FINAL
Site Inspection Report
Marianna Readiness Center
Marianna, Florida

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

September 2023

Prepared for:

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

UNCLASSIFIED

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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
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DoD	Department of Defense
DOT	Department of Transportation
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
EDR™	Environmental Data Resources, Inc.™
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FedEx	Federal Express
FLARNG	Florida Army National Guard
GPS	Global positioning system
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
NAVD88	North American Vertical Datum 1988
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid

PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RC	Readiness Center
RI	Remedial Investigation
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
USCS	Unified Soil Classification System
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 one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required because there is no release that is the responsibility of the ARNG or based on SLs for relevant compounds. This SI was completed at the Marianna Readiness Center (RC) in Marianna, Florida. The Marianna RC will also be referred to as the "facility" throughout this document.

The Marianna RC is located in Jackson County, Florida. The facility is currently used as a logistical support RC and home to a ground transportation unit. The Florida ARNG (FLARNG) has operated at the subject property since 1956. FLARNG leases the property through the Trustees of the Internal Improvement Fund of the state of Florida for use as an RC. Two storage buildings are located south of the main RC building, and a covered, non-enclosed structure used for vehicle maintenance is located at the southwest corner of the property.

The PA identified one AOI for investigation during the SI phase. SI sampling results from the AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOI. At no point during either the PA or the SI was there any evidence that any of the relevant compounds were the result of current or historical ARNG/DoD activities.

[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	Future Action
1	Well Pump House	◐	●	No further action under CERCLA

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

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

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2. Facility Background

2.1 Facility Location and Description

The Marianna RC is located off US 90 (parallel to Interstate 10), approximately 4 miles west of the City of Marianna in Jackson County, Florida (**Figure 2-1**). The facility is currently used as a logistical support RC and home to a ground transportation unit. The Florida ARNG (FLARNG) has operated at the subject property since 1956. FLARNG leases the property through the Trustees of the Internal Improvement Fund of the state of Florida for use as an RC. The facility is situated on approximately 5 acres, with a 20,868 square-foot building (Jackson County Property Appraiser, 2019). Two storage buildings are located south of the main RC building, and a covered, non-enclosed structure used for vehicle maintenance is located at the southwest corner of the property. Based on aerial imagery provided in the Environmental Data Resources, Inc.™ (EDR™) report, there does not appear to be evidence of major changes in facility operation from 1961 (the first available aerial image of the property) to the present (EDR, 2019).

A potable well used by the facility is located at the southeast corner of the property and is enclosed in a brick pump house. The well is actively used as the facility's primary water supply and is equipped with a chlorination and filtration system.

Aerial imagery in the EDR™ report suggests the surrounding properties have remained predominately rural and residential, with the exception of state- and county-owned facilities to the west and south of Marianna RC. A state-owned facility was located about 1,800 feet southwest of the facility, prior to 1940. Property records and ARNG personnel interviews indicate that this facility may have operated as a prison prior to converting to the current Florida Department of Transportation (FDOT) maintenance facility. The date of this transfer was not determined during the PA. An agricultural center located adjacent to and to the west and south of the Marianna RC was developed after 1955. Currently, area surrounding the facility consists of commercial and residential properties to the north, residential and pastureland to the east, and state and county properties to the south and west.

2.2 Facility Environmental Setting

Jackson County is divided into three physiographic units: the Marianna River Valley Lowlands, the Delta Plain Highlands, and the Terraced Coastal Lowlands, all of which are minor units of the Coastal Plain Physiographic Province. The Marianna RC is situated in the Marianna River Valley Lowlands physiographic unit, which was formed as the result of erosion and deposition by a number of streams, namely, the Chattahoochee-Apalachicola rivers, the Chipola River, Dry Creek, and Holes Creek. The lowlands along each of these streams developed as floodplain terraces and are considered one physiographic unit that was developed in the Marianna area through complicated sequences of stream erosion, deposition, and capture (Moore, 1955). The resulting topography is rolling hills consisting of clays, silts, and sands bisected by stream valleys with outcroppings of limestone (WRS Infrastructure & Environment, Inc., 2003). The topography of the facility is generally level (**Figure 2-2**).

2.2.1 Geology

The following descriptions were adapted from a Florida Geologic Survey geological map (Green, et al. 2003). Near ground surface, the Pliocene-Pleistocene Citronelle Formation consists of sands and gravels with varying amounts of clay. The Citronelle Formation overlies the Middle Miocene to Early Pliocene-age Alum Bluff group, which consists of clayey sands and gravels, to stiff, greenish, micaceous clays with variable admixtures of silt, sand, and shell.

The Lower Miocene-age Chattahoochee Formation lies unconformably below the Alum Bluff group and consists of brownish-gray, moderately indurated, sandy packstone to wackestone, with foraminifera.

Oligocene-age Marianna Limestone lies unconformably below the Chattahoochee Formation and is characterized as cavernous, white to gray, soft, fine-grained, poorly indurated, glauconitic, fossiliferous wackestone. In and around the town of Marianna, a grayish-yellow or light olive-green dolosilt occurs at the top of the Marianna Limestone.

Late Eocene-age Ocala group limestones lie unconformably below the Marianna Formation. In the northwest portion of Jackson County, Ocala Group limestones are up to 200 feet thick and consist of moderately indurated cream- to white--colored grainstone with large benthic foraminifera. The Bumpnose member of the Ocala group has been identified in the vicinity of the facility and is characterized by poorly- to well- indurated, cream to white, fossiliferous packstone, and in some areas, wackestone.

During the SI, fine- to medium-grained sands and medium- to high-plasticity clays were observed as the dominant lithology below the Marianna RC. The borings were completed at depths between 35 and 70 feet below ground surface (bgs). These results and facility observations are consistent with the reported environment of the region. Boring logs are presented in **Appendix E**.

2.2.2 Hydrogeology

The regional hydrogeologic framework of Jackson County generally consists of three aquifer systems: the surficial aquifer, the intermediate aquifer, and the Floridan Aquifer (WRS Infrastructure & Environment, Inc., 2003).

The surficial aquifer is relatively thin and composed of sand and clay terrace deposits and admixtures. The surficial aquifer surrounding the Marianna RC is encountered at approximately 5 feet bgs and is believed to flow towards the northwest, in concurrence with local topography. The surficial aquifer is rarely used for potable water supplies, as the clastic sediments that comprise this aquifer generally have low permeability and produce small quantities of water from wells. The surficial aquifer is generally under unconfined conditions and is recharged by local rainfall (WRS Infrastructure & Environment, Inc., 2003).

The intermediate aquifer is primarily composed of clays, sandy clays, intercalated sands, creamy white limestone, and greenish-gray marls; it is the confining unit between the surficial aquifer and the Floridan Aquifer, but it may be breached by sinkholes that provide localized areas of fluid exchange and semi-confining conditions. This unit is typically the Chattahoochee Formation and often contains thin irregular lenses of sandy limestone and dolomite, which may yield small quantities of water under artesian conditions. Recharge of the intermediate aquifer is through leakage from the overlying surficial aquifer (WRS Infrastructure & Environment, Inc., 2003).

Collectively, the Ocala Group Limestones and Marianna Limestone comprise the Floridan Aquifer system in the Marianna area. All of these limestones are sources of groundwater for most municipalities and industries and are considered artesian (Moore, 1955). Much of the Florida Aquifer contains good secondary porosity caused by dissolution following deposition. The Floridan Aquifer is recharged where the unit outcrops at the surface or is breached by sinkholes. Regional groundwater flow in the Floridan Aquifer is to the south (WRS Infrastructure & Environment, Inc., 2003).

An EDR™ 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 (EDR, 2019). Three public water supply wells have been identified to the southwest of the facility that supply state and federal government

facilities. One potable water supply well is present on the facility installed to a total depth of 220 ft bgs. Based on current online real estate sales information for private residences in the local area surrounding the facility, private residences are supplied by private well water. Groundwater features surrounding the facility are shown in **Figure 2-3**.

