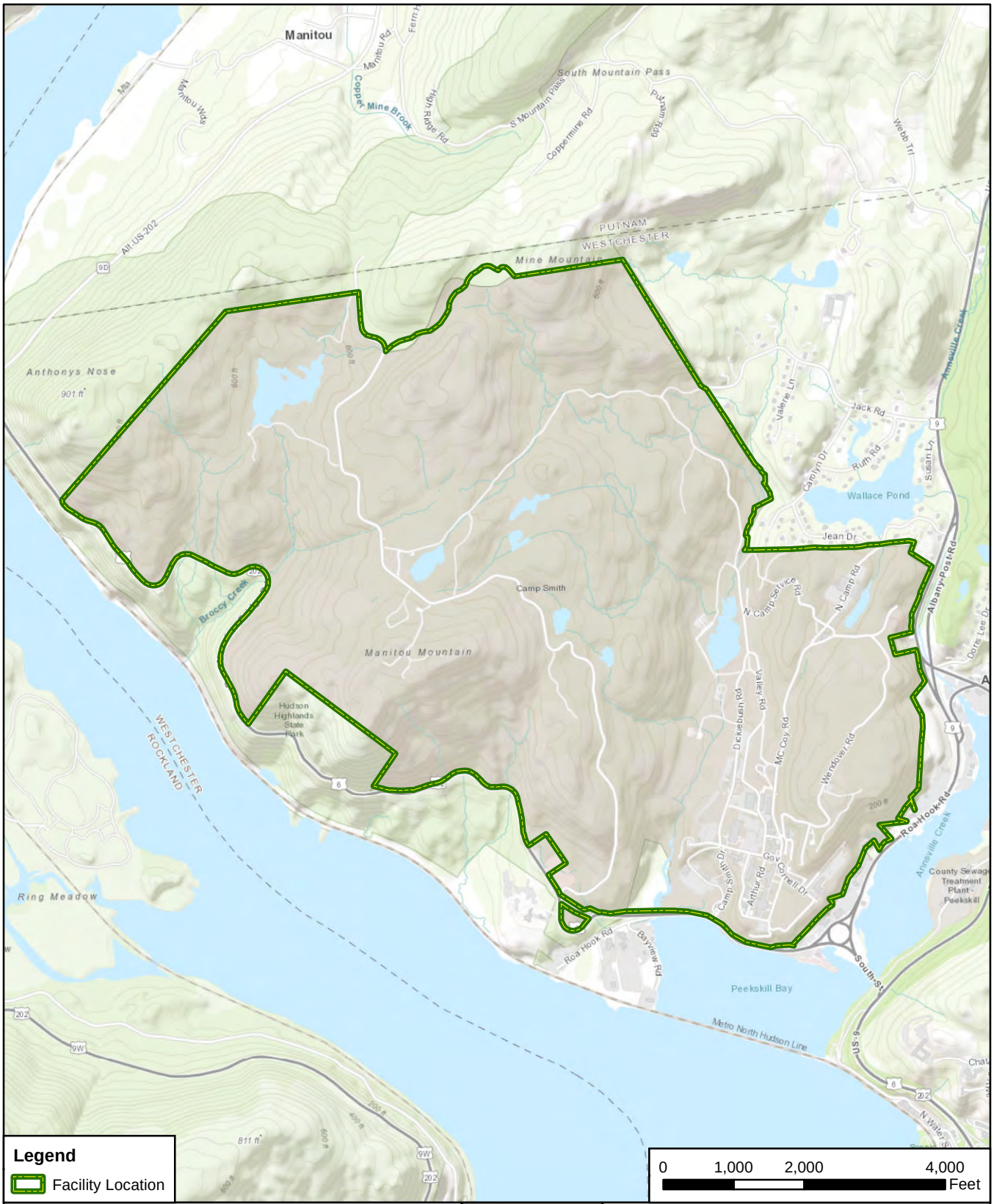

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	8/31/2020	GIS BY	MS	8/31/2020
SCALE	1:24,000	CHK BY	BP	8/31/2020
Base Map: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN,		PM	RG	8/31/2020

Facility Topography

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Figure 10-2

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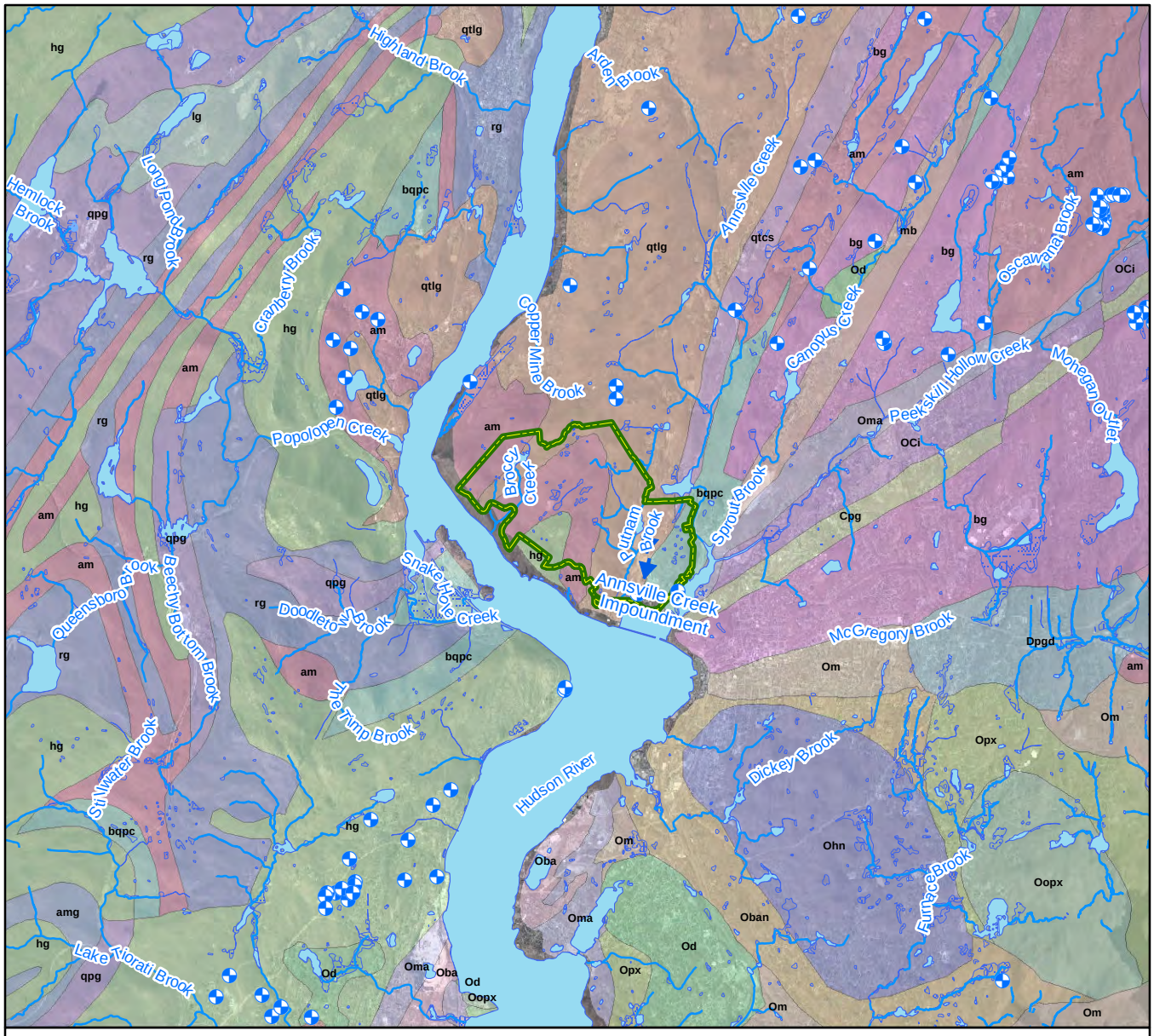

Facility Location
Water Body
Wetland
River/Stream
Inferred Groundwater Flow Direction

Geology

- Dpgd = Peekskill Pluton Granite
- Dpgr = Peekskill Pluton Granodiorite
- Oban = Norite
- Od = Diorite
- Ohn = Norite
- Oh = Hornblendite
- Oopx = Olivine Pyroxenite
- Oma = Schist
- Opx = Pyroxenite
- Om = Manhattan Formation
- Oba = Balmville Limestone
- OCi = Inwood Marble
- Cpg = Quartzite/Conglomerate
- bqpc = Gneiss/Granitic Gneiss
- mb = Marble
- qtcs = Gneiss/Quartzite
- qtlg = Gneiss/Quartzite
- rg = Gneiss/Marble
- am = Amphibolite
- bg = Granitic Gneiss
- hg = Granite/Gneiss
- lg = Luecogranite Gneiss
- qpg = Gneiss
- amg = Amphibolite/Gneiss

Wells

- Potable Well

0 4,250 8,500 17,000 Feet

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	1/11/2021	GIS BY	MS	1/11/2021
SCALE	1:102,000	CHK BY	BP	1/11/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	1/11/2021

N

Groundwater Features

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Figure 10-3

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CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	8/31/2020	GIS BY	MS	8/31/2020
SCALE	1:22,800	CHK BY	BP	8/31/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	8/31/2020

N

Surface Water Features

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Figure 10-4

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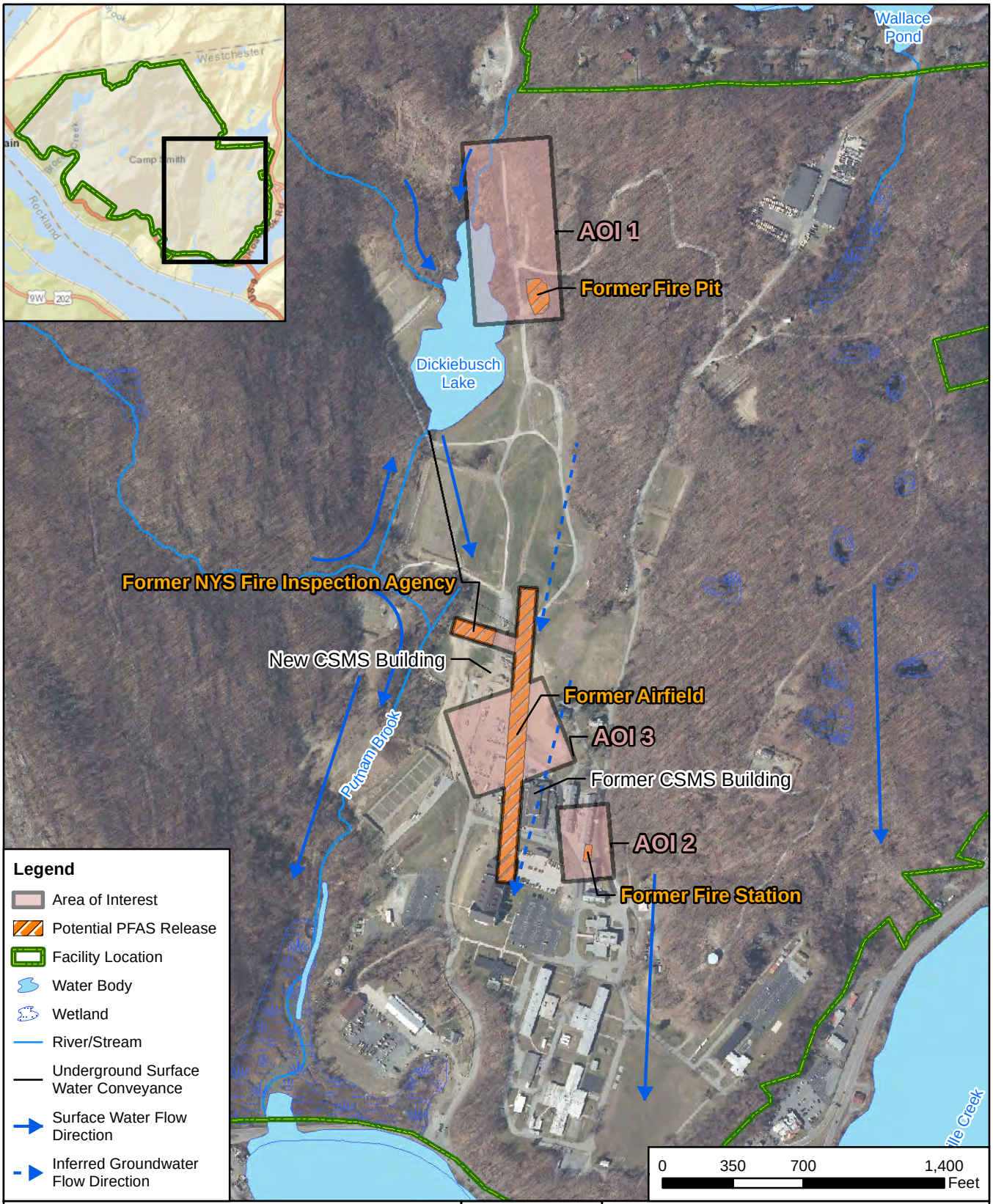

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	1/7/2021	GIS BY	MS	1/7/2021
SCALE	1:8,400	CHK BY	BP	1/7/2021
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	1/7/2021

N

Areas of Interest

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Figure 10-5

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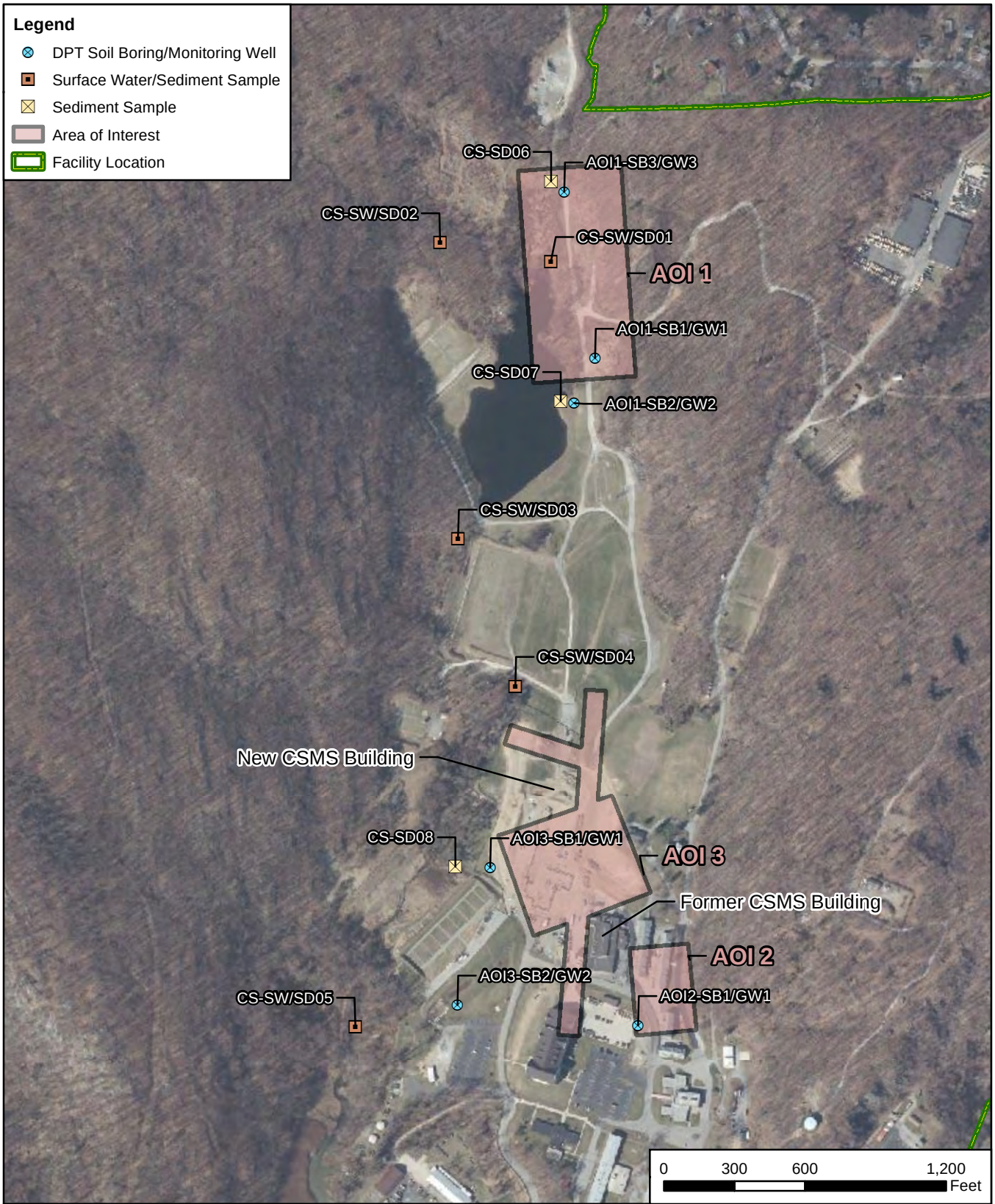

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	8/31/2020	GIS BY	MS	8/31/2020
SCALE	1:7,200	CHK BY	BP	8/31/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	8/31/2020

N

Site Inspection Sample Locations, Mobilization 1

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Figure 10-6

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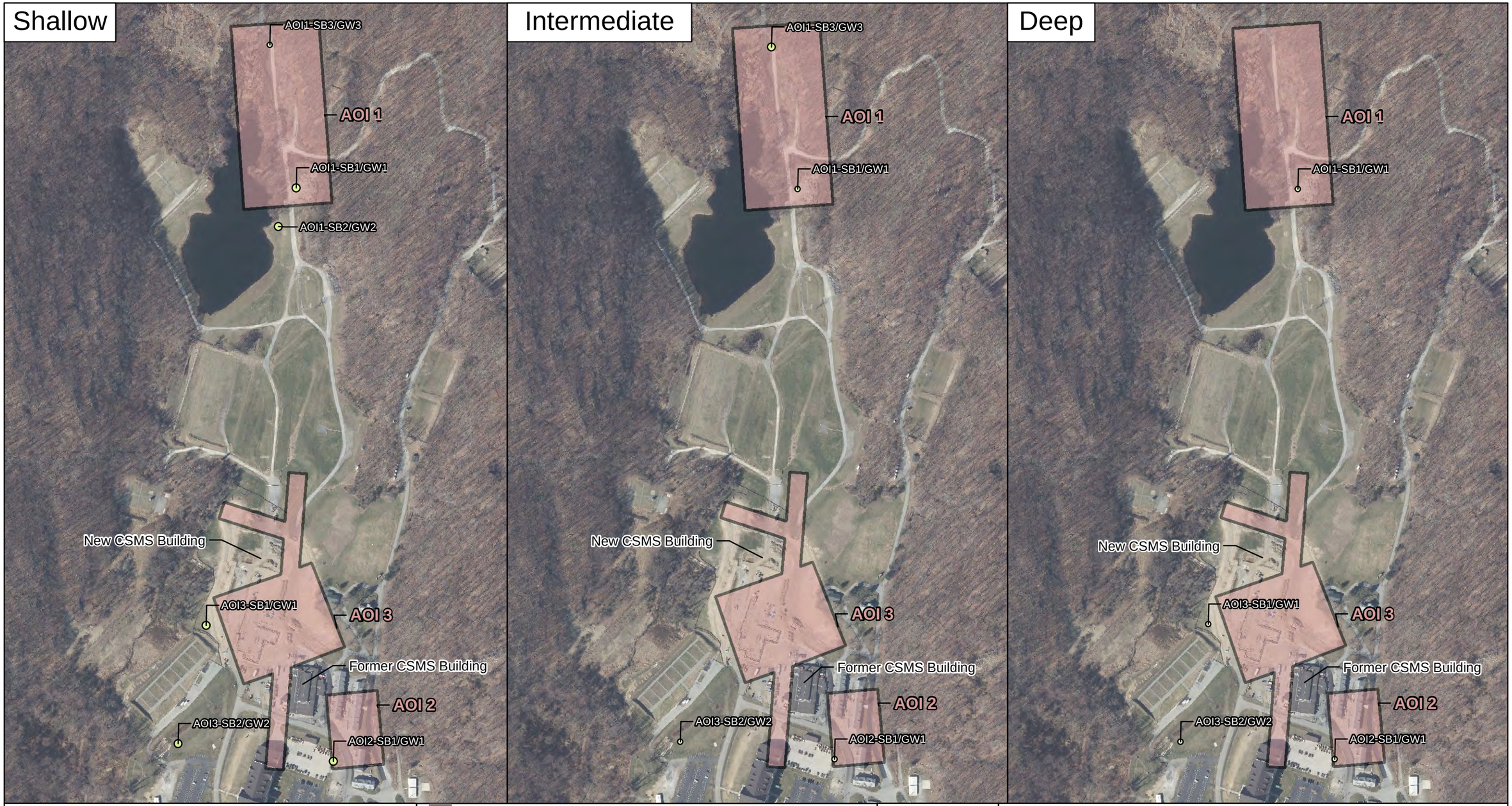

