FINAL
Site Inspection Report
McCrady Training Center
Eastover, South Carolina

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

August 2023

Prepared for:

Army National Guard Bureau
111 S. George Mason Drive
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Acronyms and Abbreviations

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

PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
SCARNG	South Carolina Army National Guard
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

Executive Summary

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

The PA identified three Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for relevant compounds. This SI was completed at McCrady Training Center (MTC) in Eastover, South Carolina and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1: Wash Rack and Fuel Point, AOI 2: MTC Military Fire Station, and AOI 3: MTC Civilian Fire Station. MTC will also be referred to as the "facility" throughout this document.

MTC occupies approximately 15,000 acres in Eastover, South Carolina. The facility is primarily used for professional military education, infantry training, and maintenance for vehicles and equipment. Related infrastructure includes vehicle maintenance shops, open training areas, live fire ranges, pistol ranges, two fire stations, a wash rack, and a water point.

The PA identified three AOIs for investigation during the SI phase. SI sampling results from the three AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation for AOI 1: Wash Rack and Fuel Point, AOI 2: MTC Military Fire Station, and AOI 3: MTC Civilian Fire Station.

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

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

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

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

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

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

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Wash Rack and Fuel Point	◐	●	●	Proceed to RI
2	MTC Military Fire Station	◐	●	N/A	Proceed to RI
3	MTC Civilian Fire Station	◐	●	N/A	Proceed to RI

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

1. Introduction

1.1 Project Authorization

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

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

1.2 SI Purpose

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

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

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2. Facility Background

2.1 Facility Location and Description

MTC occupies approximately 15,000 acres in Eastover, Richland County, South Carolina. The facility is an enclave of US Army Fort Jackson, occupying the eastern portion of the Fort Jackson installation. MTC is located approximately 18 miles east of Columbia, South Carolina and 6 miles northeast of McEntire Joint National Guard Base. The main gate is located along Leesburg Road, due west of US Route 601. The Cantonment is located near the main gate within the southeast portion of the facility. **Figure 2-1** illustrates the location of MTC. The AOIs investigated during the SI are within the Cantonment area of MTC.

The facility is used by South Carolina ARNG (SCARNG) for professional military education, infantry training, and maintenance for vehicles and equipment. SCARNG began occupation of the property in 1984, and the licensing term has been extended indefinitely since 1998.

2.2 Facility Environmental Setting

MTC is located in the Upper Coast Plain physiographic province. The topography is characterized as a fairly high, rolling to hilly plateau that is largely controlled by where streams are most numerous and have cut valleys (US Department of Agriculture [USDA], 1918). The range in elevations in the Cantonment is from 173 to 258 feet above mean sea level, with a general topographic gradient to the south/southeast (**Figure 2-2**). The area surrounding MTC is predominantly undeveloped, wooded land with scattered residential homes.

2.2.1 Geology

MTC sits on the Atlantic Coastal Plain, a geologic province defined by passive continental margin Tertiary and Quaternary sedimentation. The coastal plain consists of a thick, eastward-dipping wedge of clastic and carbonate strata sourced from the Appalachian Mountains to the west (Katuna et al., 1997). These strata were deposited from the late Cretaceous to the present and are the type of coastal deposition over time being controlled by periodic sea level rise and fall (Cooke, 1936). MTC lies in the Upper Coastal Plain, near the boundary between the unconsolidated sediments of the coastal plain and the crystalline rocks of the Piedmont. Because of this location, deposits in the area are sand-dominated and associated with a relatively stable Cretaceous beach depositional environment (Cain et al., 2000). As the coastal plain progressed seaward, rivers coming off the Appalachian Mountains began to shape the landscape, resulting in fluvial sedimentation consisting of sandy channels and clayey floodplains and swamps (**Figure 2-3**).

During the SI, silty sand and poorly graded sand were observed as the dominant lithology of the unconsolidated sediments below MTC. The borings were completed at depths between 45 and 75 feet below ground surface (bgs). Additionally, isolated layers of well-graded sand, clayey-sand, clay, and silt were also observed in the borings, with thicknesses ranging from a several inches to 15 feet.

2.2.2 Hydrogeology

The coastal plain has gently dipping layered aquifers separated by confining units. The water bearing units consist of unconsolidated sand and occasionally permeable limestone. The Middendorf aquifer is the major aquifer under Richland County, and it is composed largely of coarse sand of Cretaceous age (Newcome, 2003). This aquifer is semi-confined but not enough

to produce artesian flow conditions, as Richland County is located where the Middendorf Formation begins to outcrop at the surface.

An Environmental Data Resources, Inc.™ report conducted a well search for a 1-mile radius surrounding the facility. Using additional online resources, such as state and local Geographic Information System databases, wells were researched to a 4-mile radius of the facility. MTC is serviced by four on-facility potable wells, one in the northern portion of the facility (screen interval unknown, total well depth 168 feet bgs) and three in the southeastern portion of the facility (screen intervals between 200 to 350 feet bgs, total depths between 200 to 355 feet bgs) (South Carolina Department of Natural Resources [SCDNR], 2022). Several domestic, irrigation, and/or public supply wells exist within 4 miles to the north, east, south, and southwest. Groundwater features are presented in **Figure 2-3**.

Depths to water measured in March 2022 during the SI ranged from 40.34 to 68.56 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-4** and indicate local groundwater flow direction in the vicinity of AOI 1 and AOI 2 is to the west, towards Colonels Creek. At AOI 3, groundwater flow direction follows the inferred regional groundwater flow direction to the southeast, towards the Leesburg Branch.

2.2.3 Hydrology

The majority of the facility lies within the Upper and Lower Colonels Creek Watersheds and is drained by Colonels Creek and its tributaries. The Cantonment sits at a topographic high point and is drained on the west side by Colonels Creek and on the east side by Leesburg Branch. Both creeks flow south and lead into Murray Pond, which eventually drains to the Wateree River, located approximately 6 miles to the southeast. The western and eastern borders of Richland County are shaped by the Congaree River and Wateree River, respectively, and join at a confluence that drains into Lake Marion. Lake Marion is approximately 27 miles southeast of the facility and is a source of drinking water for surrounding communities and towns.

The wash rack area in the Cantonment is designed as a closed loop system consisting of a series of settling basins. If a discharge is required, it is released into an on-facility stormwater retention basin located just to the south of the wash rack. The outfall associated with the stormwater retention basin (Outfall 001) is regulated under a National Pollution Discharge Elimination System permit for discharge to Colonels Creek and Wateree River. Surface water features are presented in **Figure 2-5**.

2.2.4 Climate

MTC is in a humid subtropical climate zone characterized by long and warm summers and short and mild winters. Rainfall is generally greater during the summer months but otherwise well distributed year-round, with a normal annual precipitation of 45.24 inches. Summer temperatures peak in July, with an average high of 93 degrees Fahrenheit (°F) and an average low of 72 °F. Winter temperatures are lowest in January, with an average high of 56 °F and an average low of 34 °F. Snowfall is rare, and the region typically receives only about 1.2 inches of snowfall annually (National Oceanic and Atmospheric Administration [NOAA], 2022).

2.2.5 Current and Future Land Use

The facility is used by SCARNG for professional military education, infantry training, and maintenance for vehicles and equipment. The different organizational units at MTC include the Unit Training Equipment Site, Cantonment, Maintenance Shop, and US Marine Corp Reserve (Synterra, 2018). Related infrastructure includes vehicle maintenance shops, open training areas, live fire ranges, pistol ranges, two fire stations, a wash rack, and a water point. Reasonably anticipated future land use is not anticipated to change from the current land use.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

A wildlife survey was not conducted, but MTC does contain significant areas of habitat. The following species have not been identified at the facility but may be present in the surrounding area.

The following amphibians, birds, crustaceans, fishes, plants, insects, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Richland County, South Carolina (US Fish and Wildlife Service [USFWS], 2022).

- **Amphibians:** Chamberlain's Dwarf salamander, *Eurycea chamberlaini* (under review)
- **Birds:** Red-cockaded woodpecker, *Picoides borealis* (endangered); Wood stork, *Mycteria americana* (threatened), Bald eagle, *Haliaeetus leucocephalus* (recovery); Golden-winged warbler, *Vermivora chrysoptera* (under review)
- **Crustaceans:** Little River crayfish, *Cambarus spicatus* (under review)
- **Fishes:** Robust redhorse, *Moxostoma robustum* (under review)
- **Flowering Plants:** Georgia aster, *Symphyotrichum georgianum* (resolved taxon); Ciliate-leaf tickseed, *Coreopsis integrifolia* (under review); Carolina birds-in-a-nest, *Macbridea caroliniana* (under review); Bog spicebush, *Lindera subcoriacea* (under review); Purpledisk honeycombhead, *Balduina atropurpurea* (resolved taxon); Rough-leaved loosestrife, *Lysimachia asperulaefolia* (endangered); Canby's dropwort, *Oxypolis canbyi* (endangered); Smooth coneflower, *Echinacea laevigata* (endangered); Spathulate seedbox, *Ludwigia spathulate* (status undefined)
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)
- **Mammals**: Tricolored bat, *Perimyotis subflavus* (under review); Little brown bat, *Myotis lucifugus* (under review)
- **Reptiles**: Southern hognose snake, *Heterodon simus* (resolved taxon)

2.3 History of PFAS Use

Three potential release areas were identified at the MTC during the PA where AFFF may have been used or released historically (AECOM, 2020). MTC includes a wash rack, fuel point, and two fire stations (MTC Military Fire Station and MTC Civilian Fire Station). In 2012, AFFF was accidentally released from a firetruck near the fuel point, and the area was subsequently flushed with water that drained toward the wash rack. Although there are no documented releases from either fire station, AFFF may have been released at the facility during firefighting activities, training, product handling, or storage. The potential release areas were grouped into three AOIs based on proximity to one another and presumed groundwater flow. A description of each AOI is presented in **Section 3**. At the time of this report, all AFFF has been removed from the facility with the exception of one full tank remaining within a fire engine located at the MTC Civilian Fire Station.

2.4 Potable Well Sampling

Four potable supply wells exist at the facility. The facility potable wells were sampled in 2017 and 2020. The 2017 results showed a low-level detection of PFOA (1.19 J nanograms per liter [ng/L]) and non-detect for PFOS, PFHxS, PFNA, and PFBS. PFOS, PFOA, PFHxS, PFNA, and PFBS were not detected in 2020. One potable well is located approximately 125 feet to the south of the MTC Civilian Fire Station building at AOI 3. Facility potable wells are depicted on **Figure 2-3**.

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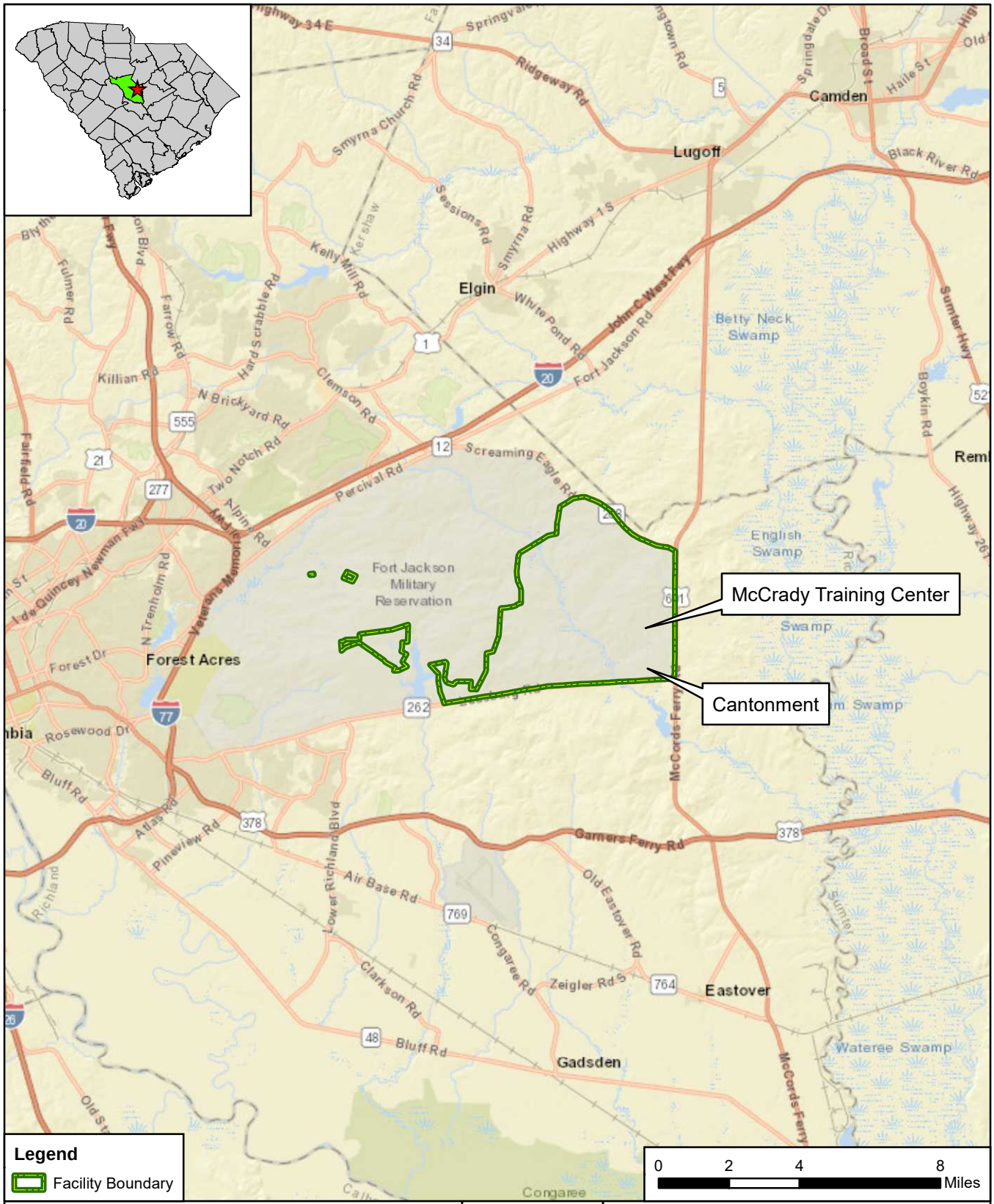

