FINAL
Site Inspection Report
Esler Field Army Aviation Support Facility
Louisiana

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

June 2022

Prepared for:

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

UNCLASSIFIED

THIS PAGE INTENTIONALLY BLANK

Table of Contents

Appendices

Figures

Tables

Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society of 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
DL	detection limit
DoD	Department of Defense
DPT	direct push technology
DQI	data quality indicator
DQO	data quality objective
DUA	data usability assessment
DVR	data validation report
EDR™	Environmental Data Resources, Inc.™
EIS	extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
ERB	equipment rinsate blank
FedEx	Federal Express
GPRS	Ground Penetrating Radar Systems, LLC.
HA	Health Advisory
HDPE	high-density polyethylene
IDW	investigation-derived waste
IIS	injection internal standards
ITRC	Interstate Technology Regulatory Council
LAARNG	Louisiana Army National Guard
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit

MS	matrix spike
MSD	matrix spike duplicate
n.d.	no date
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
NOAA	National Oceanic and Atmospheric Administration
OSD	Office of the Secretary of Defense
OWS	oil/water separator
P&A	plugged and abandoned
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFCs	perfluorinated compounds
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic acid
PID	photoionization detector
PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCRA	Time Critical Removal Action
TOC	total organic carbon
TPP	Technical Project Planning
UCMR 3	Unregulated Contaminant Monitoring Rule 3
UFP	Uniform Federal Policy

US	United States
USACE	United States Army Corps of Engineers
USACHPPM	United States Army Center for Health Promotion and Preventative Medicine
USAEHA	United States Army Environmental Hygiene Agency
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VFD	Volunteer Fire Department
WWD #3	Water Works District No. 3

THIS PAGE INTENTIONALLY BLANK

Executive Summary

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

Esler Field AASF occupies 1,991 acres along on Route 116 (Esler Field Road), adjacent to the Camp Beauregard Training Site. The facility is used for numerous training exercises. Roughly 60% and 40% of the airport's operations are military and civilian, respectively. The MMR Group and Crest Industries have facilities at Esler Field AASF and each support multiple aircraft.

During the PA for PFAS, six potential PFAS release areas were identified: Sewage Oxidation Pond, North Ramp/Wash Rack, Hangar Buildings 6001 and 6002, South Ramp, Firehouse Building 6004, and Storage Building 6067/6068 (AECOM, 2020). PFAS-containing aqueous film forming foam (AFFF) may have been released during fire training activities at the North Ramp/Wash Rack and South Ramp. Releases at these locations would be conveyed to the Sewage Oxidation Pond via stormwater drainage. AFFF has also been historically stored at Firehouse Building 6004, Storage Building 6067/6068, and the Hangar Buildings 6001 and 6002. The potential PFAS release areas were grouped into four AOIs, AOI 1 through AOI 4, which were investigated during the SI. The SI field activities were conducted from 26 July to 3 August 2021 and included the collection of soil and groundwater samples.

To fulfill the project Data Quality Objectives set forth in the approved SI Quality Assurance Project Plan Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of 18 PFAS by liquid chromatography with tandem mass spectrometry compliant with Quality Systems Manual 5.3 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.9** of this Report.

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

The SLs are presented on **Table ES-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain the 18 PFAS analyzed within the boundaries of the facility.

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

- At AOI 1, PFOA, PFOS, and PFBS were detected in groundwater at the Sewage Oxidation Pond potential PFAS release area but were below the SLs, at concentrations of 5.13 nanograms per liter (ng/L), 0.810 J ng/L, and 0.856 J ng/L. Based on the results of the SI, further evaluation of AOI 1 is not warranted.

- At AOI 2, PFOA, PFOS, and PFBS were not detected in groundwater at the North Ramp/Wash Rack and Hangar Buildings 6001 and 6002 potential PFAS release areas. Based on the results of the SI, further evaluation of AOI 2 is not warranted.
- At AOI 3, PFOS and PFBS were detected in groundwater at the South Ramp, at concentrations below the SLs. The maximum detection of PFOS was 1.41 J ng/L at AOI03-02, whereas PFBS was only detected at AOI03-03, with a concentration of 7.57 ng/L. PFOA was not detected in any of the three temporary well locations. Based on the results of the SI, further evaluation of AOI 3 is not warranted.
- At AOI 4, no groundwater samples were collected. At the Storage Building 6067/6068, AOI04-01, PFOA, PFOS, and PFBS were not detected in soil. At the Firehouse Building 6004, AOI04-02, PFOA, PFOS, and PFBS were detected at concentrations below the SLs. Based on the results of the SI, further evaluation of AOI 4 is not warranted.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs.

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

Table ES-3 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo a Remedial Investigation. Based on the results of this SI, further evaluation is not warranted at AOI 1: Sewage Oxidation Pond, AOI 2: North Ramp/Wash Rack, AOI 2: Hangar Buildings 6001 and 6002, AOI 3: South Ramp, AOI 4: Firehouse Building 6004, and AOI 4: Storage Building 6067/6068.

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

Analyte	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	130	1,600	40
PFOS	130	1,600	40
PFBS	1,900	25,000	600

Notes:

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

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Sewage Oxidation Pond	◐	◐	N/A
2	North Ramp/Wash Rack	◐	○	N/A
	Hangar Buildings 6001 & 6002	◐	○	N/A
3	South Ramp	◐	◐	◐
4	Firehouse Building 6004	◐	N/A	N/A
	Storage Building 6067/6068	○	N/A	N/A

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

Table ES-3: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Sewage Oxidation Pond	PFOA, PFOS, and PFBS detected in groundwater at source area below the SLs. No exceedances of SLs in soil.	No further action
2	North Ramp/Wash Rack	No detections of PFOA, PFOS, and PFBS in groundwater. No exceedances of SLs in soil.	No further action
	Hangar Buildings 6001 & 6002	No detections of PFOA, PFOS, and PFBS in groundwater. No exceedances of SLs in soil.	No further action
3	South Ramp	Detections of PFOS and PFBS in groundwater below the SLs. No detections of PFOA in groundwater. No exceedances of SLs in soil.	No further action
4	Firehouse Building 6004	No exceedances of SLs in soil.	No further action
	Storage Building 6067/6068	No detections of PFOA, PFOS, or PFBS in soil.	No further action

THIS PAGE INTENTIONALLY BLANK

1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites, ARNG Installations, Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at Esler Field Army Aviation Support Facility (AASF), near Pineville, Louisiana. Esler Field AASF 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; US Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and polyfluoroalkyl substances (PFAS). The term PFAS is used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

A PA was performed at Esler Field AASF (AECOM, 2020) that identified six potential PFAS release areas at the facility, which were grouped into four Areas of Interest (AOIs). The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

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

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

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

THIS PAGE INTENTIONALLY BLANK

2. Facility Background

2.1 Facility Location and Description

Esler Field AASF is located in central Louisiana, off Louisiana Highway 116 (Esler Field Rd), in Rapides Parish, approximately 12 miles northeast of Alexandria (**Figure 2-1**). Esler Field encompasses approximately 1,991 acres and is immediately adjacent (south of) to the 12,889-acre Camp Beauregard Training Site, which is geographically separate from the 729-acre Camp Beauregard Cantonment Area. Esler Field was constructed in 1940 for the US Army Air Corps and was originally named Camp Beauregard Army Field. The Air Corps used the facility extensively through 1942. The facility was renamed Esler Army Airfield in 1941 to honor Lieutenant Esler. In 1945, the facility was reassigned directly to Third Air Force and began the process of deactivation. The facility was finally closed in 1946, and it remained Federal property until the 1950s, when it was ceded to the Rapides Parish Police Jury as surplus property. Under the Rapides Parish Police Jury, the facility served as the City of Alexandria's commercial airport until the 1990s, when commercial traffic was moved to Alexandria International Airport (Louisiana ARNG [LAARNG], no date [n.d.]).

In 2001, Rapides Parish Police Jury transferred the facility's management to the LAARNG in a 99-year lease, and the facility is now used for numerous training exercises. Currently, roughly 60 percent (%) of the airport's operations are military, and the rest are civilian. Although Esler Field does not offer private jet passenger services, it does provide both military and civilian aircraft fuel services. In December of 2011, the MMR Group, which previously based its aviation operations at Alexandria International Airport, completed work on its new corporate aviation facility at Esler Field. The facility includes 10,000 square feet of hangar space and 3,000 square feet of office space. MMR shares its facilities with Crest Industries, and the two groups currently support multiple aircraft.

2.2 Facility Environmental Setting

Esler Field AASF is located in the Upper West Gulf Coastal Plain physiographic region. The topography of the facility is considered gently rolling, and the elevations across the area range from approximately 60 to 140 feet above mean sea level. The higher elevations occur on the northern most portion of the facility, whereas lower elevations are located along the northern floodplain of Flagon Bayou, along the south and eastern boundaries of the facility (LAARNG, 2007). Topography is shown on **Figure 2-2**.

2.2.1 Geology

In general, the geology of central Louisiana is composed of marine sediments deposited during fluctuating sea levels, and fluvial sediments deposited by the meandering Mississippi River system. These sediments dip less than 5 degrees toward the south-southeast, and their compositions range from clays to sands (US Army Environmental Hygiene Agency [USAEHA], 1994). The Oligocene to Miocene fluvial and marine deposits in the central portion of the State comprise, from oldest to youngest, the Catahoula Formation overlain by the Lena, Carnahan Bayou, and Dough Hills members of the Fleming Formation (USAEHA, 1994). The Catahoula formation contains thick sand beds that are interbedded with thinner clay layers (US Army Center for Health Promotion and Preventive Medicine [USACHPPM], 2004). The three members of the Fleming Formation consist of consolidated clays with discontinuous silts and sands (USAEHA, 1994).

As shown on **Figure 2-3**, most of Esler Field AASF is mapped as the Dough Hills Member of the Miocene Fleming Formation and described as undifferentiated fluviatile silts and sands with

calcareous brackish-water clays (US Geological Survey [USGS], 2019a). Immediately north and south are more recent Quaternary alluvial and fluvial deposits overlying the older Oligocene to Miocene sediments. These Quaternary deposits are composed of alternating clayey and sandy to gravely facies. The sandy to gravely facies have high porosity and permeability, which allow for greater rainwater infiltration. The clayey facies act as a surficial confining layer limiting infiltration into the underlying formations (USAEHA, 1994).

In previous studies, soil borings advanced along the western boundary of Camp Beauregard Training Site (north of Esler Field) show sediments in a downward coarsening sequence from primarily silt at the surface, to sand, and eventually to sand and gravel, at depths between 15 and 25 feet below ground surface (bgs). An abrupt facies shift from the overlying coarse sand and gravel to a stiff clay was identified across the investigation area, at depths ranging from 25 feet to 35 feet bgs. The thickness of this clay layer was not determined due to direct-push technology (DPT) rig refusal. Soil borings advanced near the southwestern boundary of Camp Beauregard were noted, with sandy silts observed to fine downward into stiff silty clay and clay, where the DPT rig was refused at depths ranging between 15 and 26 feet bgs (USACE, 2014).

Soil borings completed during the SI were drilled to depths between 20 and 45 feet bgs. The top 3 to 5 feet of unconsolidated sediments were predominantly coarse-grained sediments (sand and gravel), with minor components of fine-grained sediments (silt and clay). Directly underlying these surficial sediments were thick layers of fine-grained sediments, characterized as clay-rich silt to silt-rich clay, ranging in thickness from 10 to 26 feet. Grain size analyses were collected on the fine-grained sediments and are presented in **Appendix F**. Underlying these thick layers of silt and clay are sand-rich lenses with varying minor amounts of silt and clay. These sand lenses are characterized as poorly graded sand (<15% fines) to silty/clayey sand (>15% fines) and range from 0.5 to 6 feet in thickness. The sands observed at Esler Field AASF were predominantly fine-grained, with localized areas of minor medium-grained sand. The sand lenses are interbedded with clay- and silt-dominated lenses, often grading from poorly graded sand to silty/clayey sand to sandy clay/silt to clay/silt, and vice versa. These facility observations are consistent with the fluviatile silts and sands of the Dough Hills Member. Boring logs are presented in **Appendix E** .

2.2.2 Soil

Surficial soils at Esler Field consist primarily of fine sandy loam and clay loam derived from marine and alluvial Quaternary deposits (US Department of Agriculture [USDA], Soil Conservation Service, 1980). Soils present at Esler Field include Beauregard silt loam, Caddo silt loam, Cahaba fine sandy loam, and the Libusse silt loam. The Beauregard, Caddo, and Libusse silt loams have relatively low permeability, while the Cahaba is well-drained and moderately permeable. All of these soil types are described as relatively acidic with slight erodibility (USDA, 2019).

2.2.3 Hydrogeology

Esler Field is underlain by the Coastal Lowlands aquifer system, locally known as the Miocene Fleming Formation. The Coastal Lowlands aquifer system consists of a gulf-ward thickening, heterogenous, unconsolidated to poorly consolidated wedge of discontinuous beds of sand, silt, and clay, with an approximate thickness of 2,000 feet thick in the vicinity of Esler Field. This system yields large quantities of water for agricultural, public supply, domestic, commercial, and industrial uses (Tomaszewski, 2009). The inferred direction of groundwater flow is north-northeast (**Figure 2-3**). It is possible that the groundwater may locally flow to the southeast, towards Flagon Bayou.