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	1/11/2021	GIS BY	MS	1/11/2021
SCALE	1:5,795	CHK BY	SL	1/11/2021
Base Map:		PM	RG	1/11/2021

Area of Interest
Facility Location

PFOS Results (µg/Kg)
- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

0 240 480 960 Feet

N

PFOS Detections in Soil, Mobilization 1

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Figure 10-7

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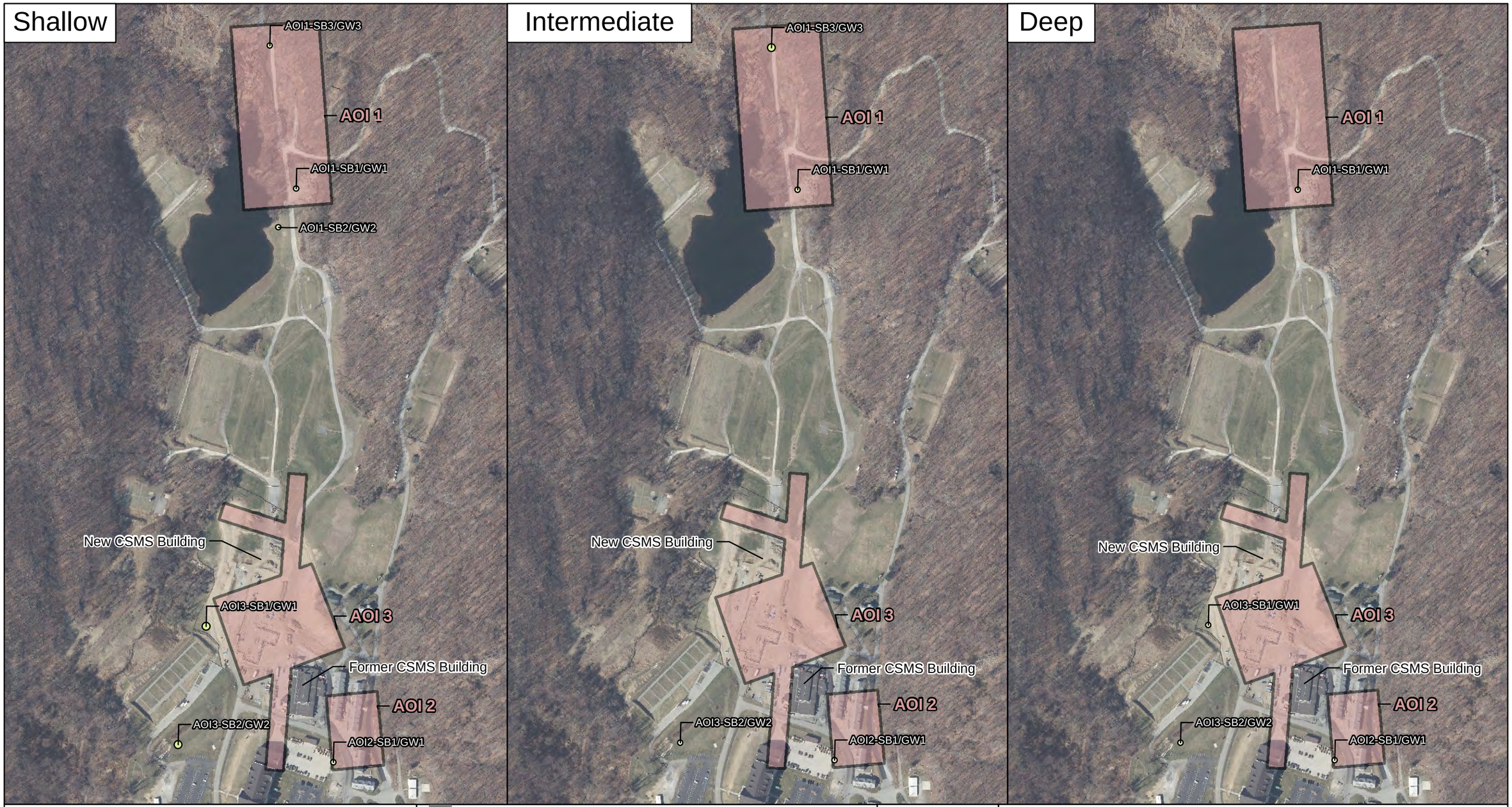

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	1/7/2021	GIS BY	MS	1/7/2021
SCALE	1:5,795	CHK BY	BP	1/7/2021
Base Map:		PM	RG	1/7/2021

Area of Interest
Facility Location

PFOA Results (µg/Kg)
- ND
- >ND - 10
- >10 - 130
- >130 - 1,600
- >1,600

0 240 480 960 Feet

N

PFOA Detections in Soil, Mobilization 1

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Figure 10-8

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PFOA

PFOS

PFOA + PFOS

AOI1-SB3/GW3

AOI 1

AOI1-SB1/GW1

AOI1-SB2/GW2

New CSMS Building

AOI3-SB1/GW1

AOI 3

Former CSMS Building

AOI3-SB2/GW2

AOI 2

PFOA Results (ng/L)

- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOS Results (ng/L)

- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOA+PFOS Results (ng/L)

- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	9/2/2020	GIS BY	MS	9/2/2020
SCALE	1:5,795	CHK BY	BP	9/2/2020
Base Map: NYS ITS GIS Program Office		PM	RG	9/2/2020

Legend

- Area of Interest
- Facility Location

0 240 480 960 Feet

N

PFOA and PFOS Detections in Groundwater, Mobilization 1

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Figure 10-9

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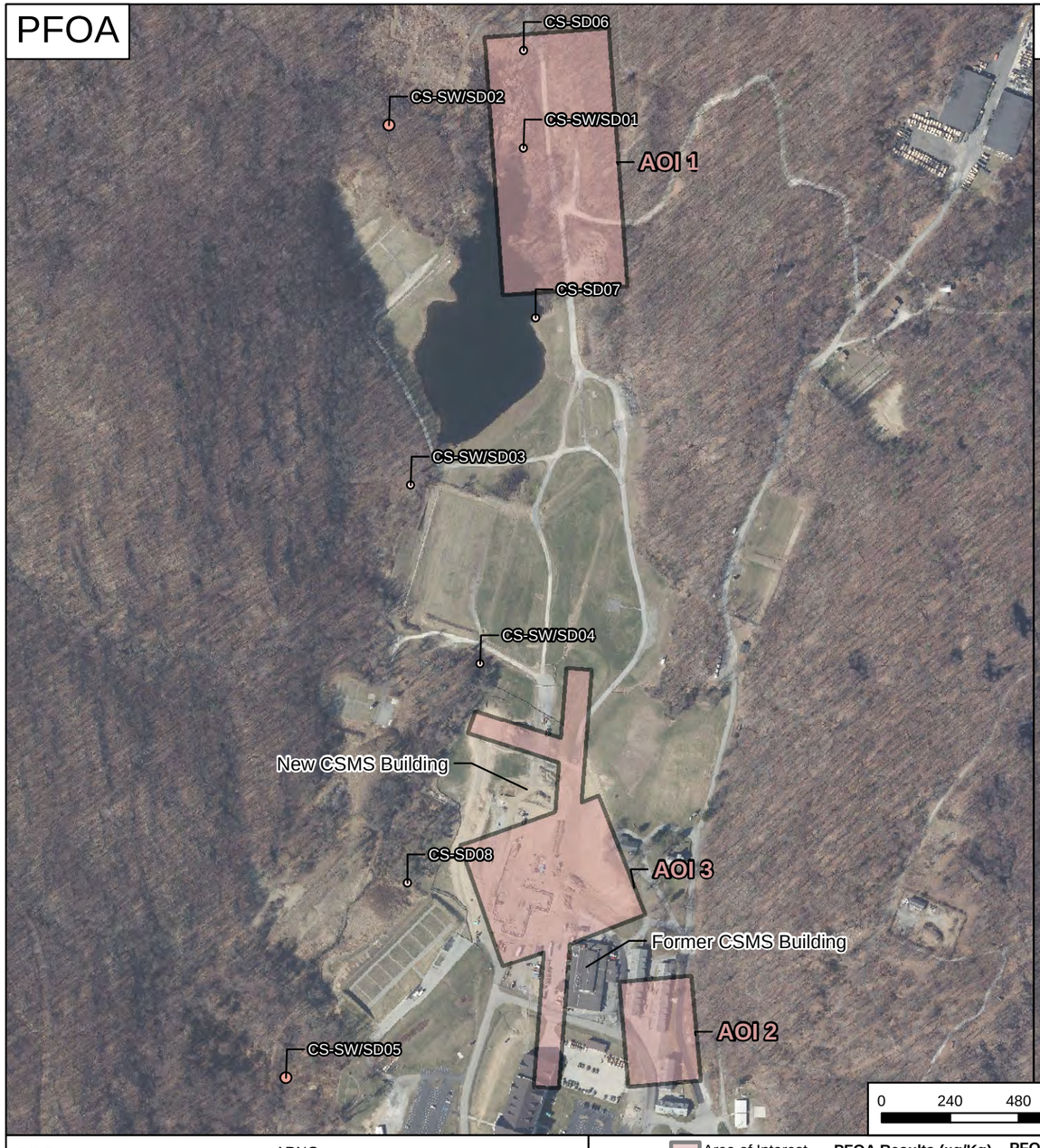

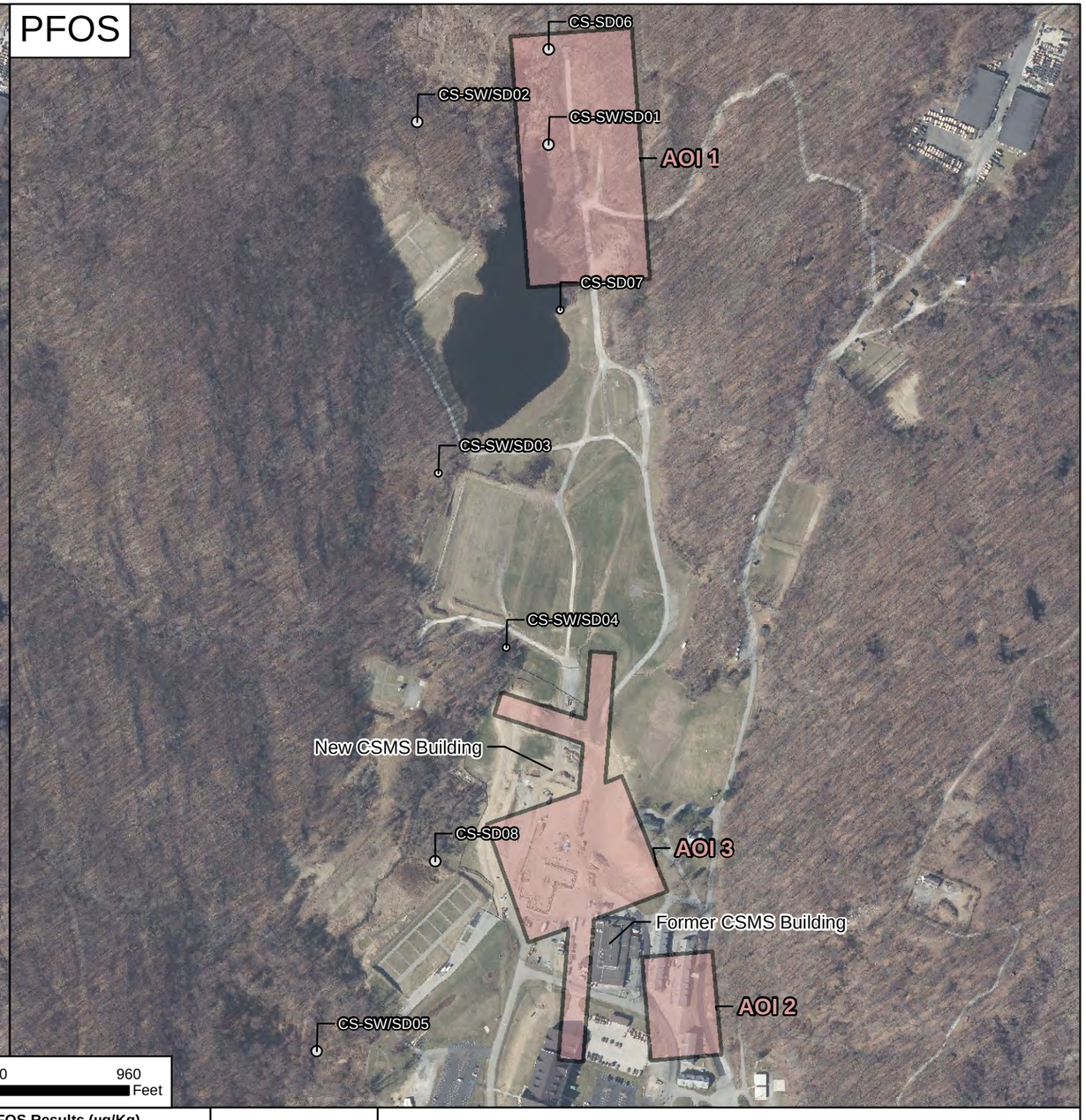

0 240 480 960 Feet

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	1/7/2021	GIS BY	MS	1/7/2021
SCALE	1:5,758	CHK BY	BP	1/7/2021
Base Map:		PM	RG	1/7/2021

Area of Interest
Facility Location

PFOA Results (µg/Kg)
- ND
- >ND - 10
- >10 - 100
- >100 - 1,000
- >1,000

PFOS Results (µg/Kg)
- ND
- >ND - 10
- >10 - 100
- >100 - 1,000
- >1,000

N

PFOA and PFOS Detections in Sediment, Mobilization 1

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Figure 10-10

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PFOA

PFOS

CS-SW/SD01

CS-SW/SD02

CS-SW/SD03

CS-SW/SD04

CS-SW/SD05

AOI 1

AOI 2

AOI 3

New CSMS Building

Former CSMS Building

0 240 480 960 Feet

Area of Interest

Facility Location

PFOA Results (ng/L)

ND

>ND - 10

>10 - 100

>100 - 1,000

>1,000

PFOS Results (ng/L)

ND

>ND - 10

>10 - 100

>100 - 1,000

>1,000

N

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Camp Smith, NY			
REVISED	8/31/2020	GIS BY	MS	8/31/2020
SCALE	1:5,760	CHK BY	BP	8/31/2020
Base Map: NYS ITS GIS Program Office		PM	RG	8/31/2020

PFOA and PFOS Detections in Surface Water, Mobilization 1

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Figure 10-11

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Table 10-1
PFAS Detections in Surface Soil
Site Inspection, Mobilization 1, Camp Smith

Area of Interest		AOI1								AOI2		AOI3							
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		AOI 2-SB1-0.5-1		AOI 3-SB1-0.5-1		AOI 3-SB1-1-2		AOI 3-SB1-1-2-FD		AOI 3-SB2-0.5-1	
Sample Date		12/11/2019		12/11/2019		12/11/2019		12/11/2019		12/10/2019		12/10/2019		12/10/2019		12/10/2019		12/10/2019	
Depth		0.5 - 1 ft		0.5 - 1 ft		0.5 - 1 ft		1 - 2 ft		0.5 - 1 ft		0.5 - 1 ft		1 - 2 ft		1 - 2 ft		0.5 - 1 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 5.1 Table B-15 (ug/Kg)																			
PFBA	-	ND		ND		0.146	J	0.325	J	0.143	J	0.270	J	0.304	J	0.207	J	0.301	J
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND		0.130	J
PFOA	130	ND		ND		ND		0.919	J	ND		0.172	J	ND		ND		0.173	J
PFOS	130	0.260	J	0.345	J	ND		0.339	J	0.432	J	0.194	J	ND		ND		1.02	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFBA	perfluorobutyrate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate

Acronyms and Abbreviations

AOI	Area of Interest
FD	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
Qual	Interpreted Qualifier
QSM	Quality Systems Manual
SB	Soil boring
ug/Kg	micrograms per Kilogram
USEPA	United States Environmental Protection Agency
-	Not applicable

Table 10-2
PFAS Detections in Shallow Subsurface Soil
Site Inspection, Mobilization 1, Camp Smith

Area of Interest		AOI1				AOI2		AOI 3	
Sample ID		AOI 1-SB1-6-8		AOI 1-SB1-12-14		AOI 2-SB1-11-13		AOI 3-SB2-7-9	
Sample Date		12/11/2019		12/11/2019		12/10/2019		12/10/2019	
Depth		6 - 8 ft		12 - 14 ft		11 - 13 ft		7 - 9 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)									
PFBA	-	0.313	J	0.257	J	0.299	J	0.274	J
PFNA	-	ND		ND		ND		ND	
PFOA	1600	ND		ND		ND		ND	
PFOS	1600	ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFBA	perfluorobutyrate
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate

Acronyms and Abbreviations

AOI	Area of Interest
FD	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
Qual	Interpreted Qualifier
QSM	Quality Systems Manual
SB	Soil boring
ug/Kg	micrograms per Kilogram
USEPA	United States Environmental Protection Agency
-	Not applicable

Table 10-3
PFAS Detections in Deep Subsurface Soil
Site Inspection, Mobilization 1, Camp Smith

Area of Interest	AOI2		AOI3	
Sample ID	AOI 2-SB1-21-23		AOI 3-SB2-15-17	
Sample Date	12/10/2019		12/10/2019	
Depth	21 - 23 ft		15 - 17 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)				
PFBA	0.347	J	0.234	J

Interpreted Qualifiers
J = Estimated concentration

Chemical Abbreviations

PFBA	perfluorobutyrate

Acronyms and Abbreviations

AOI	Area of Interest
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
ug/Kg	micrograms per Kilogram

Table 10-4
PFAS Detections in Groundwater
Site Inspection, Mobilization 1, Camp Smith

Area of Interest			AOI1						AOI3					
Sample ID			AOI 1-GW1		AOI 1-GW2		AOI 1-GW3		AOI 3-GW1		AOI 3-GW1-FD		AOI 3-GW2	
Sample Date			12/11/2019		12/11/2019		12/11/2019		12/10/2019		12/10/2019		12/10/2019	
Analyte	**OSD Screening Level [a]**	**USEPA HA[b]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)														
6:2 FTS	-	-	2.10	J	ND		ND		ND		ND		2.60	J
PFBA	-	-	7.28	J	4.73	J	35.4		12.9		12.5		4.50	J
PFBS	600	-	2.87	J	ND		3.39	J	3.77	J	3.69	J	2.66	J
PFDA	-	-	1.68	J	ND		ND		ND		ND		ND	
PFHpA	-	-	4.77	J	3.50	J	9.51	J	8.83	J	8.09	J	ND	
PFHxA	-	-	9.81	J	3.42	J	11.4		22.0		21.3		4.49	J
PFHxS	-	-	14.6		3.45	J	10.2		6.19	J	5.93	J	ND	
PFNA	-	-	4.18	J	4.23	J	5.17	J	3.57	J	4.25	J	ND	
PFOA	40	70	29.0		24.0	J-	58.4		35.5		39.9		10.3	
PFOS	40	70	37.8		13.2	J+	12.5		15.3		14.8		19.7	
PFPeA	-	-	ND		ND		ND		21.9		22.2		ND	
PFOA+PFOS Total	-	70	66.8		37.2		**70.9**		50.8		54.7		30.0	

Grey Fill	Detected concentration exceeded OSD screening level
Bold Font	Detected concentration exceeded USEPA HA

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ = 0.1. 8 April 2021.

b. United States Environmental Protection Agency (EPA). 2016. Drinking Water Health Advisory for Perfluorooctanoic Acid (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 Perfluorooctane Sulfonate (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
FD	Duplicate
GW	Groundwater
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
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 10-5
PFAS Detections in Sediment
Site Inspection, Mobilization 1, 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 5.1 Table B-15 (ug/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

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 DL. However, the reported adjusted DL is approximate and may be inaccurate or imprecise.