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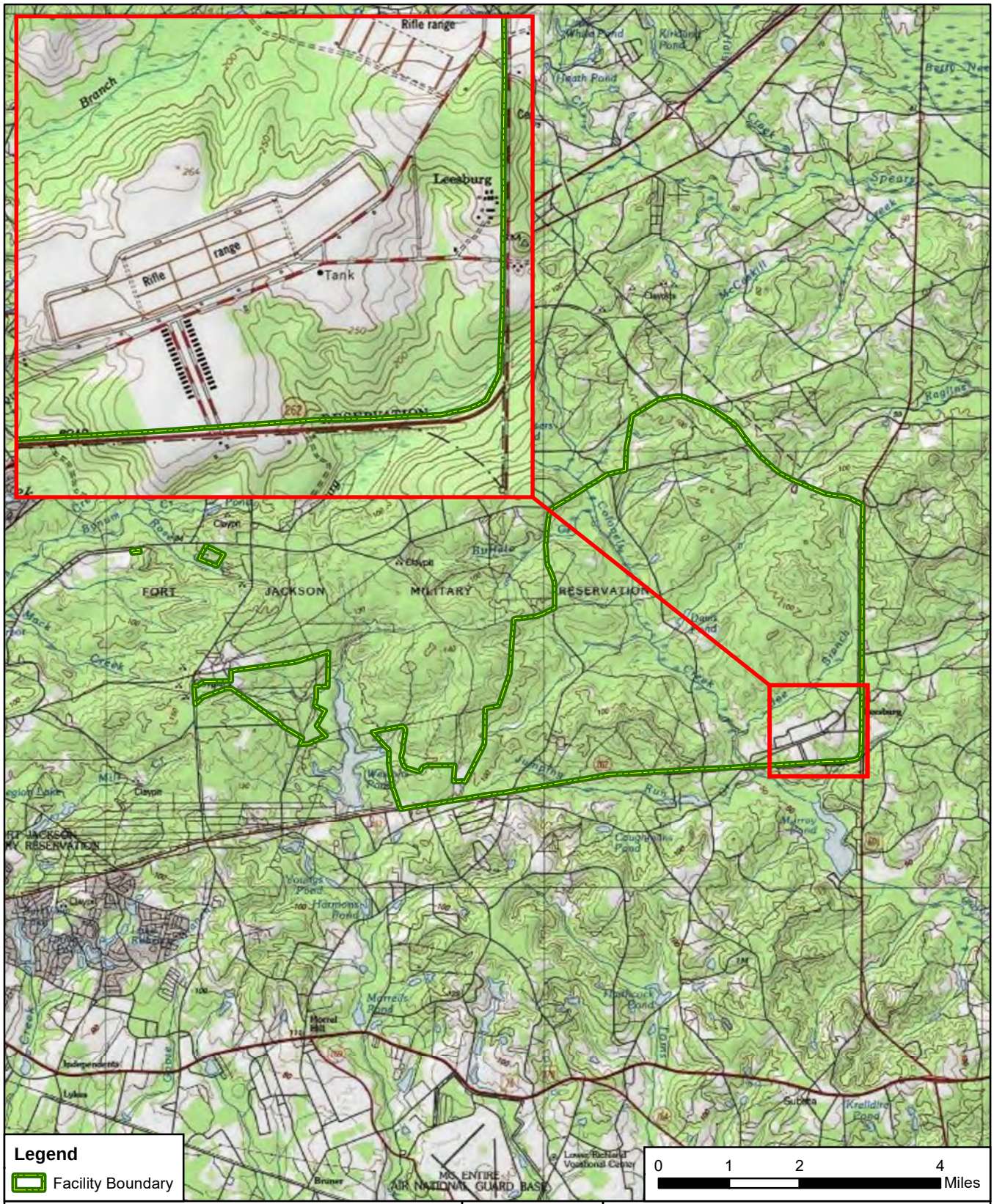
SCALE	1:253,440	CHK BY	BW	8/26/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/26/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



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SCALE	1:126,720	CHK BY	BW	2/24/2023
Base Map: Copyright:© 2013 National Geographic Society, i-cubed		PM	CM	2/24/2023

Facility Topography

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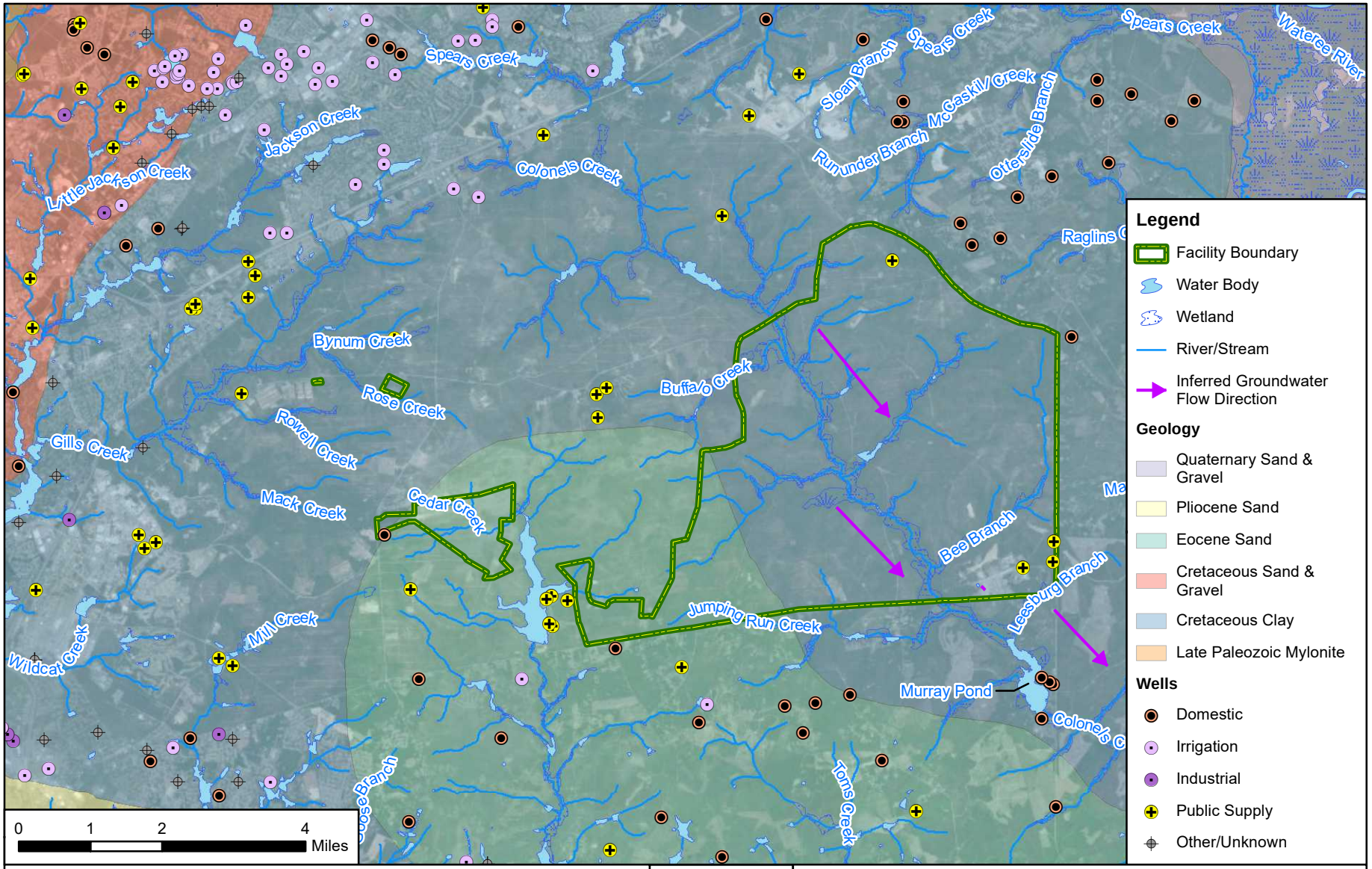
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



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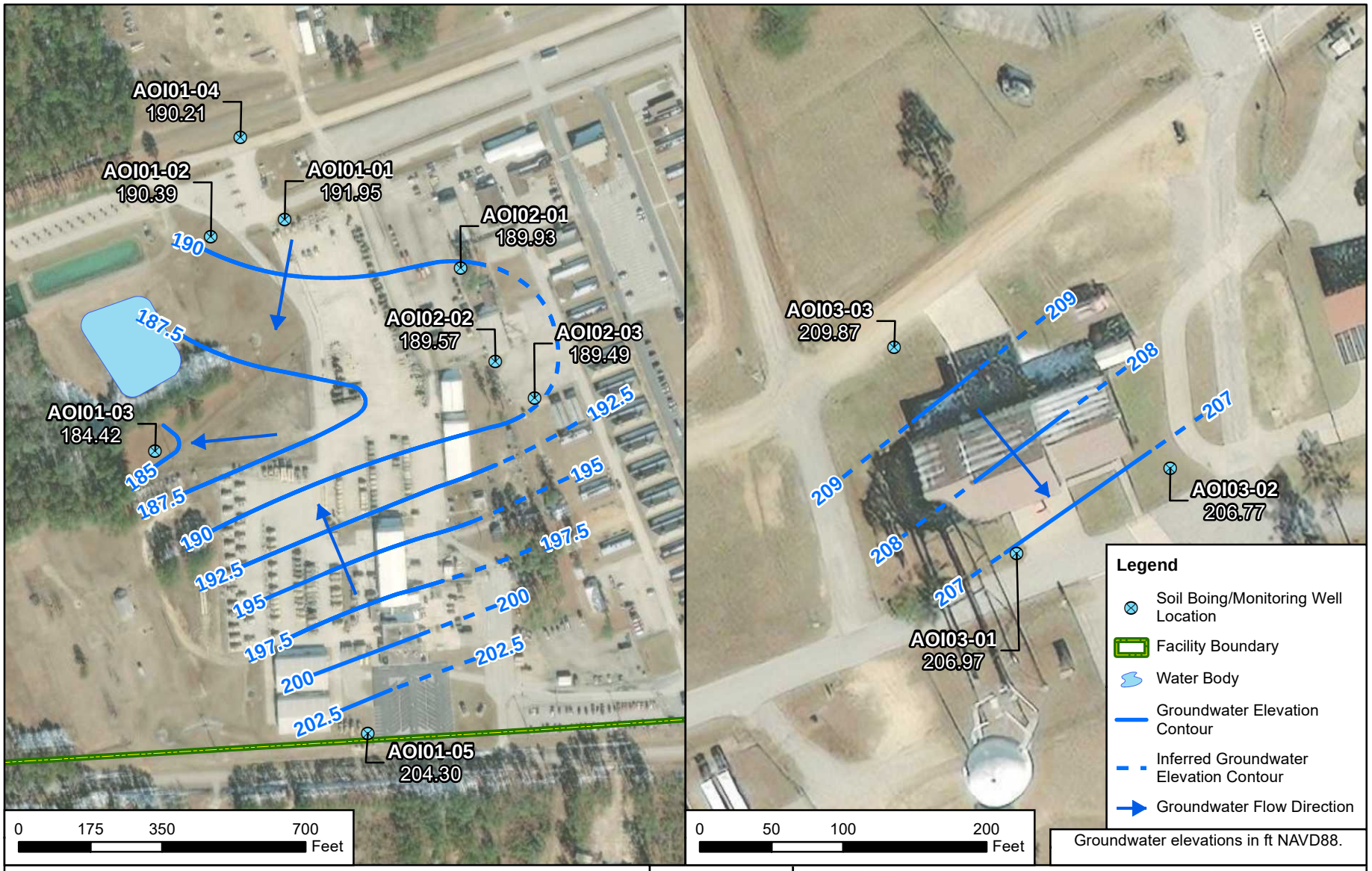
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/26/2022

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3



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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/20/2022

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Groundwater Elevations, March 2022

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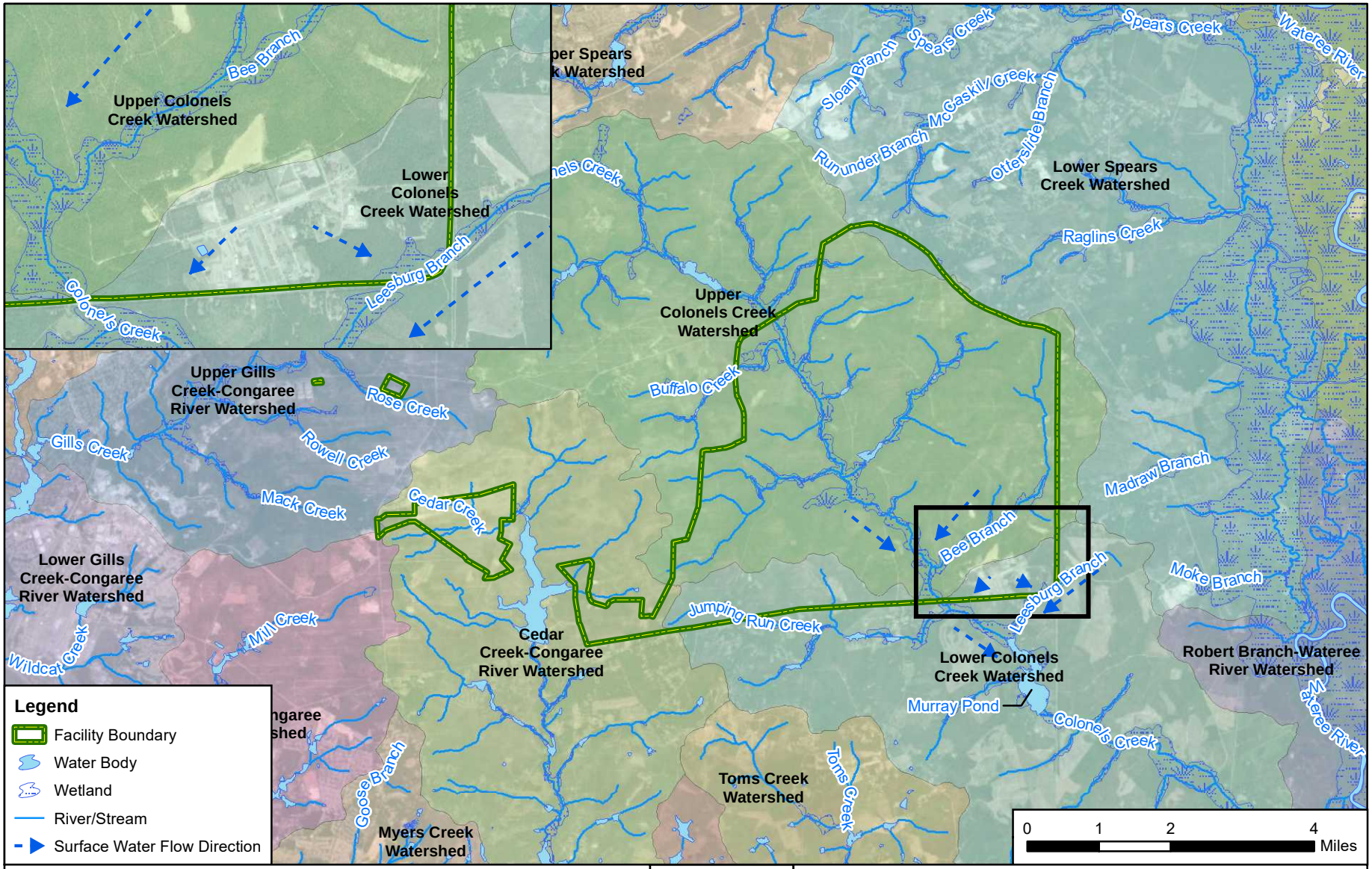
Figure 2-4



CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/26/2022

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Suface Water Features

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Figure 2-5

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3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, three potential release areas were identified at MTC and grouped into three AOIs (AECOM, 2020). The potential release areas are shown on **Figure 3-1**.

3.1 AOI 1 Wash Rack and Fuel Point

AOI 1 includes the fuel point and adjacent wash rack. In 2012, approximately 5 to 10 gallons of diluted AFFF were accidentally released from a firetruck near the fuel point during a demonstration on how to backflush a hose. The release area was subsequently flushed with water that drained west, downhill towards the wash rack.