Underlying the Coastal Lowlands aquifer system is the Mississippi Embayment aquifer system, which is in poorly consolidated sedimentary rocks of Late Cretaceous to middle Eocene age. The two systems are separated by a thick, effective confining unit. Of the six aquifers contained within

the Mississippi Embayment aquifer system, the Middle Claiborne aquifer is the most heavily used; it has a reported thickness in the vicinity of Esler Field, ranging from 600 to 800 feet (USGS, 2019b).

Water to the facility and areas north, south, and west of the facility is supplied by the Water Works District No. 3 of Rapides Parish (WWD #3). WWD #3 distributes water sourced from seven groundwater wells (40%) and a surface water structure on Big Creek, in Grant Parish, Louisiana (60%), over 8 miles north of Esler Field. Two of the WWD #3's supply wells are located at Camp Beauregard. Two wells at Esler Field (#8 and #9) were drilled in 2007 to depths of 651 and 621 feet, respectively. These wells are offline due to methane, which is cost prohibitive to remove. However, well #8 (north of AASF) is used to supply the Esler Field maintenance facility's fire protection system water storage tank (French, 2020). Residents and businesses east of Esler Field are served by Buckeye Water District No. 50. The Buckeye District obtains all source water from five wells that range from 1,800 to 2,000 feet deep. Two wells (#1 and #2) are located northeast of Buckeye, off LA-115 (over 7 miles east of Esler Field); three wells (#3, #4, and #5) are located in Libuse, Louisiana (approximately 2 miles south southwest of Esler Field) (Charrier, 2020).

Using additional online resources, such as state and local geographic information system databases, wells were researched to a 4-mile radius of the facility. A total of 23 wells were identified within 1 mile of the facility (Environmental Data Resources, Inc.™ [EDR™], 2019). One well (named Esler Field Well No 2) is located on the northwest portion of the airfield, in the same location as Esler Field Well #8 (**Figure 2-3**). Esler Field Well No 2 is reported as drilled in 1941 to a depth of 635 feet bgs and screened from 591 to 633 feet bgs. LAARNG reports this well is offline. Six wells are noted as USGS Louisiana Water Science Center wells, with depths ranging from 150 to 675 feet bgs, and they are installed in the Carnahan Bayou member of the Fleming Formation. The Carnahan Bayou unit is identified as a confined aquifer within the Coastal Lowlands aquifer system, with approximate depths to water ranging from 20 to 90 feet. Of the remaining 16 wells, one well with a depth of 650 feet bgs is reported as destroyed (owner: Louisiana National Guard, immediately north of the facility), and 15 wells are reported as plugged and abandoned (P&A). Eleven of the fifteen P&A wells were reported as test holes, with depths ranging from 260 to 706 feet bgs, and four of the fifteen wells were reported as monitoring wells owned by TEXACO and located in close proximity to the facility, with depths of 30 feet bgs (EDR™, 2019). One active domestic well, located approximately 2 miles southeast of the facility, was identified with a well depth of 71 feet bgs (Louisiana Department of Natural Resources, 2021).

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data, it was indicated that no PFAS were detected in a public water system within 20 miles of the facility (USEPA, 2017a). PFAS analyses performed in 2016 had method detection limits (MDLs) that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR 3 but might be detected if analyzed today.

Depths to water measured in August 2021 during the SI ranged from 6.12 to 19.93 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-5** and indicate groundwater flow direction is generally toward Flagon Bayou to the south and southwest.

2.2.4 Hydrology

Esler Field AASF is located in the Lower Flagon Bayou Watershed (**Figure 2-4**). Surface water in the vicinity of the facility consists of perennial and intermittent streams, open water bodies, and wetlands. The ground surface slopes to the south, toward Flagon Bayou, which flows east then northeast, discharging to Catahoula Lake. Catahoula Lake, which covers over 46 square miles in LaSalle Parish, supports multiple species of waterfowl including duck, geese, and wading birds, and it is used for recreational fishing and hunting (Horst, 2019).

Wastewater from the facility is conveyed to the west via underground pipe to the small, square, lined Sewage Oxidation Pond on the southwest corner of the facility.

2.2.5 Climate

Esler Field, located in north-central Louisiana, has a sub-tropical climate influenced by its proximity to the Gulf of Mexico. The average temperature (1981-2010) for Esler Field is 65 degrees Fahrenheit (°F), with an average daily low of 37°F in January to an average daily high of 94°F in August. Annual precipitation is 57.5 inches and is relatively evenly distributed, with the lowest precipitation from July to September (National Oceanic and Atmospheric Administration [NOAA], 2019). The mean annual relative humidity is 74% (LAARNG, 2007). The mean annual evaporation rate in central Louisiana is 45 inches (NOAA, 1982). Thunderstorm activity is most common during hurricane season (1 June to 31 October), when tropical storms and hurricanes regularly develop in the Gulf of Mexico. The tropical disturbances cause high winds and excessive rainfall (LAARNG, 2007).

2.2.6 Current and Future Land Use

Esler Field AASF is currently leased from Rapides Parish and is primarily used for a variety of helicopter-related training activities (LAARNG, 2007). Access to the facility is restricted and controlled by fencing and gates. Reasonably anticipated future land use is not expected to change from the current land use. Residential areas are located approximately 1 mile to the west and 1 mile to the southeast.

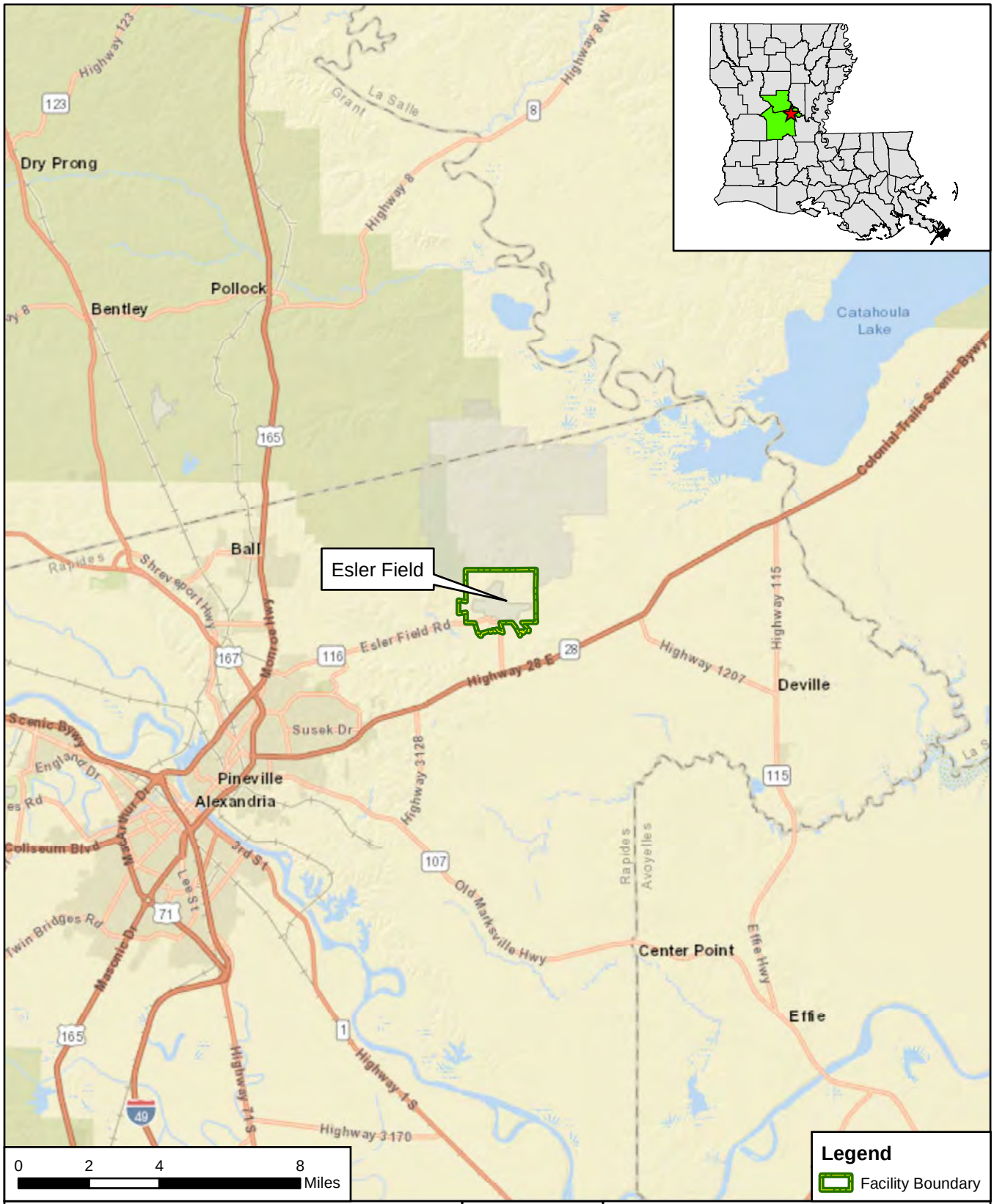
2.2.7 Sensitive Habitat and Threatened/ Endangered Species

The following birds, plants, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Rapides Parish, Louisiana (US Fish and Wildlife Service [USFWS], 2021).

- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate).
- **Mammals**: Northern Long-Eared bat, *Myotis septentrionalis* (threatened).
- **Clams:** Louisiana pearlshell, *Margaritifera hembili* (threatened).
- **Fish:** Pallid sturgeon, *Scaphirhynchus albus* (endangered).
- **Birds:** Red-cockaded woodpecker, *Picoides borealis* (endangered).
- **Reptiles:** Louisiana pinesnake, *Pituophis ruthveni (*threatened*).*

2.3 History of PFAS Use

Six potential PFAS release areas were identified at the Esler Field AASF during the PA and were grouped into four AOIs, where aqueous film forming foam (AFFF) may have been used or released historically (AECOM, 2020). Esler Field AASF includes two hangars, Hangar Buildings 6001 and 6002. Both hangars are equipped with water deluge fire suppression systems and stores Chemguard 3% AFFF. There have been no reported releases at either of the hangars. Between 1996 and 2007, fire training activities with Tri-Max™ foam carts were used at the North Ramp and Wash Rack. From 2005/2006 to 2007, fire training activities involving the Tri-Max™ carts were also conducted at the South Ramp. From the 1980s to through the 1990s, Firehouse Building 6004 served as the fire station for the Esler Regional Airport and was the storage location of AFFF. AFFF was also stored at Storage Building 6067/6068 up to the time of the PA. Descriptions of AOIs 1 through 4 are presented in **Section 3**.



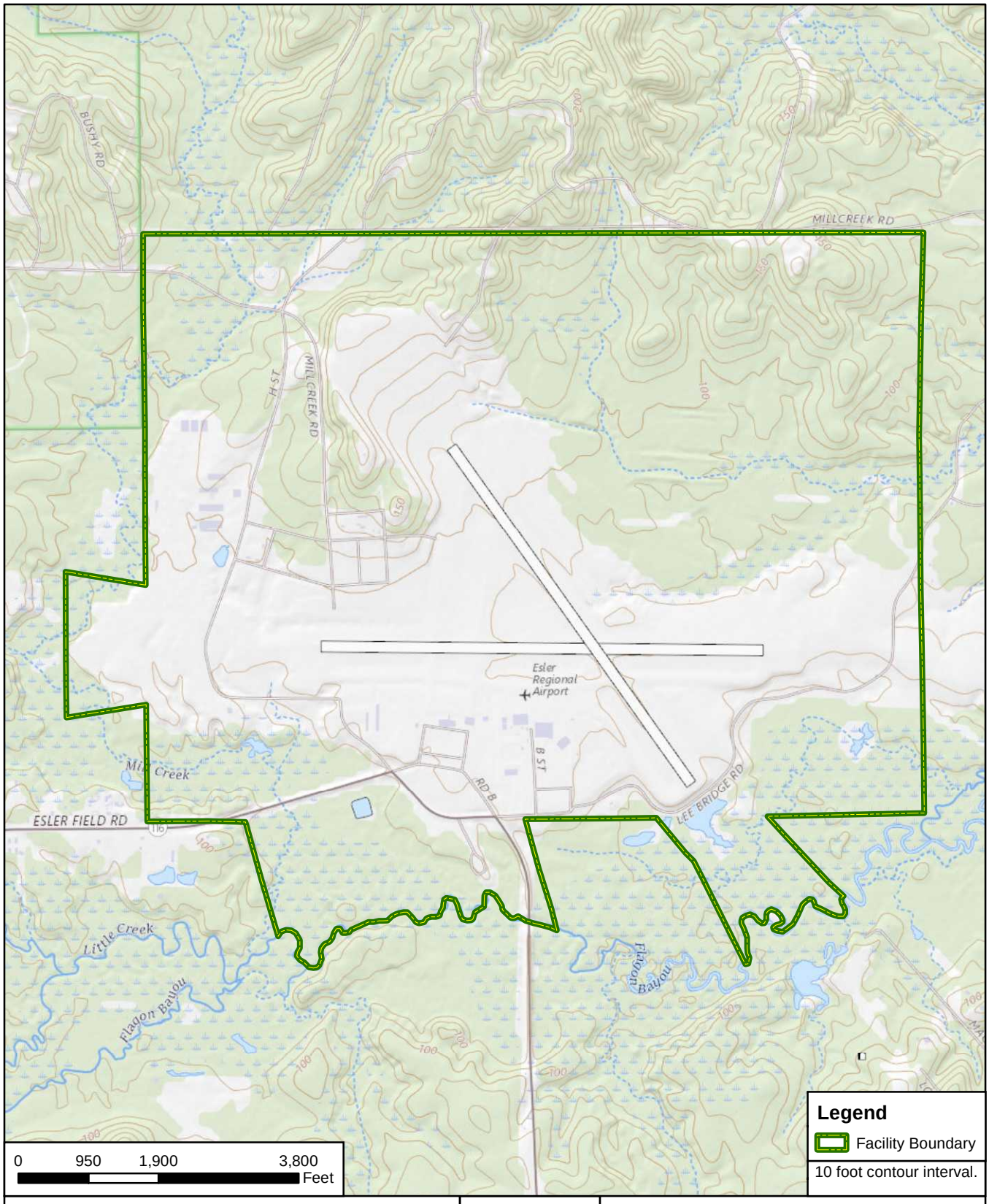
CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Esler Field, LA			
REVISED	9/17/2021	GIS BY	MS	9/17/2021
SCALE	1:253,440	CHK BY	SS	9/17/2021
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	9/17/2021