Chemical Abbreviations

PFBA	perfluorobutyrate
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

CS	Camp Smith
ft	feet
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SD	Sediment
ug/Kg	micrograms per Kilogram

Table 10-6
PFAS Detections in Surface Water
Site Inspection, Mobilization 1, 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 5.1 Table B-15 (ng/L)										
PFDoA	ND	UJ	ND	UJ	ND	UJ	ND	UJ	2.64	J-

Interpreted Qualifiers

J- = Estimated concentration, biased low

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

Chemical Abbreviations

PFDoA	perfluorododecanoic acid

Acronyms and Abbreviations

CS	Camp Smith
LCMSMS	Liquid Chromatography Mass Spectrometry
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SW	Surface water
ng/L	nanogram per liter

QAPP Worksheet #11: Project/Data Quality Objectives

Data Quality Objectives (DQOs) specify the level of data required to support the decision-making process for a project. Specific DQOs have been established for each facility and are described in this UFP-QAPP Addendum. These DQOs follow the USEPA's seven-step iterative process for DQO development. DQOs are influenced by the ongoing project planning discussions with stakeholders and will be updated if new consensus decisions materialize.

1. State the Problem

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 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI will be performed follows this DoD policy. Should the maximum 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. The SLs were calculated using the USEPA Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

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 drinking water wells are present downgradient. The SLs are presented in **Worksheet #15** of this QAPP Addendum.

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 fire training areas, 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).

2. Identify the Goals of the Study

The goals of the Supplemental SI include the following:

1. Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs at Camp Smith.
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 TCRA (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.
4. Collect or develop data to evaluate the release.
5. Collect data to better characterize the release for more effective and rapid initiation of an RI, if determined necessary.
6. 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).

3. Identify Information Inputs

Primary information inputs include:

- The PA Report for Camp Smith (AECOM, 2019a);
- Analytical data collected during the SI Mobilization 1 at Camp Smith;
- Groundwater, surface water, soil, and/or sediment (if applicable) sample data collected in accordance with this QAPP Addendum; and
- Field data collected including groundwater elevation and water quality parameters measured using a multi-parameter water quality meter.

4. Define the Boundaries of the Study

The scope of the Supplemental SI is horizontally bounded by the property limits of Camp Smith. Off-facility sampling is not included in the scope of this Supplemental SI; however, if future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with the property owner(s). The scope of the Supplemental SI is vertically bounded as follows: groundwater (anticipated between 20 and 100 feet bgs max), surface soil (0 to 2 feet bgs), and subsurface soil via sonic borings and hand auger (> 2 feet bgs). The temporal boundaries of the study are limited by seasonal conditions; the field work for the scope will be performed November 2020.

5. Develop the Analytic Approach

Samples will be analyzed by a DoD Environmental Laboratory Accreditation Program (ELAP) and National Environmental Laboratory Accreditation Program (NELAP) certified laboratory [i.e., Pace Gulf Coast (formerly Gulf Coast Analytical Laboratories, LLC [GCAL])]. Data will be compared to SLs (**Worksheet #15**) and decision rules as defined in the PQAPP will be applied concerning actions to be taken based on any SL exceedances. Decision rules have been developed for groundwater and soil that will apply to all data collected. These rules will govern response actions based on the results of the Supplemental SI sampling effort.

The decision rules described in the tables at the end of this section (**Tables 11-1** and **11-2**) identify actions based on the following:

Groundwater:

1. Is there a human receptor within 4 miles of the facility?
2. What is the concentration of PFOA, PFOS, and PFBS at the potential source area?
3. What is the concentration of PFOA, PFOS, and PFBS at the boundary?
4. What does the CSM suggest in terms of source, pathway, and receptor?

Soil:

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

Soil and groundwater samples will be collected within and downgradient of the AOIs identified in **Worksheet #10**. Based on previous investigations, the depth to groundwater varies across the facility and is expected to be encountered within the overburden at AOI 1 and AOI 3 at approximately 20 feet bgs. The confined aquifer (which is a potable water source) is expected to begin between 50 and 65 feet bgs, and no deeper than 100 feet bgs. Proposed Supplemental SI sample locations and depths are defined in **Worksheet #17**.

6. Specify Performance/Acceptance Criteria

See **Worksheet #37**.

7. Develop the Detailed Plan for Obtaining Data

See **Worksheet #17** and **#18**.

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Table 11-1: Groundwater Decision Rules

Scenario	PFAS Concentration Range	Response (Off-facility human receptor within 4 miles)	Response (No off-facility human receptor within 4 miles)
Scenario 1	ND	No further action required during SI phase.	No further action required during SI phase.
Scenario 2	> ND (any positive detection) and < SLs	1.) Assess CSM including: - Data reliability and bias - Migration via groundwater flow (i.e., groundwater flow towards potential receptors) - Flow to surface water bodies, drinking water intakes - Distance from boundary to receptor - Aquifer where drinking water well(s) are screened - Estimated timeframe of release(s) 2.) No further action during SI Phase at this time. ARNG may consider need for additional evaluation in the future for groundwater.	1.) Assess CSM as described. 2.) No further action during SI Phase at this time. ARNG may consider need for additional evaluation in the future for groundwater.
Scenario 3	> SLs	1.) Assess CSM as described above and: - Potential off-facility alternative PFAS sources 2.) If exceedance of SLs is near facility boundary and the assessment of the CSM implies unacceptable risk to human health caused by a PFAS release attributable to ARNG activities, ARNG may initiate off-facility sampling protocol. 3.) Proceed to RI.	1.) Assess CSM as described. 2.) Proceed to RI.

Notes:
< = less than
> = greater than
ARNG = Army National Guard
CSM = conceptual site model
ND = non-detect
PFAS = per- and polyfluoroalkyl substances
RI = Remedial Investigation
SI = Site Inspection
SL = screening level

Table 11-2: Soil Decision Rules

Scenario	PFAS Concentration Range	Response
Scenario 1	ND	No further action during SI Phase.
Scenario 2	> ND (any positive detection) and < SLs	1.) Assess CSM including: - Potential for particulate runoff (i.e., transport via surface water) - Nearby receptors and land use (residential or industrial/commercial worker) at the source location (i.e., potential for incidental ingestion) - Depth to groundwater; distance to nearby surface water body - Comparison of soil concentrations to groundwater concentrations at the source or nearby surface water body - Data reliability and bias 2.) No further action for soil during SI Phase at this time. ARNG may consider need for additional evaluation in the future.
Scenario 3	> SLs	1.) Assess CSM as above and: - Comparison of soil concentrations to groundwater concentrations at the source and downgradient at the boundary - Comparison of soil concentrations to surface water concentrations at or near the source and downgradient at the boundary 2.) Proceed to RI.

Notes:
> = greater than
ARNG = Army National Guard
CSM = conceptual site model
ND = non-detect
OSD = Office of the Secretary of Defense
PFAS = per- and polyfluoroalkyl substances
RI = Remedial Investigation
SI = Site Inspection
SL = screening level

QAPP Worksheet #14 & #16: Project Tasks and Schedule

The following table describes the main tasks and schedule for the Supplemental SI:

Task	Start Date	End Date
Pre-mobilization	May 2021	May 2021
Mobilization	June 2021*	June 2021*
Field Work	June 2021*	June 2021*
Demobilization	June 2021*	June 2021*
Data Review/Validation	July 2021	August 2021
Reporting	September 2021	March 2022

Notes:
* Weather permitting

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Final PQAPP Worksheet #15: Screening Limits and Laboratory-Specific Detection/Quantitation Limits

Matrix: Groundwater/ Surface Water/ Potable Wells
Analyte Group: PFAS
Method: PFAS by LC/MS/MS Compliant with QSM 5.3 Table B-15

Analyte	CAS Number	Laboratory Control Spike Lower Control Limit (%)	Laboratory Control Spike Upper Control Limit (%)	Achievable Laboratory Limits		
				DL (ng/L)	LOD (ng/L)	LOQ (ng/L)
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	65	140	1.70	4.0	10
Perfluoroheptanoic acid (PFHpA)	375-85-9	72	130	1.85	4.0	10
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	68	131	1.64	4.0	10
Perfluorononanoic acid (PFNA)	375-95-1	69	130	1.68	4.0	10
Perfluorooctanoic acid (PFOA)	335-67-1	71	133	1.80	4.0	10
Perfluorobutanesulfonic acid (PFBS)	375-73-5	72	130	1.47	4.0	10
Perfluorobutanoic acid (PFBA)	375-22-4	73	129	2.13	4.0	10
Perfluoropentanoic acid (PFPeA)	2706-90-3	72	129	2.35	4.0	10
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2991-50-6	61	135	5.38	8.0	10
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2355-31-9	65	136	4.60	8.0	10
Perfluorodecanoic acid (PFDA)	335-76-2	71	129	1.65	4.0	10
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	71	132	2.76	4.0	10
Perfluorododecanoic acid (PFDoA)	307-55-1	72	134	2.45	4.0	10
Perfluorohexanoic acid (PFHxA)	307-24-4	72	129	1.94	4.0	10
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	65	144	2.56	4.0	10
Perfluoroundecanoic acid (PFUdA)	2058-94-8	69	133	1.86	4.0	10
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	64	140	1.79	4.0	10
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	67	138	1.63	4.0	10

Notes:
% = percent
CAS = Chemical Abstracts Service
DL= detection limit
LC/MS/MS = liquid chromatography tandem mass spectrometry
LOD = limit of detection
LOQ = limit of quantitation
ng/L = nanograms per liter
PFAS = per- and polyfluoroalkyl substances
QSM =Quality Systems Manual
USEPA = United States Environmental Protection Agency

Matrix: Soil/Sediment
Analyte Group: PFAS
Method: PFAS by LC/MS/MS Compliant with QSM 5.3 Table B-15

Analyte	CAS Number	Laboratory Control Spike Lower Control Limit (%)	Laboratory Control Spike Upper Control Limit (%)	Achievable Laboratory Limits		
				DL (µg/kg)	LOD (µg/kg)	LOQ (µg/kg)
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	68	136	0.18	0.40	1.0
Perfluoroheptanoic acid (PFHpA)	375-85-9	71	131	0.13	0.40	1.0
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	67	130	0.14	0.40	1.0
Perfluorononanoic acid (PFNA)	375-95-1	72	129	0.09	0.40	1.0
Perfluorooctanoic acid (PFOA)	335-67-1	69	133	0.15	0.40	1.0
Perfluorobutanesulfonic acid (PFBS)	375-73-5	72	128	0.12	0.40	1.0
Perfluorobutanoic acid (PFBA)	375-22-4	71	135	0.13	0.40	1.0
Perfluoropentanoic acid (PFPeA)	2706-90-3	69	132	0.15	0.40	1.0
N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2991-50-6	61	139	0.19	0.40	1.0
N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2355-31-9	63	144	0.28	0.40	1.0
Perfluorodecanoic acid (PFDA)	335-76-2	69	133	0.12	0.40	1.0
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	69	133	0.16	0.40	1.0
Perfluorododecanoic acid (PFDoA)	307-55-1	69	135	0.20	0.40	1.0
Perfluorohexanoic acid (PFHxA)	307-24-4	70	132	0.15	0.40	1.0
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	66	139	0.22	0.40	1.0
Perfluoroundecanoic acid (PFUdA)	2058-94-8	64	136	0.14	0.40	1.0
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	64	140	0.17	0.40	1.0
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	65	137	0.26	0.40	1.0

Notes:
% = percent
µg/kg = micrograms per kilogram
CAS = Chemical Abstracts Service
DL= detection limit
LC/MS/MS = liquid chromatography with tandem mass spectrometry
LOD = limit of detection
LOQ = limit of quantitation
PFAS = per- and polyfluoroalkyl substances
QSM =Quality Systems Manual
USEPA = United States Environmental Protection Agency

Matrix: Soil
Analyte Group: Wet Chemistry

Analyte	Method	Laboratory Control Spike Lower Control Limit (%)	Laboratory Control Spike Upper Control Limit (%)	Achievable Laboratory Limits		
				DL (mg/kg)	LOD (mg/kg)	LOQ (mg/kg)
Total Organic Carbon	9060A	90	110	150	200	250

Notes:
% = percent
DL= detection limit
LOD = limit of detection
LOQ = limit of quantitation
mg/kg = milligrams per kilogram
NA = not applicable

SLs for Soil and Groundwater

The DoD has adopted a policy to retain facilities in the CERCLA process based on conservative SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG program under which this SI will be performed follows this DoD policy and should the maximum 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. The SLs were calculated using the USEPA Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

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 drinking water wells are present downgradient.

Analyte	CAS Number	Residential (Soil) (µg/kg)[a,b] 0-2 feet bgs	Industrial/ Commercial Composite Worker (Soil) (µg/kg)[a,b]	Tap Water (Groundwater) (ng/L)[a,e]	USEPA HA (Groundwater representative of Drinking Water) (ng/L)[c,d,e]
Perfluorooctanesulfonic acid (PFOS)	1763-23-1	130	1,600	40	70[d]
Perfluoroheptanoic acid (PFHpA)	375-85-9	-	-	-	-
Perfluorohexanesulfonic acid (PFHxS)	355-46-4	-	-	-	-
Perfluorononanoic acid (PFNA)	375-95-1	-	-	-	-
Perfluorooctanoic acid (PFOA)	335-67-1	130	1,600	40	70[d]
Perfluorobutanesulfonic acid (PFBS)[f]	375-73-5	1,900	25,000	600	-
Perfluorobutanoic acid (PFBA)	375-22-4	-	-	-	-
Perfluoropentanoic acid (PFPeA)	2706-90-3	-	-	-	-
N-ethyl perfluorooctanesulfonamidoacetic acid	2991-50-6	-	-	-	-
N-methyl perfluorooctanesulfonamidoacetic acid	2355-31-9	-	-	-	-
Perfluorodecanoic acid (PFDA)	335-76-2	-	-	-	-
Perfluorotetradecanoic acid (PFTeDA)	376-06-7	-	-	-	-
Perfluorododecanoic acid (PFDoA)	307-55-1	-	-	-	-
Perfluorohexanoic acid (PFHxA)	307-24-4	-	-	-	-
Perfluorotridecanoic acid (PFTrDA)	72629-94-8	-	-	-	-
Perfluoroundecanoic acid (PFUdA)	2058-94-8	-	-	-	-
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	27619-97-2	-	-	-	-
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	39108-34-4	-	-	-	-

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 October 2019.

b.) The SLs for soil are based on incidental ingestion of soil applied to the soil intervals reasonably anticipated to be encountered; surface soil (0 to 2 feet bgs for the residential scenario) and subsurface soil (2 to 15 feet bgs for the industrial/commercial worker scenario)

c.) USEPA. 2016a. Drinking Water 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 Sulfonate (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

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

e.) For the deep monitoring wells downgradient of AOI 2 and 3 (CS-MW002 and CS-MW003), an exceedance of SLs at either location would result in both AOI 2 and AOI 3 moving forward to RI due to the uncertainties associated with groundwater flow pathways within fractured bedrock.

f.) USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ = 0.1. 8 April 2021.

µg/kg = micrograms per kilogram
bgs = below ground surface
CAS = Chemical Abstracts Service
HA= Health Advisory
ng/L = nanograms per liter
OSD= Office of the Secretary of Defense
SL = screening level

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QAPP Worksheet #17: Sampling Design and Rationale

Worksheet #17a-f describes the sampling design, basis for its selection, and field investigation details. Field activities will be completed per the Standard Operating Procedures (SOPs) appended to the original SI QAPP Addendum (AECOM, 2019b).

The objective of the Supplemental SI is to further assess whether there has been a release to soil and groundwater from each AOI and determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs. As discussed in **Worksheet #10**, three AOIs were identified at Camp Smith. Groundwater flow at Camp Smith is predominantly to the south towards the Hudson River.

- AOI 1 – Former Fire Pit: AOI 1 includes the former fire pit training area and the eastern portion of Dickiebusch Lake. Potential PFAS releases to soil may have occurred during the monthly live fire training exercises; however, there are no documented reports of AFFF use during these training exercises.
- AOI 2 – Former Fire Station: AOI 2 includes the former Fire Station building and the former CSMS building. Potential AFFF releases to soil may have occurred during the storage of materials and the washing of firefighting equipment, although, it is unknown exactly what type of firefighting equipment was stored or if any AFFF was spilled.
- AOI 3 – Former Airfield/ Former NYS Fire Inspection Agency: AOI 3 includes the former Airfield and the former NYS Fire Inspection Agency. Potential AFFF releases to soil may have occurred during active use of the Former Airfield or during training activities at the Former NYS Fire Inspection Agency, although it is unknown if AFFF were released at either location.

Environmental media samples will be collected from the AOI in accordance with the applicable CSM, as summarized in **Table 17-1**. Permanent monitoring wells will be installed where PFAS were potentially released and downgradient of the potential source areas.

In instances where deviations from this sampling design and rationale are made due to unforeseen Site conditions, a Field Change Request Form will be generated to document the change and request feedback from the AECOM Task and Project Managers, USACE, and ARNG.

Sampling Tasks

The field program will include tasks as detailed in the following Worksheet elements:

- **Worksheet #17a** – Mobilization
- **Worksheet #17b** – Sonic Drilling and Soil Sampling
- **Worksheet #17c** – Permanent Groundwater Monitoring Well Installation and Groundwater Sampling
- **Worksheet #17d** – Synoptic Water Level Measurements
- **Worksheet #17e** – Surveying
- **Worksheet #17f** – Investigation-Derived Waste Management

Table 17-1: Site Inspection Sample Count

AOI	Potential PFAS Release Area	# of Sonic Boring	# of HA Boring Locations	Approximate Depth (feet bgs)	Groundwater Samples	Soil Samples
1	Former Fire Pit	1 (2 wells)	0	Shallow: 20 Deep: 50-80 (anticipated)	2	2
2	Former Fire Station	0	4	0-2 and 2-4	0	8
2 and 3	Former Fire Station and Former Airfield/ Former NYS Fire Inspection Agency	2	0	50-80 (anticipated)	2	2
3	Former Airfield/ Former NYS Fire Inspection Agency	1	0	20	1	2
Total (not including QC)		4	4	--	5	14

Notes:
1) All samples will be analyzed for PFAS.
2) One soil sample per AOI will be analyzed for pH and TOC from a location in the source area. Grain size analysis will be performed in up to one soil sample per AOI where extensive horizontal and vertical clay units are identified by the field geologist, if these conditions are encountered in the field.