The initial AFFF release occurred on both paved surfaces and directly on grassy areas. AFFF releases to the paved surfaces could have infiltrated the subsurface via cracks in the pavement or joints between areas that are paved with different materials.

3.2 AOI 2 MTC Military Fire Station

AOI 2 is the MTC Military Fire Station. There are three tankers and five fire engines, collectively referred to as “firetrucks”, with either 50-gallon or 30-gallon foam tank capacities at the military fire station. One event occurred in 2012 where the firetrucks were filled with an unknown amount of AFFF in the paved lot behind the adjacent vehicle storage building. There were reportedly no spills in the process, and the firetrucks do not have any known history of leakage. Firetruck nozzles are cleaned and tested with only water in the same paved lot behind the adjacent vehicle storage building. Approximately ten 5-gallon buckets of AFFF were stored at the military fire station at the time of the PA. The AFFF was of the brand and type Buckeye Platinum 3%-6% AR AFFF. It is estimated that approximately 40 5-gallon buckets have been procured for the facility since approximately 2006. There is no inventory or procurement system to track AFFF usage, so the current storage of AFFF may not reflect the amount of AFFF that has been potentially used or disposed.

Although there are no documented AFFF releases from the two fire station buildings, a data gap exists between the years when the military fire station was active (estimated mid-1990s or early-2000s) and the extent of interviewee knowledge (after 2005). Because AFFF is stored within both the station and firetrucks within the buildings, it is possible that AFFF may have historically been spilled or released during firefighting activities, training, or product handling within the time period of the data gap.

Any released AFFF within the MTC Military Fire Station buildings may have been captured by trench drains located within the buildings; however, it is unknown to where the trench drains lead. Any expelled AFFF outside of the buildings would have occurred on unpaved, grassy surfaces. AOI 2 is located in close proximity to AOI 1 to the east; surface water runoff likely flows downslope towards the on-facility stormwater retention basin before discharging to Colonels Creek and Murray Pond (Wateree River tributaries).

3.3 AOI 3 MTC Civilian Fire Station

AOI 3 is the MTC Civilian Fire Station. The MTC Civilian Fire Station is located within the Cantonment on SCARNG property. The civilian fire station, which was established in 2013, is the location of the McCrady Fire and Emergency Services under authority of the Columbia-Richland Fire Department.

There are two 50-gallon capacity foam tank firetrucks stationed at the MTC Civilian Fire Station that are currently equipped with AFFF. Three 5-gallon buckets of Buckeye Platinum 3%-6% Alcohol Resistant (AR) AFFF are also stored within the civilian fire station. The two firetrucks were filled with AFFF at the off-facility Columbia Fire Department Station #31 in 2013, prior to the establishment of the MTC Civilian Fire Station. There were reportedly no spills in the filling process, and the firetrucks do not have any known history of leakage. AFFF has never been used by the McCrady Fire and Emergency Services for training or any other purposes. The McCrady Fire and Emergency Services also operated out of the MTC Military Fire Station for approximately 1 year prior to the construction of the civilian fire station. Although there are no documented AFFF releases from the fire station building, the fire station has storage of AFFF within the building and firetrucks.

Any released AFFF may have occurred on paved or grassy surfaces outside the MTC Civilian Fire Station. The MTC Civilian Fire Station is surrounded by storm drains, which are routed to the stormwater retention basin that discharges into Colonel Creek and Murray Pond (Wateree River tributaries) (Synterra, 2018). It is possible that released AFFF may have been carried via surface runoff into downslope storm drains.

3.4 Adjacent Sources

Three off-facility, potential sources were identified adjacent to MTC during the PA and are not associated with ARNG activities. The adjacent potential sources are shown on **Figure 3-1** and described in the following sections for informational purposes only and will not be investigated as part of this SI.

3.4.1 US Army Fort Jackson

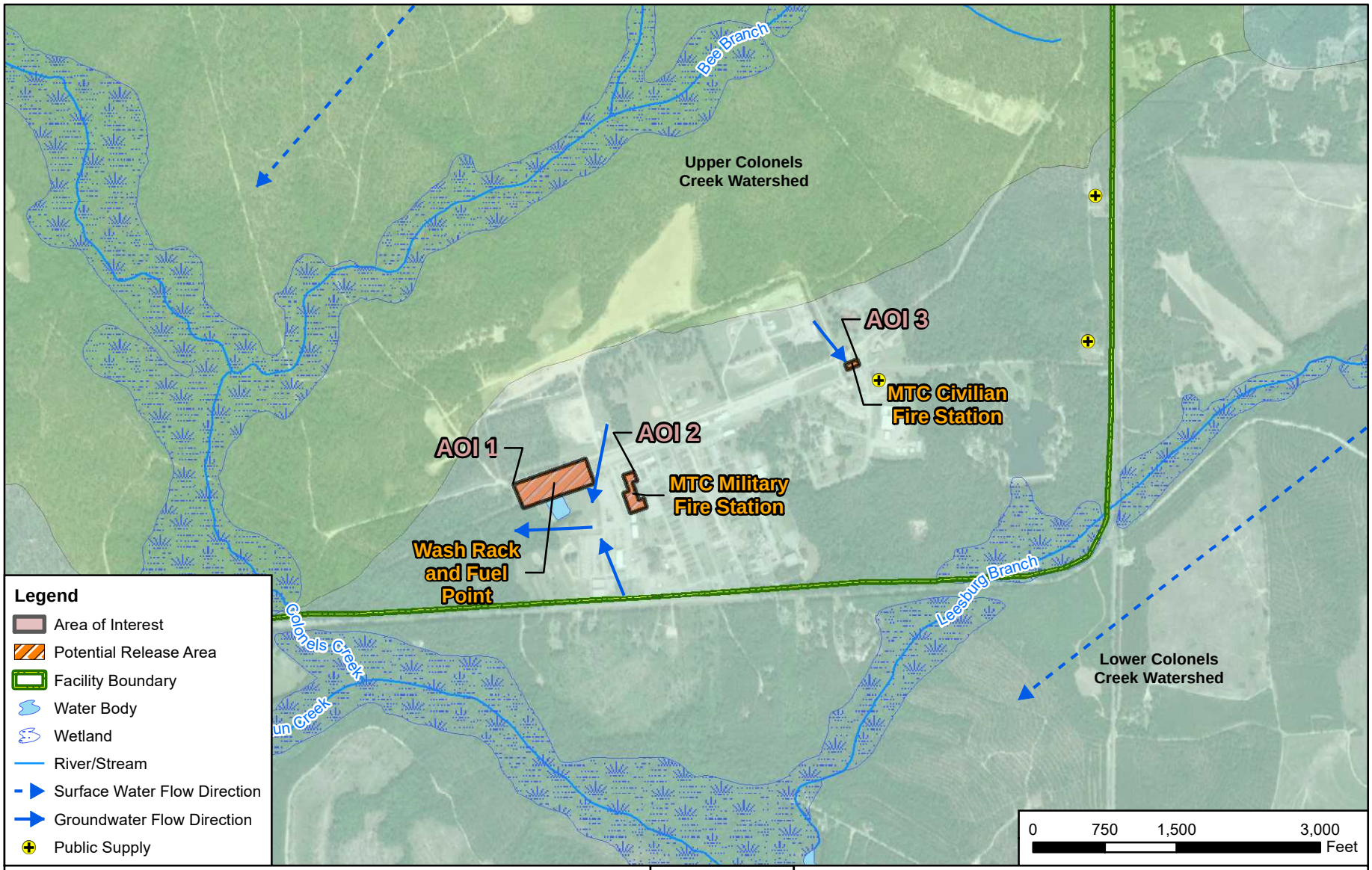
Fort Jackson is a large US Army installation that encompasses the border of MTC. The installation was originally established in 1917 and has become the “largest and most active initial entry training center in the US Army.” (Militarybases.us, n.d.). A separate PFAS PA/SI for Fort Jackson is being conducted by the US Army. Fort Jackson is considered a potential PFAS release area due to the implications of an ongoing PFAS investigation at the installation.

3.4.2 Columbia Fire Department Station #31

The Columbia Fire Department Station #31 is located immediately outside the southeast corner of the facility boundary, at address 1911 McCords Ferry Road, Eastover, South Carolina 29044. The two firetrucks stationed at MTC Civilian Fire Station were filled with AFFF off-facility at Station #31 in 2013. Because AFFF is known to have been historically stored and handled at Station #31, it was identified as a potential PFAS release area.

3.4.3 Republic Services Northeast Sanitary Landfill

The Republic Services Northeast Sanitary Landfill is located approximately 2.3 miles east of the MTC main gate at address 1581 Westvaco Road, Eastover, South Carolina 29044. The landfill was identified as a potential PFAS release area, because PFAS may be present in a variety of solid waste materials landfilled and have historically been discovered in landfills, leachates, and landfill gas (USEPA, 2018).



CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	10/4/2022	GIS BY	MS	10/4/2022
SCALE	1:577,095	CHK BY	BW	10/4/2022
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c)		PM	CM	10/4/2022

N

Area of Interest

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

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

4.1 Problem Statement

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

4.2 Information Inputs

Primary information inputs included:

- The PA for MTC (AECOM, 2020);
- Analytical data collected as part of facility potable well sampling events in 2017 and 2020 (AECOM, 2021);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-QAPP Addendum (AECOM, 2021); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.3 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). The scope of the SI was vertically bounded as follows: groundwater (72 feet bgs), soil from direct-push technology (DPT) borings (75 feet bgs), and surface soil (0 to 2 feet bgs). The temporal boundaries of the study are limited to the period during which fieldwork occurred (February to March 2022).

4.4 Analytical Approach

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

4.5 Data Usability Assessment

The Data Usability Assessment (DUA), which is provided in **Appendix A**, is an evaluation at the conclusion of data collection activities that uses the results of both data verification and validation

in the context of the overall project decisions or objectives. Using both quantitative and qualitative methods, the assessment determines whether project execution and the resulting data have met installation-specific DQOs. Both sampling and analytical activities are considered to assess whether the collected data are of the right type, quality, and quantity to support the decision-making process (DoD, 2019a; DoD, 2019b; USEPA, 2017).

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

5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, McCrady Training Center, Eastover, South Carolina* dated October 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, McCrady Training Center, Eastover, South Carolina* dated November 2021 (AECOM, 2021); and
- *Final Site Safety and Health Plan, McCrady Training Center, Eastover, South Carolina* dated January 2022 (AECOM, 2022).

The SI field investigation activities were conducted from 11 February 2022 to 4 March 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as noted in **Section 5.8**.

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

- Thirty-three (33) soil samples from 11 boring locations;
- Eleven (11) grab groundwater samples from 11 temporary wells;
- Eighteen (18) quality assurance (QA)/quality control (QC) samples.

Figure 5-1 provides the sample locations for all media across the facility. **Table 5-1** presents the list of samples collected for each media. Field documentation is provided in **Appendix B**. A Log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in **Appendix B2,** land survey data are provided in **Appendix B3**, a Nonconformance Corrective Action Report is provided in **Appendix B4**, and water well records are provided in **Appendix B5**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

defining overall project objectives, including DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 13 September 2021, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, SCARNG, USACE, United States Army Environmental Command (USAEC) and South Carolina Department of Health and Environmental Control (SCDHEC). Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021).

A TPP Meeting 3 will be held [date to be determined] after the field event to discuss the results of the SI. Meeting minutes for TPP 3 will be included in **Appendix D** in a later version of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM placed a ticket with the South Carolina 811, the local utility clearance provider, to notify them of intrusive work on 28 January 2022. Additionally, AECOM contracted Ground Penetrating Radar Systems (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 28 January 2022 with input from the AECOM field team and MTC facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in the shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

A potable water source at MTC was sampled on 22 December 2021 to assess usability for decontamination of drilling equipment. Results of the sample collected (MTC-PW-01) confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, this sample was analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample associated with the source used during the SI are provided in **Appendix F**. A discussion of the results is presented in the DUA (**Appendix A**).

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

5.2 Soil Borings and Soil Sampling

Soil samples were collected via DPT, in accordance with the SI QAPP Addendum (AECOM, 2021). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top five feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1** and depths are provided **Table 5-1**.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample

between surface and the groundwater table (13 to 15 feet bgs), and one subsurface soil sample approximately 1 to 2 feet above the groundwater table.

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

Soil borings completed during the SI found silty sand and poorly graded sand were observed as the dominant lithology of the unconsolidated sediments below MTC. The borings were completed at depths between 45 and 75 feet bgs. Isolated layers of well-graded sand, clayey-sand, clay, and silt were also observed in the borings with thicknesses ranging from a several inches to 15 feet.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15, total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2021). Due to a laboratory error, the grain size analysis was not performed (see details in **Section 5.8**).

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

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021) as described in **Section 5.3** below using bentonite grout at completion of sampling activities. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

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

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

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

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021) and South Carolina Well Standards and Regulations, R.61-71.H-I by removing the PVC and backfilling with neat cement grout. Upon completion of well abandonment, the ground surface at each location was patched to match existing surrounding conditions.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 4 March 2022. Groundwater elevations were measured in the 11 new temporary monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by South Carolina-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021). Survey data from the newly installed wells on the facility were collected on 3 March 2022 in the applicable Universal Transverse Mercator zone projection with World Geodetic System 83 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B3**.

5.6 Investigation-Derived Waste

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

Soil IDW (i.e., soil cuttings) generated during the SI activities were containerized in properly labeled 55-gallon drums and stored at the facility in a location designated by MTC Environmental Manager and SCARNG. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location. A final decision of whether the soil can be returned to the ground surface or otherwise disposed will be determined by ARNG G-9, SCARNG, USACE, and SCDHEC after a review of the soil analytical results. ARNG will coordinate the appropriate management of the soil IDW.

Liquid IDW generated during SI activities (i.e. purge water, development water, and decontamination fluids) were containerized in properly labeled 55-gallon drums and stored at the facility in a location designated by MTC Environmental Manager and SCARNG. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location. A final decision regarding whether the liquid can be returned to the ground surface or treated will be determined by ARNG G-9, SCARNG, USACE, and

SCDHEC after a review of the groundwater analytical results. Liquid IDW with concentrations that exceed the SLs will be managed in accordance with the Army Guidance for Addressing Releases of PFAS, Q18 (DA, 2018). The IDW will be stored on the facility at a location designated by the MTC Environmental Manager and SCARNG. ARNG will coordinate waste profiling, transportation, and disposal of the liquid IDW.