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_2-1_Esler_Field_FacilityLocation.mxd



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Esler Field, LA			
REVISED	12/14/2021	GIS BY	MS	12/14/2021
SCALE	1:22,800	CHK BY	SS	12/14/2021
Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	12/14/2021

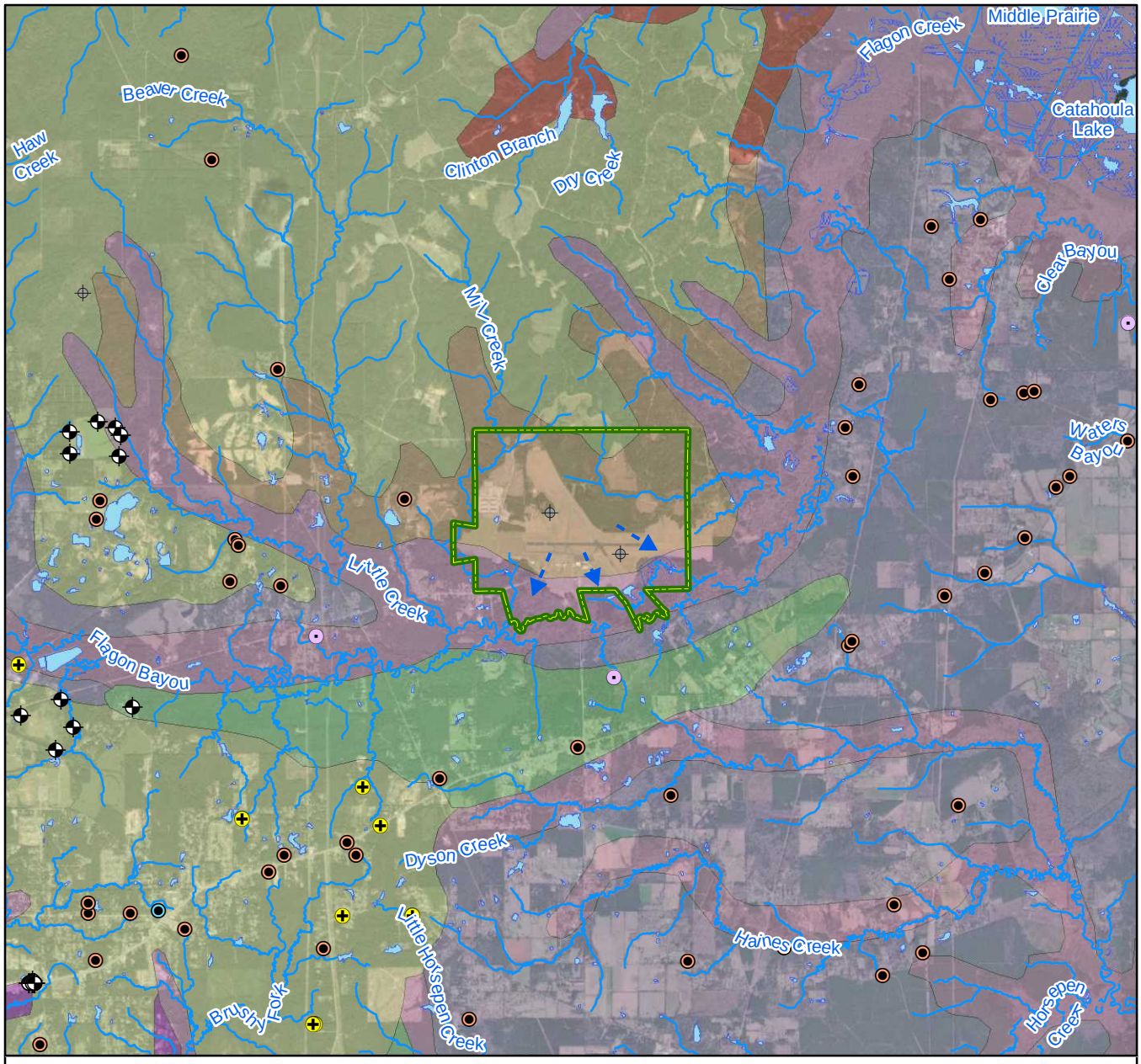
N

Facility Topography Map

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_2-2_Esler_Field_Facility_Topogrpahy.mxd



Legend

- Facility Boundary
- Water Body
- Wetland
- River/Stream
- Groundwater Flow Direction

Geology

- Recent Alluvium
- Prairie Terraces
- Intermediate Terraces
- High Terraces
- Williamson Creek
- Carnahan Bayou
- Dough Hills

Wells

- Commercial Public Supply
- Domestic
- Public Supply
- Irrigation
- Monitoring
- Other - Offline

0 4,000 8,000 16,000 Feet

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Esler Field, LA			
REVISED	10/8/2021	GIS BY	MS	10/8/2021
SCALE	1:96,000	CHK BY	JH	10/8/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	10/8/2021

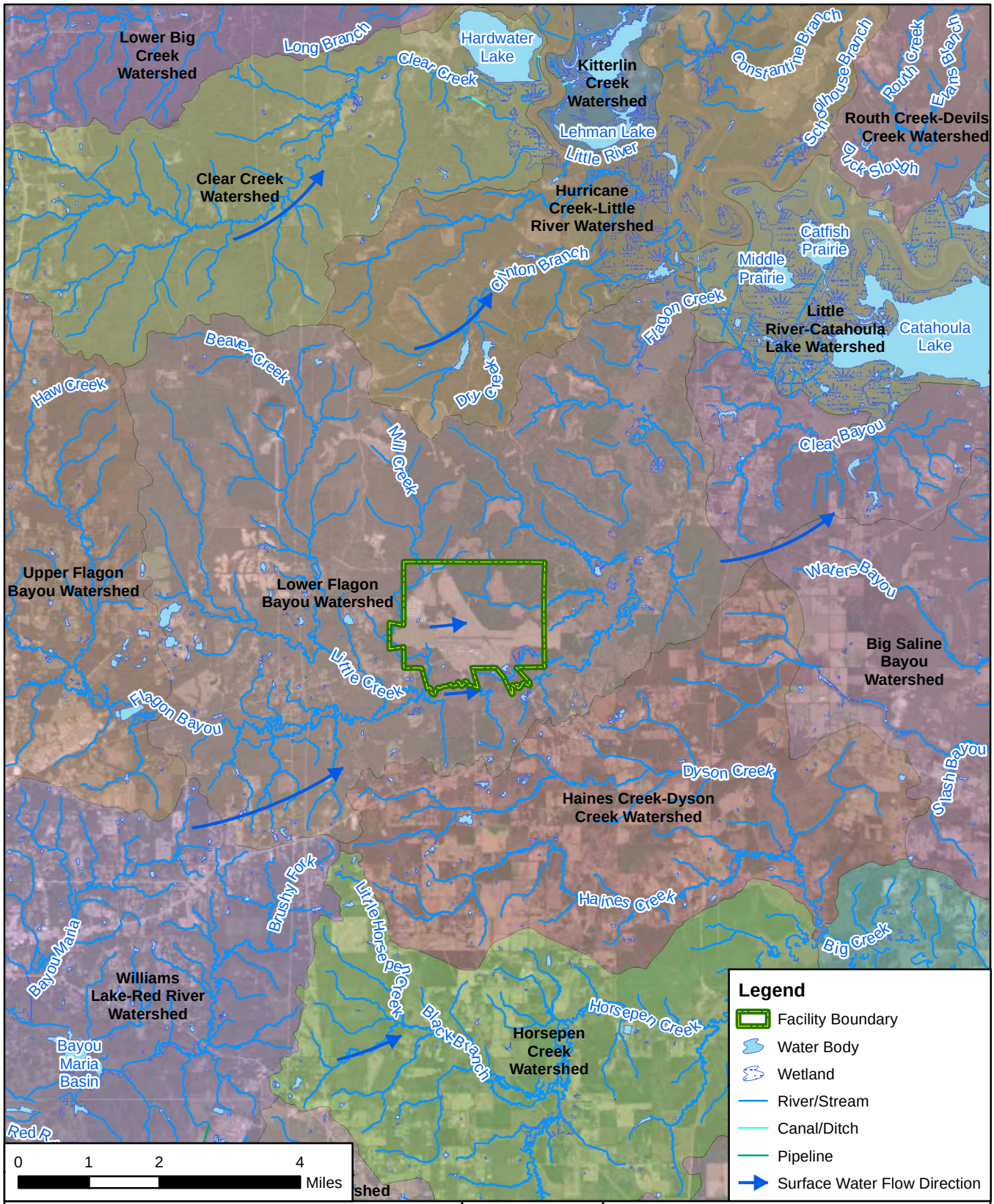
N

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_2-3_Esler_Field_Groundwater.mxd



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Esler Field, LA			
REVISED	10/7/2021	GIS BY	MS	10/7/2021
SCALE	1:126,720	CHK BY	SS	10/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	10/7/2021

Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_2-4_Esler_Field_Surfacewater_Features.mxd

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	10/7/2021	GIS BY	MS	10/7/2021
SCALE	1:4,800	CHK BY	SS	10/7/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	10/7/2021

Legend

- Soil Boring/Temp Monitoring Well Location
- Facility Boundary
- Water Body
- River/Stream
- Approximate Path of Storm Sewer Pipe
- Groundwater Elevation Contour
- Inferred Groundwater Elevation Contour
- Groundwater Flow Direction

N

Groundwater Elevation Contours

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_2-5_Esler_Field_SI_GW_Contours.mxd

THIS PAGE INTENTIONALLY BLANK

3. Summary of Areas of Interest

This section presents a summary of each potential PFAS release area by AOI. Based on the PA findings, six potential PFAS release areas, Sewage Oxidation Pond, North Ramp/Wash Rack, Hangar Buildings 6001 and 6002, South Ramp, Firehouse Building 6004, and Storage Building 6067/6068, were identified at Esler Field AASF and grouped into four AOIs (AECOM, 2020). The potential PFAS release areas are shown on **Figure 3-1**.

3.1 AOI 1

AOI 1 consists of one potential PFAS release area. The potential release area is described below.

3.1.1 Sewage Oxidation Pond

Stormwater is conveyed from various points on the facility to the approximately 1.3-acre square, lined, Sewage Oxidation Pond on the southwestern portion of the installation. Between 1996 and 2007, fire training activities occurred on the North Ramp/Wash Rack and South Ramp in which foam was dispensed from Tri-Max™ carts and was subsequently rinsed down nearby stormwater drains (described further in **Sections 3.2.1** and **3.3.1**). Drains convey stormwater to an oil/water separator (OWS) and then to the Sewage Oxidation Pond. LAARNG reports the Sewage Oxidation Pond overflows at least once a year, with resulting overflow discharging to surrounding surface soil and potentially to Flagon Bayou. The geographic coordinates for the Sewage Oxidation Pond are 31° 23'18.34"N; 92°18'15.23"W.

3.2 AOI 2

AOI 2 consists of two potential PFAS release areas. The potential release areas are described below.

3.2.1 North Ramp/Wash Rack

Fire training at the North Ramp/Wash Rack was conducted annually between 1996 and 2007. The exact location of the training events held on the ramps varied from year to year. During these drills (held jointly with the local Holloway Volunteer Fire Department [VFD]), expired or nearly expired Tri-Max™ foam carts were fully expended. After training, the expended carts were recharged with 5-gallon buckets stored in the Storage Building (discussed further in **Section 3.4.2**). Foam dispensed from Tri-Max™ carts during training was rinsed from the ramp down into a nearby stormwater drain. Drains convey stormwater southwest to an OWS and then to the Sewage Oxidation Pond located on the southwestern portion of the facility. The geographic coordinates for the North Ramp/Wash Rack are 31° 23'27.15"N; 92°17'45.64"W.

3.2.2 Hangar Buildings 6001 and 6002

Hangar Buildings 6001 (primary hangar built before 1955) and 6002 (built between 1955 and 1971) are located in close proximity to each other, in the south-central portion of the facility. The fire suppression systems in the hangars are water deluge (no foam). Chemguard 3% AFFF is stored in each building. No suspected releases or spills of AFFF occurred at these locations (AECOM, 2020). The geographic coordinates for the hangars are 31° 23'28.67"N; 92°17'46.84"W (6001) and 31° 23'30.01"N; 92°17'50.54"W (6002).

3.3 AOI 3

AOI 3 consists of one potential PFAS release area. The potential release area is described below.