AOI = area of interest
bgs = below ground surface
HA = hand auger
QC = quality control

QAPP Worksheet #17a
Sampling Design and Rationale
Mobilization

Site Preparation

The site preparation activities for the SI field investigation operations include mobilization of field team personnel and equipment. No vegetation clearance is planned during field investigation activities.

PFAS Site Water Supply Sampling and Sampling Equipment Acceptability

A sample from the potable water source (i.e., decontamination water) will be collected prior to mobilization to confirm that it is acceptable for use for during field activities (i.e., equipment decontamination). The water source is acceptable for use if the detected concentration is less than 1/5 the SL. If the decontamination water has concentrations greater than 1/5 the SL, the project team will determine whether the water is acceptable for its intended use based on site-specific factors (i.e., drilling methodology, relevant sample media). If the water is deemed unacceptable, water will be brought onsite from another source confirmed to be PFAS-free through sampling. Quality control (QC) samples will not be collected for the decontamination water sample.

Materials being purchased or rented for field work will be confirmed as acceptable for use in the PFAS sampling environment. A summary of acceptability of materials for use in the PFAS sampling environment is provided in SOP 3-41 of the original SI QAPP Addendum (AECOM, 2019b). As an additional layer of control, prior to the start of field work each day, a PFAS Sampling Checklist will be completed (AECOM, 2019b). The checklist will serve as a reminder to each field

team member regarding the allowable materials within the sampling environment. An example of the checklist is provided below.

Example PFAS Daily Sampling Checklist

Team Members		
Yes	No	Description
		Has AECOM PFAS Sampling guidance been reviewed by all team members?
		Comments:
Yes	No	Has AECOM field sampling staff received needed training certification?
		Comments:
Yes	No	Was a briefing held for field sampling staff?
		Comments:
Yes	No	Were additional PFAS sampling instructions given to field sampling staff?
		Comments:
Yes	No	Have personal clothing and PPE requirements been followed by all field sampling staff?
		Comments:
Yes	No	Were lotions and sunscreen used for field sampling staff?
		Comment:
Sample Collection		
Yes	No	Has a PFAS-free water source been identified?
		Comment
		Source of PFAS-free water:
Yes	No	Have all sampling items, parts and equipment been inspected to be free of PFAS?
		Comment:
Yes	No	Has sampling location sequence been communicated to avoid cross-contaminations?
		Comment:
Yes	No	Have drilling fluids been evaluated and shown to be free of PFAS?
		Comment:
Yes	No	Use of PFAS-free decontamination solution?
		Brand name of decontamination solution:
Yes	No	Have all field logs, notebooks, pens, labels been inspected, and do they meet AECOM PFAS sampling guidance requirements?
		Comment:
Yes	No	Have all sample shipping materials (ice, Ziploc® bags) been inspected, and do they meet AECOM PFAS sampling guidance requirements?
		Comment:
Yes	No	Have all blanks arrived at the site and will they be collected to verify cross-contamination?
		Comment:
Document Control		
Yes	No	Have all variances from sampling guidance been documented?
		Comment:
Other Comments:		

Personnel Qualifications

All personnel mobilized to the site will meet applicable Occupational Safety and Health Administration (OSHA) training requirements including hazardous waste operations and emergency response (HAZWOPER) training and medical surveillance requirements as specified in the Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP). Personnel will be required to complete the DoD's *Operations Security Awareness for Military Members, DoD Employees, and Contractors* and *Level 1 Antiterrorism Awareness Training*. Additionally, all AECOM employees that will be performing field work will take an internal PFAS sampling guidance training.

Permits and Notifications

Utility clearance will be performed by a private utility locator using ground-penetrating radar, with input from the NYARNG and the AECOM field team. AECOM or its drilling subcontractor will contact Dig Safely New York, the local one-call utility location system. AECOM will also contact the Camp Smith Environmental Manager at least five business days prior to the scheduled start of the field activities. A site walk will be scheduled with the appropriate ARNG personnel to mark out locations of the subsurface utilities. As a precaution, the first 5 feet of each boring will be advanced using air knifing methods. All field work will be coordinated with the ARNG Environmental Manager and/or his/her designee.

Health and Safety Requirements

Health and safety requirements for SI field activities are provided in the APP. Field personnel will wear PFAS-free Level D personal protective equipment (PPE). Detailed Activity Hazard Analyses identifying the physical, chemical, and biological hazards that may be encountered at the site and the associated mitigation methods are presented in the SSHP.

All onsite personnel who may be exposed to hazardous conditions will be required to meet training requirements identified in Federal Regulation 29 CFR 1910.120 (HAZWOPER). At least two personnel trained in first aid and cardiopulmonary resuscitation (CPR) will be onsite during field activities. Training certificates for personnel (HAZWOPER 40-hour training; current HAZWOPER 8-hour refresher training; and first aid/CPR) will be maintained onsite by the Site Supervisor.

Personnel and visitors who enter the site will be required to review the APP and SSHP and sign the acknowledgement form. Site workers will be required to sign the daily tailgate safety meeting form and fill out daily Activity Hazard Analysis forms. Safety issues that arise during implementation of field activities will be addressed during tailgate safety meetings held daily before the workday and will be documented in the daily tailgate safety meeting form.

Community Air Monitoring

Community air monitoring will be performed in accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), Attachment 1A of the NYSDEC Division of Environmental Remediation-10 Technical Guidance for Site Investigation and Remediation (**Appendix A**). Air monitoring activities will be implemented to protect the community from any potential airborne releases that could result from field activities associated with the SI (NYSDEC, 2010).

Continuous air monitoring will be performed in the vicinity of the drill rig when intrusive activities are underway. Air monitoring will consist of a dust monitor placed on a tripod adjacent to the work areas, in a downwind location. Background (upwind) levels will be measured each day prior to start-up of site activities and periodically throughout the day. If particulate levels (PM10) are greater than 100 micrograms per cubic meter ($\mu g/m^3$) above background for a 15-minute period, or if airborne dust is observed leaving the work area, dust suppression techniques will be employed. Work will continue with these suppression techniques provided that PM10 levels do not exceed 150 $\mu g/m^3$ above background and no visible dust is migrating from the work area. If PM10 exceeds 150 $\mu g/m^3$ over background, work will be stopped, and a re-evaluation of activities will be initiated.

QAPP Worksheet #17b
Sampling Design and Rationale
Sonic Boring Advancement and Soil Sampling

Soil samples will be collected via hand auger and sonic drilling technology (SOP 3-17 [AECOM, 2019b]). Hand augers will be used at locations designated for collection of surface and subsurface soil samples (0 to 2, 2 to 4 feet bgs) only. Borings will be advanced using sonic drilling technology at locations designated for subsurface soil sample collection; however, hand augers will be used to clear the top 5 feet of the boring in accordance with AECOM utility clearance protocols.

A FrasteXL Max sonic drill rig (or equivalent) will be used to collect continuous soil cores to the target depth. The estimated target depths are included in **Table 17-1** and **Table 17-2**; the actual boring depths will be determined in the field based on the lithology observed in the soil cores. The sampling approach targets two intervals, the overburden/weathered bedrock (shallow [S]) and the bedrock (deep [D]), as described in **Table 17-1**. The total depths of the shallow and deep borings reflect the depths of the downgradient drinking water wells and are being advanced as a surrogate to evaluate the pathway between potential release areas and the drinking water wells. Soil samples will be collected from each boring, if possible. In the overburden borings, one surface soil sample (0 to 2 feet bgs) and one subsurface soil sample approximately 1 foot above the groundwater table will be collected. In the deep borings, one subsurface soil sample will be collected approximately 1 foot above the groundwater table or 1-foot above bedrock, whichever is encountered first. Rock samples will not be collected. At the hand auger locations within AOI 2, two samples will be collected per boring: 0 to 2 feet bgs and 2 to 4 feet bgs.

The proposed sample locations are shown on **Figure 17-1, Figure 17-2,** and **Figure 17-3** and described in **Worksheet #18**. The soil sample rationale and target depths for the borings are provided in **Table 17-2** below. The rationale for the target depths was determined based on the geology of the facility. A clay layer separates unconsolidated sediments and soils near the surface from the confined aquifer below. The shallow borings will target the soils above the confining clay layer and the deeper borings will target below the confining clay layer.

Table 17-2: Soil Sample Rationale and Target Depths for Borings

Area of Interest	Number of Borings	Sample Collection Method	Target Depth (feet bgs)	Rationale
AOI 1	1	Sonic	50-80 (anticipated)	One boring will be advanced in the northern portion of AOI 1 to assess whether an upgradient source is potentially contributing to PFAS detections downgradient. Target depth of the boring is first instance of water-bearing fractures in competent rock; target depth of the soil samples is surface soil (0 to 2 feet bgs) and approximately 1-foot above the groundwater table or 1-foot above bedrock, whichever is encountered first.
AOI 2	4	Hand Auger	0-2, 2-4	Four hand auger locations will be advanced in the parking lot area adjacent to the Former Fire Station to assess potential releases from AOI 2. The target depth of each location is 4 feet bgs (below asphalt/concrete). The concrete/asphalt will be saw-cut and removed with hand tools to expose the underlying soil. The sample locations will be adjusted in the field to target low-lying areas where fluids from firetrucks and equipment washing activities would have been suspected to accumulate. Additionally, the parking lot and road in this area is suspected to consist of 10-inch thick

Area of Interest	Number of Borings	Sample Collection Method	Target Depth (feet bgs)	Rationale
				concrete containing rebar with an asphalt coating. If the presence of rebar interferes with the utility clearance, the sample locations will be adjusted to the closest location that can be cleared for utilities without interference.
AOI 2 and 3	2	Sonic	50-80 (anticipated)	Two borings will be advanced into the bedrock to assess potential impacts in the flow path between identified potential releases and downgradient Wells A and B. Target depths of the borings are first instance of water-bearing fractures in competent rock; target depth of the soil sample from each boring is approximately 1-foot above the groundwater table or 1-foot above bedrock, whichever is encountered first.
AOI 3	1	Sonic	20	One boring will be advanced at AOI 3 near the potential release area. Target depth of the boring is the top of groundwater; target depth of the soil samples is surface soil (0 to 2 feet bgs) and approximately 1-foot above the groundwater table.

Notes:
AOI = area of interest
bgs = below ground surface

The soil cores will be continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS) per SOP 3-16 (AECOM, 2019b). A photoionization detector (PID) will be used to screen the breathing zone during boring activities. Observations and measurements will be recorded on field forms and in a non-treated field logbook. Photographs of the boring cores will also be taken. At a minimum, depth interval, recovery thickness, PID concentrations, moisture, relative density, color (using a Munsell soil color chart), and texture (using the USCS) will be recorded. Additional observations to be recorded may include groundwater or perched water depth, organic material, or cultural debris. If a clay layer is observed in a boring with a thickness in excess of 3 feet, a sample will be collected, and temporary casing will be set to seal the overlying material before proceeding deeper.

If a boring is required in asphalt, it will be abandoned by backfilling with bentonite chips to approximately 6 inches bgs, and the remainder of the borehole will be patched with an asphalt cold patch. Borings into concrete will be avoided, if possible; however, if borings are advanced into concrete, the borings will be abandoned by backfilling with bentonite chips to approximately 6 inches bgs, and the remainder of the borehole will be filled with concrete to provide as flush a surface as possible. The surface at each location will be restored to match the surrounding area.

QC samples will be collected in accordance with **Worksheet #20**. Field duplicate samples will be collected at a rate of 10 percent (%) and analyzed for the same parameters as the accompanying samples. Matrix spikes/matrix spike duplicates (MS/MSDs) will be collected at the rate of 5% and analyzed for the same parameters as the accompanying samples. One Field Reagent Blank (FRB) will be collected per sampling event and will be analyzed for PFAS. For non-dedicated sampling equipment, decontamination will be completed after each use (i.e., downhole tool and hand auger decontaminated between intervals sampled for laboratory analysis), and associated equipment rinsate blanks (ERBs) will be collected at a rate of one per twenty samples. ERBs will be analyzed for the same analytes as the associated samples. A temperature blank will be placed in each cooler to ensure that samples are preserved at or below 6 degrees Celsius (°C) during shipment.

Each sample will be collected into laboratory-supplied bottleware and submitted to the laboratory for analysis of selected parameters. Samples will be analyzed for PFAS by liquid chromatography tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual [QSM] 5.3 Table B-15. Additionally, one soil sample per AOI from a location in the source area will be analyzed for total organic carbon (TOC) (USEPA Method 9060A) and pH (USEPA Method 9045D). Additionally, up to one soil sample per AOI will be submitted for grain size analysis with sieve and hydrometer (American Society for Testing and Materials [ASTM] D-422) (i.e., clay content). The grain size analysis will be performed where extensive horizontal and vertical clay units are identified by the field geologist, if these conditions are encountered in the field. Sample containers will be PFAS-free. The laboratory method detection limits (DLs) for these analytes are presented in **Worksheet #15**. Samples will be packaged on ice and transported daily via overnight commercial carrier under standard chain of custody (CoC) procedures to the laboratory (see SOP 3-04 in the Final SI QAPP [AECOM, 2019b]).

QAPP Worksheet #17c
Sampling Design and Rationale
Permanent Groundwater Monitoring Well Installation and Groundwater Sampling

Boreholes for permanent well construction will be created using a FrasteXL Max sonic drill rig (or equivalent). Once the borehole has been advanced to the specified depth, the permanent well will be constructed of a 10-foot section of 2-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe will be used for each sampling location. The target screen interval for shallow monitoring wells will be the soil or weathered bedrock/bedrock interface, which is expected to be encountered at approximately 20 feet bgs. If groundwater is not encountered by 100 feet bgs, how to proceed will be discussed with the client. The target screen interval for the deeper monitoring wells will be the first set of water-bearing fractures within competent bedrock. This determination will be made based on observations of fractures from the recovered bedrock core and performing a short-duration pump test to ensure the identified fracture(s) produce sufficient recharge for groundwater sampling. The target screen intervals and rationale for the sampling locations are described in **Table 17-3**.

Table 17-3: Groundwater Sample Rationale and Proposed Screen Intervals

Area of Interest	# Permanent wells	Target Screen Interval (feet bgs)	Rationale[1]
AOI 1	2 (within 1 boring)	Shallow: top of groundwater in overburden (20) Deep: first water-bearing fracture (50-80 anticipated)	Two permanent wells proposed: one shallow and one deep. Target screen interval of the shallow well is in overburden at the top of groundwater. Target depth for deep well is the first instance of water-bearing fractures in competent rock. Target depths were selected to evaluate the potential vertical distribution of PFAS impacts from an unidentified upgradient source.
AOI 2 and 3	2	Deep: first water-bearing fracture (50-80 anticipated)	Two deep permanent wells to evaluate the bedrock aquifer flow path between potential release areas at AOI 2/ AOI 3 and Wells A and B. Target depths of the borings are first instance of water-bearing fractures in competent rock.
AOI 3	1	Shallow – top of groundwater in overburden (20)	One shallow permanent well proposed at AOI 3 near the potential release area. Target depth of the boring is the overburden at the top of groundwater.

Notes:
[1] For the deep monitoring wells downgradient of AOI 2 and 3 (CS-MW002 and CS-MW003), an exceedance of SLs at either location would result in both AOI 2 and AOI 3 moving forward to RI due to the uncertainties associated with groundwater flow pathways within fractured bedrock.
AOI = area of interest
bgs = below ground surface

A filter pack of 20/40 silica sand will be installed in the annulus around the well screen to a minimum of 2 feet above the well screen. A 2 feet-thick bentonite seal will be placed above the filter pack and hydrated with water. Bentonite chips will be placed in the well annulus from the top of the bentonite seal to 6-inches below ground surface. The remaining space will be filled with concrete during construction the well pad (SOP 3-12 [AECOM, 2019b]). CS-MW001S, CS-MW001D, and CS-MW004 will be finished as stick-up monitoring wells with a 2-foot by 2-foot concrete well pad. Three bollards will be installed around each well pad to protect the well. The stick-up well casing and bollards will be approximately 3 feet in height. CS-MW002D and CS-MW003D will be flush-mount and in paved areas but out of high traffic areas (for example, in adjacent zebra-striped emergency parking areas). Monitoring wells completed as “stick-ups” will include a metal protective casing and flush mounts will have a well skirt and cover.

Permanent monitoring wells will be developed no sooner than 24 hours following completion of well installation. Development will be completed by a combination of surging with a surge block and over-pumping with a submersible or Waterra pump and associated high-density polyethylene (HDPE) tubing. Water clarity will be visually monitored and water quality parameters, including dissolved oxygen (DO), specific conductivity (SC), oxidation-reduction potential (ORP), pH, temperature, and turbidity will be measured using a flow-through cell every 5 minutes during purging to determine progress of development. The water quality meter will be calibrated initially and continually throughout its usage each day, as needed. A calibration check will be performed at the end of each day. Each well will be developed until the well produces clear (silt-free) water with a minimum of three stable water quality readings, as outlined below:

- pH – within ± 0.2 units.
- DO – within ± 10%.
- SC – within ± 3%.
- ORP – within ± 10 millivolts.
- Temperature – within ± 1°C.
- Turbidity – at or below 10 nephelometric turbidity unit (NTU) or within ± 10% if above 10 NTU.

If the well has slow groundwater recharge and is purged dry, the well will be considered developed when bailed or pumped dry three times in succession and the turbidity has decreased. If any water is added to the well’s borehole during drilling, three times the volume of water added will also be removed during well development.

Samples will be collected no sooner than 24 hours following development via low-flow sampling methods using a peristaltic pump or 1.75” QED Sample Pro® bladder pump with disposable bladder and tubing (depending on depth to water). The QED Sample Pro® has been tested and shown to be PFAS-free. Water levels will be measured to the nearest 0.01 inch and recorded. The pump tubing will be PFAS-free (i.e. HDPE or other PFAS-free material) and placed at the center of the well screen or at the mid-point of the water column, if groundwater is not at a higher elevation than the top of the screen. Water quality parameters (e.g., temperature, SC, pH, DO, ORP, and turbidity) will be measured and recorded on the field sampling form. Reusable groundwater sampling equipment will be decontaminated between boring locations, as warranted (see SOP 3-06 [AECOM, 2019b]). In addition, a subsample of each groundwater sample will be collected in a separate container and undergo a shaker test to identify if there is any foaming. If

foaming is observed, the observation will be noted on the CoC to notify the laboratory prior to analysis.

Non-dedicated sampling materials will be decontaminated between boring locations. Water quality parameters (e.g., temperature, SC, pH, DO, ORP) will be measured and recorded on the field sampling form after the grab sample has been collected. Water quality parameters will be measured using a water quality meter and flow-through cell (see SOP 3-14 [AECOM, 2019b]).