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

5.7 Laboratory Analytical Methods

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

5.8 Deviations from SI QAPP Addendum

One deviation from the SI QAPP Addendum was identified during review of the field documentation. The deviation is noted below and is documented in Nonconformance and Corrective Action Report (**Appendix B4**):

- Upon review of field documentation, it was discovered that soil samples AOI01-03-GS and AOI02-01-GS collected for grain size analysis were inadvertently not logged in by the laboratory during sample check in and, therefore, not analyzed. The SI QAPP Addendum states that grain size analysis would 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. As a result, AECOM used information from the soil core photographs and boring logs to understand geologic conditions at the facility. Additionally, this discrepancy does not affect the determination of whether further investigation of the AOI is needed in a Remedial Investigation (RI). This action was documented in a nonconformance and corrective action report provided in **Appendix B4**.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, McCrady Training Center, South Carolina

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)[1]	Comments
Soil Samples							
AOI01-01-SB-0-2	2/17/2022 13:00	0 - 2	x				
AOI01-01-SB-0-2-D	2/17/2022 13:00	0 - 2	x				FD
AOI01-01-SB-13-15	2/17/2022 14:20	13 - 15	x				
AOI01-01-SB-46-48	2/17/2022 15:00	46 - 48	x				
AOI01-02-SB-0-2	3/1/2022 12:30	0 - 2	x	x	x		
AOI01-02-SB-0-2-D	3/1/2022 12:30	0 - 2		x			FD
AOI01-02-SB-13-15	3/1/2022 13:55	13 - 15	x				
AOI01-02-SB-41-43	3/1/2022 14:45	41 - 43	x				
AOI01-02-SB-41-43-MS	3/1/2022 14:45	41 - 43	x				MS
AOI01-02-SB-41-43-MSD	3/1/2022 14:45	41 - 43	x				MSD
AOI01-03-GS	2/24/2022 13:15	31 - 33				x	
AOI01-03-SB-0-2	2/24/2022 9:15	0 - 2	x				
AOI01-03-SB-13-15	2/24/2022 9:50	13 - 15	x				
AOI01-03-SB-51-53	2/24/2022 13:25	51 - 53	x				
AOI01-04-SB-0-2	2/17/2022 8:30	0 - 2	x				
AOI01-04-SB-13-15	2/17/2022 9:25	13 - 15	x				
AOI01-04-SB-49-51	2/17/2022 11:30	49 - 51	x				
AOI01-05-SB-0-2	3/3/2022 11:55	0 - 2	x				
AOI01-05-SB-13-15	3/3/2022 13:15	13 - 15	x				
AOI01-05-SB-36-38	3/3/2022 16:10	36 - 38	x				
AOI02-01-GS	3/2/2022 13:30	55-57				x	
AOI02-01-SB-0-2	3/2/2022 9:00	0 - 2	x	x	x		
AOI02-01-SB-0-2-MS	3/2/2022 9:00	0 - 2		x			MS
AOI02-01-SB-0-2-MSD	3/2/2022 9:00	0 - 2		x			MSD
AOI02-01-SB-13-15	3/2/2022 10:00	13 - 15	x				
AOI02-01-SB-61-63	3/2/2022 16:30	61 - 63	x				
AOI02-02-SB-0-2	2/25/2022 13:10	0 - 2	x				
AOI02-02-SB-13-15	2/25/2022 13:25	13 - 15	x				
AOI02-02-SB-13-15-D	2/25/2022 13:25	13 - 15	x				FD
AOI02-02-SB-60-62	3/1/2022 9:15	60 - 62	x				
AOI02-03-SB-0-2	2/24/2022 16:00	0 - 2	x				
AOI02-03-SB-13-15	2/24/2022 16:30	13 - 15	x				
AOI02-03-SB-58-60	2/25/2022 10:10	58 - 60	x				
AOI03-01-SB-0-2	2/14/2022 15:35	0 - 2	x				
AOI03-01-SB-13-15	2/15/2022 15:00	13 - 15	x				
AOI03-01-SB-13-15-D	2/15/2022 15:00	13 - 15	x				FD
AOI03-01-SB-64-66	2/15/2022 16:25	64 - 66	x				
AOI03-02-SB-0-2	2/14/2022 11:25	0 - 2	x	x	x		
AOI03-02-SB-0-2-MS	2/14/2022 11:25	0 - 2	x	x			MS
AOI03-02-SB-0-2-MSD	2/14/2022 11:25	0 - 2	x	x			MSD
AOI03-02-SB-13-15	2/14/2022 15:15	13 - 15	x				
AOI03-02-SB-66-68	2/15/2022 9:30	66 - 68	x				
AOI03-03-SB-0-2	2/16/2022 10:40	0 - 2	x				
AOI03-03-SB-13-15	2/16/2022 11:00	13 - 15	x				
AOI03-03-SB-62-64	2/16/2022 13:40	62 - 64	x				
AOI03-03-SB-62-64-D	2/16/2022 13:40	62 - 64	x				FD
Groundwater Samples							
AOI01-01-GW	2/18/2022 14:20	NA	x				
AOI01-01-GW-D	2/18/2022 14:20	NA	x				FD
AOI01-02-GW	3/2/2022 12:20	NA	x				

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, McCrady Training Center, South Carolina

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)[1]	Comments
AOI01-03-GW	2/25/2022 15:00	NA	x				
AOI01-04-GW	2/18/2022 11:00	NA	x				
AOI01-05-GW	3/4/2022 11:40	NA	x				
AOI01-05-GW-MS	3/4/2022 11:40	NA	x				MS
AOI01-05-GW-MSD	3/4/2022 11:40	NA	x				MSD
AOI02-01-GW	3/4/2022 8:45	NA	x				
AOI02-02-GW	3/2/2022 10:10	NA	x				
AOI02-02-GW-D	3/2/2022 10:10	NA	x				FD
AOI02-03-GW	2/28/2022 13:40	NA	x				
AOI03-01-GW	2/17/2022 11:10	NA	x				
AOI03-02-GW	2/16/2022 16:40	NA	x				
AOI03-03-GW	2/24/2022 10:05	NA	x				
Quality Control Samples							
MTC-DW-01	12/22/2021 11:30	NA	x				Decontamination Source Water
MTC-ERB-01	2/14/2022 12:20	NA	x				Hand Auger
MTC-ERB-02	3/3/2022 12:05	NA	x				Drill Rod "Shoe"
MTC-ERB-03	2/28/2022 13:50	NA	x				Bladder Pump
MTC-ERB-04	3/3/2022 11:25	NA	x				Pressure Washer
MTC-FRB-01	2/28/2022 16:00	NA	x				

Notes:

[1] = Due to a laboratory error, the grain size samples collected at locations AOI01-03 and AOI02-01 were not analyzed.

AOI = area of interest
ASTM = American Society for Testing and Materials
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
GW = groundwater
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
MTC = McCrady Training Center
NA = not applicable
QSM = Quality Systems Manual
SB = soil boring
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, McCrady Training Center, South Carolina

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	55	49 - 54	241.81	240.93	49.86	48.98	191.95
	AOI01-02	50	41 - 46	234.96	234.04	44.57	43.65	190.39
	AOI01-03	57.5	52.5 - 57.5	238.49	236.75	54.07	52.33	184.42
	AOI01-04	55	50 - 55	239.82	238.58	49.61	48.37	190.21
	AOI01-05	45	37 - 42	246.00	244.64	41.70	40.34	204.30
2	AOI02-01	70	62 - 67	252.98	252.44	63.05	62.51	189.93
	AOI02-02	65	60 - 65	250.50	250.10	60.93	60.53	189.57
	AOI02-03	65	60 - 65	251.00	250.55	61.51	61.06	189.49
3	AOI03-01	70	67 - 72	275.49	273.48	68.52	66.51	206.97
	AOI03-02	75	67 - 72	276.33	275.33	69.56	68.56	206.77
	AOI03-03	70	64 - 69	275.21	274.70	65.34	64.83	209.87

Notes:

AOI = area of interest
bgs = below ground surface
btoc = below top of casing
NAVD88 = North American Vertical Datum 1988

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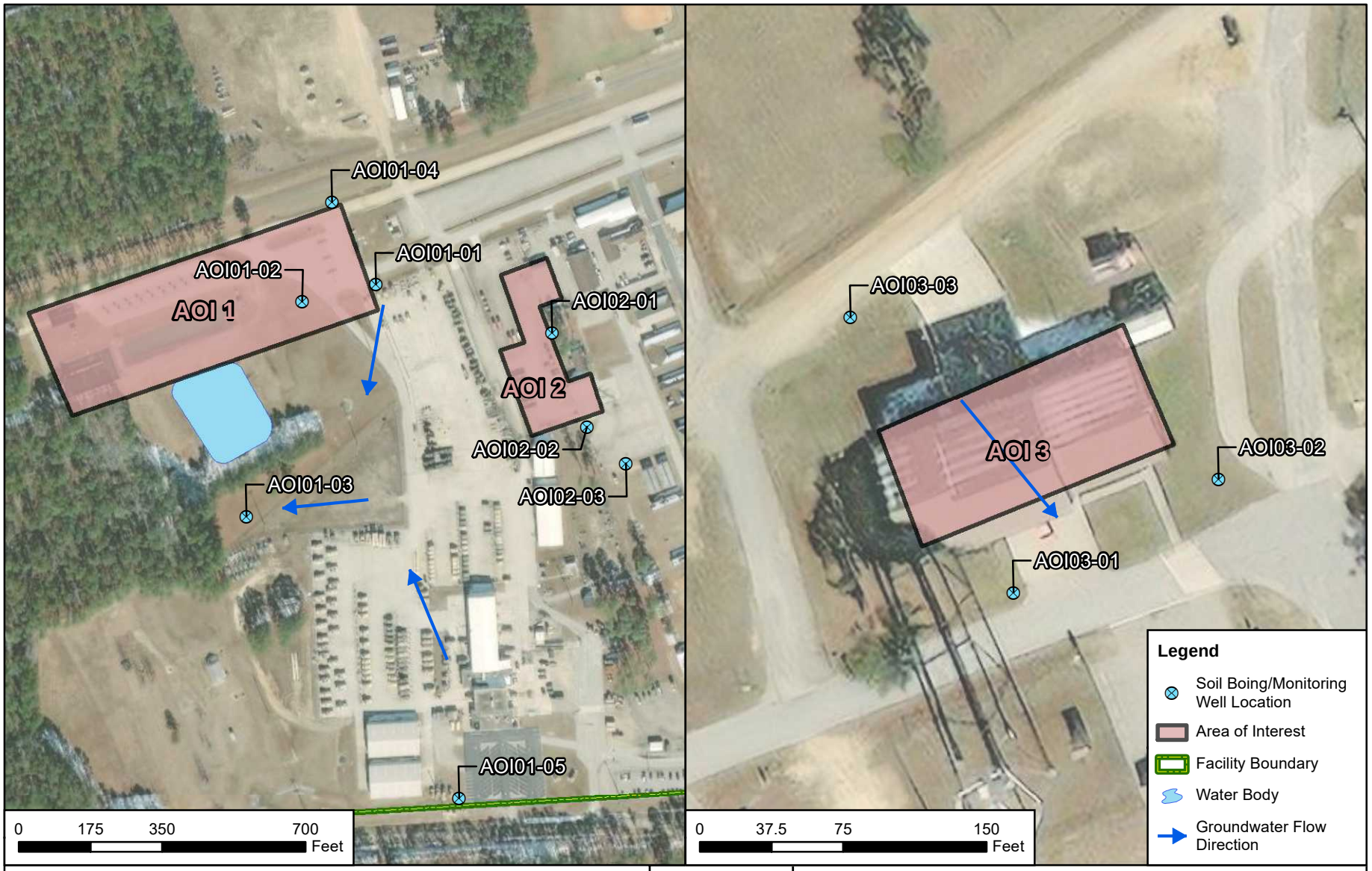

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/26/2022	GIS BY	MS	8/26/2022
SCALE	1:4,200	CHK BY	BW	8/26/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/26/2022

N

Site Inspection Sample Locations

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Section 6.3** through **Section 6.5**. **Table 6-2** through **Table 6-5** present results in soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

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

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

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

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

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

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

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

6.2 Soil Physicochemical Analyses

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

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

6.3 AOI 1

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

6.3.1 AOI 1 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs, shallow subsurface soil from 13 to 15 feet bgs, and deep subsurface soil between 36 and 53 feet bgs at boring locations AOI01-01 through AOI01-05. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

The relevant compounds were detected below their SLs in at least one surface soil sample, with the following maximum concentrations: PFOA at 0.167 J micrograms per kilogram (µg/kg), PFOS at 4.82 µg/kg, PFHxS at 2.49 µg/kg, PFNA at 0.026 J µg/kg, and PFBS at 0.103 J µg/kg. All maximum concentrations were detected at AOI01-02.

PFOS and PFHxS were each detected below their SLs in at least three shallow subsurface soil samples, with maximum concentrations of 0.688 J µg/kg and 0.117 J µg/kg, respectively. PFOA, PFNA, and PFBS were not detected in shallow subsurface soil.

PFOS, PFHxS, and PFBS were each detected in at least one deep subsurface soil sample, with maximum concentrations of 1.55 µg/kg, 0.142 J µg/kg, and 0.059 J µg/kg, respectively. PFOA and PFNA were not detected in deep subsurface soil.

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI01-01 through AOI01-05. The following maximum concentrations were detected:

- PFOA was detected above the SL of 6 ng/L at AOI01-02, with a concentration of 7.64 ng/L.

- PFOS was detected above the SL of 4 ng/L at four of the five wells, with concentrations ranging in from 15.1 ng/L to 192 ng/L. One of the four wells is AOI01-05, which is located at the southern facility boundary upgradient of AOI 1 with a concentration of 20.0 ng/L.
- PFHxS was detected above the SL of 39 ng/L at AOI01-02, with a concentration of 59.1 ng/L.
- PFNA was detected below the SL in two of the five wells, with a maximum concentration of 3.45 J ng/L.
- PFBS was detected below the SL in four of the five wells, with a maximum concentration 14.5 ng/L.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil below their SLs. PFOA, PFOS, and PFHxS were each detected in at least one groundwater sample at concentrations above their SLs. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2

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

6.4.1 AOI 2 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs, shallow subsurface soil from 13 to 15 feet bgs, and deep subsurface soil between 58 and 63 feet bgs boring locations AOI02-01 through AOI02-03. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

The relevant compounds were detected below their SLs in at least one surface soil sample with the following maximum concentrations: PFOA at 4.34 µg/kg, PFOS at 0.628 J µg/kg, PFHxS at 0.478 J µg/kg, PFNA at 0.526 J µg/kg, and PFBS at 0.043 J µg/kg.

PFOA, PFOS, PFHxS, and PFNA were detected below their SLs in at least two shallow subsurface soil samples, with the following maximum concentrations: PFOA at 0.563 J µg/kg, PFOS at 0.467 J µg/kg, PFHxS at 0.206 J µg/kg, and PFNA at 1.33 µg/kg. PFBS was not detected in shallow subsurface soil.

PFOS and PFHxS were detected in at least one deep subsurface soil sample with maximum concentrations of 0.087 J µg/kg and 0.072 J µg/kg, respectively. PFOA, PFNA, and PFBS were not detected in deep subsurface soil.

6.4.2 AOI 2 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI02-01 through AOI02-03. The following maximum concentrations were detected:

- PFOA was detected above the SL of 6 ng/L at AOI02-02, with a concentration of 10.3 ng/L.
- PFOS was detected above the SL of 4 ng/L at AOI02-01 and AOI02-02, with concentrations of 7.11 J+ ng/L and 9.28 ng/L, respectively.
- PFNA was detected above the SL of 6 ng/L at AOI02-02, with a concentration of 21.9 ng/L.
- PFHxS was detected below the SL of 39 ng/L at AOI02-01 and AOI02-02, with concentrations of 4.25 ng/L and 4.14 ng/L, respectively.
- PFBS was detected below the SL of 601 ng/L at AOI02-01, with a concentration of 1.53 J ng/L.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil, at concentrations below their SLs. PFOA, PFOS, and PFNA were each detected in one or two groundwater samples at concentrations above their SLs. Based on the exceedances of the SLs in groundwater, further evaluation at AOI 2 is warranted.