The surficial aquifer at Marianna RC was encountered deeper than anticipated. Local knowledge was based on a nearby site investigated under the FDEP underground storage tank program and that site's existing monitoring well network (WRS Infrastructure & Environment, Inc., 2003). It is believed that the shallow clay deposits encountered at Marianna RC and the nearby area may form localized perched conditions for shallow groundwater. At Marianna RC these shallow clay deposits may intersect with stormwater drainages preventing the perched conditions and accumulation of the shallow groundwater seen in the nearby area. Depths to water measured in February 2022 during the SI ranged from 30.97 to 43.05 feet bgs (133.33 to 135.85 ft North American Vertical Datum 1988 [NAVD88]). Groundwater was encountered only on the southern portion of the facility where it appears to be perched on top of competent limestone bedrock in monitoring wells AOI01-01, AOI01-02, and MRC-02. The limestone was not encountered in the northern portion of the facility at locations MRC-01, MRC-03, and MRC-04, even when drilled to greater depths. The borings are discussed in greater detail in Section 5.2. Groundwater elevation contours from the SI are presented on **Figure 2-4** and indicate groundwater flow direction is generally to the west-northwest in accordance with local topography.

2.2.3 Hydrology

One surface water retention area was identified at the Marianna RC, located approximately 80 feet southwest of the main building. A surface water drainage ditch runs east to west, parallel to the US 90. Surface water flow appears to be directed to the north and northwest, toward the storm water retention area as well as the storm water drainage ditch located to the north of the Marianna RC Building. Springs are abundant in the area surrounding the Marianna RC because of the karst topography and geology. The facility is located in an area designated by the Florida Geological Survey and the Florida Department of Environmental Protection (FDEP) as a Springs Protections Area (FDEP, 2011). The facility is located approximately 4 miles west of Jackson Blue Spring, which is defined as a 1st magnitude spring located in Jackson County (Bartel et.al, 2011). Connectivity between the storm water retention pond and local springs is not suspected. Surface water features surrounding the facility are shown in **Figure 2-5**.

Wastewater at the facility is managed via a septic system located in the grassy area west of the primary RC building and north of the stormwater retention pond. The wastewater drain field is to the north of the septic system.

2.2.4 Climate

The Marianna RC is located in Northwest Florida and the climate is characterized subtropical with hot and humid summers and mild winters. The average annual high temperature is 79 degrees Fahrenheit (°F), the average annual low temperature is 56 °F, and average annual precipitation is 53.58 inches (US Climate Data, 2022). The threat of hurricanes is high during the 6-month long Atlantic hurricane season, which spans from 1 June to 30 November. Peak hurricane season occurs between mid-August and late October, when waters in the equatorial Atlantic and Gulf of Mexico have warmed enough to help support the development of tropical waves (Florida Climate Center, Florida State University, 2019).

2.2.5 Current and Future Land Use

The Marianna RC is currently owned by the state of Florida, leased to FLARNG, and is developed with the Marianna RC building, two storage buildings, and one non-enclosed maintenance area.

Surrounding properties consist of commercial and residential properties to the north, residential and pastureland to the east, and state- and county-owned facilities to the south and west. Reasonably anticipated future land use is not expected to change from the current land use.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

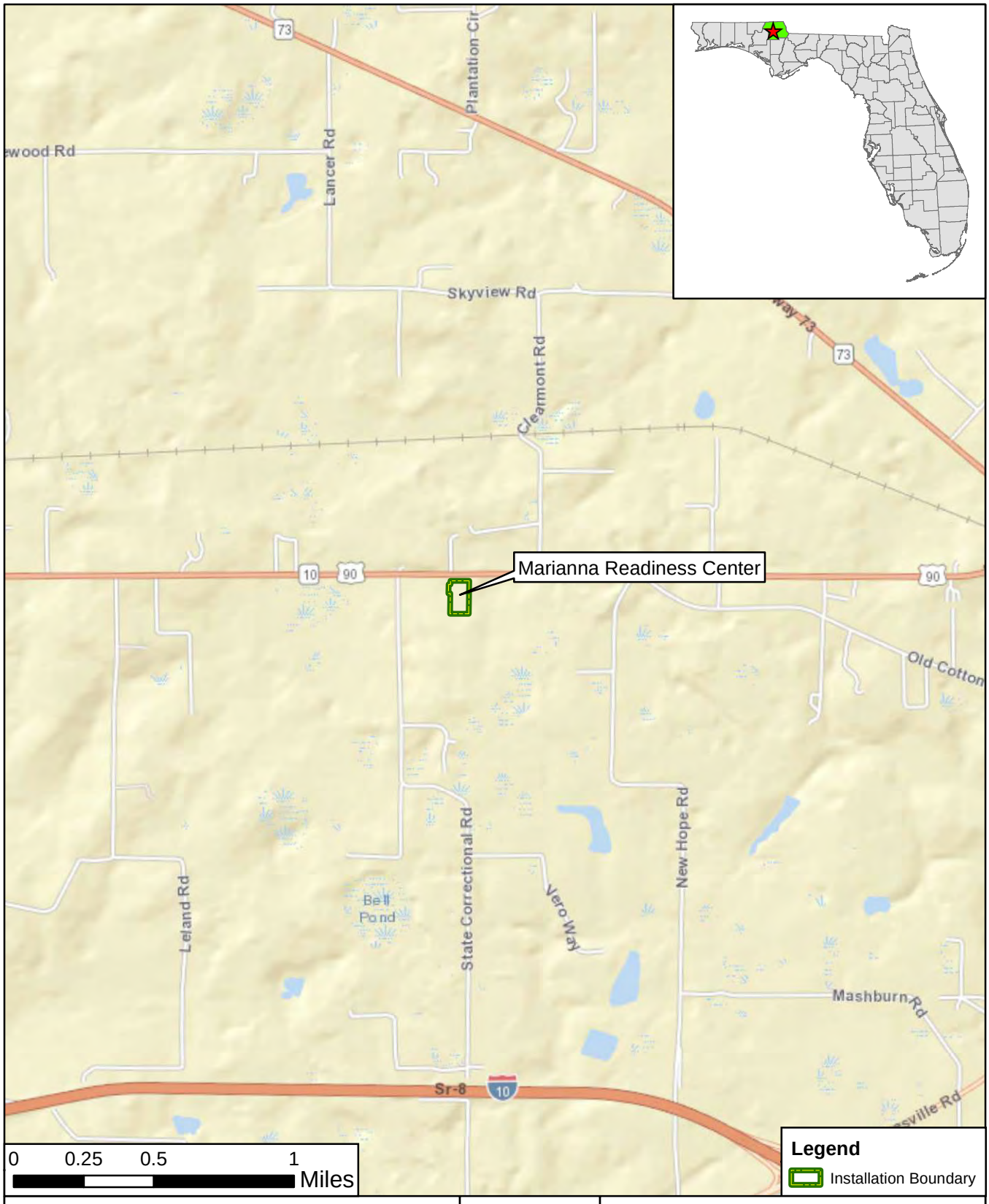
A wildlife survey has not occurred at the facility, and the facility does not have any significant areas of habitat. The following species have not been identified at the facility but may be present in the surrounding area.

The following amphibians, clams, conifers and cycads, crustaceans, fish, flowering plants, insects, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Jackson County, Florida (US Fish and Wildlife Service [USFWS], 2022).