Each sample will be collected into laboratory-supplied bottleware and submitted to the laboratory for analysis of selected parameters (PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15) (DoD, 2019) as per SOP 3-41 (AECOM, 2019b). The laboratory method DLs for these analytes are presented in **Worksheet #15**. QC samples will be collected in accordance with **Worksheet #20**. ERBs will not be prepared or analyzed unless a deviation from this plan requires sample handling using non-dedicated equipment. If non-dedicated sampling equipment is used, ERBs will be collected at a rate of one per twenty samples and will be analyzed for the same analytes as the associated samples. Sample containers will be PFAS-free and the aqueous samples will not be filtered. Samples will be packaged on ice and transported daily via overnight commercial carrier under standard CoC procedures to the laboratory (SOP 3-04 [AECOM, 2019b]).

QAPP Worksheet #17d
Sampling Design and Rationale
Synoptic Water Level Measurements

Groundwater levels will be used to monitor site-wide groundwater elevations and assess groundwater flow. Synoptic water level elevation measurements will be collected from the newly-installed permanent monitoring wells. The wells will be surveyed, and the water level measurement will be taken from the survey mark on the northern side of the well casing.

QAPP Worksheet #17e
Sampling Design and Rationale
Surveying

A small notch will be cut on the northern side of the well casing, which will be surveyed by a state-licensed surveyor (see SOP 3-07 [AECOM, 2019b]). The top of casing and ground surface elevation will be surveyed for each newly installed well. Survey data will be collected in the applicable Universal Transverse Mercator zone projection with WGS84 datum (horizontal) and North American Vertical Datum 1988 (vertical).

QAPP Worksheet #17f
Sampling Design and Rationale
Investigation-Derived Waste Management

Currently, the disposal of PFAS investigation-derived waste (IDW) is not regulated. PFAS IDW is considered a non-hazardous waste and will be managed in accordance with USEPA, *Management of Investigation Derived Waste* (USEPA, 2014) and applicable state regulations, such as the NYSDEC Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation*. Containerized waste will also be managed in accordance with the Army Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Non-hazardous solid IDW (i.e., soil and rock cuttings) generated during SI activities with no evidence of contamination (e.g., no visual or olfactory evidence of contamination, no elevated readings on the PID) will be returned to the ground surface on the downgradient side of the

borehole or at an onsite location designated the NYARNG. The solid IDW will not be sampled and will assume the PFAS characteristics of the associated soil samples.

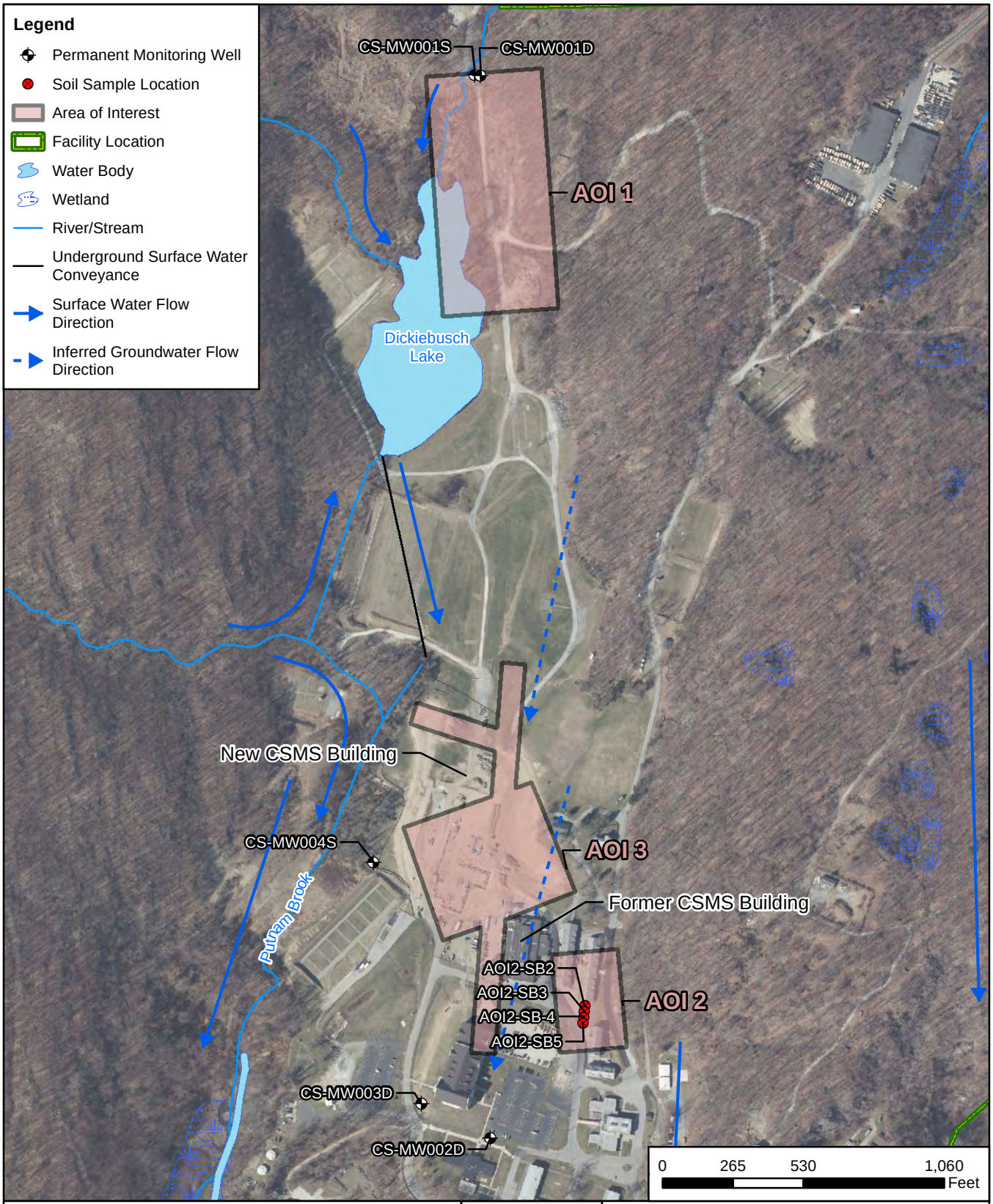
Although not anticipated, if elevated PID readings are observed, or if visual or olfactory evidence of petroleum contamination is observed, the soil IDW from the select boring location with impacts will be containerized in properly labeled 55-gallon drums (see SOP 3-05). The containerized IDW will be temporarily stored onsite at a location designated by the NYARNG. ARNG will manage disposal of the solid IDW and will coordinate with NYSDEC to ensure proper disposal in accordance with Section 6 New York Codes, Rules, and Regulations (NYCRR) Part 364.

Liquid IDW (i.e., drilling slurry, well development/purge water, and decontamination fluids) generated during SI activities will be containerized in properly-labeled 55-gallon drums (see SOP 3-05). Liquid IDW will be containerized separately by location of generation. The liquid IDW will not be sampled and will assume the PFAS characteristics of the associated groundwater samples collected from that source location. The containerized liquid IDW will be temporarily stored at a location designated by NYARNG until the analytical results for the associated groundwater samples are available. Liquid IDW drums will only be filled 75% full to account for freeze/thaw cycles. Drums will be labeled with a paint pen and faced away from the south and west. ARNG will manage the liquid IDW under a separate contract in accordance with *SOP No. 042A for Treating Liquid Investigation-Derived Material (Purge water, drilling water, and decontamination fluids)* (EA Engineering, Science, and Technology, Inc., 2021). ARNG will coordinate with the NYSDEC to ensure proper disposal is in accordance with Section 6 NYCRR Part 364.

Additionally, within the drums of drilling slurry, solids are anticipated to settle at the bottom of the drum. One solid sample will be collected per well location for analysis of PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. ARNG will manage disposal of the drilling solids and will coordinate with NYSDEC to ensure proper disposal in accordance with Section 6 NYCRR Part 364.

At locations where soil IDW is returned to the ground surface, AECOM will collect global positioning system (GPS) points (i.e., polygons) around the location where the IDW was placed. The polygon will be included in the reporting phase for future use, if required.

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



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	9/11/2020	GIS BY	MS	9/11/2020
SCALE	1:6,360	CHK BY	BP	9/11/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	9/11/2020

Site Inspection Sample Locations, Mobilization 2

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 17-1

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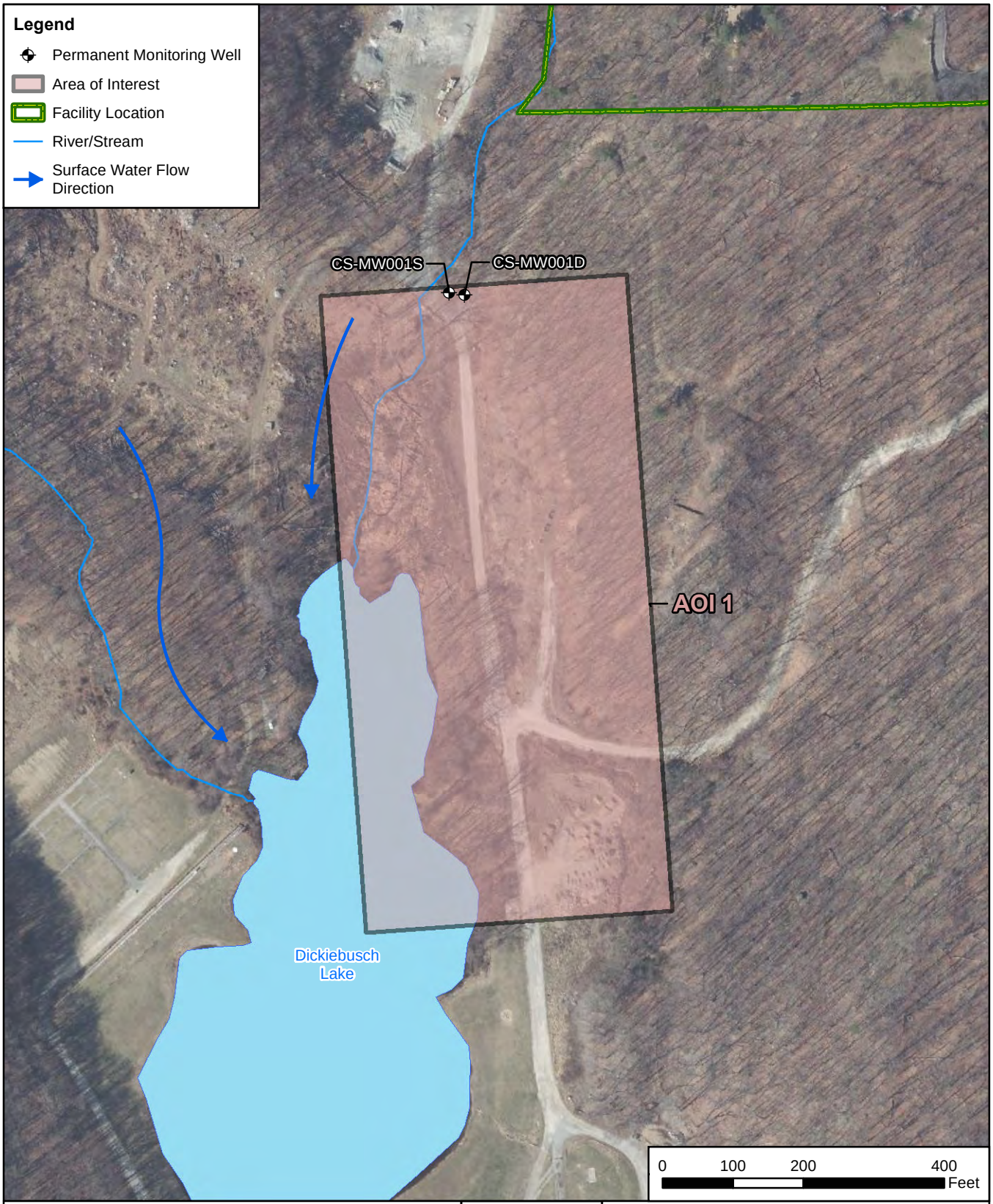

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	9/11/2020	GIS BY	MS	9/11/2020
SCALE	1:2,400	CHK BY	BP	9/11/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	9/11/2020

N

Site Inspection Sample Locations, Mobilization 2 – AOI 1

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 17-2

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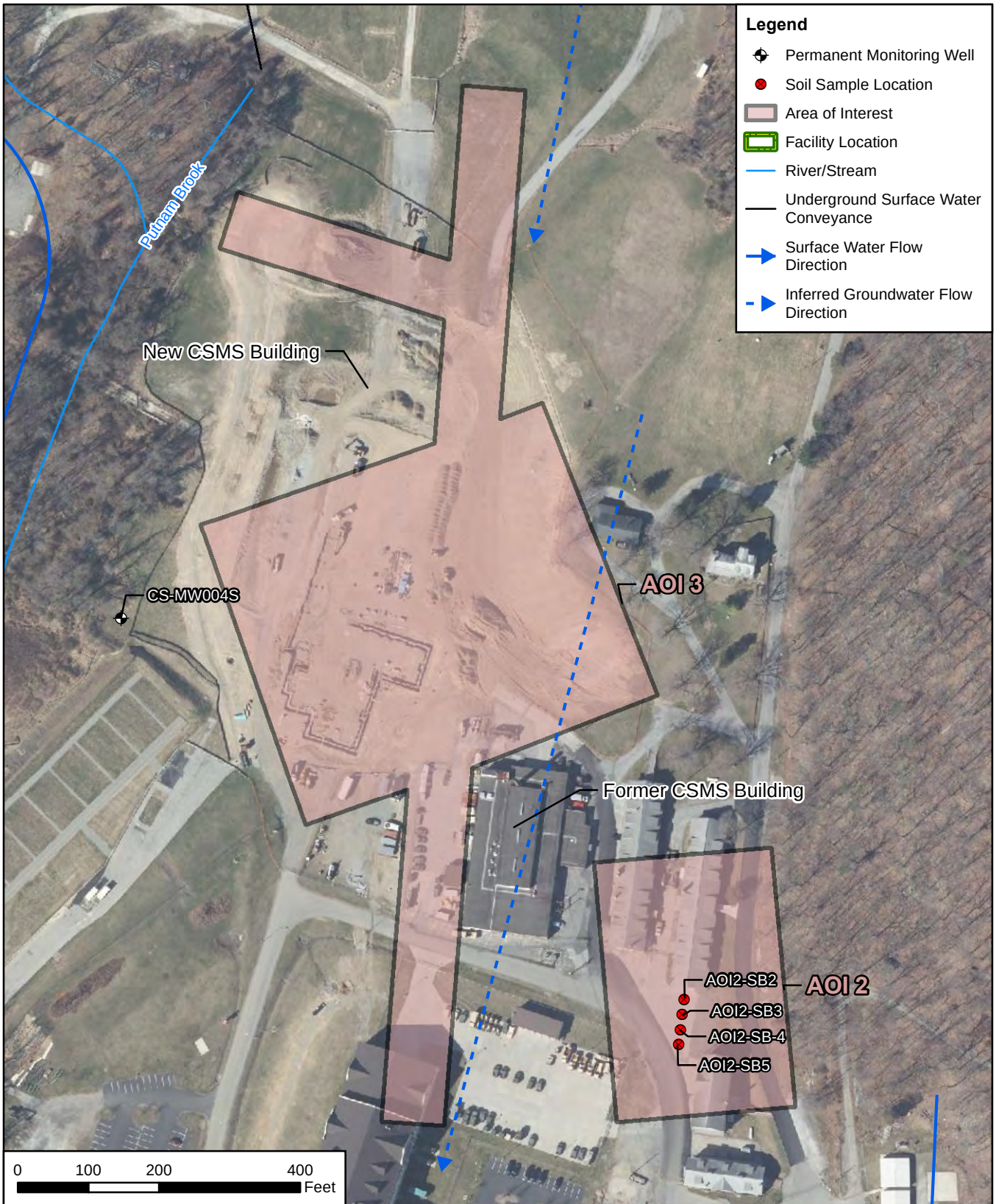

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Camp Smith, NY			
REVISED	9/11/2020	GIS BY	MS	9/11/2020
SCALE	1:2,400	CHK BY	BP	9/11/2020
Base Map: NYS Digital Ortho-imagery Program (NYSDOP), 2016		PM	RG	9/11/2020

Site Inspection Sample Locations, Mobilization 2 – AOI 2, AOI 3

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 17-3

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QAPP Worksheet #18: Sampling Locations and Methods

The table below describes the samples that will be collected during the SI. Sampling SOPs can be found in **Appendix B**.

AOI	Location Identifier	Sample Identifier	Matrix	Depth (feet bgs)	Type (Sampling Tool)	Analyte/Analytical Group	Sampling SOP
Soil Samples							
All	CS-MW001S CS-MW004S AOI2-SB2 AOI2-SB3 AOI2-SB4 AOI2-SB5	CS-MW001S-[Depth] CS-MW004S-[Depth] AOI2-SB2-[Depth] AOI2-SB3-[Depth] AOI2-SB4-[Depth] AOI2-SB5-[Depth]	Surface Soil	0-2	Geoprobe® Dual-tube Sampling System	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15) Limited Sample Selection (one sample per AOI): TOC (USEPA Method 9060A) pH (USEPA Method 9045D) Limited Sample Selection (up to one sample per AOI): Grain Size/Clay Content (ASTM D-422)	3-21
All	AOI2-SB2 AOI2-SB3 AOI2-SB4 AOI2-SB5	AOI2-SB2-[Depth] AOI2-SB3-[Depth] AOI2-SB4-[Depth] AOI2-SB5-[Depth]	Subsurface Soil	2-4	See Above	See Above	3-21
All	CS-MW001D CS-MW002D CS-MW003D CS-MW004S	CS-MW001D-[Depth] CS-MW002D-[Depth] CS-MW003D-[Depth] CS-MW004S-[Depth]	Subsurface Soil	Above groundwater table or top of bedrock	See Above	See Above	3-21
Groundwater Samples							
All	CS-MW001S CS-MW001D CS-MW002D CS-MW003D CS-MW004S	CS-MW001S-GW CS-MW001D-GW CS-MW002D-GW CS-MW003D-GW CS-MW004S-GW	Groundwater	Mid-screen	Peristaltic pump	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	3-14

AOI	Location Identifier	Sample Identifier	Matrix	Depth (feet bgs)	Type (Sampling Tool)	Analyte/Analytical Group	Sampling SOP
QA/QC Samples							
All	AOI[TBD]-[TBD]*	AOI[TBD]-[TBD]-SB-[Start Depth]-[End Depth]-D* AOI[TBD]-[TBD]-SB-[Start Depth]-[End Depth]-MS* AOI[TBD]-[TBD]-SB-[Start Depth]-[End Depth]-MSD*	Solid (Soil)	TBD	Hand Auger; Geoprobe® Dual-tube Sampling System	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15) Limited Sample Selection (one sample per AOI): TOC (USEPA Method 9060A) pH (USEPA Method 9045D)	3-21
All	AOI[TBD]-[TBD]*	AOI[TBD]-[TBD]-GW-D* AOI[TBD]-[TBD]-GW-MS* AOI[TBD]-[TBD]-GW-MSD*	Aqueous (Groundwater)	Mid-screen	Peristaltic pump	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	3-14
NA	NA	CS-FRB-01	Water Quality	NA	NA (Pour laboratory-supplied PFAS-free water)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	3-10
NA	NA	CS-ERB-01 CS-ERB-02 CS-ERB-03 CS-ERB-04	Water Quality	NA	NA (Pour laboratory-supplied PFAS-free water)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	3-10
NA	NA	CS-DECON-01	Decontamination Water Source	NA	NA (collect from tap or hose)	PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15)	3-10

Notes:
* Locations of field quality control samples (duplicates and MS/ MSDs) will be selected in the field at the rates specified in Worksheet #20 of this SI QAPP Addendum. The location and sample identifiers listed in Worksheet #18 are included as examples only.