6.5 AOI 3

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

6.5.1 AOI 3 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs, shallow subsurface soil from 13 to 15 feet bgs, and deep subsurface soil between 62 and 68 feet bgs at boring locations AOI03-01 through AOI03-03. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

The relevant compounds were detected below their SLs in at least one surface soil sample, with the following maximum concentrations: PFOA at 0.176 J µg/kg, PFOS at 0.894 J µg/kg, PFHxS at 1.31 µg/kg, PFNA at 0.038 J µg/kg, and PFBS at 0.065 J µg/kg.

PFOS and PFHxS were detected below their SLs in at least one shallow subsurface soil sample, with maximum concentrations of 0.144 J µg/kg and 0.050 J µg/kg, respectively. PFOA, PFNA, and PFBS were not detected in shallow subsurface soil.

PFOS was detected below its SL in all three deep subsurface soil samples, with a maximum concentration of 0.114 J µg/kg. PFOA, PFHxS, PFNA, and PFBS were not detected in deep subsurface soil.

6.5.2 AOI 3 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI03-01, AOI03-02, and AOI03-03. AOI03-03, the upgradient location, was the only location with any relevant compound detections. The following concentrations were detected:

- PFOS was detected above the SL of 4 ng/L, at a concentration of 5.56 J+ ng/L.
- PFOA and PFBS were detected below their SLs in groundwater, with concentrations of 1.69 J ng/L and 1.10 J ng/L, respectively.
- PFHxS and PFNA were not detected in groundwater.

6.5.3 AOI 3 Conclusions

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

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Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, McCrady Training Center

Area of Interest		AOI01												AOI02					
Sample ID		AOI01-01-SB-0-2		AOI01-01-SB-0-2-D		AOI01-02-SB-0-2		AOI01-03-SB-0-2		AOI01-04-SB-0-2		AOI01-05-SB-0-2		AOI02-01-SB-0-2		AOI02-02-SB-0-2		AOI02-03-SB-0-2	
Sample Date		02/17/2022		02/17/2022		03/01/2022		02/24/2022		02/17/2022		03/03/2022		03/02/2022		02/25/2022		02/24/2022	
Depth		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																			
PFBS	1900	ND	U	ND	U	0.103	J	0.034	J	ND	U	ND	U	ND	U	ND	U	0.043	J
PFHxS	130	0.163	J	0.181	J	2.49		0.146	J+	0.037	J	0.066	J	0.076	J	0.478	J	0.077	J
PFNA	19	ND	U	ND	U	0.026	J	ND	U	ND	U	ND	U	ND	U	0.526	J	0.034	J
PFOA	19	ND	U	ND	U	0.167	J	0.148	J	ND	U	0.106	J	ND	U	4.34		0.271	J
PFOS	13	0.241	J	0.284	J	4.82		0.223	J	0.205	J	0.069	J	0.628	J	0.268	J	0.341	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, McCrady Training Center

	Area of Interest	AOI03					
	Sample ID	AOI03-01-SB-0-2		AOI03-02-SB-0-2		AOI03-03-SB-0-2	
	Sample Date	02/14/2022		2/14/2022		02/16/2022	
	Depth	0-2 ft		0-2 ft	0-2 ft	0-2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)							
PFBS	1900	0.027	J	0.065	J	0.042	J
PFHxS	130	0.044	J	1.31		0.050	J
PFNA	19	0.038	J	ND	U	ND	U
PFOA	19	0.176	J	0.105	J	ND	U
PFOS	13	0.153	J	0.894	J	0.109	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, McCrady Training Center

Area of Interest		AOI01										AOI02							
Sample ID		AOI01-01-SB-13-15		AOI01-02-SB-13-15		AOI01-03-SB-13-15		AOI01-04-SB-13-15		AOI01-05-SB-13-15		AOI02-01-SB-13-15		AOI02-02-SB-13-15		AOI02-02-SB-13-15-D		AOI02-03-SB-13-15	
Sample Date		02/17/2022		03/01/2022		02/24/2022		02/17/2022		03/03/2022		03/02/2022		02/25/2022		02/25/2022		02/24/2022	
Depth		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft		13-15 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	0.117	J	0.077	J	0.043	J	ND	U	0.206	J	0.049	J	ND	UJ	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	1.33		0.743	J	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	0.563	J	0.334	J	ND	U
PFOS	160	0.115	J	0.162	J	0.688	J	0.079	J	ND	U	ND	U	0.467	J	0.256	J	0.099	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report, McCrady Training Center

	Area of Interest	AOI03							
	Sample ID	AOI03-01-SB-13-15		AOI03-01-SB-13-15-D		AOI03-02-SB-13-15		AOI03-03-SB-13-15	
	Sample Date	02/15/2022		02/15/2022		02/14/2022		02/16/2022	
	Depth	13-15 ft		13-15 ft		13-15 ft		13-15 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**
PFBS	25000	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	ND	U	ND	U	0.050	J	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U
PFOS	160	ND	U	ND	U	0.144	J	0.060	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

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

Area of Interest	AOI01										AOI02					
Sample ID	AOI01-01-SB-46-48		AOI01-02-SB-41-43		AOI01-03-SB-51-53		AOI01-04-SB-49-51		AOI01-05-SB-36-38		AOI02-01-SB-61-63		AOI02-02-SB-60-62		AOI02-03-SB-58-60	
Sample Date	02/17/2022		03/01/2022		02/24/2022		02/17/2022		03/03/2022		03/02/2022		03/01/2022		02/25/2022	
Depth	46-48 ft		41-43 ft		51-53 ft		49-51 ft		36-38 ft		61-63 ft		60-62 ft		58-60 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																
PFBS	ND	U	0.059	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	0.142	J	0.071	J	0.041	J	ND	U	ND	U	0.072	J	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	1.55		0.189	J	0.245	J	0.306	J	ND	U	ND	U	0.087	J	0.064	J

Interpreted Qualifiers

J = Estimated concentration

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

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

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

Acronyms and Abbreviations

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

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

Area of Interest	AOI03							
Sample ID	AOI03-01-SB-64-66		AOI03-02-SB-66-68		AOI03-03-SB-62-64		AOI03-03-SB-62-64-D	
Sample Date	02/15/2022		02/15/2022		02/16/2022		02/16/2022	
Depth	64-66 ft		66-68 ft		62-64 ft		62-64 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)								
PFBS	ND	U	ND	U	ND	U	ND	U
PFHxS	ND	U	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U
PFOS	0.068	J	0.114	J	0.066	J	ND	UJ

Interpreted Qualifiers

J = Estimated concentration

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

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

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

Acronyms and Abbreviations

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

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, McCrady Training Center

Area of Interest		AOI01												AOI02					
Sample ID		AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		AOI01-03-GW		AOI01-04-GW		AOI01-05-GW		AOI02-01-GW		AOI02-02-GW		AOI02-02-GW-D	
Sample Date		02/18/2022		02/18/2022		03/02/2022		02/25/2022		02/18/2022		03/04/2022		03/04/2022		03/02/2022		03/02/2022	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)																			
PFBS	601	4.15		4.15		14.5		1.53	J	ND	U	5.00		1.53	J	ND	U	ND	U
PFHxS	39	16.1		16.5		59.1		12.6		ND	U	21.7		4.25		4.14		3.79	J
PFNA	6	ND	U	ND	U	3.45	J	0.949	J	ND	U	ND	U	ND	U	21.9		20.6	
PFOA	6	2.00	J	2.13	J	7.64		4.27		ND	U	3.66	J	1.52	J	10.3		8.51	
PFOS	4	182		192		103		15.1		ND	U	20.0		7.11	J+	9.28		8.46	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, McCrady Training Center

Area of Interest		AOI02		AOI03					
Sample ID		AOI02-03-GW		AOI03-01-GW		AOI03-02-GW		AOI03-03-GW	
Sample Date		02/28/2022		02/17/2022		02/16/2022		02/24/2022	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)									
PFBS	601	ND	U	ND	U	ND	U	1.10	J
PFHxS	39	ND	U	ND	U	ND	U	ND	U
PFNA	6	ND	U	ND	U	ND	U	ND	U
PFOA	6	ND	U	ND	U	ND	U	1.69	J
PFOS	4	2.18	J+	ND	U	ND	U	5.56	J+

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Shallow

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Intermediate

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Deep

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

PFOA Results (µg/Kg)

ND
>ND - 19
>19 - 250
>250 - 2,500
>2,500

N

0 310 620 1,240 Feet

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

PFOA Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/29/2022	GIS BY	MS	8/29/2022
SCALE	1:7,440	CHK BY	BW	8/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/29/2022

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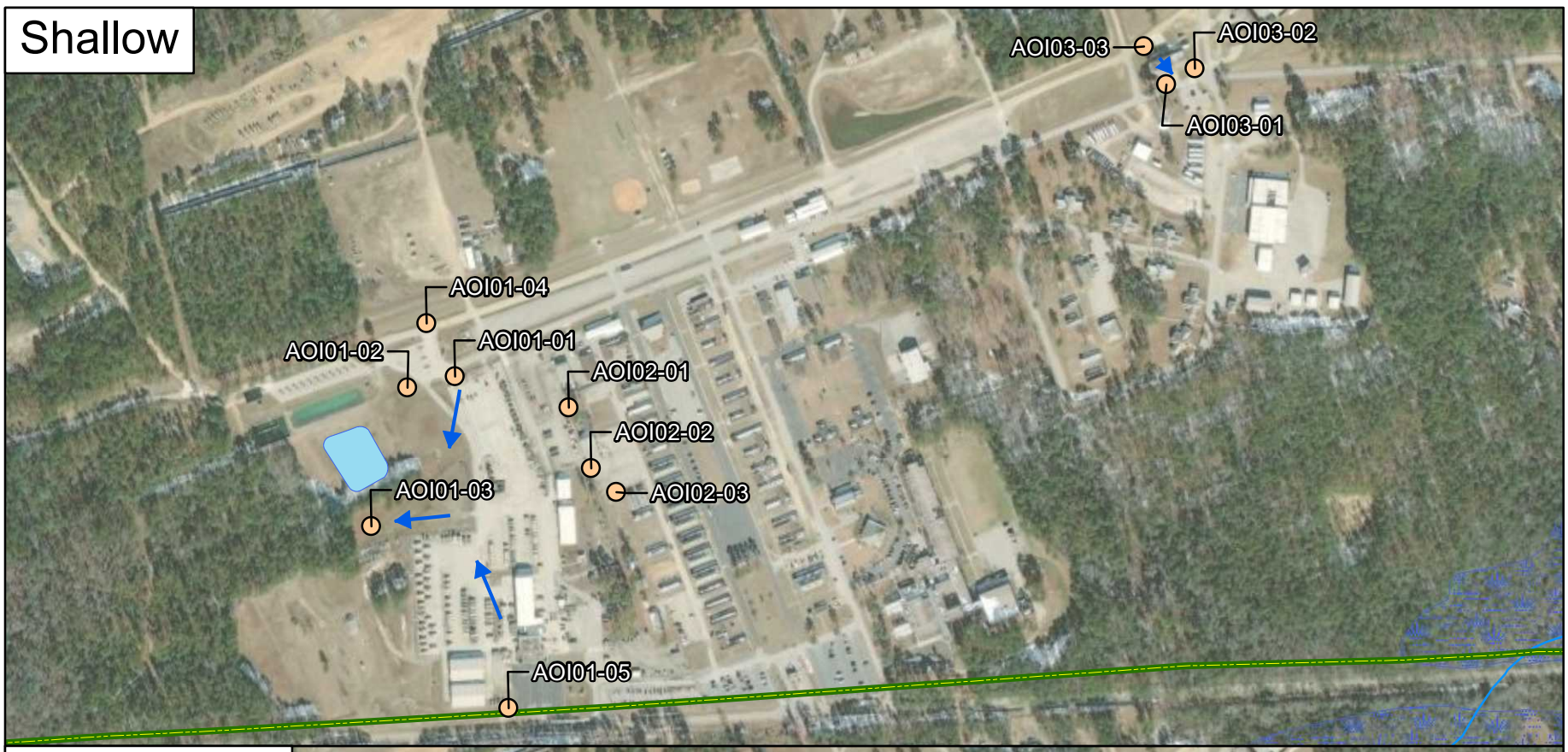
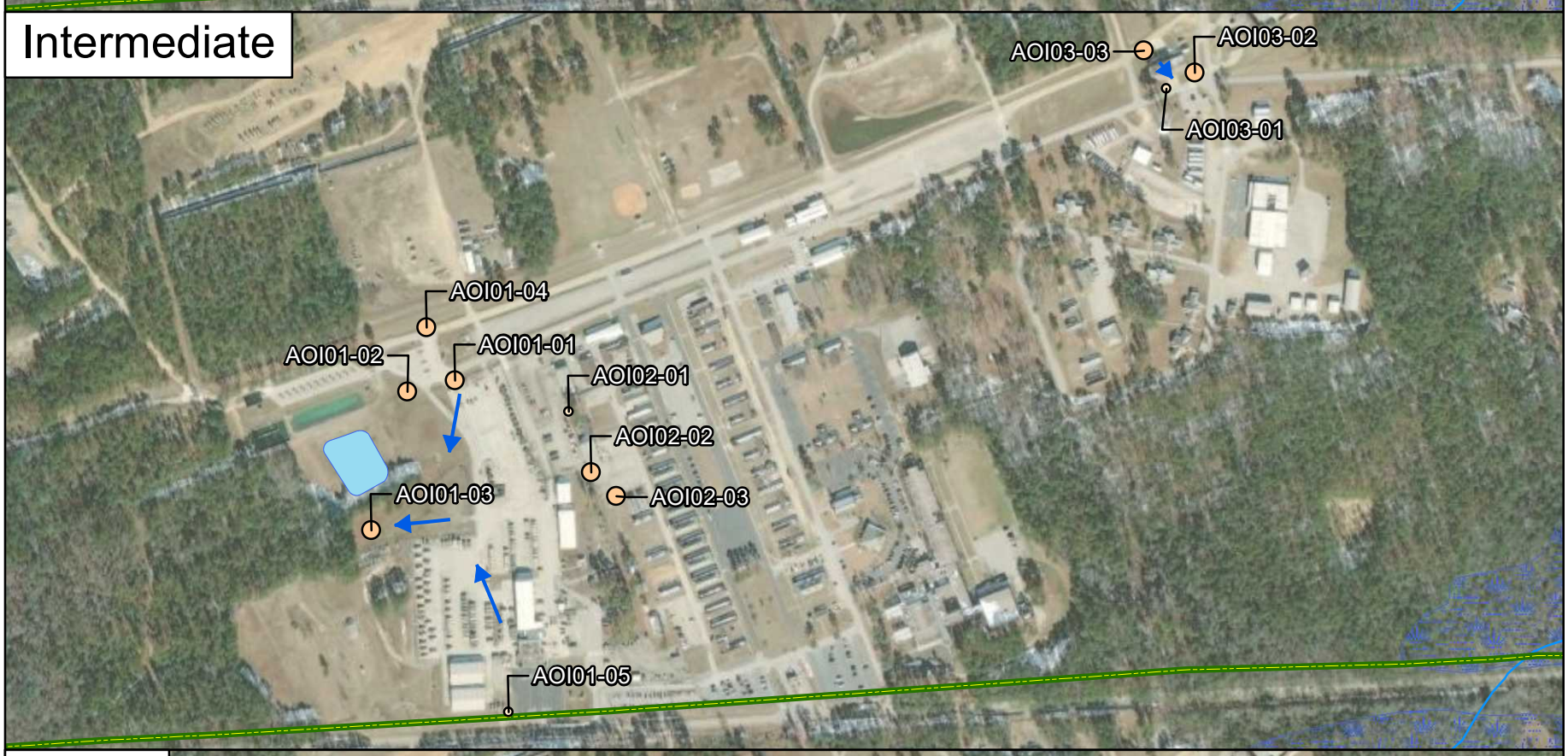
Figure 6-1