- **Amphibians:** Reticulated flatwoods salamander, *Ambystoma bishop* (endangered)
- **Clams:** Gulf moccasinshell, Medionidus penicillatus (endangered); Shinyrayed pocketbook, Hamiota subangulata (endangered); Purple bankclimber (mussel), *Elliptoideus sloatianus* (threatened); Southern kidneyshell, *Ptychobranchus jonesi* (endangered); Fat threeridge (mussel), *Amblema neislerii* (endangered); Southern Sandshell, *Hamiota australis* (threatened); Rayed creekshell, *Anodontoides radiatus* (under review); Southern elktoe, *Alasmidonta triangulate* (under review); Chipola slabshell, *Elliptio chipolaensis* (threatened); Tapered pigtoe, *Fusconaia burkei* (threatened); Oval pigtoe, *Pleurobema pyriforme* (endangered); Choctaw bean, *Villosa choctawensis* (endangered); Fuzzy pigtoe, *Pleurobema strodeanum* (threatened)
- **Conifers and Cycads:** Florida torreya, *Torreya taxifolia* (endangered)
- **Crustaceans:** Coastal flatwoods crayfish, Procambarus apalachicolae (under review)
- **Fishes:** Halloween darter, *Percina crypta* (under review)
- **Flowering Plants:** Gentian pinkroot, *Spigelia gentianoides* (endangered)
- **Insects:** Southern snaketail, Ophiogomphus australis (under review)
- **Mammals**: Gray bat, *Myotis grisescens* (endangered); Tricolored bat, *Perimyotis subflavus* (under review); Little brown bat, *Myotis lucifugus* (under review)
- **Reptiles:** Eastern diamondback rattlesnake, *Crotalus adamanteus* (under review); Gopher tortoise, *Gopherus polyphemus* (candidate); Eastern indigo snake, *Drymarchon corais couperi* (threatened)

2.3 History of PFAS Use

One potential release area was identified at the Marianna RC during the PA (AECOM, 2020). In 2017, the facility's potable water supply well was sampled and measured low-level detections of relevant compounds. Routine monitoring has continued since 2017; recent sampling from September 2021 detected levels of PFOS and PFOA in both pre- and post-treated water at the facility. PFOS was detected above the SL of 4 ng/L, with a concentration of 11 ng/L in both the pre- and post-treated water. PFOA was detected below the SL in the pre- and post-treated water, with concentrations of 4.2 ng/L and 4.1 ng/L, respectively. According to FLARNG personnel, AFFF has not been used or stored at the facility; however, the detections of PFAS may be indicative of a potential release in the vicinity of the well pump house and surrounding area (AOI 1). A description of AOI 1 is presented in **Section 3**.



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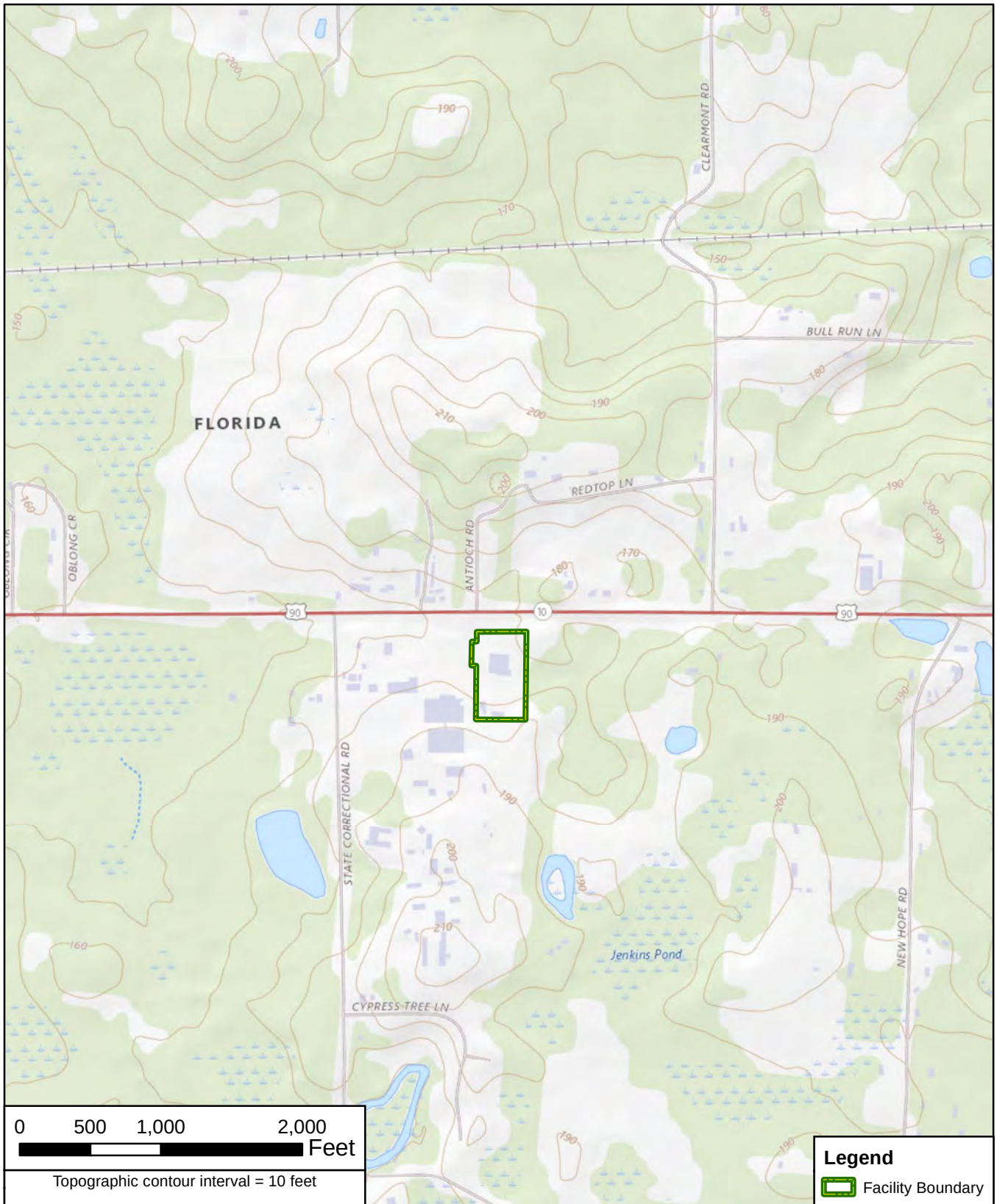
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/23/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



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Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	2/23/2023

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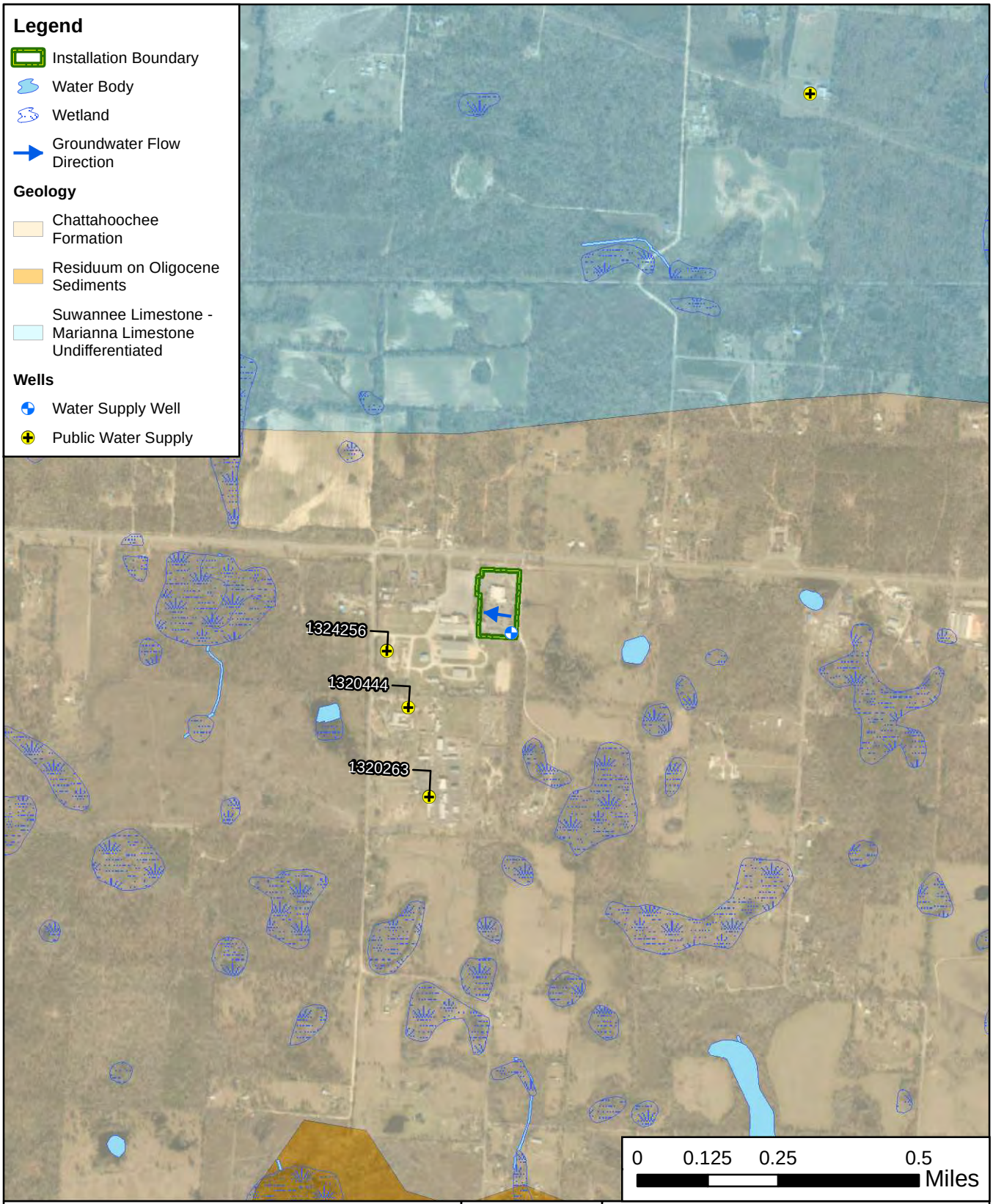
Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