3.3.1 South Ramp

The South Ramp was constructed in 2005-2006, and fire training was conducted until 2007. The exact location of the training events held on the ramp varied from year to year. During these drills (held jointly with the local Holloway VFD), expired or nearly expired Tri-Max™ foam carts were fully expended. After training, the expended carts were recharged with 5-gallon buckets stored in the Storage Building. Foam dispensed from Tri-Max™ carts during training was rinsed from the ramp down into a nearby stormwater drain. Drains convey stormwater west to an OWS and then to the Sewage Oxidation Pond located on the southwestern portion of the facility. The geographic coordinates for the South Ramp are 31° 23'24.84"N; 92°17'38.92"W.

3.4 AOI 4

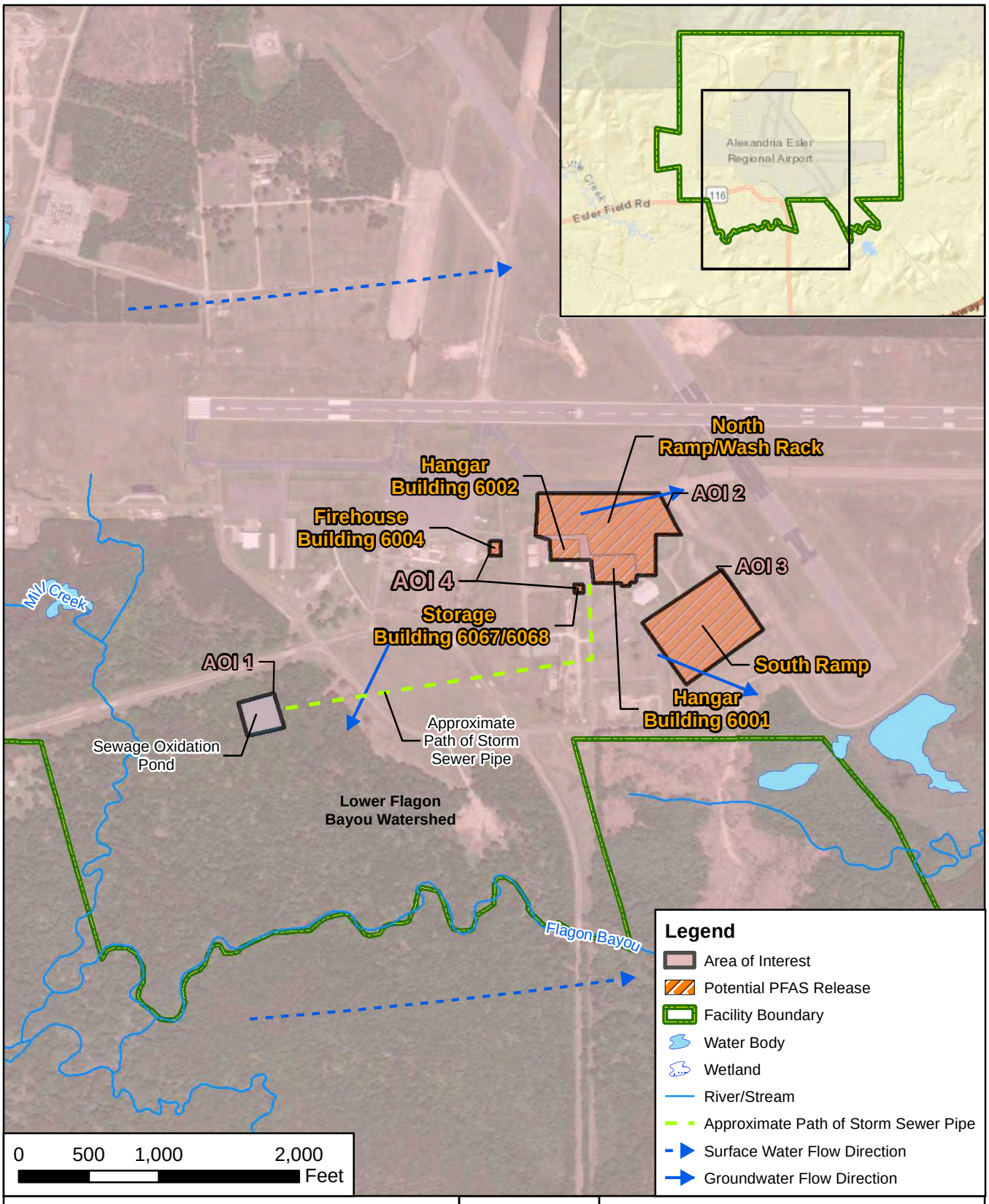
AOI 4 consists of two potential PFAS release areas. The potential release areas are described below.

3.4.1 Firehouse Building 6004

Firehouse Building 6004 was active from the late 1980s through the 1990s, when Esler Field was still Esler Regional Airport. Firehouse Building 6004 was a civilian firehouse run by the Holiday Village Fire Department, and AFFF was stored in 5-gallon buckets within the building. The firehouse shut down in the late 1990s, and fire response is now currently handled through a pre-accident plan with the Holloway VFD. There have been no reported AFFF releases or spill incidents at this location (AECOM, 2020). The geographic coordinates for Firehouse Building 6004 are 31° 23'30.01"N; 92°17'56.20"W.

3.4.2 Storage Building 6067/6068

AFFF was previously stored in a portable building before being moved to the Storage Building (6067/6068), located just south of the primary hangar (Hangar 6001). At the time of the PA, three containers of Chemguard 3% solution were stored in the building (AECOM, 2020). During training from 1996 to 2007, 5-gallon buckets of AFFF were used to recharge the fire extinguisher carts located on the North and South Ramps. There have been no reported AFFF releases or spill incidents at this location. The geographic coordinates for the Storage Building 6067/6068 are 31° 23'27.15"N; 92°17'49.38"W.



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:12,000	CHK BY	SS	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	4/21/2022

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_3-1_Esler_Field_AOIs.mxd

THIS PAGE INTENTIONALLY BLANK

4. Project Data Quality Objectives

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

4.1 Problem Statement

The following problem statement was developed during project planning:

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

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

The SLs are presented in **Section 6.1** of this Report.

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

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

4.2 Goals of the Study

The following goals were established for this SI:

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

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

4.3 Information Inputs

Primary information inputs included:

- The PA for Esler Field AASF (AECOM, 2020);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021a); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). Temporal boundaries were limited to the summer season, which was the earliest available time that field resources were available to complete the study.

4.5 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the 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 and decision rules as defined in the SI QAPP Addendum (AECOM, 2021a). These rules governed response actions based on the results of the SI sampling effort.

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

Groundwater:

- Is there a human receptor within 4 miles of the facility?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release areas?

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

Soil:

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

Soil and groundwater samples were collected at the potential release areas. Groundwater was encountered at approximately 6.12 to 19.93 feet bgs.

4.6 Data Usability Assessment

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

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

4.6.1 Precision

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

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established quality control (QC) criteria. No associated calibration verifications displayed results outside the project established precision limits presented in the QAPP Addendum (AECOM, 2021a).

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

MS/MS duplicate (MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. The MS/MSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2021a).

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2021a) with limited exceptions. The field duplicate pair performed on sample AOI03-02-SB-9-11 displayed non-detect results for PFBS, perfluorohexanoic acid (PFHxA), and perfluorohexanesulfonic acid (PFHxS), while the associated field duplicate sample displayed positive results for these analytes. Several field duplicate pairs displayed one non-detect result for a compound, while the associated field duplicate sample displayed a positive result. The associated field duplicate pair results were qualified as estimated and should be considered usable as qualified. The field duplicate pair performed on parent sample AOI02-02-SB-0-2 displayed a relative percent difference greater than the project established precision limits for total organic carbon (TOC). The associated field duplicate pair results were qualified as estimated and should be considered usable as qualified.

4.6.2 Accuracy

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

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis. The LCS/LCSD samples were within the project established accuracy limits presented in the QAPP Addendum (AECOM, 2021a), with one exception. One LCS displayed a percent recovery greater than the established project precision limit of 129% for perfluorobutyrate (PFBA) at 130%. The associated field sample results were all non-detect and should be considered usable as reported.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. The MS/MSD samples were within the project established control limits presented in the QAPP Addendum (AECOM, 2021a).

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Field sample AOI01-01-GW displayed an EIS area count for M_2 sodium 1 H, 1 H,2H,2H-perfluoro-1-[1 ,2-$^{13}C^2$]octanesulfonate (6:2 FTS) greater than the project established precision limits presented in the QAPP Addendum (AECOM, 2021a). The associated field sample result was non-detect and should be considered usable as reported.

Injection internal standards (IIS) were added by the laboratory after sample extraction and prior to analysis as a legacy requirement of DoD QSM 5.1 to measure relative responses of target analytes. Even though not required under the current DoD QSM 5.3 analysis, the IIS are still

added to the sample after extraction as an additional QC measure. The IIS percent recoveries were within the established precision limits presented in the QAPP Addendum (AECOM, 2021a).

4.6.3 Representativeness

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

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by LC/MS/MS Compliant with QSM Table B-15, including the specific preparation requirements (i.e., ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified in Table B-15 were monitored, standards that contained both branched and linear isomers when available were used, and isotopically labeled standards were used for quantitation.

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. The laboratory used approved standard methods in accordance with the QAPP Addendum (AECOM, 2021a) for all analyses. All technical and analytical holding times were met by the laboratory for the initial results with limited exceptions. The holding time for pH analysis is considered ‘immediate’, so all pH sample results have been qualified as estimated.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Three PFAS instrument blanks and one method blank displayed target analyte concentrations greater than the detection limit (DL) for N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) and N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA). The associated field sample results were either non-detect or displayed concentrations greater than five times the blank detections and should be considered usable as reported.

Field blanks and equipment blanks were also collected for groundwater and soil samples. The blank sample results were non-detect and should be considered usable as reported.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The sample results were non-detect and should be considered usable as reported.

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

4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability. Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was

determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows and reflects the exclusion of “X/UX” flagged data, if applicable:

- PFAS in aqueous media by DoD QSM Table B-15 at 100%
- PFAS in solid media by DoD QSM Table B-15 at 100%
- pH in soil by USEPA Method 9045D at 100%
- TOC by USEPA Method 9060 at 100%

4.6.6 Sensitivity

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

5. Site Inspection Activities

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

- *Final Preliminary Assessment Report, Esler Field Army Aviation Support Facility, Louisiana* dated July 2020 (AECOM, 2020);
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Esler Field Army Aviation Support Facility, Louisiana* dated July 2021 (AECOM, 2021a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b); and
- *Final Site Safety and Health Plan, Esler Field Army Aviation Support Facility, Louisiana* dated July 2021 (AECOM, 2021b).

The SI field activities were conducted from 26 July to 3 August 2021 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, 2021a).

The following samples were collected during the SI and analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 to fulfill the project DQOs:

- Thirty (30) soil samples from 16 boring locations;
- Seven (7) grab groundwater samples from seven (7) temporary well locations; and
- Fourteen (14) quality assurance (QA)/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**, and land survey data are provided in **Appendix B3**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 26 May 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, LAARNG, USACE, Louisiana Department of Environmental Quality, 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 on 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, Tolunay-Wong Engineers, Inc. placed a ticket with the Louisiana 811 utility clearance provider to notify them of intrusive work on 14 July 2021. However, because the AASF is a private facility, the participating Louisiana 811 locators did not clear utilities at the entire facility. Therefore, AECOM contracted Ground Penetrating Radar Systems, LLC. (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 22 July 2021 with input from the AECOM field team and Esler Field AASF 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 PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be acceptable for use in a PFAS investigation prior to the start of field activities. A sample from a potable water source at Esler Field AASF was collected on 17 June 2021, prior to mobilization, and analyzed for PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15. The results of the decontamination water sample are provided in **Appendix F**. A discussion of the results is presented in **Section 4.6.3**. Other non-dedicated sampling equipment was decontaminated using PFAS-free American Society of Testing and Materials (ASTM) Type II deionized water and Alconox™.

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

5.2 Soil Borings and Soil Sampling

Soil samples were collected via DPT, in accordance with the SI QAPP Addendum (AECOM, 2021a). A GeoProbe® 7822DT Macro-Core® soil 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 5-2**. Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

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

2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table.

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

Soil borings completed during the SI were drilled to depths between 20 and 45 feet bgs. Generally, the subsurface soil can be characterized by thick layers (10 to 26 feet) of fine-grained sediments, characterized as clay-rich silt to silt-rich clay overlying sand-rich lenses. These sand lenses are characterized as poorly graded sand (<15% fines) to silty/clayey sand (>15% fines) and range from 0.5 to 6 feet in thickness. The sand lenses are interbedded with clay and silt dominated lenses, often grading from poorly graded sand to silty/clayey sand to sandy clay/silt to clay/silt, and vice versa. These facility observations are consistent with the fluviatile silts and sands of the Dough Hills Member. Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM 5.3 Table B-15), TOC (USEPA Method 9060A) and pH (USEPA Method 9045D) and grain size (ASTM Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) using bentonite chips at completion of sampling activities.

5.3 Temporary Well Installation and Groundwater Grab Sampling

DPT borings were converted to temporary wells. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5 to 10-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

The temporary wells were allowed to recharge after installation and before collection of groundwater samples. After the recharge period, groundwater samples were collected using either a peristaltic pump or a bladder pump with PFAS-free HDPE tubing. Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) after each grab sample was collected. Additionally, a subsample of each groundwater sample was collected in a separate

container, and a shaker test was completed to identify if there was any foaming. No foaming was noted in any of the groundwater samples.