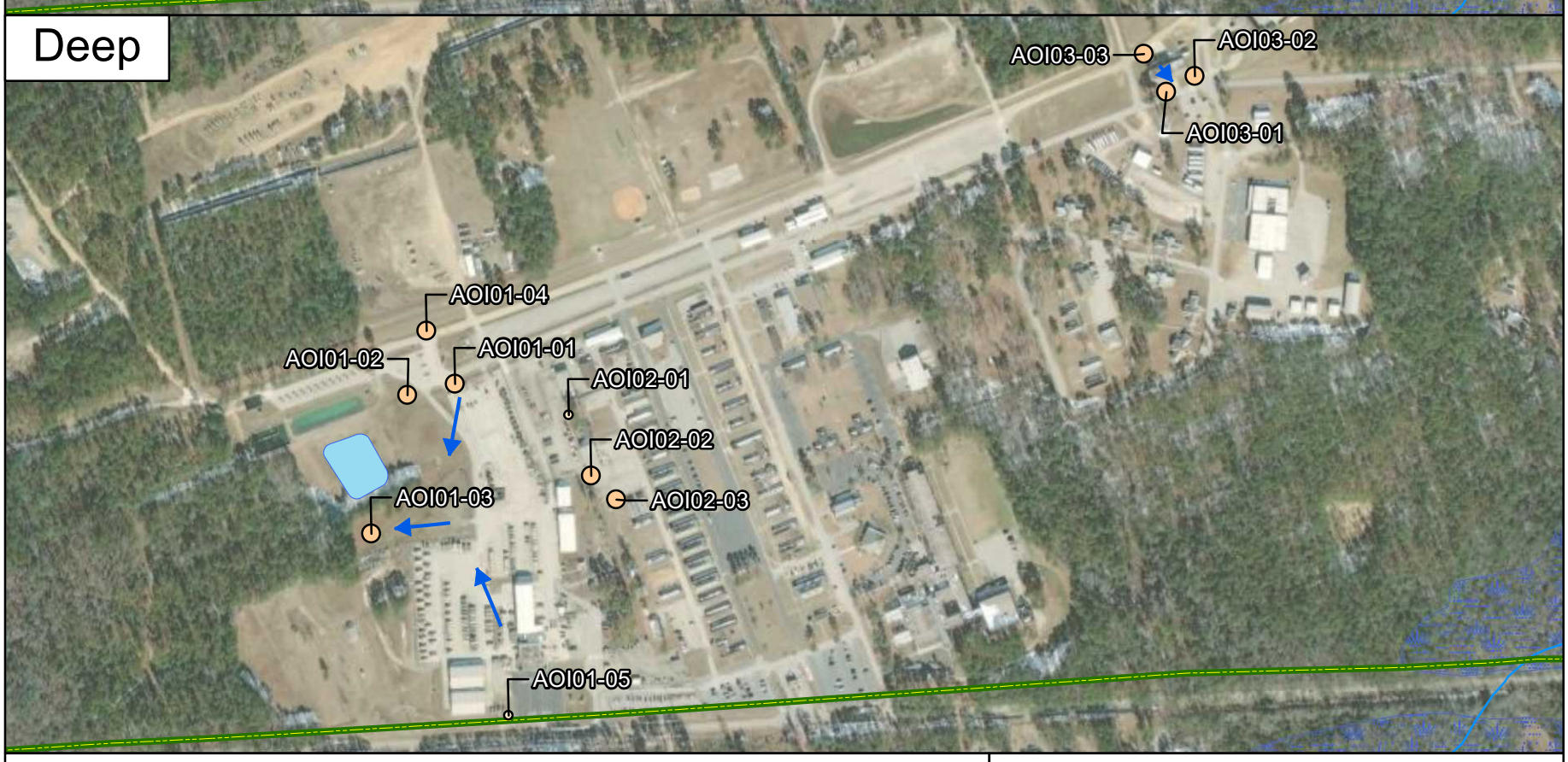
Shallow



Intermediate



Deep



Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

PFOS Results (µg/Kg)

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

N

0 310 620 1,240 Feet

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

PFOS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/29/2022	GIS BY	MS	8/29/2022
SCALE	1:7,440	CHK BY	BW	8/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/29/2022

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Figure 6-2

Shallow

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Intermediate

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Deep

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

PFBS Results (µg/Kg)

ND
>ND - 10
>10 - 1,900
>1,900 - 25,000
>25,000

N

0 310 620 1,240 Feet

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

PFBS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/29/2022	GIS BY	MS	8/29/2022
SCALE	1:7,440	CHK BY	BW	8/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/29/2022

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Figure 6-3

Shallow

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Intermediate

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Deep

AOI03-03
AOI03-02
AOI03-01
AOI01-04
AOI01-02
AOI01-01
AOI02-01
AOI02-02
AOI01-03
AOI02-03
AOI01-05

Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

PFHxS Results (µg/Kg)

ND
>ND - 10
>10 - 130
>130 - 1,600
>1,600

N

0 310 620 1,240 Feet

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

PFHxS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/29/2022	GIS BY	MS	8/29/2022
SCALE	1:7,440	CHK BY	BW	8/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/29/2022

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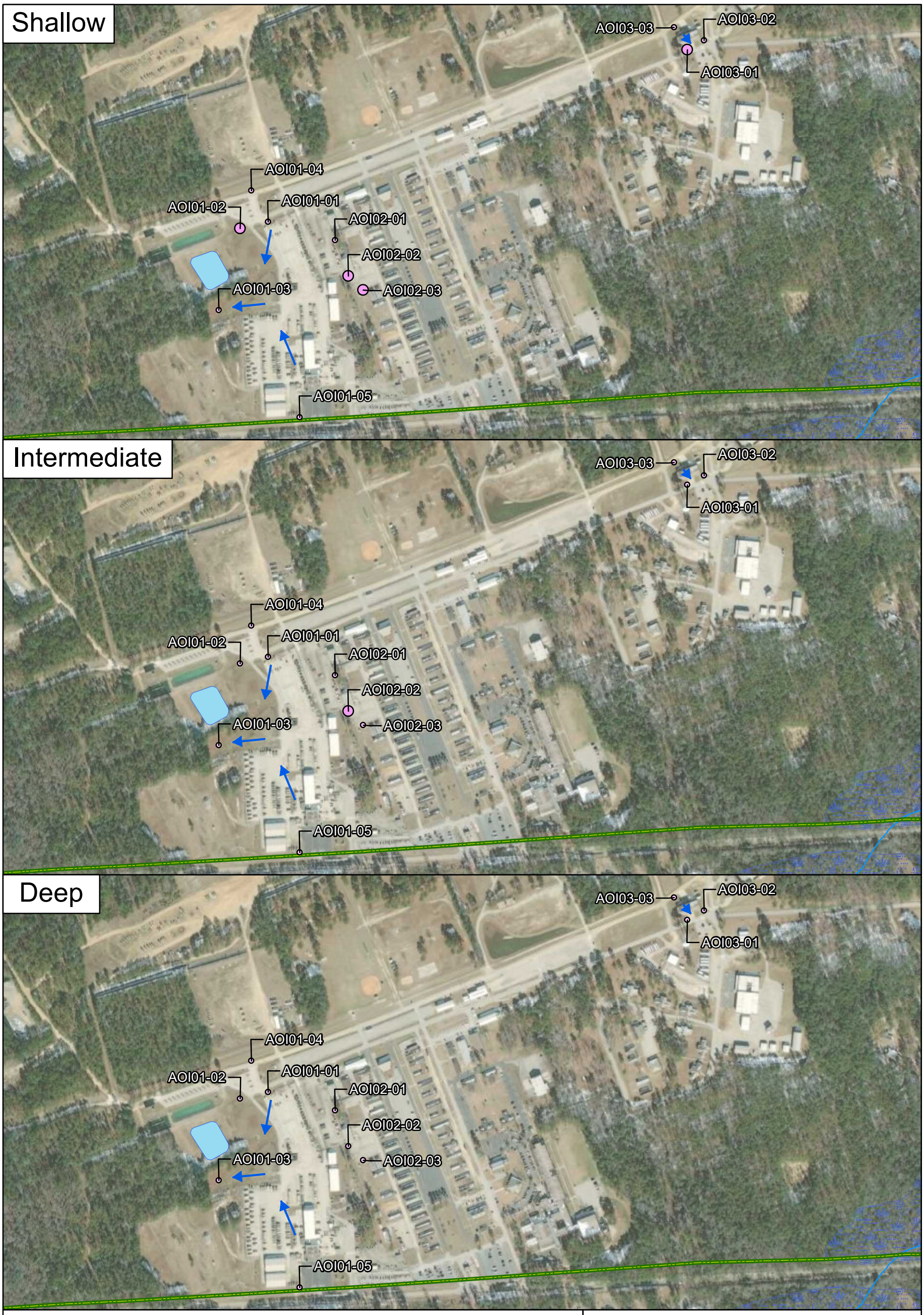
Figure 6-4



Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

PFNA Results (µg/Kg)

- ND
- >ND - 19
- >19 - 250
- >250 - 2,500
- >2,500

N

0 310 620 1,240 Feet

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

PFNA Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	10/4/2022	GIS BY	MS	10/4/2022
SCALE	1:7,440	CHK BY	BW	10/4/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/4/2022

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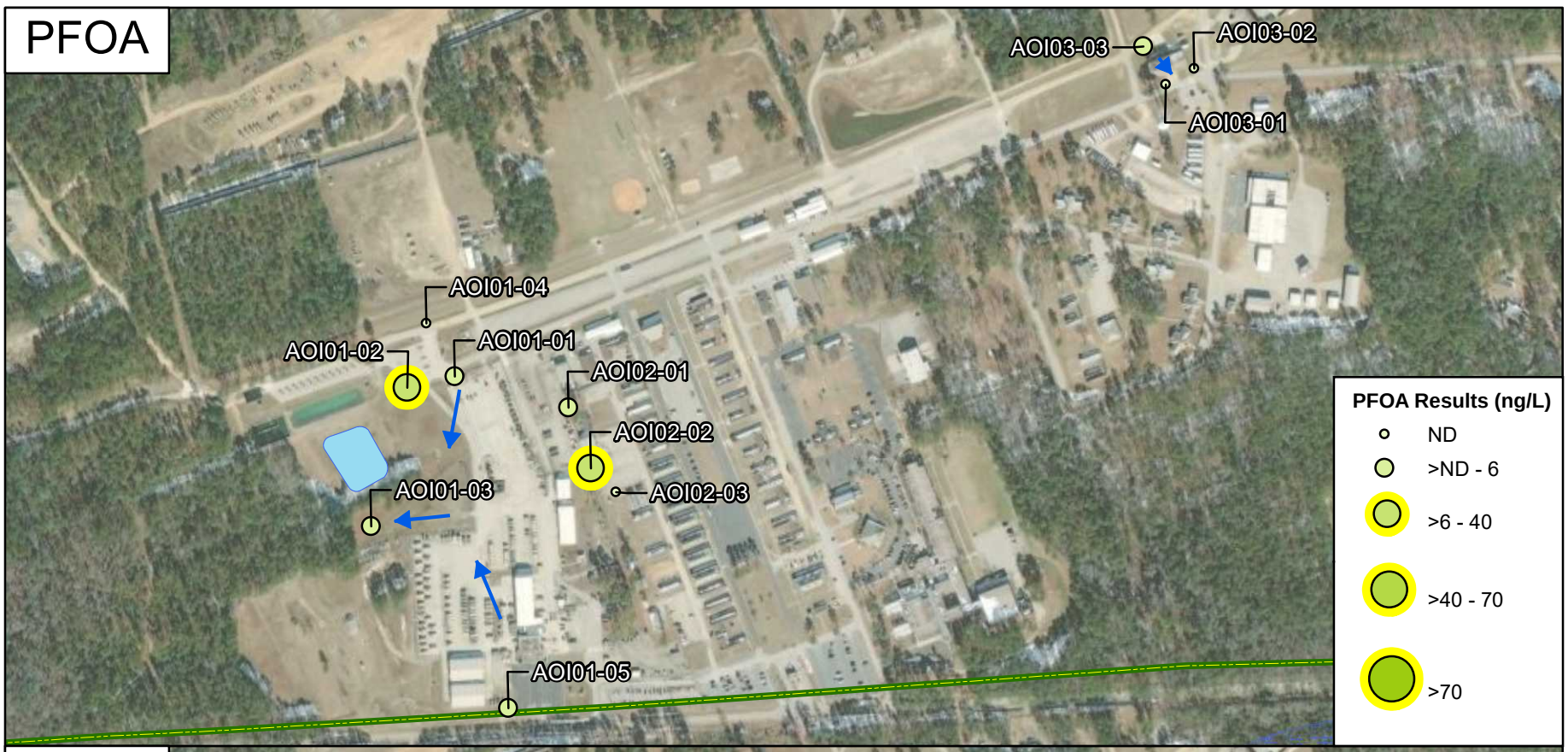
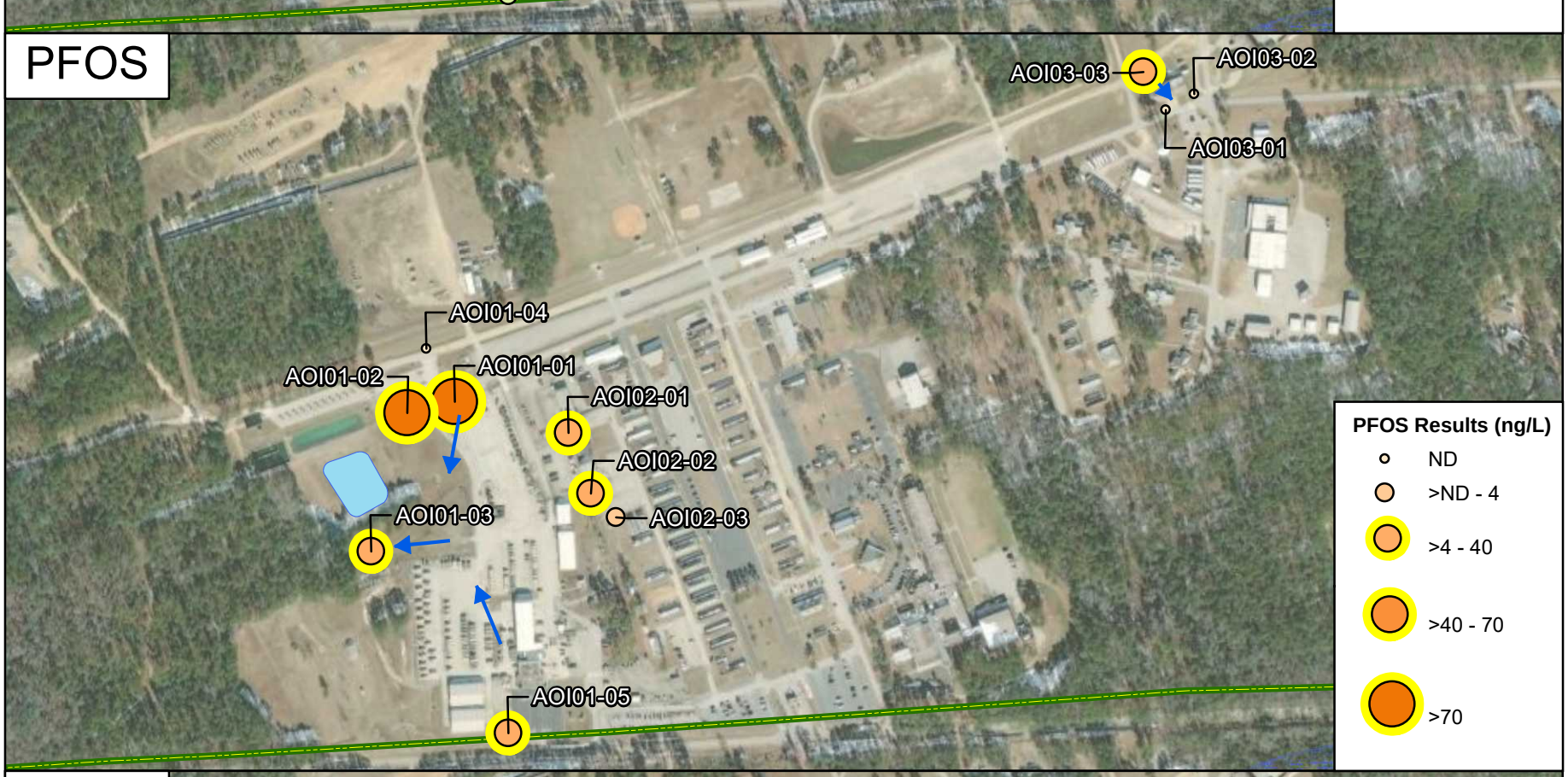
Figure 6-5