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Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	10/20/2022	GIS BY	MS	10/20/2022
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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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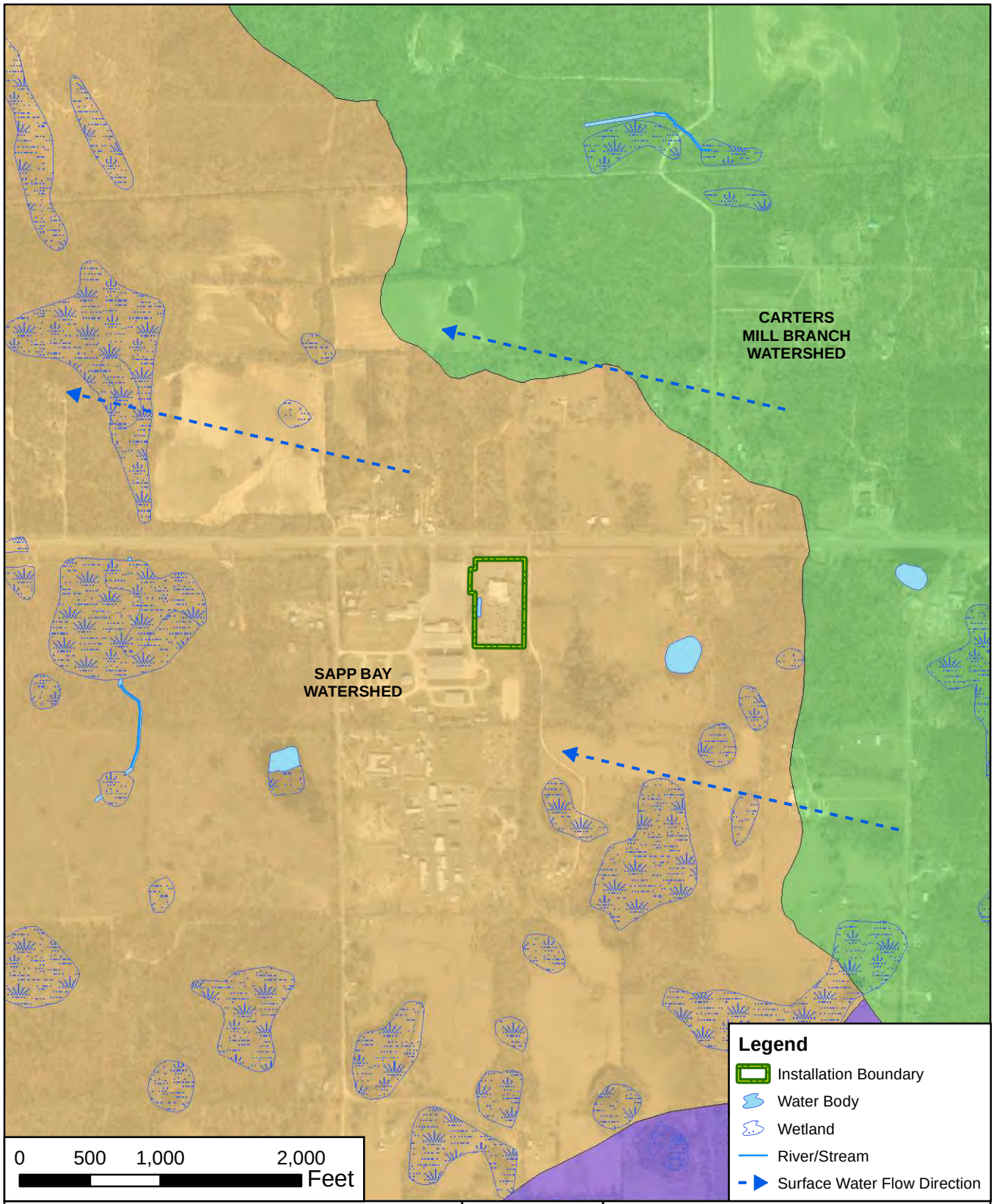
Groundwater Elevations, February 2022

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4



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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

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Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, one potential release area was identified at Marianna RC and designated as one AOI. The potential release area is shown on **Figure 3-1**.

3.1 AOI 1 Well Pump House

AOI 1 includes the well pump house and surrounding area, including the facility's water supply well. In 2017, prior to the PA, the potable well was sampled (pre-treatment) and analytical results indicated low-level of the relevant compounds. Routine monitoring of the potable water supply has continued since 2017; recent sampling from September 2021 detected levels of PFOS and PFOA in both pre- and post-treated water at the facility. PFOS was detected above the SL of 4 ng/L, with a concentration of 11 ng/L in both the pre- and post-treated water. PFOA was detected below the SL in the pre- and post-treated water, with concentrations of 4.2 ng/L and 4.1 ng/L, respectively. Analytical data for the initial 2017 sampling and subsequent monitoring of Marianna RC's potable well are included in **Appendix F**. According to FLARNG personnel with knowledge of the facility since 2007, AFFF has not been used or stored in this area. However, the detections of PFAS may be indicative of a potential release in the vicinity of the AOI.

The potable well and pump house are located at the southeast corner of the Marianna RC property and provide water for the RC. The well was installed in 1957 to a depth of 220 feet bgs, and the pump is enclosed in a brick structure and is equipped with a chlorination and filtration system.

3.2 Adjacent Sources

No off-facility sources adjacent to Marianna RC were identified during the PA. Four adjacent properties (FDOT Former Lee's Motel, Thompson Tractor Co, Inc., FDOT-Marianna, and CAT Pit) were reviewed for their potential for off-facility contamination but are not considered to be potential off-site sources at this time (AECOM, 2020).