Notes (continued):
AOI = area of interest
ASTM = American Society for Testing and Materials
bgs = below ground surface
D = duplicate
ERB = equipment rinsate blank
FRB = field regent blank
GW = groundwater
LC/MS/MS = liquid chromatography-tandem mass spectrometry
MS = matrix spike
MSD = matrix spike duplicate
NA = not applicable
PFAS = per- and polyfluoroalkyl substances
PW = potable water
QA = quality assurance
QC = quality control
QSM = Quality Systems Manual
SB = soil boring
SOP = standard operating procedure
TBD = to be determined
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

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Final PQAPP Worksheet #20: Field Quality Control Summary

Matrix	Analytical Group	Field Samples	Field Duplicates	Matrix Spikes	Matrix Spike Duplicates	Field Reagent Blanks	Equipment Rinsate Blanks*	Total Samples
Groundwater	PFAS	5	1	1	1	1	1	10
Soil	PFAS	14	2	1	1	0	2**	20
	pH, TOC	3	1	1	1	0	0	6
	Grain Size	3	0	0	0	0	0	3
Decontamination Water	PFAS	1	0	0	0	0	0	1

Notes:
*Applies only if use of non-dedicated sampling equipment is necessary
** Equipment rinsate blanks for solid matrices are aqueous samples

PFAS = per- and polyfluoroalkyl substances
TOC = total organic carbon

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Appendix A – Community Air Monitoring Plan

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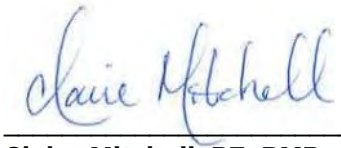
Memorandum for Appendix A: Community Air Monitoring Plan
Supplemental Site Inspection
Quality Assurance Project Plan Addendum
Camp Smith, Cortlandt, New York
Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites, ARNG Installations, Nationwide

To protect the community from any potential airborne releases that could result from field activities associated with the Site Inspection, community air monitoring will be performed in general accordance with the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP), Attachment 1A of the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER)-10 Technical Guidance for Site Investigation and Remediation, as attached to this Memorandum (NYSDEC, 2010). A CAMP is required by the NYSDEC whenever intrusive work is conducted as part of an environmental investigation or remediation.

Per DER-10, continuous air monitoring will be performed in the vicinity of the drill rig when intrusive activities are underway. Air monitoring will consist of a dust monitor placed on a tripod adjacent to the work areas, in a downwind location. Background (upwind) levels will be measured each day prior to start-up of site activities and periodically throughout the day. Per the NYSDOH Generic CAMP, the following actions will be taken if acceptable levels of air impacts are exceeded:

- If particulate levels (PM10) are greater than 100 micrograms per cubic meter ($\mu g/m^3$) above background for a 15 minute period, or if airborne dust is observed leaving the work area, dust suppression techniques will be employed. Work will continue with these suppression techniques provided that PM10 levels do not exceed 150 $\mu g/m^3$ above background and no visible dust is migrating from the work area. If PM10 exceeds 150 $\mu g/m^3$ over background, work will be stopped, and a re-evaluation of activities will be initiated.

Signed:



Claire Mitchell, PE, PMP
Project Manager
AECOM Technical Services, Inc.

New York State Department of Health
Generic Community Air Monitoring Plan
(Appendix 1A of the NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation)

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

Appendix B – Technical Project Planning Meeting Minutes

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Meeting Minutes
Camp Smith – Site Inspection (SI)
Technical Project Planning (TPP) – Meeting 3
Preliminary Assessments and Site Inspections (PA/SIs) for Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
Contract No. W912DR-12-D-0014, DO W912DR17F0192
Thursday, 7 January 2021
1100-1230

Participants			
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** Notes: ARNG-G9 - Army National Guard-G9; USACE- United States Army Corps of Engineers; NYARNG- New York Army National Guard; NYSDEC- New York State Department of Environmental Conservation; NYSDOH- New York State Department of Health*

Ms. Amanda Martin (AECOM) welcomed participants to the virtual Technical Project Planning (TPP) 3 meeting and reviewed the purpose of the meeting, outlined the agenda, and led a roundtable of introductions. The purpose of the TPP 3 meeting was to discuss the Army National Guard (ARNG) Per- and Polyfluoroalkyl Substance (PFAS) Preliminary Assessment (PA)/ Site Inspection (SI) program, the results of the SI Mobilization 1 at Camp Smith, and the proposed approach for the SI Mobilization 2.

Presentation slides were provided to participants prior to the meeting and are included in **Attachment A**. Key points that supplement the presentation are summarized below.

A safety moment that covered the safety procedures established in the United States Army Corps of Engineers (USACE) Engineering Manual (EM) 385-1-1 was provided to the participants. A Programmatic Accident Prevention Plan (APP) and Site Safety and Health Plan (SSHP) have been prepared in accordance with EM 385-1-1. The site-specific SSHP was developed concurrently with the Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP), so that as risks related to the proposed sampling approach were identified, mitigation strategies were developed and documented in the SSHP.

Additionally, pandemic awareness and safety protocols have been incorporated into the SSHP to address field work being completed during the Coronavirus Disease 2019 (COVID-19) pandemic. Mr. Jim Freehart (New York ARNG [NYARNG]) indicated that all NYARNG facilities require contractors to wear a mask, get their temperature taken at the gate, and answer several questions regarding their recent travel and potential exposure to COVID-19 prior to entering a facility.

TPP Meeting Goals (Slides 5):

- Ms. Martin briefly reviewed the meeting goals of each TPP Meeting, including those in the ARNG PA/SI program. The TPP process is intended to be an opportunity for collaboration between the involved stakeholders, and ARNG intends to use this process to maximize the effectiveness of planning and implementation for the project.
- A combined TPP 1&2 was held in July 2019, prior to the Mobilization 1 field effort. The goals of that meeting were to provide an overview of the ARNG PA/SI program, discuss the PA findings for Camp Smith, and present the objectives for the SI data collection during Mobilization 1.
- The goals of TPP 3 were to discuss the SI Mobilization 1 findings and the proposed SI Mobilization 2 sampling approach.

- TPP 4 will be scheduled after the field work, once the Draft Final SI Report has been provided to the stakeholders, to discuss the overall SI findings.
- Participants for the previous combined TPP 1&2 and TPP 3 included ARNG, USACE, NYARNG, New York State Department of Environmental Conservation (NYSDEC), New York State Department of Health (NYSDOH), and AECOM; participants for the future TPP 4 meeting will include the addition of other local stakeholders to be determined once the SI reporting phase has begun.

Summary of PA Findings (Slides 6-8):

- The PA findings for the Camp Smith were previously presented during TPP 1&2; however, a brief review of the PA findings was provided during TPP 3. Four potential PFAS release areas were identified during the PA at Camp Smith and were grouped into three Areas of Interest (AOIs): AOI 1 – the Former Fire Pit; AOI 2 – the Former Fire Station; and AOI 3 – the Former Airfield/ Former New York State Fire Inspection Agency. The potential PFAS releases at these AOIs were attributed to firefighting training exercises, storage of materials, and washing of firefighting equipment.
- Additionally, two potable wells, Wells A/1 and B/2, are located in the southern portion of cantonment area (downgradient of the AOIs). Well A is screened 65-80 feet below ground surface (bgs), and Well B is screened 82-100 feet bgs. Borings from a previous NYARNG study indicated that there is a thick clay confining unit that separates surface water from the confined aquifer. Wells A and B draw water from the confined aquifer; however, the full extent of the clay layer is not known. The wells have been sampled for PFAS, and there has been one exceedance of the United States Environmental Protection Agency (USEPA) lifetime Health Advisory (HA) level in Well A/1 in March of 2020.
- Mr. Sean Martin (NYARNG) indicated that filters have been added to the potable water taps/sources around the post, and that the filtered water is tested periodically for PFAS. Results indicated that PFAS concentrations have been reduced to non-detect levels.

SI Mobilization 1 Summary of Approach (Slides 9-12):

- The general approach for the SI Mobilization 1 was presented.
    - Direct-push borings were conducted to the top of the groundwater table, or until bedrock refusal, whichever was encountered first. Up to three soil samples were collected from each location – generally one from the surface soil, another above the water table, and the third from the mid-point of the boring. Groundwater was encountered from 0.5 to 22 feet bgs across the site; three soil samples were not collected in the borings where very shallow groundwater was encountered. Temporary monitoring wells were installed at each boring location to collect a grab groundwater sample; however, groundwater could not be obtained at AOI 2 because bedrock refusal was encountered before reaching groundwater.
    - The total number of samples collected during the SI Mobilization 1 included 14 soil samples from 6 boring locations, 5 grab groundwater samples from temporary wells, 8 sediment samples, and 5 surface water samples (which were co-located with 5 of the sediment samples).
- An overview of the screening levels for the ARNG PA/SI program was also provided.
    - 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 screening levels (SLs) for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019. The ARNG program under which this SI will be performed follows this DoD policy. Should the maximum 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: perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS).
    - Additionally, the USEPA HAs for PFOA and PFOS will also be used as SLs for groundwater samples collected at the facility because downgradient groundwater may potentially be used as drinking water.

- Per DoD policy, a full analysis of Applicable or Relevant and Appropriate Requirements (ARARs) will be done after the Remedial Investigation (RI), during the Feasibility Study, when ARNG will evaluate state screening values and other published state PFAS values.

SI Mobilization 1 Summary of Findings (Slides 13-19):

- The results of the SI Mobilization 1 at Camp Smith were presented.
  - In groundwater, PFOA, PFOS, PFBS detected at AOI 1 and AOI 3. At location AOI1-GW3, PFOA was detected at 58.4 nanograms per liter (ng/L), which exceeded the OSD SL of 40 ng/L. Additionally, the combined value of PFOA and PFOS at the same location was 70.9 ng/L, which exceeded the USEPA HA of 70 ng/L.
  - In soil, PFOS and PFOA were detected at concentrations several orders of magnitude below SLs, but PFBS not detected.
  - In sediment, PFOS and PFOA were detected, but PFBS not detected.
  - In surface water, neither PFOA, PFOS, nor PFBS were detected.
- NYSDEC collected split samples with AECOM during the SI Mobilization 1. The data were previously provided by NYSDEC to ARNG G9. Mr. Dan Lanners (NYSDEC) asked whether AECOM had evaluated discrepancies between the ARNG data and NYSDEC data collected at AOI1-SB1/GW1. The NYSDEC sample had a total PFOA+PFOS concentration of 63.4 ng/L. Ms. Martin indicated that the total PFOA+PFOS concentration from the ARNG data at that location was 66.8 ng/L, which was close to the NYSDEC detection. The group acknowledged that there was a greater difference in the groundwater results from location AOI3-SB1/GW1 (NYSDEC result: PFOA+PFOS of 82 ng/L, ARNG result: PFOS+PFOA of 50.8 ng/L). AECOM has reviewed the field records and laboratory records, but the source of the discrepancy could not be determined. Therefore, a well will be installed adjacent to this location during Mobilization 2 to confirm the results.
- Based on the exceedance of the SLs in groundwater at AOI 1, AOI 1 will proceed to the RI phase of the CERCLA process. However, uncertainties remained after the SI Mobilization 1 regarding the sources of the exceedances in groundwater at AOI 1 and at the downgradient potable Well A. Therefore, ARNG decided to collect additional data during SI Mobilization 2 to help understand the sources of the exceedances and to prepare for the sampling design for the RI.

SI Mobilization 2 Summary of Approach and Schedule (Slides 20-25):

- The proposed scope of work for the SI Mobilization 2 was presented.
  - At AOI 1, two permanent monitoring wells, one shallow and one deep, are proposed upgradient of the location of the exceedance during Mobilization 1 (AOI1-GW3). The target screen interval of the shallow well is in overburden at the top of groundwater. The target depth for deep well is the first instance of water-bearing fractures in competent rock. The target depths were selected to evaluate the potential vertical distribution of PFAS impacts from an unidentified upgradient source. Additionally, soil samples would be collected from the boring.
  - At AOI 2, four hand auger locations are proposed in the parking lot area adjacent to the Former Fire Station. The target depth of each location is 4 feet bgs (below asphalt/concrete). The sample locations will be adjusted in the field to target low-lying areas where fluids from firetrucks and equipment washing activities would have been suspected to accumulate. Additionally, the parking lot and road in this area is suspected to consist of 10-inch thick concrete containing rebar with an asphalt coating. If the presence of rebar interferes with the utility clearance, the sample locations will be adjusted to the closest location that can be cleared for utilities without interference.
  - At AOI 3, one shallow permanent well proposed near the potential release area, adjacent to Mobilization 1 location AOI3-GW1. The target depth of the boring is the overburden at the top of groundwater. Soil samples will also be collected form the boring.
  - Downgradient of AOIs 2 and 3, two deep permanent wells to evaluate the bedrock aquifer flow path between potential release areas at AOI 2/ AOI 3 and downgradient potable Wells A and B. The target depths of the borings are first instance of water-bearing fractures in competent rock.

- NYSDEC provided clarification on a comment made on the Draft Final SI QAPP Addendum regarding adjustments to the proposed locations of the wells at AOI 1, CS-MW001S, and CS-MW001D; their suggestion was to position one set of wells on the Camp Smith property to the west of Wallace Pond (on-facility), along the tributary running north-south. The NYSDEC recommended a second pair of wells location further to the northwest at the intersection of the access road and the tributary flowing onsite the facility from the north.
    - Mr. Martin indicated that, due to thick vegetation and bedrock outcrops, there were access limitations along the facility boundary to the west of Wallace Pond.
    - Additionally, due to contract limitations, no additional borings could be included in the SI Mobilization 2; however, the locations suggested by NYSDEC would be considered during the RI.
    - During this conversation, AECOM reiterated that no surface water or sediment sampling will be performed during the Mobilization 2. These media will be considered during the RI.
- The PFAS analyte list, which includes 18 PFAS compounds, was presented. Analysis will be completed by a DoD-Environmental Laboratory Accreditation (ELAP)/National Environmental Laboratory Accreditation Program (NELAP)-certified laboratory. A Level IV deliverable will be received from the laboratory, and data will undergo Stage 2b data validation as defined in the DoD General Data Validation Guidelines.
- A general outline of the schedule was presented. The Draft Final UFP-QAPP was provided to the NYSDEC and NYSDOH in November 2020; comments were provided by NYSDEC and NYSDOH in December 2020. A backcheck version of the document will be provided with the responses to NYSDEC/NYSDOH comments in January 2021. The field investigation is tentatively planned for February 2021, pending finalization of the UFP-QAPP and weather-permitting.
- Under normal circumstances, the team would field verify the proposed locations during a site reconnaissance walk conducted after the TPP 3 meeting; however, that is not possible given the current travel restrictions due to the COVID-19 pandemic. Instead, the site walk will be performed during the mark-out and utility clearing.
- Mr. Lanners indicated that he was unsure whether NYSDEC would be onsite during the site walk or field sampling during SI Mobilization 2 due to COVID-19 travel restrictions; he will have a more definitive answer once the date of the field effort is finalized. ARNG will provide NYSDEC updates on the schedule as planning progresses. Additionally, NYSDEC confirmed that they will not be collecting split samples during the SI Mobilization 2.

Open Discussion (Slide 26):

- The project team discussed the management of investigation-derived waste (IDW). A significant amount of solid and liquid IDW will be generated during the SI Mobilization 2 due to the nature of sonic/bedrock drilling. To avoid potential burden on the facility due to storing drums, ARNG is attempting to establish a creative solution for managing the IDW and will provide an update to the group once the path forward is established.
- Mr. Martin asked to please coordinate directly with him as fieldwork planning begins because the range schedule is busy. AECOM asked that NYARNG inform the team if there are particular weeks to avoid scheduling fieldwork due to range activities. Ms. Amanda Sullivan (ARNG G9) mentioned that the AECOM team may only need access to the range areas for a few days and not the entire 5-day period. Ms. Martin further clarified that the team will likely have to go back to these locations multiple times (for drilling, development, and sampling).
- The project team also discussed the utility markout and clearance process. A private utility locator will be used to complete the utility clearance; however, a New York Dig Safe ticket will still be placed in advance of the intrusive activities in accordance with New York State law.
    - Ms. Sullivan asked how long the utility clearance and the drilling is expected to take. AECOM indicated that the utility clearing would be performed over the course of 1 day prior to the drillers mobilizing to the site. At that time, a site walk would be performed to place the proposed locations and adjust as necessary due to physical obstructions or subsurface utilities discovered during the utility clearing. AECOM will confirm the anticipated time to complete the drilling but estimated it could take up to 5 days to complete.

  - Mr. Martin asked whether preclearing will be performed at all locations using an air knife or hand auger. AECOM confirmed that after the utility clearing is done, all locations will be pre-cleared to 5 feet bgs using hand tools. The surface soil locations will be cleared by the utility survey contractor, cored by the drillers (due to the thick concrete and rebar), and collected during hand tools (since the sample intervals are less than 5 feet bgs).
- Ms. Wendy Kuehner (NYSDOH) asked whether ARNG would consider using the NYSDEC PFAS screening levels if they were approved for use at other DoD facilities (both ARNG facilities or those under jurisdiction of other DoD entities). For example, she indicated the NYSDEC PFAS screening levels are being used at the DoD facility in Newburgh, New York. Ms. Kuehner indicated she was under the impression the DoD was trying to approach screening levels consistently across all DoD entities. Ms. Sullivan indicated that her understanding was that, per the directive given to the ARNG, the ARNG will follow the OSD SLs until the FS phase, when ARARs are discussed and considered. Ms. Sullivan indicated she would double check with her chain of command regarding Ms. Kuehner's inquiry.

The presentation ended at 1230, and the phone line was closed.