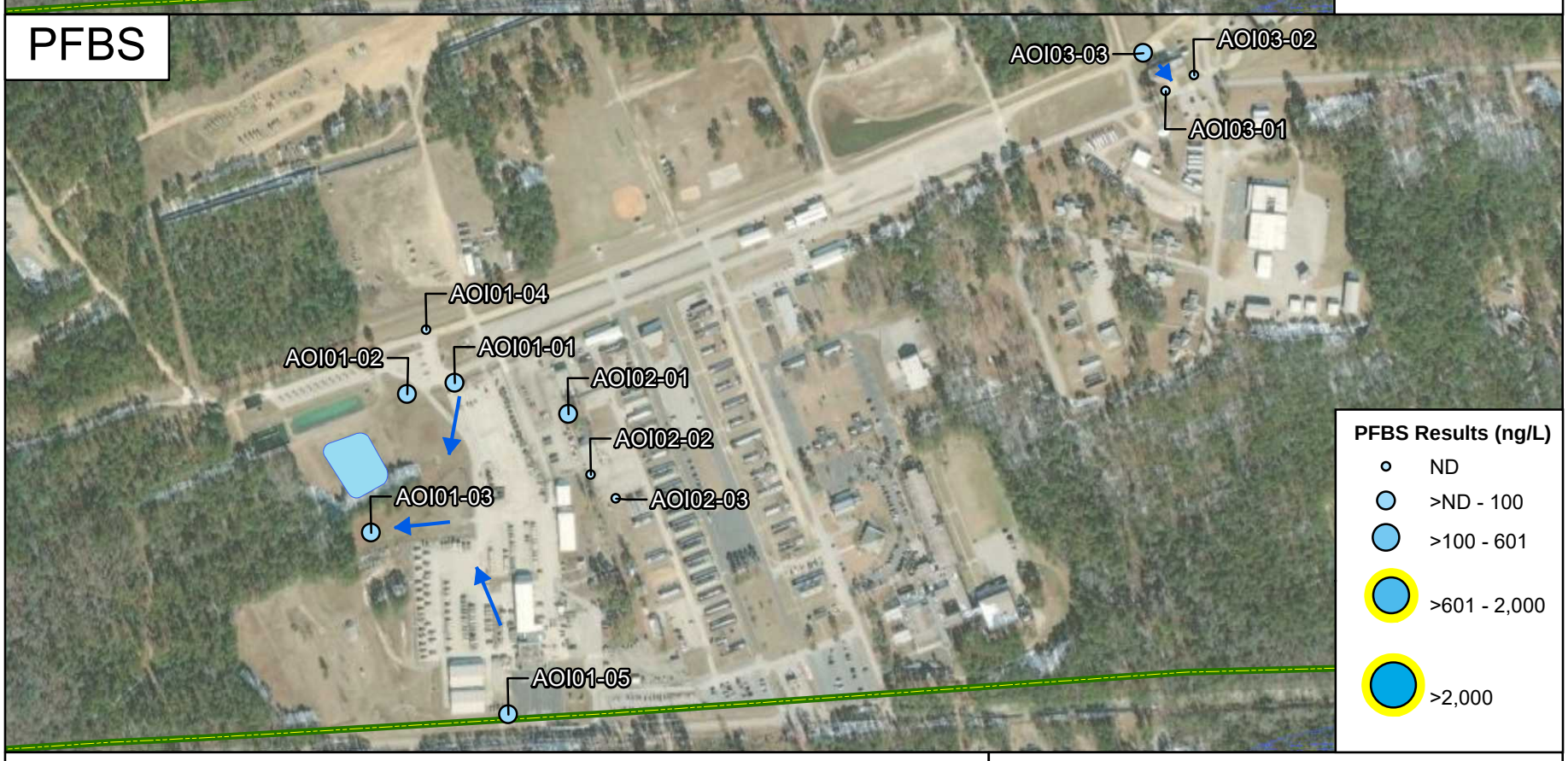
PFOA



PFOS



PFBS



Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

N

0 310 620 1,240
Feet

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

PFOA, PFOS, and PFBS Detections in Groundwater

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	10/5/2022	GIS BY	MS	10/5/2022
SCALE	1:7,440	CHK BY	BW	10/5/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/5/2022

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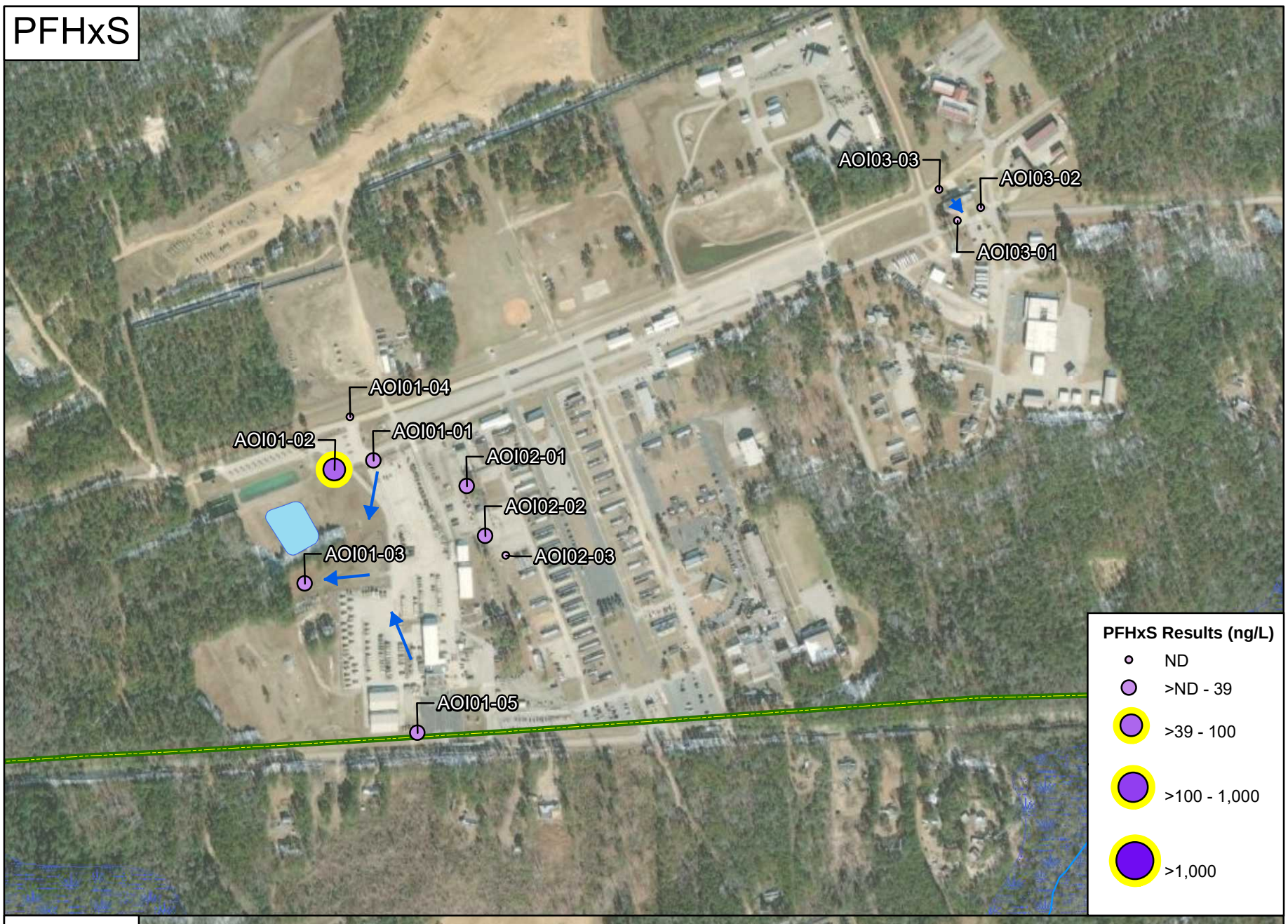
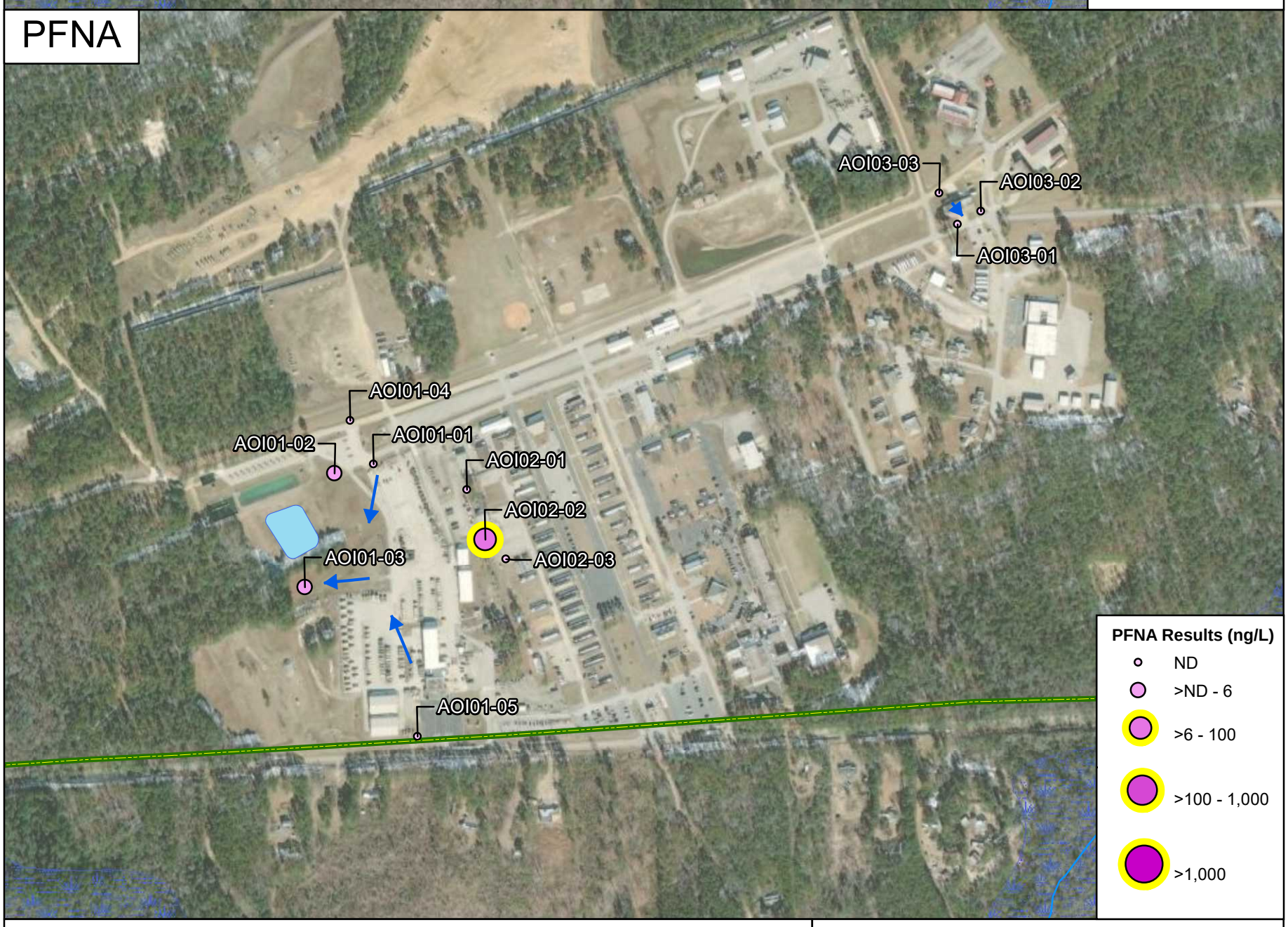
Figure 6-6

PFHxS



PFNA



Facility Boundary
Water Body
Wetland
Groundwater Flow Direction

N

0 310 620 1,240
Feet

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

PFHxS and PFNA Detections in Groundwater

CLIENT	ARNG			
PROJECT	Site Inspection at McCrady Training Center, SC			
REVISED	8/29/2022	GIS BY	MS	8/29/2022
SCALE	1:7,440	CHK BY	BW	8/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/29/2022

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Figure 6-7

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7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** and **Figure 7-2**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

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

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

7.1 Soil Exposure Pathway

The SI results in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1, AOI 2, and AOI 3 based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 includes the fuel point and adjacent wash rack. In 2012, AFFF was released accidentally from a firetruck near the fuel point. The release area was subsequently flushed with water that drained towards the wash rack.

The relevant compounds were detected in surface soil at AOI 1. PFHxS and PFOS only were detected in subsurface soil at AOI01. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete. Construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 is the MTC Military Fire Station, where AFFF may have historically been spilled or released during firefighting activities, training, or product handling. Any released AFFF within the MTC Military Fire Station buildings may have been captured by trench drains located within the buildings; however, it is unknown where the trench drains lead. Any expelled AFFF outside of the buildings would have occurred on unpaved and grassy surfaces.