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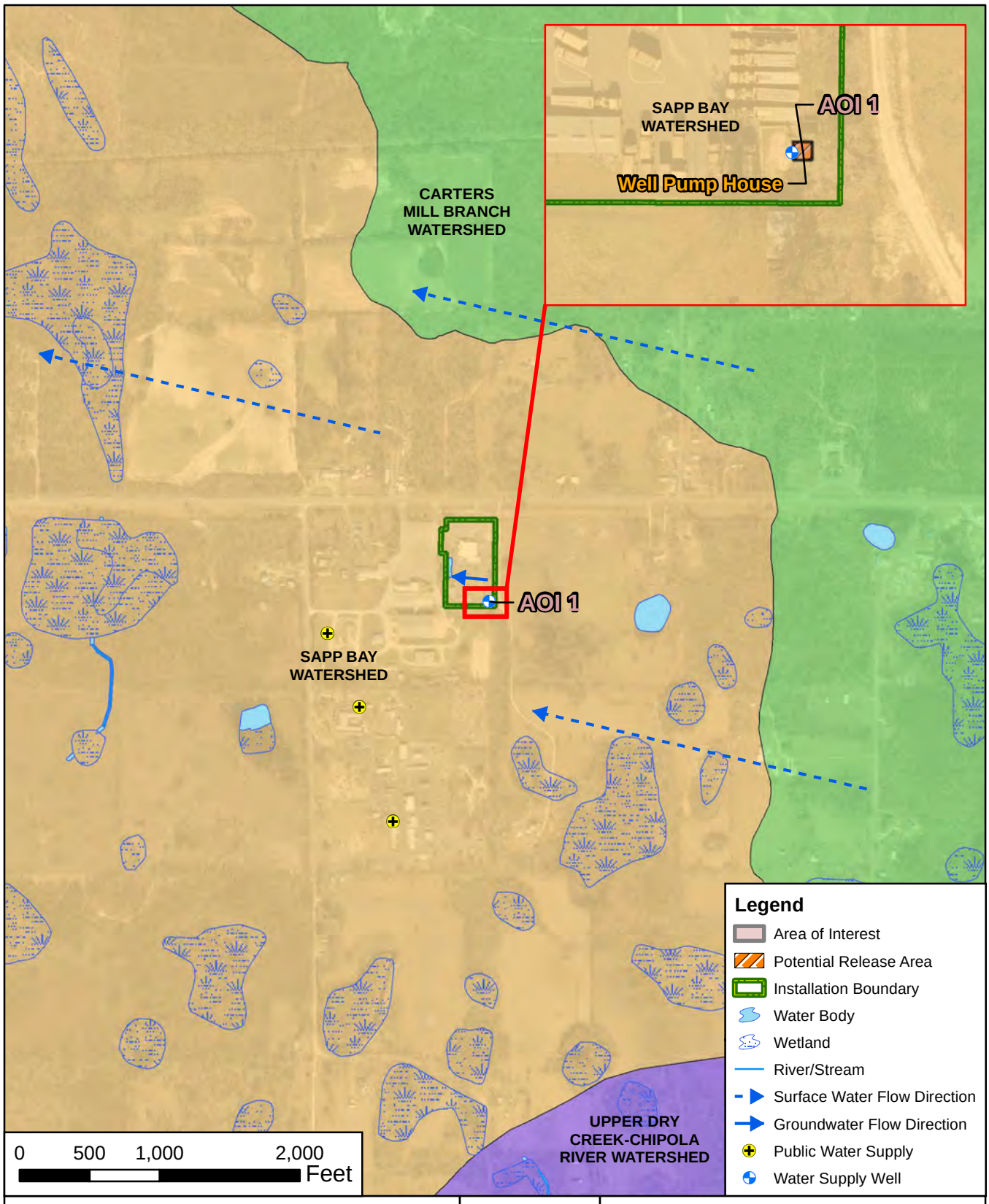

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Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

As identified during the Data Quality Objective (DQO) process and outlined in the SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021a), the objective of the SI is to identify whether there has been a release to the environment at the 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 that were the result of the ARNG activities. The SLs are presented in **Section 6.1** of this report.

4.2 Information Inputs

Primary information inputs included:

- The PA for Marianna RC (AECOM, 2020);
- Potable well groundwater analytical data at Marianna RC;
- 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 horizontally by the property limits of the facility (**Figure 2-2**) and vertically by the shallow surficial aquifer. The SI was not limited by temporal boundaries. Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s).

4.4 Analytical Approach

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

4.5 Data Usability Assessment

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

whether the collected data are of the right type, quality, and quantity to support the decision-making (DoD, 2019a; DoD, 2019b; USEPA, 2017).

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

5. Site Inspection Activities

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

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

The SI field activities were conducted from 6 January to 4 February 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, and grab groundwater sample collection. 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:

- Eighteen soil samples from six boring locations;
- Three grab groundwater samples from three temporary wells;
- Nine quality assurance (QA)/quality control (QC) samples.

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

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

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

A combined TPP Meeting 1 and 2 was held on 7 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, FLARNG, USACE, FDEP, and representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021a).

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

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the Sunshine 811 "Call Before You Dig" Florida utility clearance provider to notify them of intrusive work on 13 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 13 January 2022 with input from the AECOM field team and Marianna RC 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 shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

One potable water source at Marianna RC was sampled on 6 January 2022 to assess usability for decontamination of drilling equipment. Results of the sample collected at the truck maintenance area spigot (MRC-PW-01) determined that the water source at the facility was not acceptable for use in this investigation; therefore, it was not used and an offsite water source was identified. The offsite water source was located at Brooksville RC, another FLARNG facility that was being investigated as part of the ARNG PA and SI program immediately prior to the field activities at Marianna RC. The Brooksville RC water source was sampled from a spigot on the south side of the C-23 Hangar (BRC-PW-01) on 21 December 2021. Results of BRC-PW-01 confirmed the water source to be acceptable for use in this investigation at the time of sampling; therefore, it was used throughout the field activities. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water samples associated with the truck maintenance area spigot and C-23 Hangar water sources sampled for use during the SI are provided in **Appendix F**. Please note that field work was conducted prior to the release of the most current SLs and the PFOS result from BRC-PW-01 now exceeds its SL. As discussed in the DUA, the associated field sample results should still be considered usable for evaluating the presence or absence of PFAS at the facility and meeting the objectives of the SI. 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

Borings were installed in grass areas where available, to avoid disturbing concrete or asphalt surfaces. Soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021). A GeoProbe® 7822DT withDT22 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**. One boring location was adjusted within a 50-feet offset for reasons including drill rig access, utility avoidance, and bias toward sampling within observed drainage features.

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 on top of the substantial clay unit due to no groundwater presence, and one subsurface soil sample at 13 to 15-feet below ground surface.

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

Soil borings completed during the SI found medium to high plasticity clays with varying levels of lean and fatty clay as the dominant lithology below Marianna RC. Fine- to medium-grained sand was seen throughout the clay layers. The borings were completed at depths between 35 and 70 feet bgs. Limestone bedrock was encountered in the southern portion of the facility in soil borings AOI01-01, AOI01-02, and MRC-02. The limestone is not present in the northern portion of the facility in borings MRC-01, MRC-03, and MRC-04. The deepest boring, MRC-04, was drilled to a depth approximately 30 ft deeper than the elevation at which the limestone was being encountered with no indication of groundwater or limestone being present. These observations are consistent with the understood environment of the region.

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

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 when groundwater was encountered while drilling, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021) using bentonite chips 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 with DT22 dual-tube sampling system at four of the six proposed groundwater sampling locations. At two locations, MRC-01 and MRC-04, temporary wells were not installed because groundwater was not encountered before refusal of the drill rods. After 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 in the open borehole with no sand pack and sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. One temporary well, MRC-03, could not be sampled because the well was dry. 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 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. 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. MS/MSDs were not collected at a rate of 5% in accordance with the PQAPP (AECOM, 2018a). . Groundwater was not present in the last three proposed temporary monitoring well locations that were attempted. A MS/MSD had not yet been collected and the three temporary wells with groundwater had already been sampled more than 24 hours previously. With no additional groundwater sampling conducted, no MS/MSD was collected.

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with 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 February 2022. Groundwater elevation measurements were collected from the three new temporary monitoring wells. The fourth temporary monitoring well was dry. 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 Florida-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021). Survey data from the newly installed temporary wells on the facility were collected on 4 February 2022 in the applicable State Plane Coordinate System Florida North Zone projection with North American Datum Coordinate System of 1983 (NAD83) datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B4**.

5.6 Investigation-Derived Waste

As of the date of this report, the disposal of 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 contained in labeled, 55-gallon Department of Transportation (DOT)-approved steel drums and left onsite in a designated waste storage area. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location. ARNG will coordinate waste profiling, transportation, and disposal of the solid IDW.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were contained in labeled, 55-gallon DOT-approved steel drums, and left onsite in a designated waste storage area. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location. Containerized liquid IDW will be managed and disposed of by ARNG (either by offsite disposal or onsite disposal with treatment, as appropriate) under a separate contract in accordance with SOP No. 042A (EA, 2021).

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

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

5.7 Laboratory Analytical Methods

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

5.8 Deviations from SI QAPP Addendum

Five deviations from the SI QAPP Addendum were identified during review of the field documentation. The deviations are noted below and are documented in Field Change Request Forms (**Appendix B3**) and a Nonconformance and Corrective Action Report (**Appendix B6**):

- Soil sampling and temporary well installation at original location MRC-02 was unable to be completed as planned. The drill rig was unable to access the location due to the risk of damaging the concrete spillway of the stormwater retention pond at the facility. The location

for MRC-02 was moved approximately 50-feet north to a pre-cleared alternate location. This deviation was documented in a field change request form provided in **Appendix B3**.