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

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

Temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with bentonite chips.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 3 August 2021. Groundwater elevation measurements were collected from the seven 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 2-5**. Groundwater elevation data is provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Louisiana-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed temporary wells were collected on 3 August 2021 in the applicable Universal Transverse Mercator zone projection with North American Datum 1983 (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 PFAS investigation-derived waste (IDW) is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (AECOM, 2019b) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Solid (i.e., soil cuttings) and liquid (i.e., purge water and decontamination fluids) generated during SI activities were containerized in properly labeled and covered 5-gallon buckets. The IDW was stored at a secure and covered location designated by the Esler Field AASF Environmental Manager and LAARNG, pending the receipt of sample results. Solid and liquid IDW will be transferred to DOT-approved 55-gallon steel drums prior to disposal. The solid and liquid IDW will be disposed of via a RCRA Subtitle C landfill. The disposal contract is being managed under a separate contract (EA Engineering, Science, and Technology, Inc., 2021). Specifics on the disposal of solid and liquid IDW will be addressed in an IDW Treatment Memorandum.

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 for a subset of 18 PFAS 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. The 18 PFAS analyzed as part of the ARNG SI program include the following:

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

Soil samples were also analyzed for TOC using USEPA Method 9060A, pH by USEPA Method 9045D, and grain size analysis by ASTM Method D-422.

5.8 Deviations from SI QAPP Addendum

One deviation from the SI QAPP Addendum has resulted from a change in the soil and groundwater SLs for PFBS in the OSD Memo (dated 15 September 2021), which was issued after the submittal of the Final SI QAPP. The revised SLs were developed using the USEPA Regional Screening Levels Calculator and are considered valid toxicity-based values after peer review (Assistant Secretary of Defense, 2021).

THIS PAGE INTENTIONALLY BLANK

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Esler Field AASF, Louisiana

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-00-02	7/28/2021 12:00	0 - 2	x	x	x		
AOI01-01-SB-00-02-MS	7/28/2021 12:00	0 - 2	x				MS
AOI01-01-SB-00-02-MSD	7/28/2021 12:00	0 - 2	x				MSD
AOI01-01-SB-04-06	8/3/2021 12:35	4 - 6				x	
AOI01-01-SB-09-11	7/28/2021 12:30	9 - 11	x				
AOI01-01-SB-12-14	7/28/2021 12:40	12 - 14	x				
AOI01-01-SB-12-14-D	7/28/2021 12:40	12 - 14	x				FD
AOI01-02-SB-00-02	7/28/2021 15:45	0 - 2	x				
AOI01-03-SB-00-02	7/28/2021 16:15	0 - 2	x				
AOI01-04-SB-00-02	7/28/2021 16:05	0 - 2	x				
AOI02-01-SB-0-2	7/27/2021 7:50	0 - 2	x				
AOI02-01-SB-0-2-D	7/27/2021 7:50	0 - 2	x				FD
AOI02-01-SB-07-09	8/3/2021 12:40	7 - 9				x	
AOI02-01-SB-11-13	7/27/2021 8:42	11 - 13	x				
AOI02-01-SB-20-22	7/27/2021 9:18	20 - 22	x				
AOI02-02-SB-0-2	7/26/2021 14:10	0 - 2	x	x	x		
AOI02-02-SB-0-2-D	7/26/2021 14:10	0 - 2		x	x		FD
AOI02-02-SB-11-13	7/26/2021 14:30	11 - 13	x				
AOI02-02-SB-27-29	7/27/2021 10:17	27 - 29	x				
AOI02-03-SB-00-02	7/28/2021 14:10	0 - 2	x				
AOI03-01-SB-0-2	7/27/2021 11:36	0 - 2	x				
AOI03-01-SB-13-15	7/27/2021 11:57	13 - 15	x				
AOI03-01-SB-26-28	7/28/2021 13:10	26 - 28	x				
AOI03-02-SB-0-2	7/26/2021 11:48	0 - 2	x	x	x		
AOI03-02-SB-0-2-MS	7/26/2021 11:48	0 - 2		x	x		MS
AOI03-02-SB-0-2-MSD	7/26/2021 11:48	0 - 2		x	x		MSD
AOI03-02-SB-9-11	7/26/2021 12:06	9 - 11	x				
AOI03-02-SB-9-11-D	7/26/2021 12:06	9 - 11	x				FD
AOI03-02-SB-15-17	7/26/2021 12:20	15 - 17	x				
AOI03-03-SB-0-2	7/28/2021 9:33	0 - 2	x				
AOI03-03-SB-09-11	7/28/2021 9:56	9 - 11	x				
AOI03-03-SB-12-14	8/3/2021 12:45	12 - 14				x	
AOI03-03-SB-14-16	7/28/2021 10:02	14 - 16	x				
AOI03-04-SB-00-02	7/28/2021 14:55	0 - 2	x				
AOI03-05-SB-00-02	7/28/2021 14:35	0 - 2	x				
AOI03-06-SB-00-02	7/28/2021 9:25	0 - 2	x				
AOI04-01-SB-00-02	7/28/2021 15:10	0 - 2	x				
AOI04-02-SB-00-02	7/28/2021 15:25	0 - 2	x				
ESLR-01-SB-0-2	7/26/2021 9:47	0 - 2	x				
ESLR-01-SB-0-2-MS	7/26/2021 9:47	0 - 2	x				MS
ESLR-01-SB-0-2-MSD	7/26/2021 9:47	0 - 2	x				MSD
ESLR-01-SB-11-13	7/26/2021 10:12	11 - 13	x	x	x		
ESLR-01-SB-13-15	7/26/2021 10:20	13 - 15				x	
ESLR-01-SB-20-22	7/26/2021 10:34	20 - 22	x				

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Esler Field AASF, Louisiana

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Groundwater Samples							
AOI01-01-GW	7/28/2021 16:20	NA	x				
AOI02-01-GW	7/27/2021 11:00	NA	x				
AOI02-01-GW-D	7/27/2021 11:00	NA	x				FD
AOI02-01-GW-MS	7/27/2021 11:00	NA	x				MS
AOI02-01-GW-MSD	7/27/2021 11:00	NA	x				MSD
AOI02-02-GW	7/27/2021 12:56	NA	x				
AOI03-01-GW	7/28/2021 11:52	NA	x				
AOI03-02-GW	7/26/2021 15:35	NA	x				
AOI03-03-GW	7/28/2021 14:15	NA	x				
ESLR-01-GW	7/26/2021 13:28	NA	x				
Quality Control Samples							
ESLR-FRB-01	7/27/2021 8:15	NA	x				
ESLR-ERB-01	7/26/2021 11:40	NA	x				from hand auger
ESLR-ERB-02	7/27/2021 7:10	NA	x				from DPT shoe

Notes:
ASTM = American Society for Testing and Materials
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
QSM = Quality Systems Manual
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, Esler Field AASF

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	20	15 - 20	80.37	79.76	9.73	9.12	70.64
2	AOI02-01	25	20 - 25	93.03	92.61	20.12	19.70	72.91
	AOI02-02	35	30 - 35	92.76	92.08	20.43	19.76	72.33
3	AOI03-01	45	25 - 35	93.66	92.97	20.62	19.93	73.04
	AOI03-02	20	15 - 20	90.26	89.79	18.44	17.98	71.82
	AOI03-03	20	15 - 20	80.03	78.18	7.97	6.12	72.06
Sitewide	ESLR-01	25	20 - 25	90.60	90.11	18.44	17.95	72.16

Notes:
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

1044

1045 THIS PAGE INTENTIONALLY BLANK

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:4,800	CHK BY	SS	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	4/21/2022

Legend

- Soil Boring/Temp Monitoring Well Location
- Surface Soil Sample Location
- Area of Interest
- Facility Boundary
- Water Body
- River/Stream
- Groundwater Flow Direction
- Approximate Path of Storm Sewer Pipe

N

Site Inspection Sample Locations

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 5-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Fig_5-1_Esler_Field_SI_Sample_Locations.mxd

THIS PAGE INTENTIONALLY BLANK

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 6.7**. **Table 6-2** through **Table 6-4** present PFAS results for samples with detections in soil or groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

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

The SLs are presented on **Table 6-1** below. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil and groundwater contain or do not contain PFAS within the boundaries of the facility.

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

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

Notes:

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

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the 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, pH, and grain size, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC and pH and grain size sampling.

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

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes one potential PFAS release area: Sewage Oxidation Pond. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the potential PFAS release area: Sewage Oxidation Pond. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** and **Table 6-3** summarize the detected compounds in soil.

At the Sewage Oxidation Pond, soil was sampled from surface soil (0 to 2 feet bgs) and shallow subsurface soil (9 to 11 and 12 to 14 feet bgs) from boring location AOI01-01. Soil was also sampled from the surface soil (0 to 2 feet bgs) at locations AOI01-02, AOI01-03, and AOI01-04. PFOA, PFOS, and PFBS were detected in soil, at concentrations several orders of magnitude lower than the SLs. In the surface soil, PFOA was only detected at location AOI01-04, with a concentration of 0.659 J micrograms per kilogram (µg/kg). PFOS was detected at locations AOI01-03 and AOI01-04, at concentrations of 0.345 J µg/kg and 0.669 J µg/kg, respectively. PFBS was only detected at location AOI01-04, with a concentration of 0.035 J µg/kg. PFOA, PFOS, and PFBS were not detected in surface soil at locations AOI01-01 and AOI01-02, which are both located on the eastern side of the Sewage Oxidation Pond.

In the shallow subsurface soil, PFOS was detected in the soil sample collected at 9 to 11 feet bgs, at levels several orders of magnitude below the SL, with a concentration of 0.288 J µg/kg. PFOA and PFBS were not detected in this sample. PFOA, PFOS, and PFBS were not detected in the second shallow subsurface sample collected at 12 to 14 feet bgs.

6.3.2 AOI 1 Groundwater Analytical Results

PFOA, PFOS, and PFBS were detected in groundwater below the SLs at potential PFAS release area, AOI 1: Sewage Oxidation Pond. **Figure 6-4** present the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

Within the Sewage Oxidation Pond potential PFAS release area, groundwater was sampled from temporary monitoring well location AOI01-01. PFOA and PFOS were detected below the individual SLs of 40 nanograms per liter (ng/L), at concentrations of 5.13 ng/L and 0.810 J ng/L,

respectively. PFBS was detected at several orders of magnitude below the SL of 600 ng/L, at a concentration of 0.856 J ng/L.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations were several orders of magnitude lower than the soil SLs. PFOA, PFOS, and PFBS were detected in groundwater at concentrations below the SLs. Based on these data, further evaluation at AOI 1 is not warranted.

6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2, which includes two potential PFAS release areas: North Ramp/Wash Rack and Hangar Buildings 6001 and 6002. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.4.1 AOI 2 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the two potential PFAS release areas: North Ramp/Wash Rack and Hangar Buildings 6001 and 6002. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** and **Table 6-3** summarize the detected compounds in soil.

At the North Ramp/Wash Rack, soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (11 to 13 feet bgs), and deep subsurface soil (27 to 29 feet bgs) from boring locations AOI02-02. Soil was also sampled from the surface interval (0 to 2 feet bgs) at location AOI02-03. PFOS and PFBS were detected in soil at concentrations several orders of magnitude lower than the SLs. In the surface interval, PFOS was only detected at AOI02-02 with a concentration of 0.069 J µg/kg. PFOA and PFBS were not detected in either location. In the shallow subsurface soil, PFBS was detected at a concentration of 0.035 J µg/kg. PFOA and PFOS were not detected in the shallow subsurface interval. In the deep subsurface soil, PFOA, PFOS, and PFBS were not detected.

At Hangar Buildings 6001 and 6002, soil was sampled from the surface soil (0 to 2 feet bgs), shallow subsurface soil (11 to 13 feet bgs), and deep subsurface soil (20 to 22 feet bgs) at location AOI02-01. In surface soil, PFOS was detected at concentrations ranging from 0.168 J µg/kg to 0.221 J µg/kg, which are several orders of magnitude lower than the SL. PFOA and PFBS were not detected in the surface soil interval. In the shallow and deep subsurface soil samples, PFOA, PFOS, and PFBS were not detected.

6.4.2 AOI 2 Groundwater Analytical Results

Within the Hangar Buildings 6001 and 6002 potential PFAS release area, groundwater was sampled from temporary monitoring well location AOI02-01, whereas at the North Ramp/Wash Rack potential PFAS release area, groundwater was sampled from temporary monitoring well location AOI02-02. PFOA, PFOS, and PFBS were not detected in groundwater at either of the two potential PFAS release areas. **Figure 6-4** present the ranges of detections for PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOS and PFBS were detected in soil at AOI 2; however, the detected concentrations were several orders of magnitude lower than the soil SLs. PFOA, PFOS, and PFBS were not detected in groundwater at either potential PFAS release areas. Based on these data, further evaluation at AOI 2 is not warranted.

6.5 AOI 3

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3, which includes the South Ramp potential PFAS release area. The detected compounds in soil and groundwater are presented in **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.5.1 AOI 3 Soil Analytical Results

PFOA, PFOS, and PFBS in soil did not exceed the SLs in soil at the potential PFAS release area in AOI 3. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** and **Table 6-3** summarize the detected compounds in soil.

At the South Ramp, soil was sampled from the surface soil (0 to 2 feet bgs), shallow subsurface soil (13 to 15 feet bgs), and deep subsurface soil (26 to 28 feet bgs) intervals at AOI03-01. Soil was also sampled from (0 to 2 feet bgs), shallow subsurface soil (9 to 11 feet bgs), and deep subsurface soil (15 to 17 feet bgs) intervals at AOI03-02. AOI03-03 was sampled from the surface soil (0-2 feet bgs), shallow subsurface soil (9 to 11 feet bgs), and deep subsurface soil (14 to 16 feet bgs) intervals. Lastly, surface soil (0 to 2 feet bgs) was sampled at AOI03-04 through AOI03-06.