The relevant compounds were detected in surface soil at AOI 2. All relevant compounds except PFBS were detected in subsurface soil at AOI 2. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete. Construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 2 is presented on **Figure 7-1**.

7.1.3 AOI 3

AOI 3 is the MTC Civilian Fire Station, which includes storage of AFFF within the building and firetrucks. Any released AFFF may have occurred on paved or grassy surfaces outside the MTC Civilian Fire Station.

The relevant compounds were detected in surface soil at AOI 3. PFHxS and PFOS only were detected in subsurface soil at AOI03. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete. Construction workers could contact constituents in subsurface soil via incidental ingestion, and therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 3 is presented on **Figure 7-2**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1 and AOI 2

PFOA, PFOS, PFHxS, and/or PFNA were detected above their SLs in groundwater samples collected at AOI 1 and AOI 2. Relevant compounds (excluding PFNA) were detected at upgradient monitoring well location AOI01-05 along the facility boundary, with PFOS exceeding the SL. Due to the presence of domestic and/or public water system wells within a 4-mile radius of the facility, the nearest of which is approximately 1.2 miles from the facility boundary to the southeast, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Off-facility groundwater may also possibly or partially be impacted by off-facility sources not under control of ARNG as presented in **Section 3.4**. MTC is serviced by four on-facility potable wells; however, these wells are located cross-gradient of AOI 1 and AOI 2. Therefore, the pathway

for exposure to site workers via ingestion of groundwater is considered incomplete. Depths to water measured at AOI 1 and AOI 2 in March 2022 during the SI ranged from 40.34 to 62.51 feet bgs. Therefore, construction workers are unlikely to encounter groundwater and the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 1 and AOI 2 is presented on **Figure 7-1**.

7.2.2 AOI 3

PFOS was detected above the SL in a groundwater sample collected at AOI 3. Due to the presence of domestic and/or public water system wells within a 4-mile radius of the facility, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Off-facility groundwater may also possibly or partially be impacted by off-facility sources not under control of ARNG as presented in **Section 3.4**. MTC is serviced by four on-facility potable wells, one of which is located directly downgradient of AOI 3. Results from potable well sampling conducted during 2017 and 2020 were non-detect for all relevant compounds, with the exception of a low-level detection of PFOA (1.19 ng/l) in 2017. Additionally, results from the decontamination source water sampling conducted as part of this SI were also non-detect for relevant compounds with the exception of a low-level detection of PFOS (0.938 ng/l). Therefore, the pathway for exposure to site workers via ingestion of groundwater is considered incomplete. Depths to water measured in at AOI 3 in March 2022 during the SI ranged from 64.83 to 68.56 feet bgs. Therefore, construction workers are unlikely to encounter groundwater and the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 3 is presented on **Figure 7-2**.

7.3 Surface Water and Sediment Exposure Pathway

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

7.3.1 AOI 1

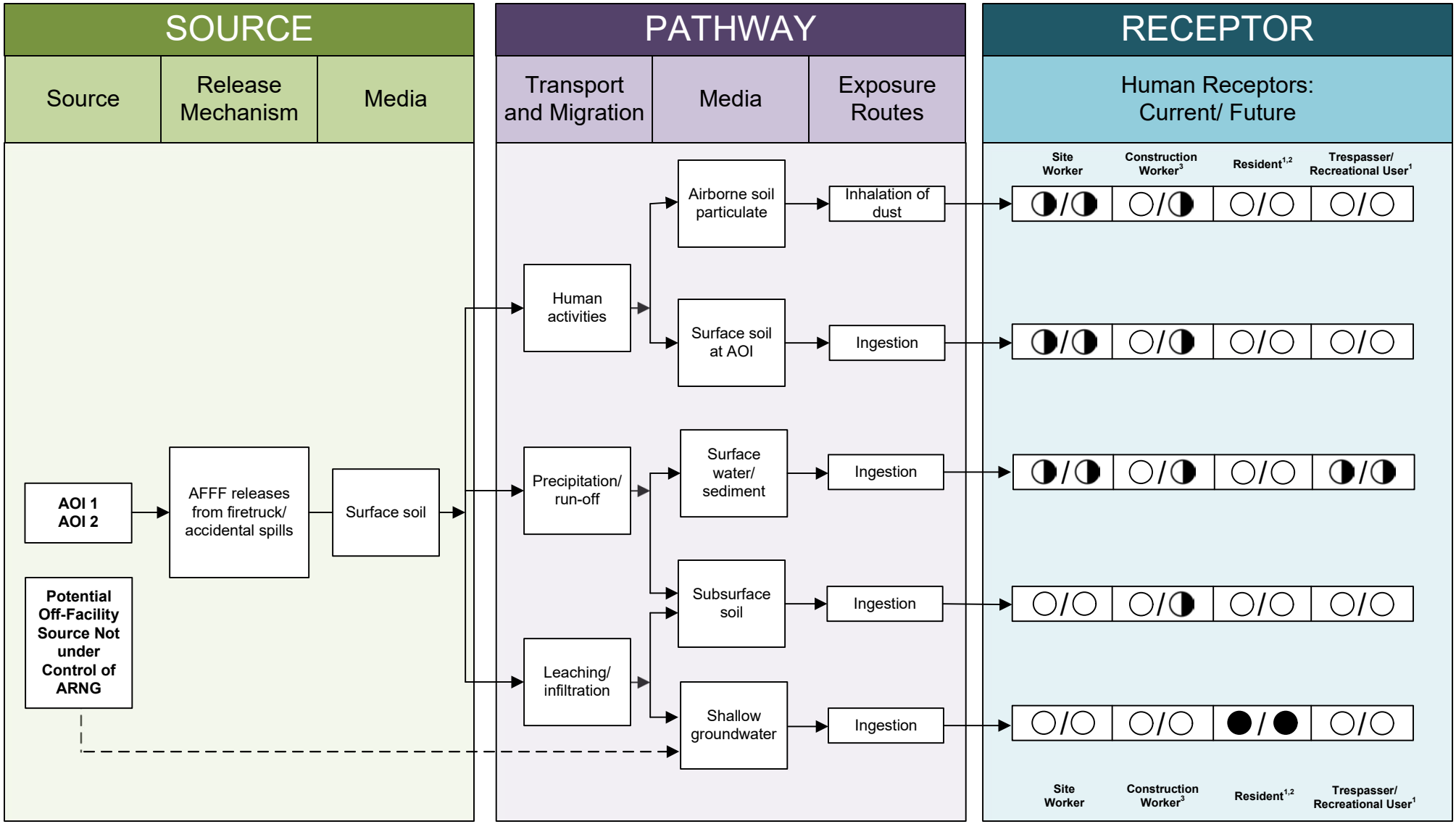
PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. Because the relevant compounds were detected in soil and groundwater at AOI 1, it is possible that those compounds may have migrated from soil to surface water. The wash rack area is designed as a closed loop system. If a discharge is required, it is released to the on-facility stormwater retention basin located just to the south of the wash rack. Therefore, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. The stormwater retention basin is permitted to discharge to Colonel Creek, and subsequently Murray Pond and Wateree River. Therefore, the surface water and sediment ingestion exposure pathway for off-facility recreational users is also considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.3.2 AOI 2

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 2; therefore, it is possible that those compounds may have migrated from soil and groundwater to surface water. AOI 2 is located in close proximity to AOI 1 to the east; surface water runoff likely flows downslope towards the on-facility stormwater retention basin. Therefore, similar to AOI 1 above, the surface water and sediment ingestion exposure pathways site workers, future construction workers, and off-facility recreation users is considered potentially complete. The CSM for AOI 2 is presented on **Figure 7-1**.

7.3.3 AOI 3

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and/or groundwater at AOI 3; therefore, it is possible that those compounds may have migrated from soil and groundwater to surface water. The MTC Civilian Fire Station is surrounded by storm drains, which are routed to the stormwater retention basin that discharges into Colonel Creek and Murray Pond (Wateree River tributaries) (Synterra, 2018). Therefore, similar to AOI 1 above, the surface water and sediment ingestion exposure pathways site workers, future construction workers, and off-facility recreation users is considered potentially complete. The CSM for AOI 3 is presented on **Figure 7-2**.



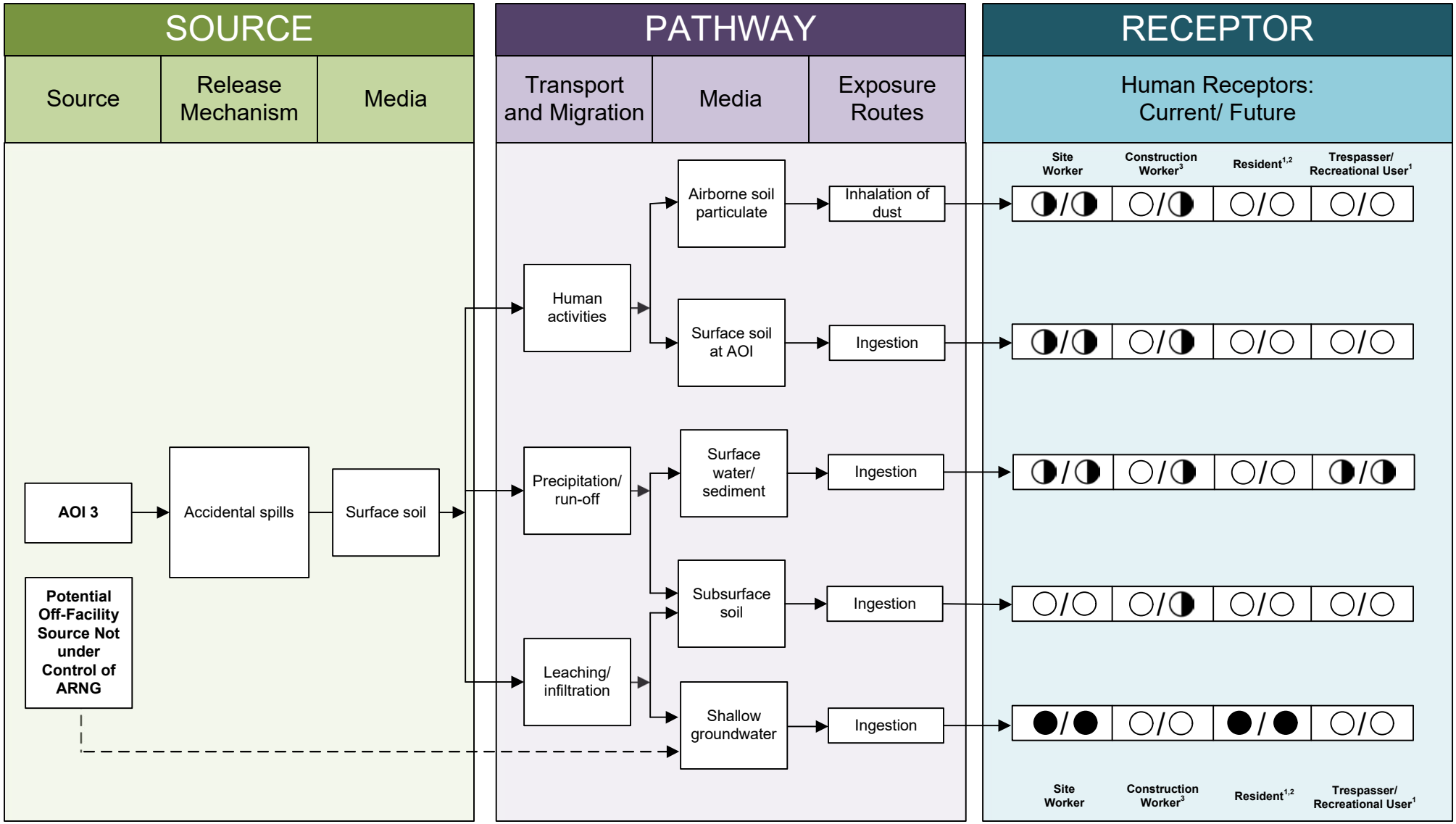
LEGEND

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

Notes:

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

Figure 7-1
Conceptual Site Model, AOI 1 and AOI 2
McCrady Training Center



LEGEND

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

Notes:

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

Figure 7-2
Conceptual Site Model, AOI 3
McCrady Training Center

8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted from 11 February 2022 to 4 March 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as previously noted in **Section 5.8**.

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

- Thirty-three (33) soil samples from 11 boring locations;
- Eleven (11) grab groundwater samples from 11 temporary wells;
- Eighteen (18) QA/QC samples.

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

8.2 Outcome

Based on the results of this SI, further evaluation is warranted in an RI for AOI 1: Wash Rack and Fuel Point, AOI 2: MTC Military Fire Station, and AOI 3: MTC Civilian Fire Station. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1, AOI 2, and AOI 3 from sources on the facility resulting from historical DoD activities. AOI 3 is run by the county fire/EMS; therefore, activities resulting in a release may not be attributable to the DoD. Sample analytical concentrations collected during the SI were compared to the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1:
    - The detected concentrations of the relevant compounds in soil at AOI 1 were below their SLs.
    - PFOA, PFOS, and PFHxS in groundwater exceeded their SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 7.64 ng/L at location AOI01-02. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 192 ng/L in the field duplicate sample AOI01-01-GW-D. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 59.1 ng/L at location AOI01-02. Detected concentrations of PFNA and PFBS were below their SLs in groundwater.

  - Based on the exceedances of the SLs in groundwater, further evaluation of AOI 1 is warranted in an RI.
  - PFOS was detected in groundwater at upgradient monitoring well location AOI01-05 (20.0 ng/L) at the facility boundary.
- At AOI 2:
  - The detected concentrations of the relevant compounds in soil at AOI 2 were below their SLs.
  - PFOA, PFOS, and PFNA in groundwater exceeded their SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 10.3 ng/L at location AOI02-02. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 9.28 ng/L at AOI02-02. PFNA exceeded the SL of 6 ng/L, with a maximum concentration of 21.9 ng/L at location AOI01-02. Detected concentrations of PFHxS and PFBS were below their SLs in groundwater.
  - Based on the exceedances of the SLs in groundwater, further evaluation of AOI 2 is warranted in an RI.
- At AOI 3:
  - The detected concentrations of the relevant compounds in soil at AOI 3 were below their SLs.
  - Relevant compounds were detected in upgradient monitoring well location AOI03-03 only. PFOS exceeded the SL of 4 ng/L in groundwater, with a concentration of 5.56 J+ ng/L. Detected concentrations of PFOA and PFBS were below their SLs in groundwater. PFNA and PFHxS were not detected in groundwater at AOI 3.
  - Results from three separate sampling events from on facility potable supply wells, including the nearby potable well downgradient of AOI 3, indicate low-level detections of PFOA and PFOS may be present below SLs.
  - Based on the exceedance of the SL in groundwater, further evaluation of AOI 3 is warranted in an RI.

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

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

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Wash Rack and Fuel Point	◐	●	●	Proceed to RI
2	MTC Military Fire Station	◐	●	N/A	Proceed to RI
3	MTC Civilian Fire Station	◐	●	N/A	Proceed to RI

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

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