- During drilling activities, groundwater was encountered deeper than originally anticipated. Additional soil samples were collected at all boring locations. One additional sample was collected at depth that was not part of the original soil sampling scope. From each boring, soil samples were collected at the surface, on top of the substantial clay unit at the facility, where groundwater was originally inferred to be (5 to 7 feet bgs), as well as one sample at 13 to 15 feet bgs. This deviation was documented in a field change request form provided in **Appendix B3**.
- At sampling locations MRC-01, MRC-03, and MRC-04, no water bearing unit was encountered within the lithology at any of the three borings. While a temporary well was installed at MRC-03, no water was able to be recovered. No temporary wells were installed at either MRC-01 or MRC-04. No alternative drilling method was available, and the area cleared of utilities was limited to a 10-foot square; therefore, additional attempts were not made to install temporary monitoring wells. This deviation was documented in a field change request form provided in **Appendix B3**.
- Groundwater was not present in the last three proposed temporary monitoring well locations that were attempted. A MS/MSD had not yet been collected and the three temporary wells with groundwater had already been sampled more than 24 hours previously. With no additional groundwater sampling conducted, no MS/MSD was collected. This deviation was documented in a nonconformance and corrective action report provided in **Appendix B6**.
- Due to a laboratory error, the grain size sample collected at location MRC-04 was not analyzed. This deviation was documented in a nonconformance and corrective action reported provided in **Appendix B6**.

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Marianna Readiness Center, Florida

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-(0-2)	2/1/2022 10:45	0 - 2	x				
AOI01-01-SB-(0-2)-D	2/1/2022 10:45	0 - 2	x				FD
AOI01-01-SB-(5-6)	2/2/2022 7:45	5 - 6	x				
AOI01-01-SB-(13-15)	2/2/2022 10:30	13 - 15	x	x	x		
AOI01-01-SB-(13-15)-D	2/2/2022 10:30	13 - 15		x	x		FD
AOI01-01-SB-(13-15)-MS	2/2/2022 10:30	13 - 15		x	x		MS
AOI01-01-SB-(13-15)-MSD	2/2/2022 10:30	13 - 15		x	x		MSD
AOI01-02-SB-(0-2)	2/1/2022 10:20	0 - 2	x				
AOI01-02-SB-(3-5)	2/2/2022 14:33	3 - 5	x				
AOI01-02-SB-(3-5)-MS	2/2/2022 14:33	3 - 5	x				MS
AOI01-02-SB-(3-5)-MSD	2/2/2022 14:33	3 - 5	x				MSD
AOI01-02-SB-(13-15)	2/2/2022 15:00	13 - 15	x				
MRC-01-SB-(0-2)	2/1/2022 11:43	0 - 2	x				
MRC-01-SB-(4-5)	2/4/2022 10:45	4 - 5	x				
MRC-01-SB-(13-15)	2/4/2022 10:50	13 - 15	x				
MRC-02-SB-(0-2)	2/2/2022 12:10	0 - 2	x	x	x		
MRC-02-SB-(8-9)	2/2/2022 12:30	8 - 9	x				
MRC-02-SB-(13-15)	2/2/2022 12:53	13 - 15	x				
MRC-03-SB-(0-2)	2/3/2022 15:22	0 - 2	x				
MRC-03-SB-(4-5)	2/3/2022 15:25	4 - 5	x				
MRC-03-SB-(13-15)	2/3/2022 15:45	13 - 15	x				
MRC-04-SB-(0-2)	2/1/2022 8:40	0 - 2	x				
MRC-04-SB-(0-2)-D	2/1/2022 8:40	0 - 2	x				FD
MRC-04-SB-(2-3)	2/3/2022 14:45	2 - 3	x				
MRC-04-SB-(13-15)	2/3/2022 14:50	13 - 15	x				
MRC-04-SB-(15-20)	2/1/2022 8:40	15 - 20				x	
Groundwater Samples							
AOI01-01-GW	2/3/2022 14:30	NA	x				
AOI01-01-GW-D	2/3/2022 14:30	NA	x				FD
AOI01-02-GW	2/4/2022 8:35	NA	x				
MRC-02-GW	2/3/2022 12:55	NA	x				

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Marianna Readiness Center, Florida

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Quality Control Samples							
MRC-PW-01	1/6/2022 11:20	NA	x				
MRC-ERB-01	2/1/2022 12:31	NA	x				drill rods
MRC-ERB-02	2/3/2022 14:35	NA	x				bladder pump
MRC-FRB-01	2/3/2022 14:30	NA	x				

Notes:
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
MRC = Marianna Readiness Center
MS/MSD = matrix spike/ matrix spike duplicate
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, Marianna Readiness Center, Florida

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	47.5	42.50 - 47.50	180.84	178.90	44.99	43.05	135.85
	AOI01-02	54.5	49.26 - 54.26	168.99	168.80	35.58	35.39	133.41
	MRC-01	47	NA	NA	180.80	DRY	DRY	DRY
	MRC-02	35	28.87 - 33.87	164.43	164.30	31.10	30.97	133.33
	MRC-03	50	35 - 45	171.86	171.20	DRY	DRY	DRY
	MRC-04	70	NA	NA	164.90	DRY	DRY	DRY

Notes:

[1] Temporary well screen set above total depth to capture groundwater interface

AOI = area of interest
bgs = below ground surface
btoc = below top of casing
MRC = Marianna Readiness Center
NA = not applicable
NAVD88 = North American Vertical Datum 1988

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CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

N

SI 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 the AOI is provided in **Section 6.3**. **Table 6-2** through **Table 6-4** present results in soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

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

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

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

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

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

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

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

6.2 Soil Physicochemical Analyses

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

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

6.3 AOI 1

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

6.3.1 AOI 1 Soil Analytical Results

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

Surface soil was sampled from 0 to 2 feet bgs at AOI01-01 and AOI01-02 and MRC-01 through MRC-04. Soil was also sampled at shallow subsurface soil intervals (2 to 15 feet bgs) at each location. Two shallow subsurface soil intervals were sampled at each location because drilling refusal was encountered before encountering groundwater during drilling.

PFOA, PFOS, PFNA, and PFHxS were detected below their SLs in surface soil as listed below. PFBS was not detected at any of the six surface soil locations.

- PFOA was detected at AOI01-01 and MRC-03, with concentrations of 0.117 J micrograms per kilogram (µg/kg) and 0.087 J µg/kg, respectively.
- PFOS was detected in all six samples, with concentrations ranging from 0.075 J µg/kg to 0.290 J µg/kg.
- PFNA was detected at AOI01-01, MRC-02, and MRC-03, with concentrations ranging from 0.035 J µg/kg to 0.044 J µg/kg.
- PFHxS was detected at AOI01-02, with a concentration of 0.054 J µg/kg.

PFOS, PFNA, and PFHxS were detected in shallow subsurface samples below SLs as listed below. PFOA and PFBS were not detected at any shallow subsurface soil samples.

- PFOS and PFHxS were detected at AOI01-01, in the 5 to 6 feet bgs interval, at concentrations of 0.445 J µg/kg and 0.136 J µg/kg, respectively.
- PFOS was also detected at MRC-04 at the 2 to 3 feet bgs and 13 to 15 feet bgs intervals at concentrations of 0.058 J µg/kg and 0.261 J µg/kg, respectively.

- PFNA was detected at MRC-04 in the 13 to 15 feet bgs interval at a concentration of 0.058 J µg/kg.

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI01-01, AOI01-02, and MRC-02. Detections are summarized below.