Attachment A - TPP 3 Briefing Slides

Camp Smith
Cortlandt, New York
Site Inspection
New York Army National Guard

Technical Project Planning (TPP) Meeting 3

Preliminary Assessments and Site Inspections (PA/SI) for Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites

7 January 2021

Agenda

- Introductions
- Safety Moment
- TPP Meeting Goals
- Camp Smith SI Mobilization 1 Results
- Camp Smith SI Mobilization 2 Overview
- Stakeholder Involvement
- Questions and Open Discussion

Introductions

- Army National Guard (ARNG) G9
  - Dave Connolly, PFAS Program Manager
  - Bonnie Packer, Nationwide Project Manager
  - Amanda Sullivan, Project Manager
- United States Army Corps of Engineers (USACE)
  - Tim Peck, Nationwide Program Manager
  - Kimberly Berg, Baltimore District
- New York Army National Guard (NYARNG)
  - 2LT Steves Vanderpool, Environmental Protection Specialist
  - James Freehart, Acting Branch Chief
  - Greg Austin, Senior Environmental Analyst
  - Sean Martin, Facility Environmental Manager
- New York State Department of Environmental Conservation (NYSDEC)
  - Dan Lanners
  - John Swartwout
  - Amen Omorogbe
- New York State Department of Health (NYSDOH)
  - Wendy Kuehner
  - Daniel Tucholski
  - Maureen Schuck
- AECOM Technical Services, Inc.
  - Amanda Martin, SI Task Manager
  - Andrew Borden, Geologist
  - Claire Mitchell, Project Manager

Safety Moment
Site Safety Procedures

- SI will follow USACE Engineering Manual (EM) 385-1-1 requirements:
  - Accident Prevention Plan addresses all component plans for EM 385-1-1, including Construction Support during drilling operations
  - Site Safety and Health Plan (SSHP) addresses project participants, training, and hazard identification and mitigation
- Health and safety documents prepared during SI planning phase
  - SSHP has been revised to incorporate COVID-19 updates and protective measures

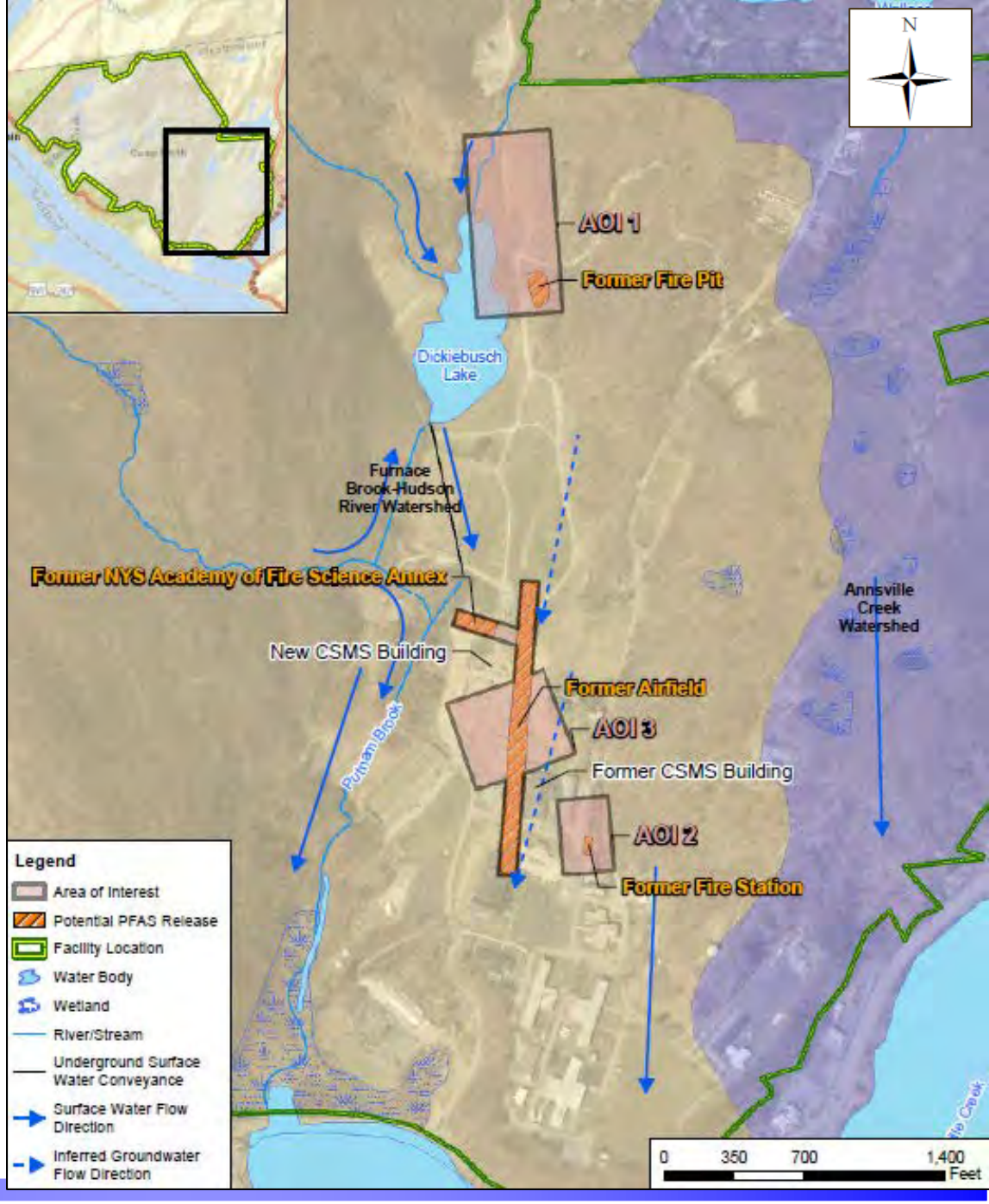
TPP Meeting Goals

- TPP 1 & 2 (July 2019): Provided overview of the ARNG PA/SI Program, discussed PA Findings, define objectives and approach for SI Mobilization 1
- TPP 3: Discuss SI Mobilization 1 findings and proposed SI Mobilization 2 approach
- TPP 4: Discuss SI findings
- Participants:
  - TPP 1, 2, & 3: ARNG G9, NYARNG, USACE, NYSDEC, NYSDOH, AECOM
  - TPP 4: ARNG G9, USACE, NYARNG, NYSDEC, NYSDOH, AECOM, other local stakeholders

PA – Summary of Findings

- Potential PFAS release areas: four potential PFAS release areas identified during the PA and placed in three Areas of Interest (AOIs)
  - AOI 1 – Former Fire Pit
  - AOI 2 – Former Fire Station
  - AOI 3 – Former Airfield/ Former NYS Fire Inspection Agency
- PFAS releases attributed to firefighting training exercises, storage of materials, and washing of firefighting equipment

PA – Summary of Findings



PA – Summary of Findings

- Potable Wells A and B in southern portion of cantonment area (downgradient of AOIs)
  - Exceedance of USEPA lifetime Health Advisory (HA) in Well A
  - Well A screen 65-80 feet below ground surface (ft bgs)
  - Well B screen 82-100 ft bgs
  - Draw from confined aquifer

SI – Mobilization 1
Summary of Approach

- Approach
  - Soil samples from each location: surface soil (0.5 to 1 ft bgs), above water table (0.5 to 22.2 ft bgs), and at mid-point, where practicable
  - Temporary monitoring wells for groundwater (GW) grab samples (ranging from 5 to 20ft bgs)
- Total Samples
  - 14 soil samples from 6 locations (soil borings and hand auger)
  - 5 GW grab samples from temporary wells
  - 8 sediment samples
  - 5 surface water samples (co-located with 5 of the sediment samples)

SI – Mobilization 1

Summary of Approach

SI – Mobilization 1
Summary of Approach

- Data compared to Office of the Secretary of Defense (OSD) Screening Levels (SLs) for soil and groundwater
  - Memorandum from the OSD dated 15 October 2019; OSD SLs adopted for ARNG PFAS program in June 2019, 7 months after finalization of Uniform Federal Policy-Quality Assurance Project Plan (UFP-QAPP) Addendum
  - Soil from 0-2 ft compared to Residential SL, 2-15 ft compared to Industrial SL, >15 ft not compared to either SL
  - Groundwater also compared to USEPA HAs since downgradient groundwater used as drinking water

SI – Mobilization 1

Summary of Approach

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

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

b.) The SL for surface soil (0 to 2 feet bgs) is based on incidental ingestion of soil (residential scenario); the SL for subsurface soil (industrial/commercial worker scenarios) and therefore will only be applied to the soil intervals reasonably anticipated to be encountered in these scenarios (2 to 15 feet bgs).

c.) If only one PFAS is present, a Hazard Quotient (HQ) of 1 applies and the values presented would increase by a factor of x10.

d.) USEPA. 2016a. Drinking Water 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 Sulfonate (PFOS). Office of Water (4304T). Health and Ecological Criteria Division, Washington, DC 20460. USEPA Document Number: 822-R-16-004. May 2016.

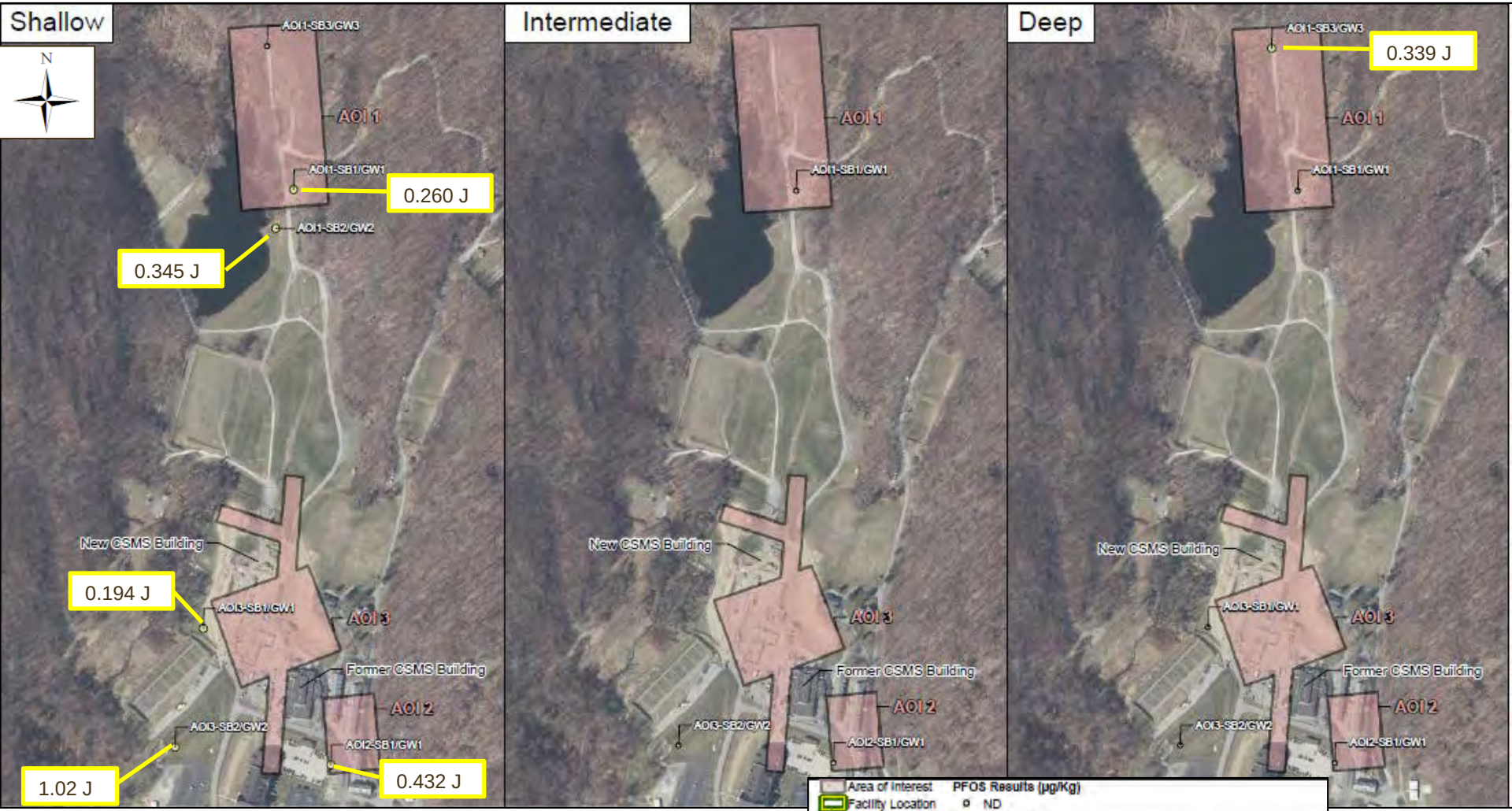
e.) USEPA HAs apply to the PFOS and PFOA concentrations individually or combined.

SI – Mobilization 1
Summary of Findings

- Groundwater – PFOA, PFOS, perfluorobutanesulfonic acid (PFBS) detected at AOI 1 and AOI 3
  - PFOA at AOI1-GW3 (58.4 ng/L) > OSD SL (40 ng/L)
  - PFOA+PFOS at AOI1-GW3 (70.9 ng/L) > USEPA HA (70 ng/L)
  - No groundwater obtained at AOI 2
- Soil – PFOS & PFOA detected at concentrations several orders of magnitude below SLs; PFBS not detected
- Sediment – PFOA & PFOS detected; PFBS not detected
- Surface Water – PFOA, PFOS, PFBS not detected