PFOS and PFBS were detected at concentrations several orders of magnitude lower than the SLs. In surface soil, PFOS was only detected at AOI03-02, with a concentration of 0.164 J µg/kg. PFBS was only detected at AOI03-04, with a concentration of 0.027 J µg/kg. PFOA was not detected in any of the six surface soil samples. In the shallow subsurface soil interval, PFOS and PFBS were only detected at AOI03-02 from 9 to 11 feet bgs. PFOS concentrations ranged from 0.077 J µg/kg to 0.137 J µg/kg and PFBS ranged from non-detect to 0.023 J µg/kg, respectively. PFOA was not detected in any of the three shallow subsurface soil samples. In the deep subsurface soil interval, PFOA, PFOS, and PFBS were not detected in any of the six samples.

6.5.2 AOI 3 Groundwater Analytical Results

PFOS and PFBS were detected in groundwater from temporary monitoring wells below the SLs at the South Ramp potential PFAS release area, in AOI 3. **Figure 6-4** present the ranges of detections for PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

At the South Ramp, groundwater was sampled from temporary monitoring well locations AOI03-01, AOI03-02, and AOI03-03. PFOS was detected in temporary well locations AOI03-02 and AOI03-03 below the SL of 40 ng/L, at concentrations of 1.41 J ng/L and 1.09 J ng/L, respectively, with the maximum concentration occurring at AOI03-02. PFBS was detected below the SL of 600 ng/L at only one temporary well, with a concentration of 7.57 ng/L detected at AOI03-03. PFOA was not detected in any of the three temporary wells. Temporary well AOI03-01 is located on the western side of the South Ramp and did not have detections of PFOA, PFOS, or PFBS.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOS and PFBS were detected in soil at AOI 3; however, the detected concentrations were several orders of magnitude lower than the soil SLs. Detections in soil only occurred at AOI03-02 and AOI03-04, which are located to the northwest and east of the South Ramp, respectively. PFOS and PFBS were detected in groundwater at concentrations below the SLs. Based on these data, further evaluation at AOI 3 is not warranted.

6.6 AOI 4

This section presents the analytical results for soil in comparison to SLs for AOI 4, which includes two potential PFAS release areas: Firehouse Building 6004 and Storage Building 6067/6068. The detected compounds in surface soil are summarized on **Table 6-2**. The detections of PFOA, PFOS, and PFBS at AOI 4 in soil are presented on **Figure 6-1** through **Figure 6-3**.

6.6.1 AOI 4 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs at the two release areas at AOI 4. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** summarizes the detected compounds in surface soil.

Soil was sampled from the surface soil interval (0 to 2 feet bgs) at locations AOI04-01 and AOI04-02. Location AOI04-01 was sampled at the southeast corner of the Storage Building 6067/6068, while AOI04-02 was sampled at the southeast corner of the Firehouse Building 6004. At the Storage Building 6067/6068, PFOA, PFOS, and PFBS were not detected in surface soil. At location AOI04-02 at Firehouse Building 6004, PFOA and PFOS were detected at concentrations below the individual SLs of 130 µg/kg, with levels of 0.154 J µg/kg and 15.0 µg/kg, respectively. PFBS was not detected at the Firehouse Building 6004.

6.6.2 AOI 4 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in soil at AOI 4: Firehouse Building 6004; however, the detected concentrations were below the soil SLs. Therefore, further evaluation at AOI 4 is not warranted.

6.7 Sitewide

This section presents the analytical results for soil and groundwater in comparison to SLs at the upgradient boring and temporary well location ESLR-01. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.7.1 Sitewide Soil Analytical Results

Soil was sampled from the surface soil (0 to 2 feet bgs), shallow subsurface soil (11 to 13 feet bgs), and deep subsurface soil (20 to 22 feet bgs) intervals at boring location ESLR-01. PFOA, PFOS, and PFBS were not detected in any of the soil intervals. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** and **Table 6-3** summarize the detected compounds in soil.

6.7.2 Sitewide Groundwater Analytical Results

One groundwater sample was collected from temporary monitoring well ESLR-01. PFBS was detected at levels orders of magnitude below the SL of 600 ng/L with a concentration of 0.974 J ng/L. PFOA and PFOS were not detected in groundwater at this location. **Figure 6-4** presents the ranges of detections for PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

6.7.3 Sitewide Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were not detected in soil. PFBS was detected in groundwater; however, PFOA and PFOS were not detected. ESLR-01 is upgradient of the AOIs at Esler Field AASF; therefore, data from the SI suggest the likelihood for offsite migration of PFAS onto the facility property from the north is low.

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Esler Field AASF

Area of Interest		AOI 1								AOI 2								AOI 3			
Sample ID		AOI01-01-SB-00-02		AOI01-02-SB-00-02		AOI01-03-SB-00-02		AOI01-04-SB-00-02		AOI02-01-SB-0-2		AOI02-01-SB-0-2-D		AOI02-02-SB-0-2		AOI02-03-SB-00-02		AOI03-01-SB-0-2		AOI03-02-SB-0-2	
Sample Date		07/28/2021		07/28/2021		07/28/2021		07/28/2021		07/27/2021		07/27/2021		07/26/2021		07/28/2021		07/27/2021		07/26/2021	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
PFBA	-	ND		ND		0.069	J	0.243	J	ND		ND		ND		0.086	J	ND		ND	
PFBS	1900	ND		ND		ND		0.035	J	ND		ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		0.141	J	ND		ND		ND		0.025	J	ND		ND	
PFHxA	-	ND		ND		0.061	J	0.503	J	0.044	J	0.039	J	0.029	J	0.549	J	ND		ND	
PFHxS	-	0.058	J	ND		0.153	J	0.665	J	0.078	J	0.087	J	0.074	J	ND		0.052	J	0.052	J
PFNA	-	ND		ND		ND		0.475	J	ND		ND		0.023	J	0.031	J	ND		1.15	J
PFOA	130	ND		ND		ND		0.659	J	ND		ND		ND		ND		ND		ND	
PFOS	130	ND		ND		0.345	J	0.669	J	0.168	J	0.221	J	0.069	J	ND		ND		0.164	J
PFPeA	-	ND		ND		ND		0.181	J	0.027	J	0.028	J	ND		0.385	J	ND		ND	
PFTrDA	-	ND		ND		ND		ND		0.261	J	0.269	J	0.036	J	ND		ND		0.044	J
PFUnDA	-	ND		ND		ND		ND		ND		ND		0.036	J	ND		ND		0.093	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

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

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Esler Field AASF

	Area of Interest	AOI 3								AOI 4				Sitewide	
	Sample ID	AOI03-03-SB-0-2		AOI03-04-SB-00-02		AOI03-05-SB-00-02		AOI03-06-SB-0-2		AOI04-01-SB-00-02		AOI04-02-SB-00-02		ESLR-01-SB-0-2	
	Sample Date	07/28/2021		07/28/2021		07/28/2021		07/28/2021		07/28/2021		07/28/2021		07/26/2021	
	Depth	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**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)															
PFBA	-	ND		0.099	J	0.090	J	ND		ND		0.293	J	ND	
PFBS	1900	ND		0.027	J	ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		0.085	J	ND	
PFDoA	-	ND		ND		ND		ND		ND		0.031	J	ND	
PFHpA	-	ND		0.025	J	0.186	J	ND		ND		0.085	J	ND	
PFHxA	-	0.027	J	0.063	J	0.274	J	ND		ND		0.214	J	ND	
PFHxS	-	ND		0.199	J	ND		ND		ND		0.313	J	ND	
PFNA	-	ND		ND		ND		0.033	J	ND		6.08		ND	
PFOA	130	ND		ND		ND		ND		ND		0.154	J	ND	
PFOS	130	ND		ND		ND		ND		ND		15.0		ND	
PFPeA	-	ND		0.044	J	0.474	J	ND		ND		0.640	J	ND	
PFTrDA	-	ND		ND		0.056	J	ND		ND		0.895	J	ND	
PFUnDA	-	ND		ND		0.026	J	ND		ND		1.38		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

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

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Esler Field AASF

Area of Interest		AOI 1						AOI 2				AOI 3								Sitewide	
Sample ID		AOI01-01-SB-09-11		AOI01-01-SB-12-14		AOI01-01-SB-12-14-D		AOI02-01-SB-11-13		AOI02-02-SB-11-13		AOI03-01-SB-13-15		AOI03-02-SB-9-11		AOI03-02-SB-9-11-D		AOI03-03-SB-09-11		ESLR-01-SB-11-13	
Sample Date		07/28/2021		07/28/2021		07/28/2021		07/27/2021		07/26/2021		07/27/2021		07/26/2021		07/26/2021		07/28/2021		07/26/2021	
Depth		9 - 11 ft		12 - 14 ft		12 - 14 ft		11 - 13 ft		11 - 13 ft		13 - 15 ft		9 - 11 ft		9 - 11 ft		9 - 11 ft		11 - 13 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
NEtFOSAA	-	ND		ND		ND		0.035	J	ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		0.061	J	ND		ND		ND		ND		ND	
PFBS	25000	ND		ND		ND		ND		0.035	J	ND		ND	UJ	0.023	J	ND		ND	
PFHxA	-	ND		ND		ND		ND		0.164	J	ND		ND	UJ	0.026	J	ND		ND	
PFHxS	-	0.075	J	ND		ND		ND		0.898	J	ND		ND	UJ	0.069	J	ND		ND	
PFNA	-	0.080	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFOS	1600	0.288	J	ND		ND		ND		ND		ND		0.077	J	0.137	J	ND		ND	
PFPeA	-	ND		ND		ND		ND		0.038	J	ND		ND		ND		ND		ND	
PFTrDA	-	0.039	J	ND		ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTrDA	perfluorotridecanoic acid

Acronyms and Abbreviations

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

Table 6-4
PFAS Detections in Groundwater
Site Inspection Report, Esler Field AASF

		Area of Interest	AOI 1		AOI 2						AOI 3						Sitewide	
		Sample ID	AOI01-01-GW		AOI02-01-GW		AOI02-01-GW-D		AOI02-02-GW		AOI03-01-GW		AOI03-02-GW		AOI03-03-GW		ESLR-01-GW	
		Sample Date	07/28/2021		07/27/2021		07/27/2021		07/27/2021		07/28/2021		07/26/2021		07/28/2021		07/26/2021	
Analyte	**OSD Screening Level [a]**	**USEPA HA [b]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)																		
PFBS	600	-	0.856	J	ND		ND		ND		ND		ND		7.57		0.974	J
PFHxA	-	-	3.65	J	ND		ND		ND		ND		ND		ND		ND	
PFHxS	-	-	6.84		ND		ND		ND		ND		ND		126		ND	
PFOA	40	70	5.13		ND		ND		ND		ND		ND		ND		ND	
PFOS	40	70	0.810	J	ND		ND		ND		ND		1.41	J	1.09	J	ND	
PFPeA	-	-	1.50	J	ND		ND		ND		ND		ND		ND		ND	
Total PFOA+PFOS	-	70	5.94		ND		ND		ND		ND		1.41		1.09		ND	

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

References

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

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

Interpreted Qualifiers

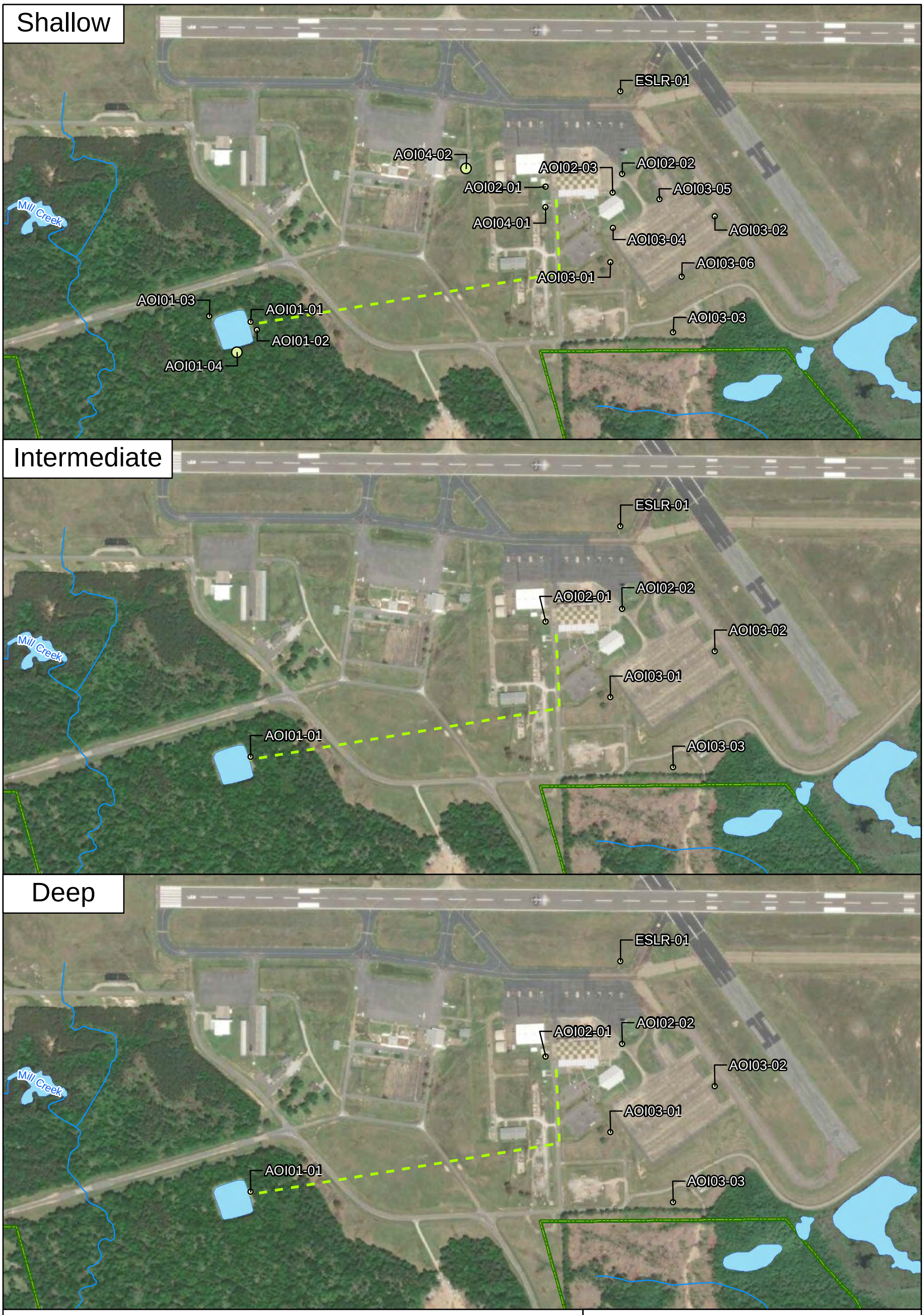
J = Estimated concentration

Chemical Abbreviations

PFBS	perfluorobutanesulfonic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	duplicate
GW	groundwater
HA	Health Advisory
HQ	hazard quotient
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency
ng/l	nanogram per liter
-	not applicable