- PFOA was detected above the SL of 6 nanograms per liter (ng/L) at AOI01-02 and MRC-02, with concentrations of 43.7 ng/L and 12.0 ng/L, respectively.
- PFOS was detected above the SL of 4 ng/L at AOI01-02 and MRC-02, with concentrations of 28.1 ng/L and 26.8 ng/L , respectively.
- PFNA was detected above the SL of 6 ng/L at AOI01-02, with a concentration of 14.1 ng/L.
- PFBS was detected below the SL of 601 ng/L at AOI01-02 and MRC-02, with detections of 7.32 ng/L and 1.66 J ng/L, respectively.
- PFHxS was detected below the SL of 39 ng/L at AOI01-02 and MRC-02, with concentrations of 32.1 ng/L and 3.51 J ng/L, respectively.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, PFNA, and PFHxS were detected in soil below their SLs. PFOA, PFOS, and PFNA were detected in groundwater at concentrations above their respective SLs. However, at no point during the PA or the SI was there any evidence that any of the relevant compounds were the result of current or historical ARNG/DoD activities.

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

Area of Interest		AOI01						MRC									
Sample ID		AOI01-01-SB-(0-2)		AOI01-01-SB-(0-2)-D		AOI01-02-SB-(0-2)		MRC-01-SB-(0-2)		MRC-02-SB-(0-2)		MRC-03-SB-(0-2)		MRC-04-SB-(0-2)		MRC-04-SB-(0-2)-D	
Sample Date		02/01/2022		02/01/2022		02/01/2022		02/01/2022		02/02/2022		02/03/2022		02/01/2022		02/01/2022	
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	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																	
PFBS	1900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	ND	U	ND	U	0.054	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	19	ND	UJ	0.044	J	ND	U	ND	U	0.041	J	0.035	J	ND	U	ND	U
PFOA	19	ND	UJ	0.117	J	ND	U	ND	U	ND	U	0.087	J	ND	U	ND	U
PFOS	13	0.080	J	0.290	J	0.272	J	0.205	J	0.186	J	0.114	J	0.075	J	ND	UJ

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

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.

Notes

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

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
MRC	Marianna Readiness Center
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, Marianna Readiness Center

Area of Interest		AOI01								MRC											
Sample ID		AOI01-01-SB-(5-6)		AOI01-01-SB-(13-15)		AOI01-02-SB-(3-5)		AOI01-02-SB-(13-15)		MRC-01-SB-(4-5)		MRC-01-SB-(13-15)		MRC-02-SB-(8-9)		MRC-02-SB-(13-15)		MRC-03-SB-(4-5)		MRC-03-SB-(13-15)	
Sample Date		02/02/2022		02/02/2022		02/02/2022		02/02/2022		02/04/2022		02/04/2022		02/02/2022		02/02/2022		02/03/2022		02/03/2022	
Depth		5-6 ft		13-15 ft		3-5 ft		13-15 ft		4-5 ft		13-15 ft		8-9 ft		13-15 ft		4-5 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**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	0.136	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	0.445	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Notes

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

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
MRC	Marianna Readiness Center
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, Marianna Readiness Center

	Area of Interest	MRC			
	Sample ID	MRC-04-SB-(2-3)		MRC-04-SB-(13-15)	
	Sample Date	02/03/2022		02/03/2022	
	Depth	2-3 ft		13-15 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)					
PFBS	25000	ND	U	ND	U
PFHxS	1600	ND	U	ND	U
PFNA	250	ND	U	0.058	J
PFOA	250	ND	U	ND	U
PFOS	160	0.058	J	0.261	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

Notes

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

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
MRC	Marianna Readiness Center
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Marianna Readiness Center

	Area of Interest	AOI01						MRC	
	Sample ID	AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		MRC-02-GW	
	Sample Date	02/03/2022		02/03/2022		02/04/2022		02/03/2022	
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	7.32		1.66	J
PFHxS	39	ND	U	ND	U	32.1		3.51	J
PFNA	6	ND	U	ND	U	14.1		4.53	
PFOA	6	ND	U	ND	U	43.7		12.0	
PFOS	4	0.909	J	1.45	J	28.1		26.8	

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

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

Notes

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

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
MRC	Marianna Readiness Center
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

Intermediate

Deep

MRC-03
MRC-04
MRC-02
MRC-01
AOI01-02
AOI01-01

PFOA Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Legend

Installation Boundary

Water Body

0 50 100 200 Feet

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

N

PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

Shallow

Intermediate

Deep

MRC-03
MRC-04
MRC-02
MRC-01
AOI01-02
AOI01-01

PFOS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Legend

Installation Boundary

Water Body

0 50 100 200 Feet

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

N

PFOS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-2

Shallow

Intermediate

Deep

MRC-03
MRC-04
MRC-02
MRC-01
AOI01-02
AOI01-01

PFBS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Legend

Installation Boundary

Water Body

0 50 100 200 Feet

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

N

PFBS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-3

Shallow

Intermediate

Deep

MRC-03
MRC-04
MRC-02
MRC-01
AOI01-02
AOI01-01

PFHxS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Legend

Installation Boundary

Water Body

0 50 100 200 Feet

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

N

PFHxS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

Shallow

Intermediate

Deep

MRC-03
MRC-04
MRC-02
MRC-01
AOI01-02
AOI01-01

PFNA Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Legend

Installation Boundary

Water Body

0 50 100 200 Feet

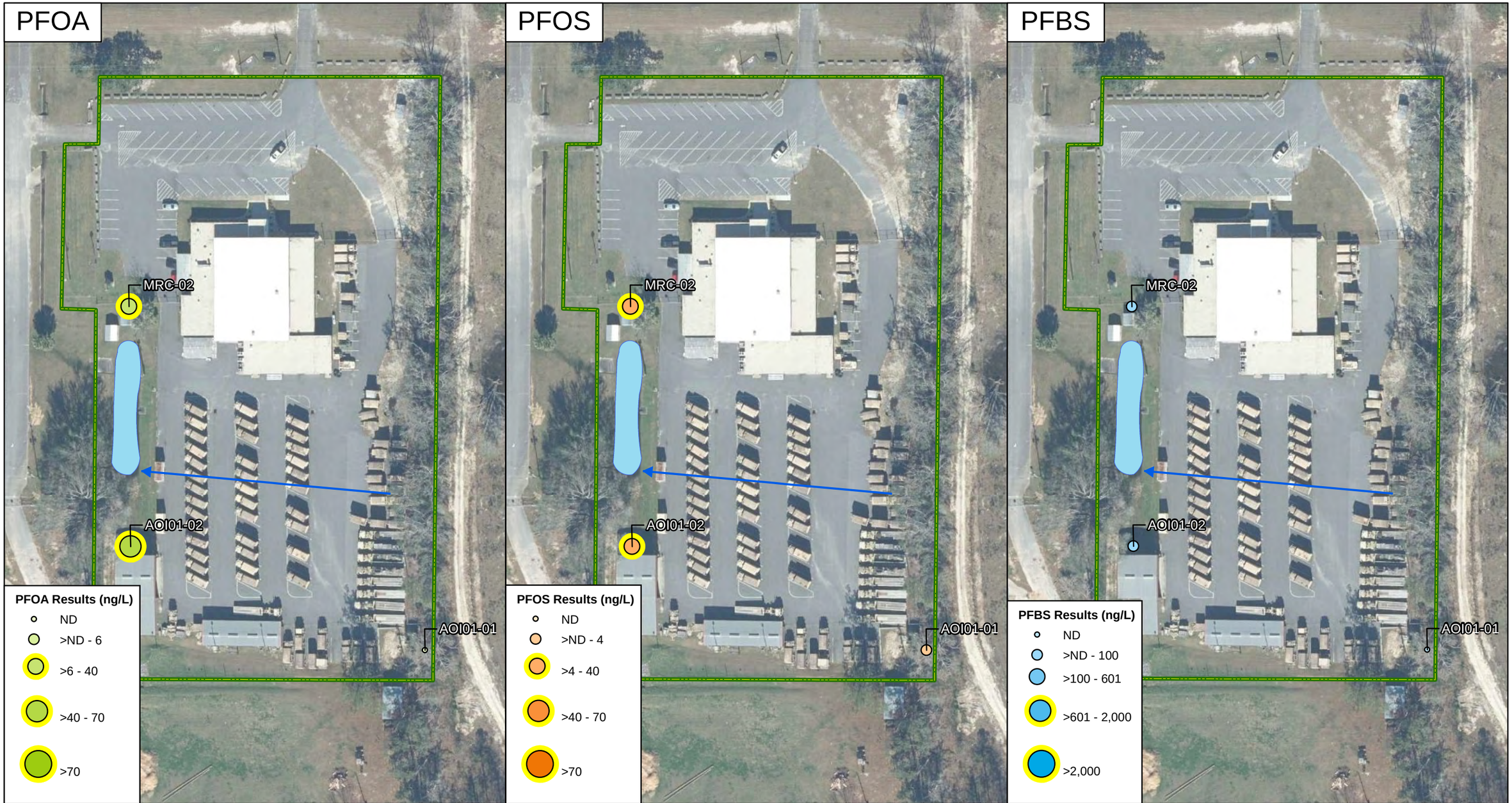
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