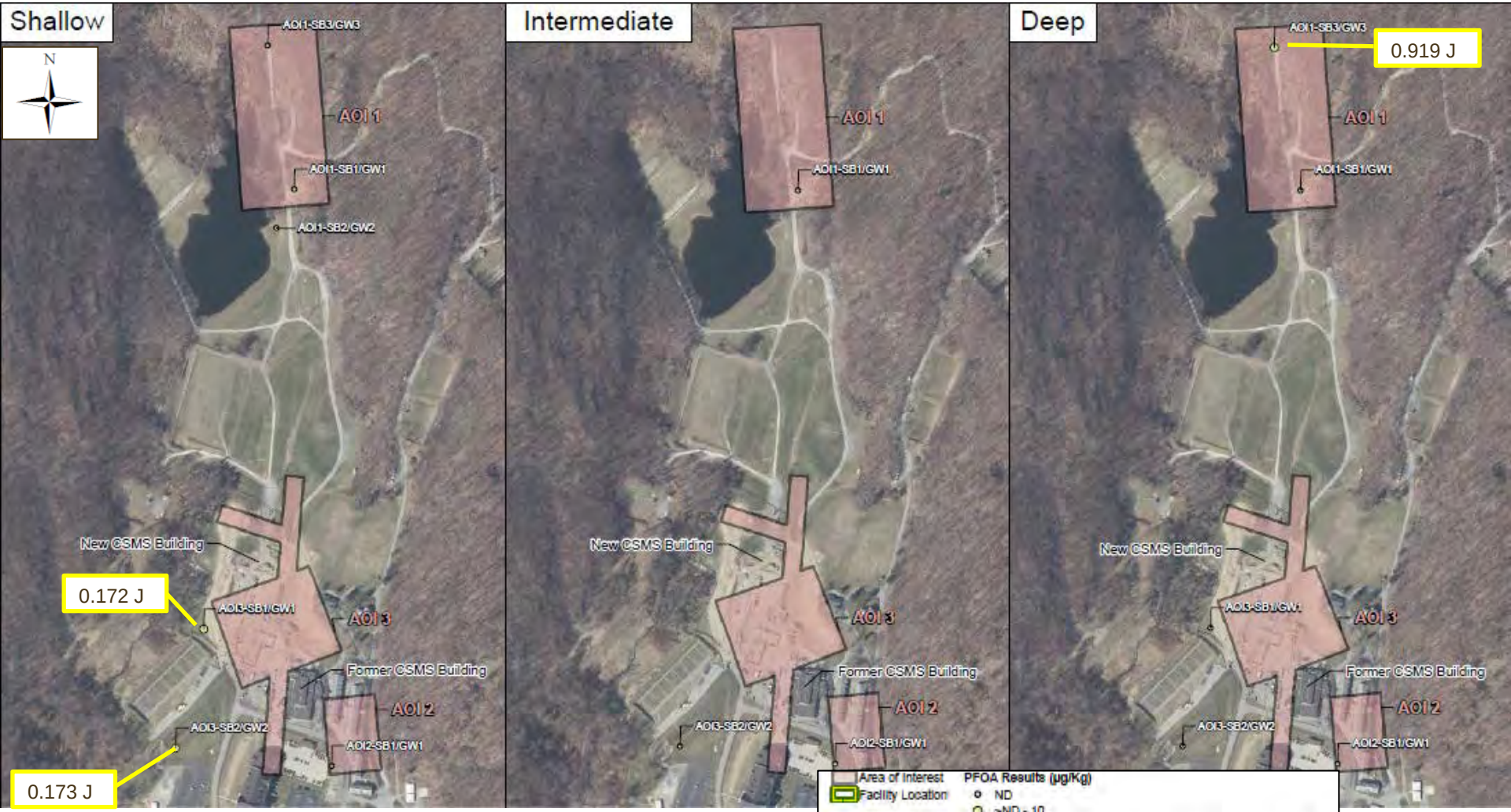
SI – Mobilization 1

Summary of Findings, PFOS in Soil



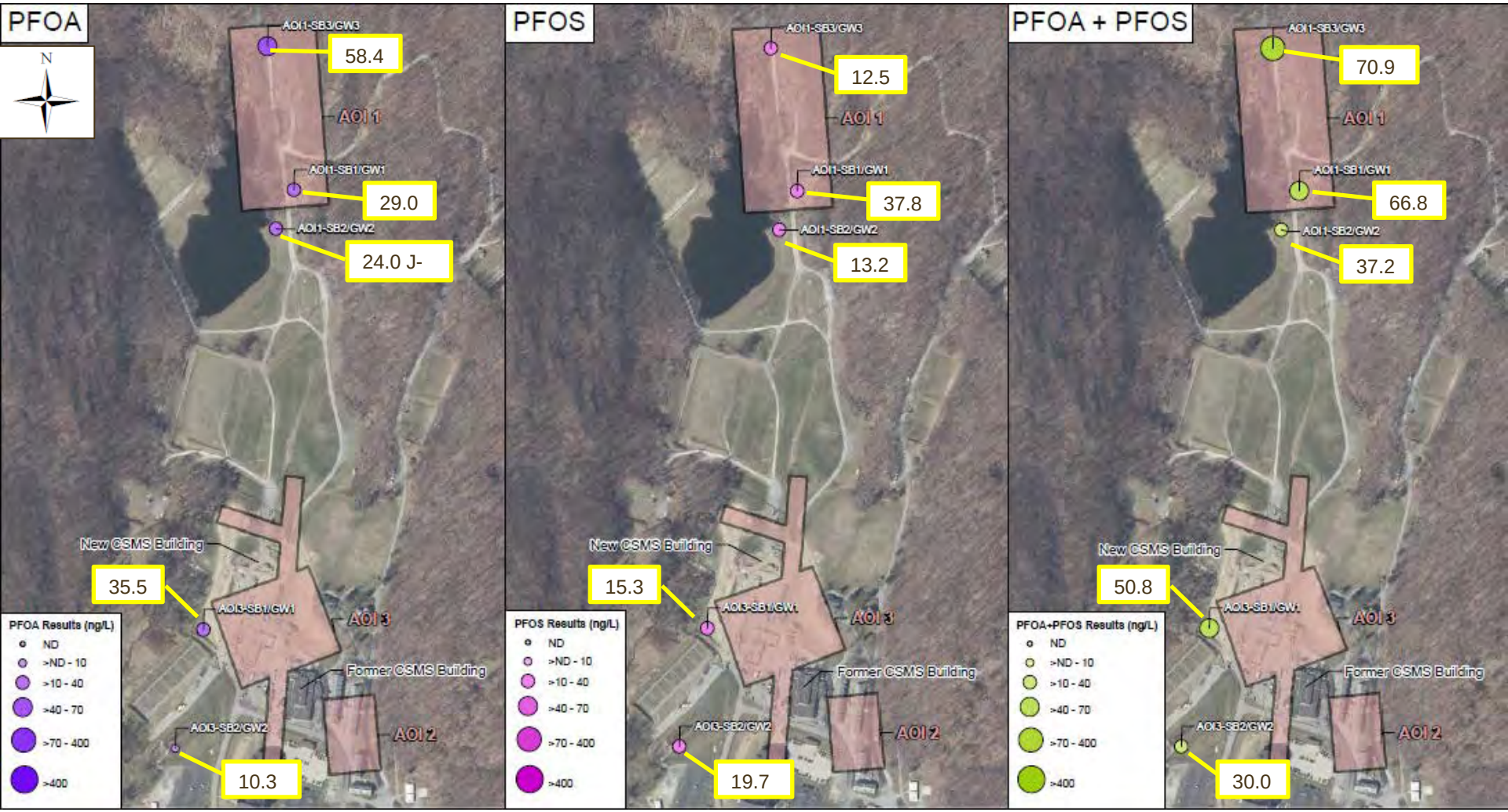
SI – Mobilization 1

Summary of Findings, PFOA in Soil



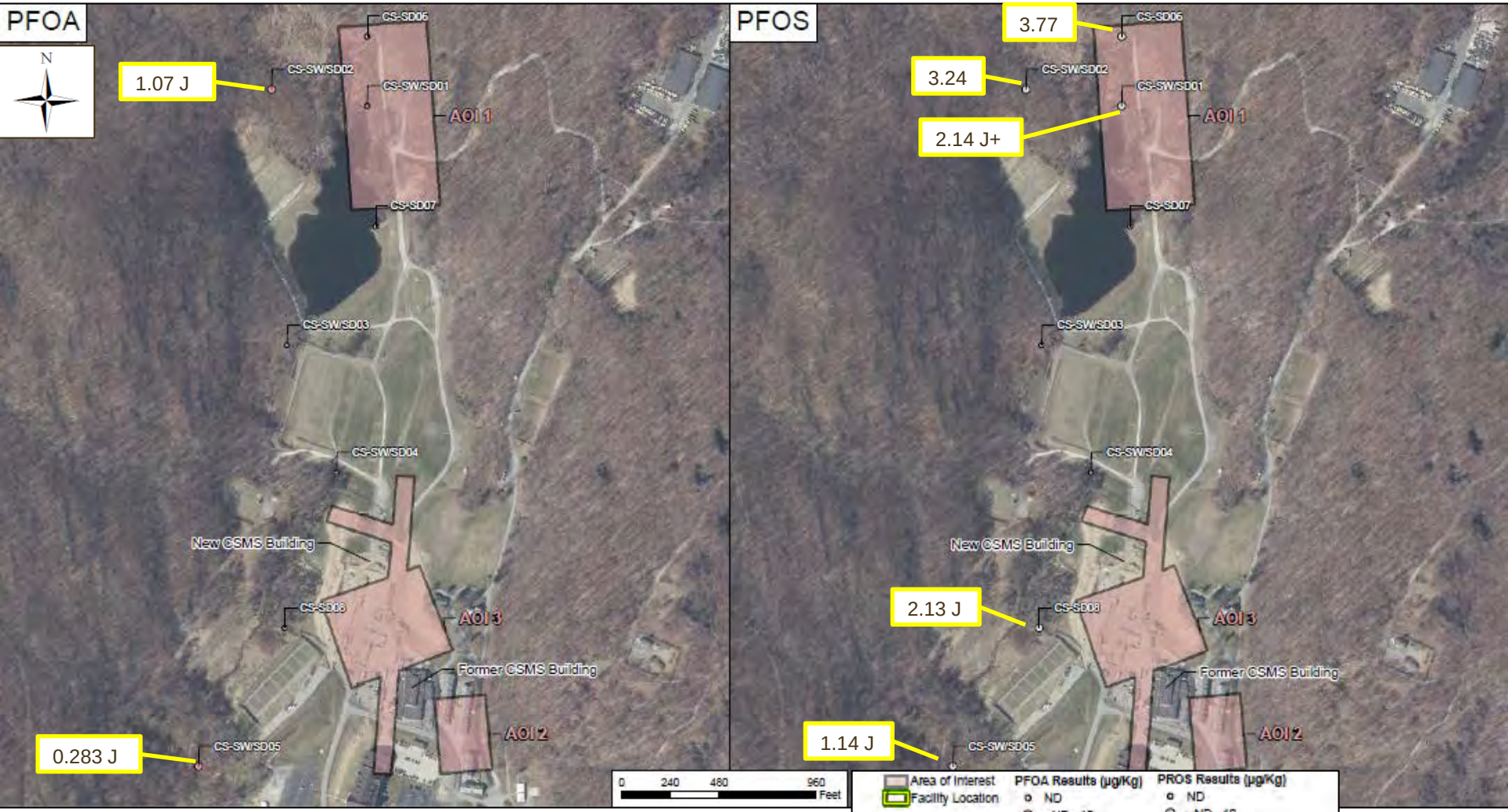
SI – Mobilization 1

Summary of Findings, PFOA and PFOS in Groundwater



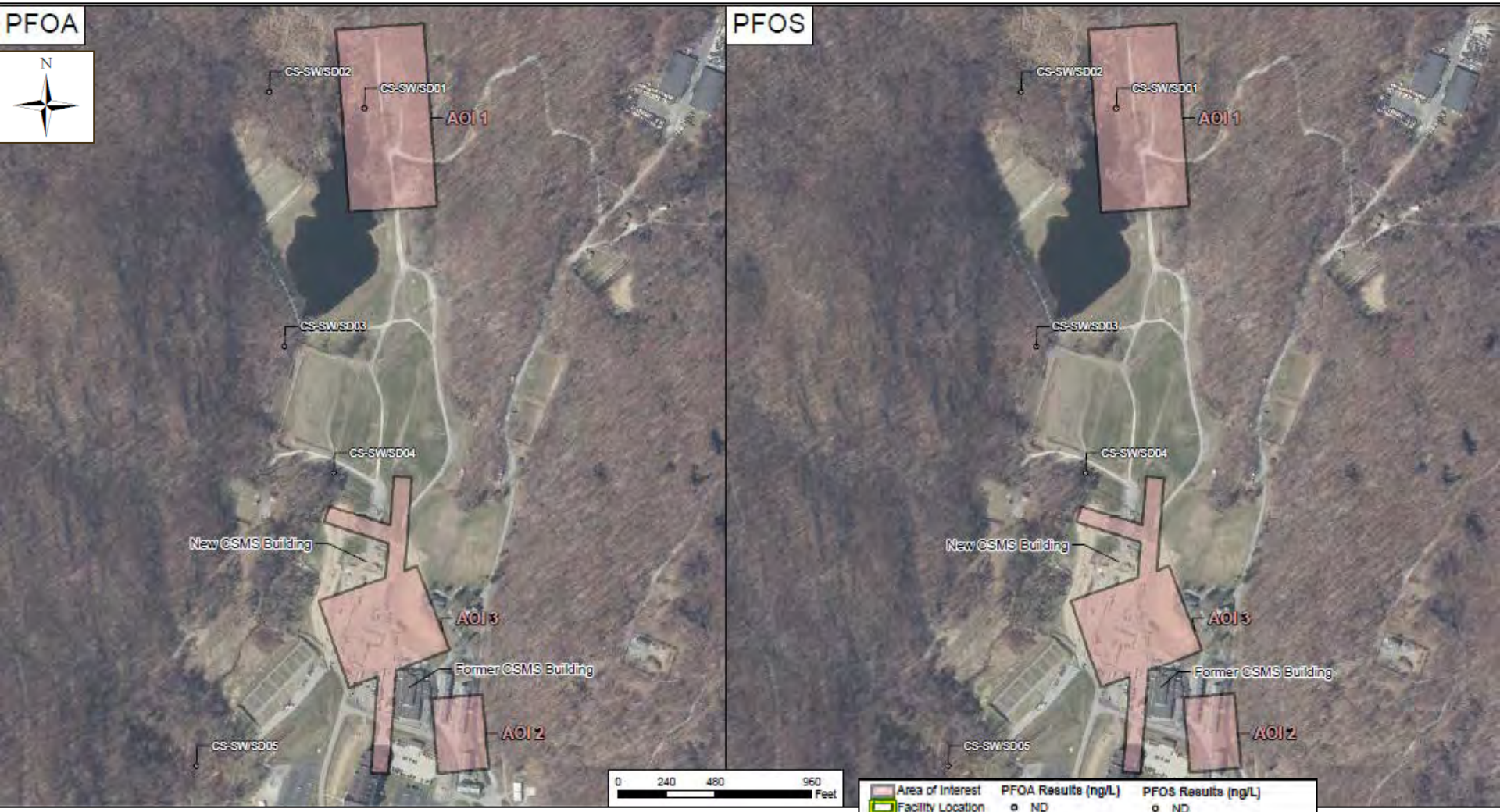
SI – Mobilization 1

Summary of Findings, PFOA and PFOS in Sediment



SI – Mobilization 1

Summary of Findings, PFOA and PFOS in Surface Water



SI – Mobilization 1

Summary of 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:

NYS = New York State

AFSA = Academy of Fire Science Annex

AOI = Area of Interest

NA = not applicable

● = detected exceedance of screening levels

◐ = detected; no exceedance of screening levels

○ = not detected

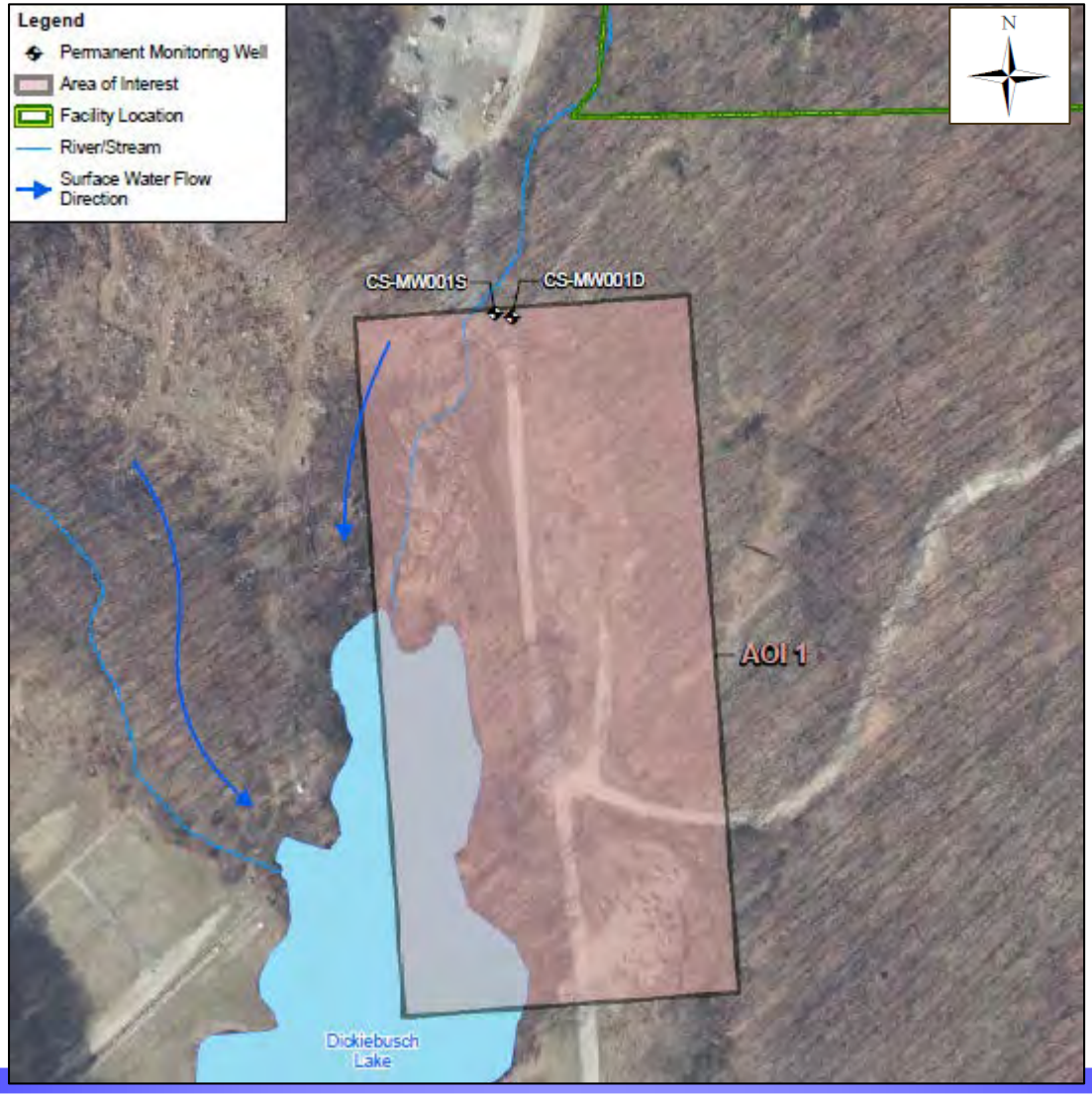
- Uncertainties
  - Source upgradient of SL exceedance at AOI1-GW3
  - Source of USEPA HA exceedance at potable Well A/1 (March 2020; downgradient of AOIs)

SI – Mobilization 2
Summary of Approach

- AOI 1 –
  - 2 permanent wells north (upgradient) of AOI1-GW3: shallow (overburden) and deep (bedrock)
  - Soil samples collected at surface and above water table
- AOI 2 –
  - Soil samples to 4 ft under concrete/asphalt; target low-lying areas where fluids from firetrucks and equipment washing suspected to accumulate
- AOI 3 –
  - 1 shallow permanent well near the potential release area
  - Soil samples collected at surface and above water table
- Downgradient of AOI 2 & 3 –
  - 2 deep permanent wells to evaluate the bedrock aquifer flow path between potential release areas at AOI 2 & 3 and Wells A and B
  - Soil samples collected above water table

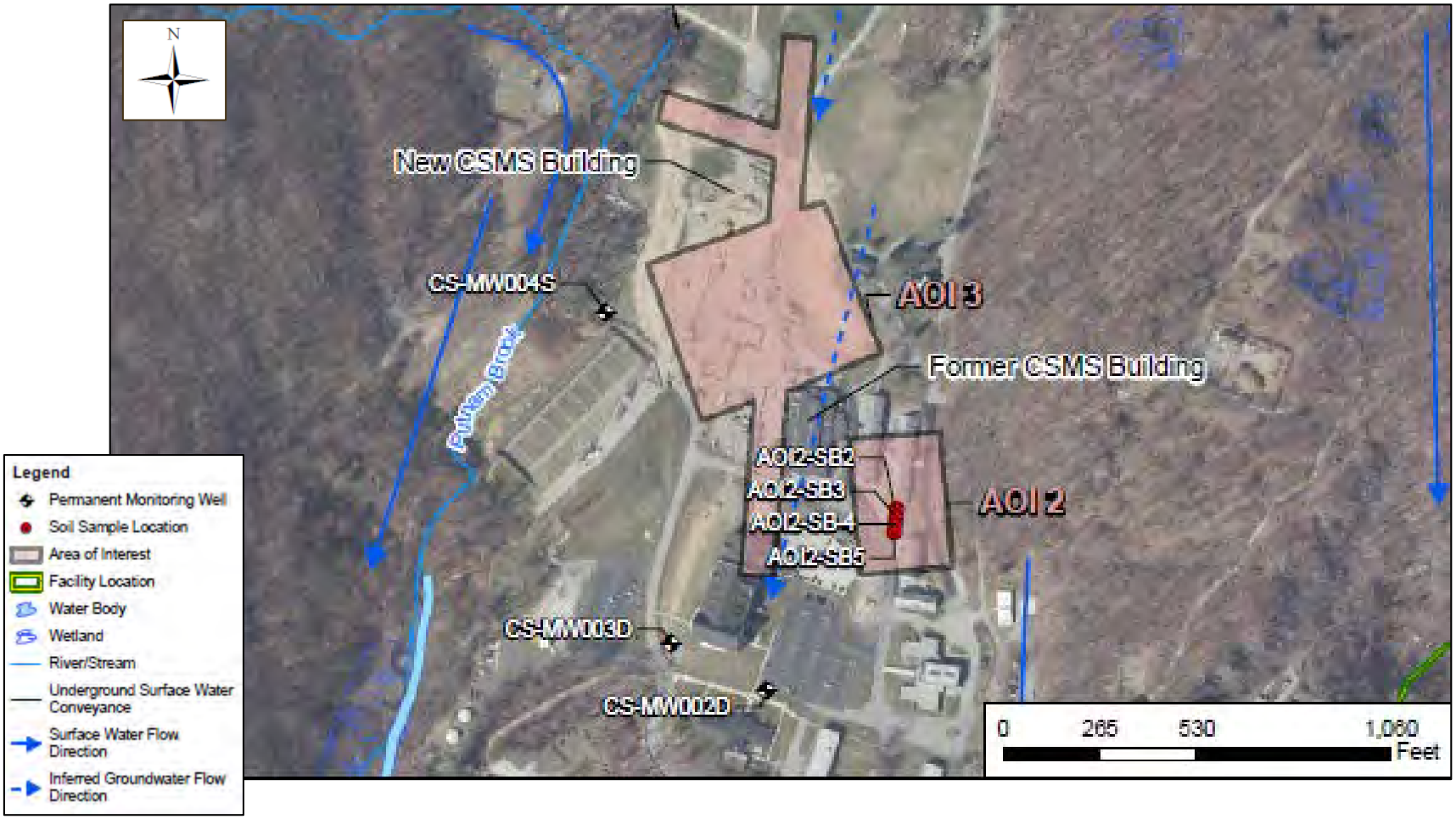
SI – Mobilization 2

Summary of Approach, AOI 1



SI – Mobilization 2

Summary of Approach, AOI 2 and AOI 3



SI – Mobilization 2
Sample Summary

AOI	Potential PFAS Release Area	# of Sonic Borings	# of HA Locations	Approximate Depth (feet bgs)	Groundwater Samples	Soil Samples
1	Former Fire Pit	1 (2 wells)	0	Shallow: 20 Deep: 50-80 (anticipated)	2	2
2	Former Fire Station	0	4	0-2 and 2-4	0	8
2 and 3	Former Fire Station and Former Airfield/ Former NYS Fire Inspection Agency	2	0	50-80 (anticipated)	2	2
3	Former Airfield/ Former NYS Fire Inspection Agency	1	0	20	1	2
Total (not including QC)		4	4	--	5	14

- Sample locations will be refined in the field
  - Confirm placement is accessible and will meet DQOs prior to the utility mark-out and locate

SI – Analytical Parameters

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

- Analysis completed by DoD-ELAP/NELAP-certified laboratory
- Level IV deliverable will be received from the laboratory
- Data will undergo Stage 2b data validation as defined in the DoD General Data Validation Guidelines

SI – Mobilization 2 Schedule

- Finalize SSI UFP-QAPP Addendum
  - Draft Final submitted: 2 November 2020
  - Document review time for NYSDEC and other stakeholders
  - Address comments and issue Final: January 2021
  - Field Investigation: February 2021 (weather permitting)

Questions and Open Discussion

- Coordination
  - Utility mark-out and clearance process
  - Investigation-derived waste (IDW) Handling
  - Site Walk
- Schedule

Acronyms

- AFFF – aqueous film forming foam
- AOI – areas of interest
- ARNG – Army National Guard
- bgs – below ground surface
- CERCLA – Comprehensive Environmental Response, Compensation, and Liability Act
- COVID-19 – Coronavirus Disease 2019
- CSM – conceptual site model
- DOH – Department of Health
- DQO – data quality objective
- ELAP – Environmental Laboratory Accreditation Program
- EM – Engineering Manual
- HA – Health Advisory
- IDW – investigation-derived waste
- NYARNG – New York Army National Guard
- NYSDEC – New York State Department of Environmental Conservation
- NYSDOH – New York State Department of Health
- NELAP – National Environmental Laboratory Accreditation Program
- OSD – Office of the Secretary of Defense
- PA – Preliminary Assessment
- PFAS – per- and polyfluoroalkyl substances
- PFBS – perfluorobutanesulfonic acid
- PFOS – perfluorooctanesulfonic acid
- PFOA – perfluorooctanoic acid
- SI – Site Inspection
- SSHP – Site Safety and Health Plan
- TPP – Technical Project Planning
- UFP-QAPP – Uniform Federal Policy-Quality Assurance Project Plan
- USACE – United States Army Corps of Engineers

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