Legend

- Facility Boundary
- Water Body
- River/Stream
- Approximate Path of Storm Sewer Pipe

PFOA Results (µg/Kg)

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

0 350 700 1,400 Feet

PFOA Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:8,400	CHK BY	JH	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,		PM	CM	4/21/2022

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Results\Fig_6-1_Esler_Field_SI_Soil_PFOA_Results.mxd

Shallow

Intermediate

Deep

Legend

- Facility Boundary
- Water Body
- River/Stream
- Approximate Path of Storm Sewer Pipe

PFOS Results (µg/Kg)

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

0 350 700 1,400 Feet

PFOS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:8,400	CHK BY	JH	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,		PM	CM	4/21/2022

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-2

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Results\Fig_6-2_Esler_Field_SI_Soil_PFOS_Results.mxd

Shallow

Intermediate

Deep

Legend

- Facility Boundary
- Water Body
- River/Stream
- Approximate Path of Storm Sewer Pipe

PFBS Results (µg/Kg)

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

0 350 700 1,400 Feet

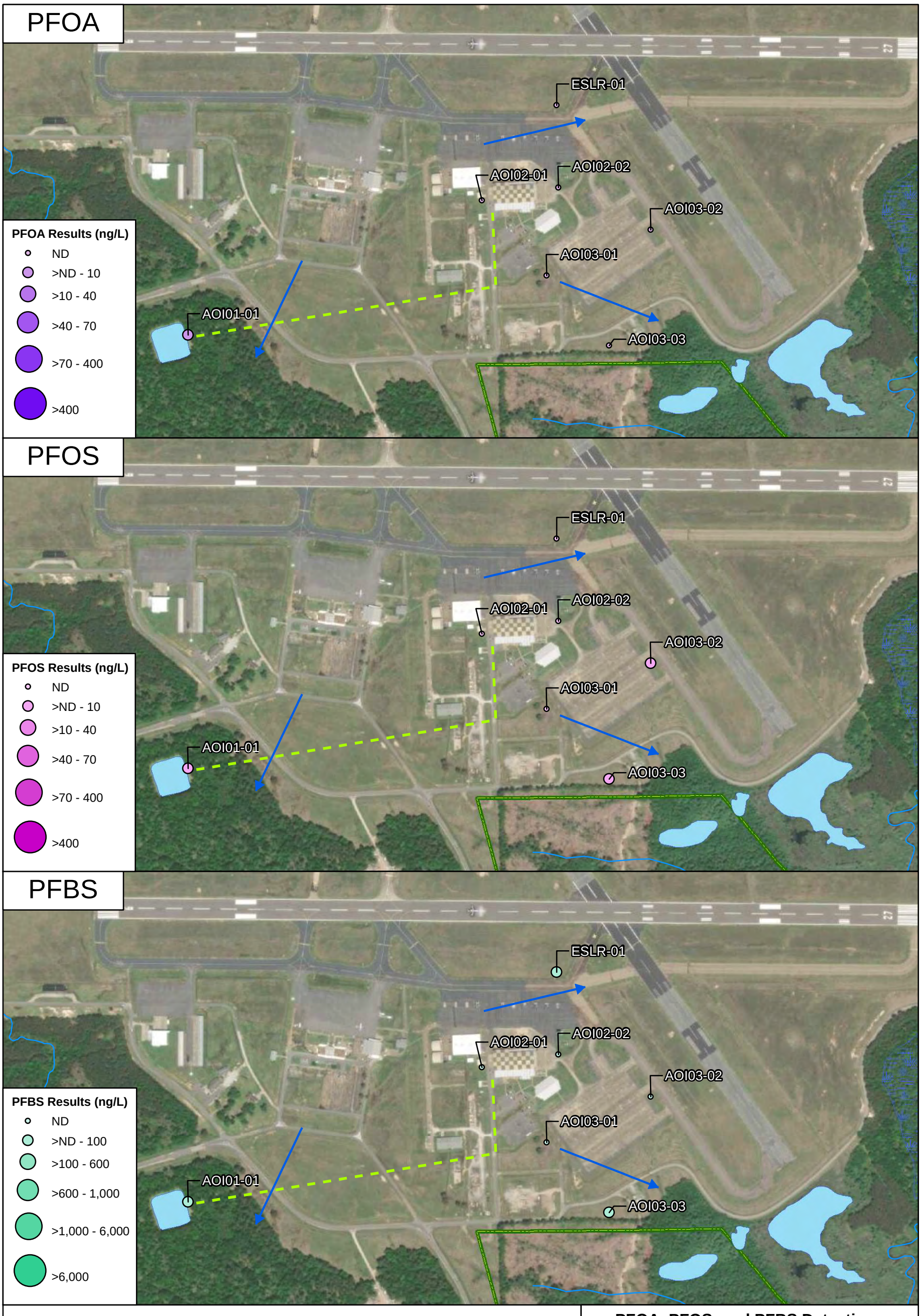
PFBS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:8,400	CHK BY	JH	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,		PM	CM	4/21/2022

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-3

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Results\Fig_6-3_Esler_Field_SI_Soil_PFBS_Results.mxd



PFOA, PFOS, and PFBS Detections in Groundwater

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Esler Field, LA			
REVISED	4/21/2022	GIS BY	MS	4/21/2022
SCALE	1:8,400	CHK BY	JH	4/21/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN,		PM	CM	4/21/2022

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\LA\Esler_Field\Esler_Field_SI_MXDs\SI_Report\Results\Fig_6-4_Esler_Field_SI_Groundwater_Results.mxd

7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-4**. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

If any of these elements are missing, the pathway is incomplete. The CSM figures use an empty circle symbol to represent an incomplete exposure pathway. Areas with an incomplete pathway generally warrant no further action. However, the pathway is considered potentially complete if PFOA, PFOS, or PFBS are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway that have detections of PFOA, PFOS, or PFBS above the SLs may warrant further investigation.

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

7.1 Soil Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 through AOI 4 based on the aforementioned criteria. These findings are discussed below.

7.1.1 AOI 1

Between 1996 and 2007, fire training activities occurred on the North Ramp/Wash Rack (AOI 2) and South Ramp (AOI 3) in which foam was dispensed from Tri-Max™ carts and was subsequently rinsed down nearby stormwater drains that convey stormwater to an OWS and then to the Sewage Oxidation Pond. The Sewage Oxidation Pond overflows at least once a year.

PFOA, PFOS, and PFBS were detected in surface soil at AOI 1, at concentrations below their respective SLs, and confirm the release of PFAS to soil. Additionally, PFOS was detected in concentrations below the SL for shallow subsurface soil. Based on the results of the SI in AOI 1, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of soil. Lasty,

ground-disturbing activities could also potentially result in construction worker exposure to PFOS in subsurface soil via ingestion. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

Between 1996 and 2007, annual fire training was conducted at the North Ramp/Wash Rack in which expired or near expired Tri-Max™ foam carts were fully expended. After training, the foam dispensed from Tri-Max™ carts during training was rinsed from the ramp down into a nearby stormwater drain that conveys stormwater southwest to an OWS and then to the Sewage Oxidation Pond. Additionally, Chemguard 3% AFFF is stored in each of the Hangar Buildings 6001 and 6002.

PFOS was detected in the surface soil at both potential release areas, whereas PFBS was detected in the shallow subsurface soil at North Ramp/Wash Rack. Based on the results of the SI in AOI 2, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities to the subsurface soil could potentially result in construction worker exposure to PFBS. The CSM for AOI 2 is presented on **Figure 7-2**.

7.1.3 AOI 3

From 2005-2006 to 2007, fire training was conducted at the South Ramp in which expired, or nearly expired TriMax™ foam carts were fully expended. Foam dispensed from Tri-Max™ carts during training was rinsed from the ramp down into a nearby stormwater drain. Drains convey stormwater west to an OWS and then to the Sewage Oxidation Pond. PFOS and PFBS were detected in surface and shallow subsurface soil at the South Ramp, at concentrations below the SLs. Ground-disturbing activities could result in site worker, construction worker, and trespasser exposure to PFOS and PFBS in surface soil via inhalation of dust and ingestion of soil. Ground-disturbing activities to the shallow subsurface soil could result in construction worker exposure to PFOS and PFBS via ingestion of soil. The CSM for AOI 3 is presented on **Figure 7-3**.

7.1.4 AOI 4

From the 1980s through the 1990s, Firehouse Building 6004 was an active firehouse that stored 5-gallon buckets of AFFF. AFFF was also stored at Storage Building 6067/6068 at the time of the PA. PFOA and PFOS were detected at concentrations below their respective SLs in surface soil at Firehouse Building 6004, whereas PFOA, PFOS, and PFBS were not detected in surface soil at Storage Building 6067/6068. Based on the results of the SI in AOI 4, ground-disturbing activities at Firehouse Building 6004 could potentially result in site worker, construction worker, and trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of surface soil. Shallow subsurface soil was not sampled as part of the SI; however, PFAS may have leached into the subsurface soil via infiltration of rainwater. Therefore, ground-disturbing activities to the shallow subsurface soil at Firehouse Building 6004 could result in construction worker exposure to PFOA and PFOS via ingestion. The CSM for AOI 4 is presented on **Figure 7-4**.

7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 through AOI 4 based on the aforementioned criteria. These findings are discussed below.

7.2.1 AOI 1

PFOA, PFOS, and PFBS in groundwater were detected at concentrations below the SLs in one temporary monitoring well at the Sewage Oxidation Pond. One active domestic well, located approximately 2 miles southeast of the facility, was identified in the surficial aquifer with a depth of 70 feet. Therefore, the ingestion exposure pathway for off-facility residents is considered potentially complete. Esler Field AASF receives its potable water from the WWD #3, which sources the water from seven deep groundwater wells and Big Creek. Consequently, the ingestion exposure pathway for site workers and trespassers is considered incomplete. Depths to water measured in August 2021 during the SI ranged from 6.12 to 20.62 feet bgs. At AOI 1, water was measured at 9.12 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, and PFBS were not detected in groundwater at the two temporary monitoring wells at the North Ramp/Wash Rack and the Hangar Buildings 6001 and 6002. Therefore, the exposure pathways for all receptors are considered incomplete. The CSM for AOI 2 is presented on **Figure 7-2**.

7.2.3 AOI 3

PFOS and PFBS were detected in groundwater at temporary monitoring wells below their respective SLs at the AOI 2 source area South Ramp. Potable water at Esler Field AASF is provided by WWD #3. Thus, the site worker ingestion exposure pathway is considered incomplete. One active domestic well screened within the surficial aquifer is located approximately 2 miles southeast of the facility. Therefore, the ingestion exposure pathway for off-facility residents is considered potentially complete. Therefore, the ingestion exposure pathway for groundwater is potentially complete for off-facility residents. Depth to water at AOI 3 ranged from 6.12 feet bgs to 19.93 feet bgs. Consequently, the ingestion exposure pathway is potentially complete for construction workers during trenching activities deep enough to encounter shallow groundwater. The CSM for AOI 3 is presented on **Figure 7-3**.

7.2.4 AOI 4

Groundwater samples were not collected at AOI 4. However, PFOA, PFOS, and PFBS were detected in surface soil at the Firehouse Building 6004. PFAS is water soluble and may have leached into the groundwater; therefore, the ingestion exposure pathway is potentially complete for construction workers during trenching activities deep enough to encounter shallow groundwater. A downgradient domestic well is located 2 miles southeast of the facility boundary. If PFAS did migrate into the groundwater from AOI 4, there is a potential for off-facility residents to be exposed to PFOA, PFOS, and PFBS. Potable water is sourced by WWD #3; therefore, the ingestion exposure pathway for site workers is considered incomplete. The CSM for AOI 4 is presented on **Figure 7-4**.