PFNA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-5



CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	10/5/2022	GIS BY	MS	10/5/2022
SCALE	1:1,200	CHK BY	BW	10/5/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/5/2022

Installation Boundary
Water Body
Groundwater Flow Direction

0 50 100 200 Feet

N

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

PFOA, PFOS, and PFBS Detections in Groundwater

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-6

PFHxS

PFNA

PFHxS Results (ng/L)

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

PFNA Results (ng/L)

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

CLIENT	ARNG			
PROJECT	Site Inspection at Marianna Readiness Center, FL			
REVISED	8/23/2022	GIS BY	MS	8/23/2022
SCALE	1:1,200	CHK BY	BW	8/23/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/23/2022

Installation Boundary
Water Body
Groundwater Flow Direction

0 50 100 200 Feet

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

N

PFHxS and PFNA Detections in Groundwater

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-7

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7. Exposure Pathways

The CSM for AOI 1, revised based on the SI findings, is presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether that 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 and whether the release came from DoD activities.

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

7.1 Soil Exposure Pathway

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

7.1.1 AOI 1

AOI 1 includes the well pump house and surrounding area. This area includes the facility's water supply well.

PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at AOI 1. Site workers, construction workers, and trespassers could contact constituents in surface soil via incidental

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

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

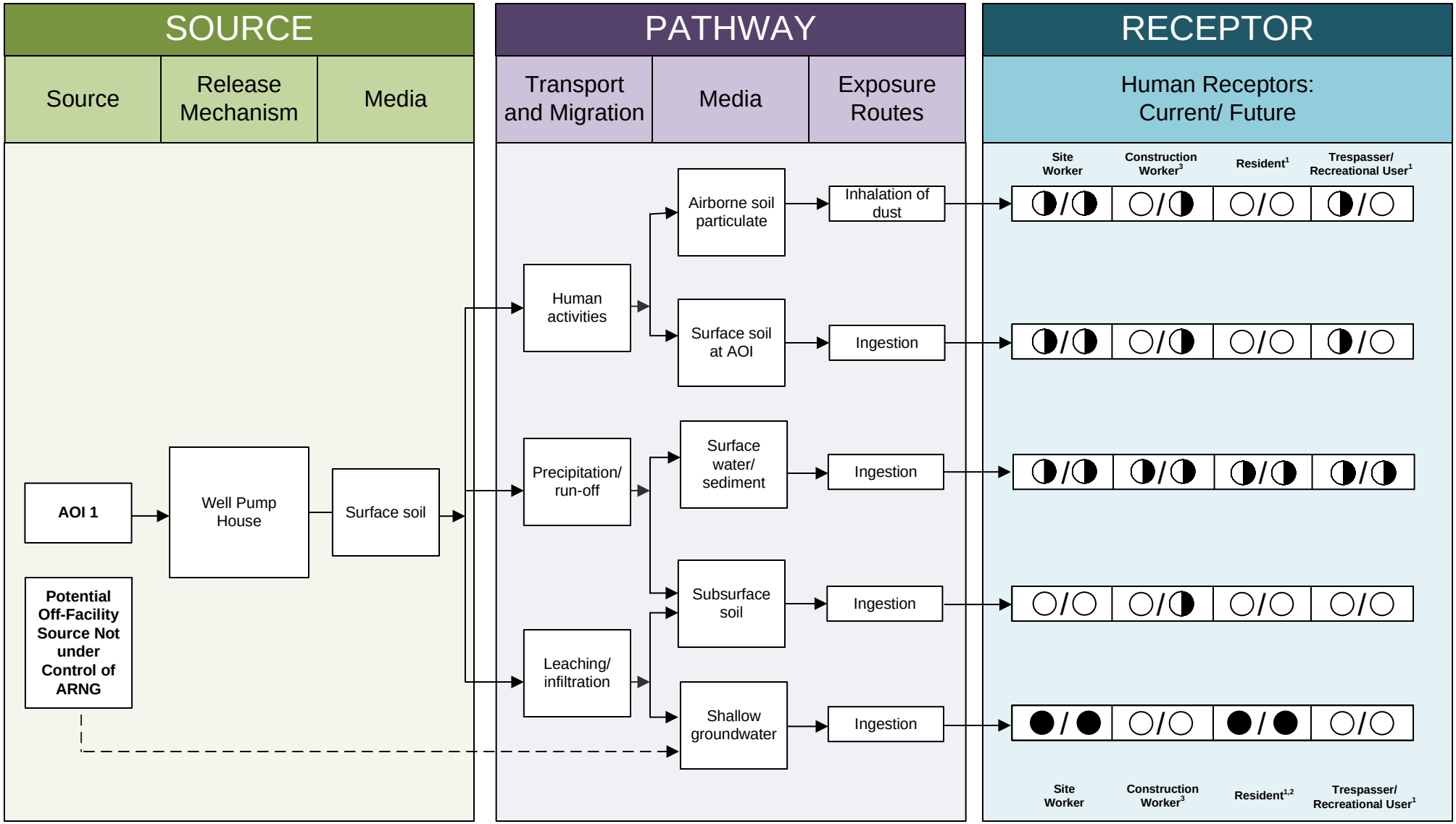
PFOA, PFOS, and PFNA were detected above their SLs in groundwater samples collected at AOI 1. Due to the presence of public water system wells within a 4-mile radius of the facility, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. The private water supply well at AOI 1 provides water to the facility; therefore, the pathway for exposure to site workers via ingestion of groundwater is also considered potentially complete. Depths to water measured during groundwater sampling at the well locations, which were not dry, ranged from 30.97 to 43.05 feet bgs. Therefore, the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

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. PFOA, PFOS, PFBS, PFNA, and PFHxS were detected in soil and groundwater at AOI 1; therefore, it is possible that those compounds may have migrated from soil and groundwater to the wetlands west of the facility or the on-facility retention pond via groundwater discharge or runoff. Therefore, the surface water and sediment ingestion exposure pathway for site workers, construction workers, or trespassers is considered potentially complete. The exposure pathway to off-facility residents is also potentially complete due to downgradient water bodies and wetlands where contaminants from groundwater may have migrated.



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. No current active construction at the facility.

Figure 7-1
Conceptual Site Model, AOI 1
Marianna RC

AECOM

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted from 6 January to 4 February 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, and grab groundwater sample collection. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as noted in **Section 5.8**.

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

- Eighteen soil samples from six boring locations;
- Three grab groundwater samples from three temporary wells;
- Nine 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 the AOI to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. Additionally, the CSM was refined to assess whether a potentially complete pathway exists between the source and potential receptors for potential exposure at the AOI, which is described in **Section 7**.

8.2 Outcome

Based on the results of this SI, further evaluation is warranted for AOI 1: Well Pump House (see **Table 8-1**). Based on the CSM developed and revised in light of the SI findings, there is also potential for exposure to drinking water receptors from AOI 1. However, at no point during either the PA or the SI was there any evidence that any of the relevant compounds were the result of current or historical ARNG/DoD activities. 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 PFOA, PFOS, PFHxS, and PFNA in soil at AOI 1 were below their SLs. PFBS was not detected in soil at AOI 1.
    - PFOA, PFOS, and PFNA in groundwater exceeded their SLs. PFOA exceeded its SL, with a maximum concentration of 43.7 ng/L at location AOI01-02. PFOS exceeded its SL, with a maximum concentration of 28.1 ng/L at location AOI01-02. PFNA exceeded its SL, with a maximum concentration of 14.1 ng/L at location AOI01-02.

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 a removal action, and/or further investigation under CERCLA.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Future Action
1	Well Pump House	◐	●	No Further Action under CERCLA

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

9. References

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