7.3 Surface Water and Sediment Exposure Pathway

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

7.3.1 AOI 1

PFAS were potentially released to surface water and sediment at AOI 1 via stormwater conveyance from the fire training areas at AOI 2 and AOI 3. PFOA, PFOS, and PFBS were detected in soil and groundwater at AOI 1; however, no surface water or sediment samples were collected. Based on these results, it is likely PFAS is also within surface water and sediment as the detections in soil and groundwater are likely due to leaching, infiltration, and overflow. Consequently, the surface water and sediment exposure pathways are considered potentially complete for site workers, construction workers, and trespassers. Surface water overflowing the Sewage Oxidation Pond, which reportedly occurs at least once per year, may result in PFAS transport to surface soil and eventually to Flagon Bayou. Therefore, the surface water and sediment exposure pathways for offsite residents and recreational users using Flagon Bayou is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.3.2 AOI 2

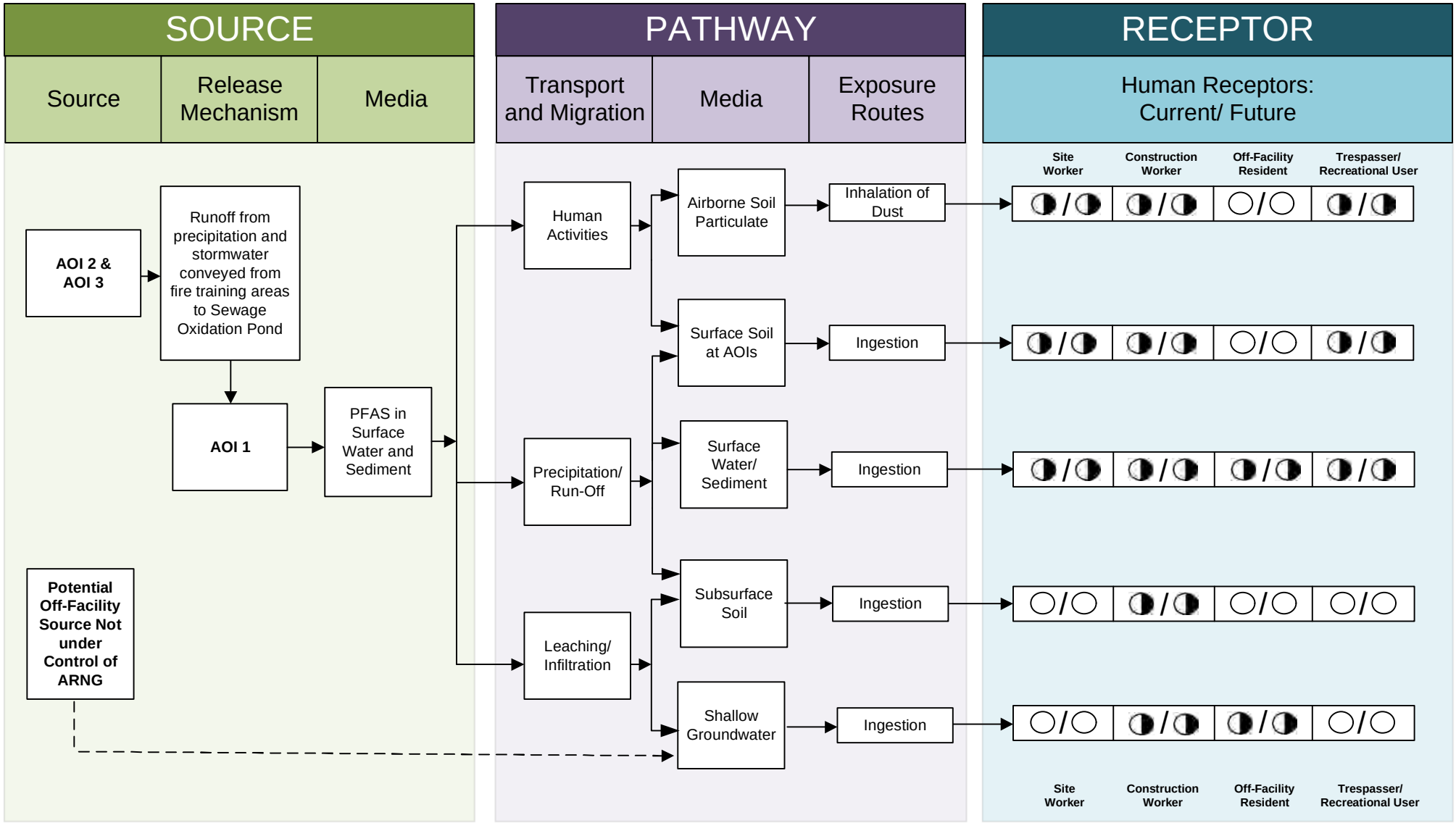
Foam dispensed on the North Ramp/Wash Rack would have been conveyed to the Sewage Oxidation Pond via stormwater conveyance. Therefore, the surface water and sediment pathway for AOI 2 is evaluated as part of AOI 1. The CSM for AOI 2 is presented on **Figure 7-2**.

7.3.3 AOI 3

Foam dispensed on the South Ramp would have been conveyed to the Sewage Oxidation Pond via stormwater conveyance. Therefore, the surface water and sediment pathway for AOI 3 is evaluated as part of AOI 1. The CSM for AOI 3 is presented on **Figure 7-3**.

7.3.4 AOI 4

PFOA, PFOS, and PFBS were detected in surface soil at AOI 4. Overland flow of water could result in the migration of these analytes into the Sewage Oxidation Pond or Flagon Bayou. Therefore, the exposure pathways for site workers, construction workers, trespassers, and offsite residents and recreational users using Flagon Bayou are considered potentially complete. The CSM for AOI 4 is presented on **Figure 7-4**.

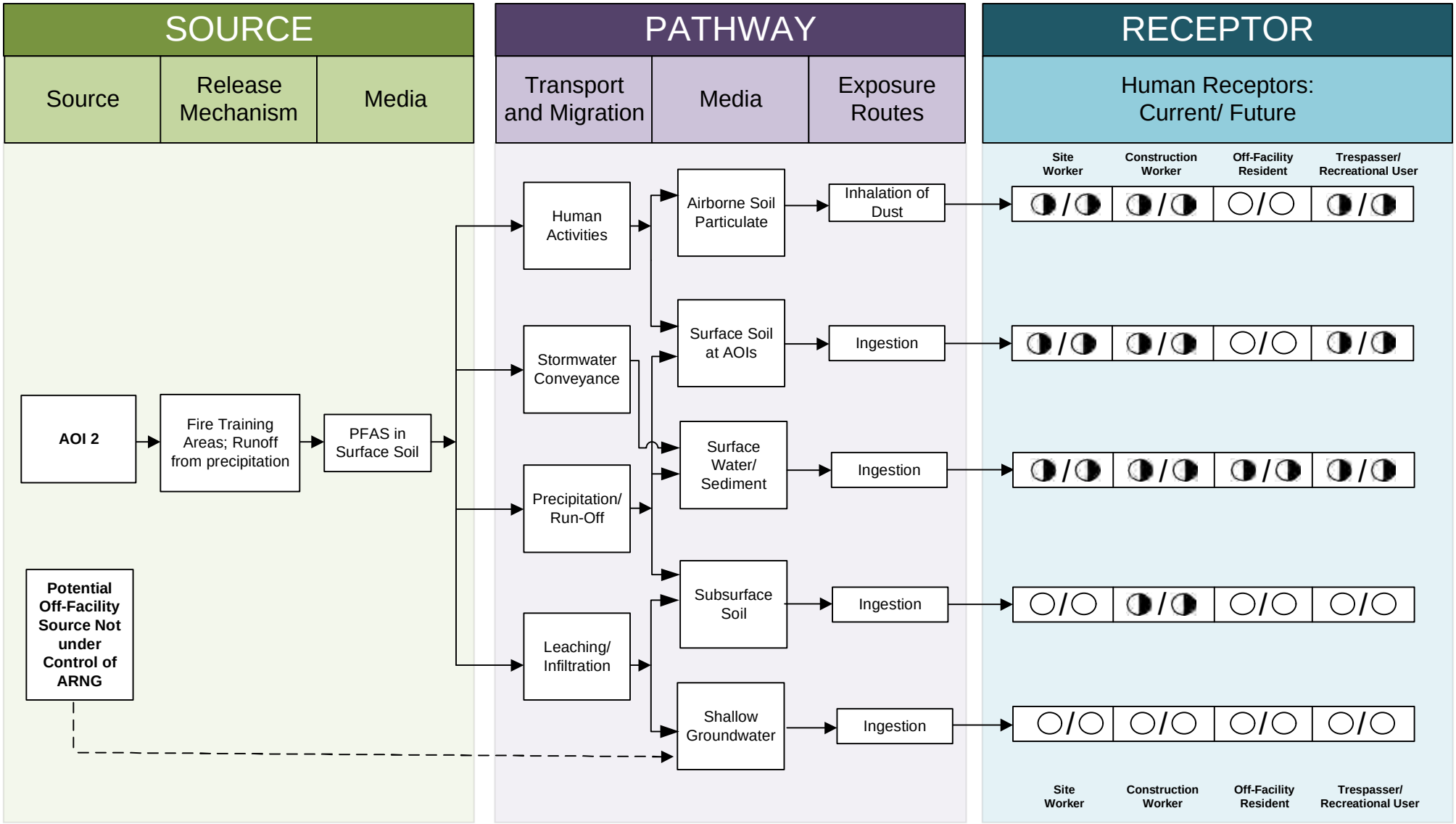


LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-1
Conceptual Site Model, AOI 1
Esler Field AASF, LA

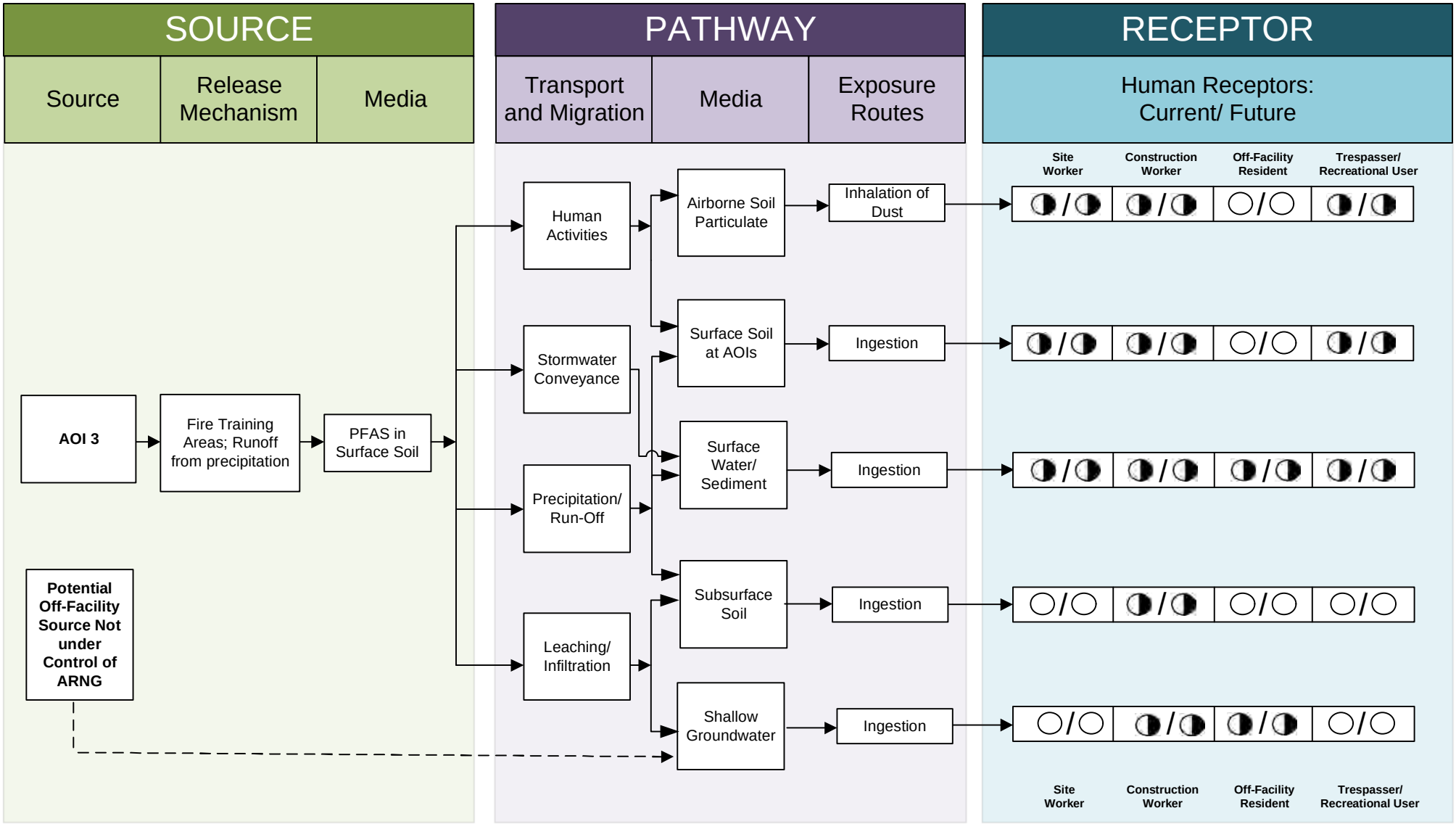


LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-2
Conceptual Site Model, AOI 2
Esler Field AASF, LA

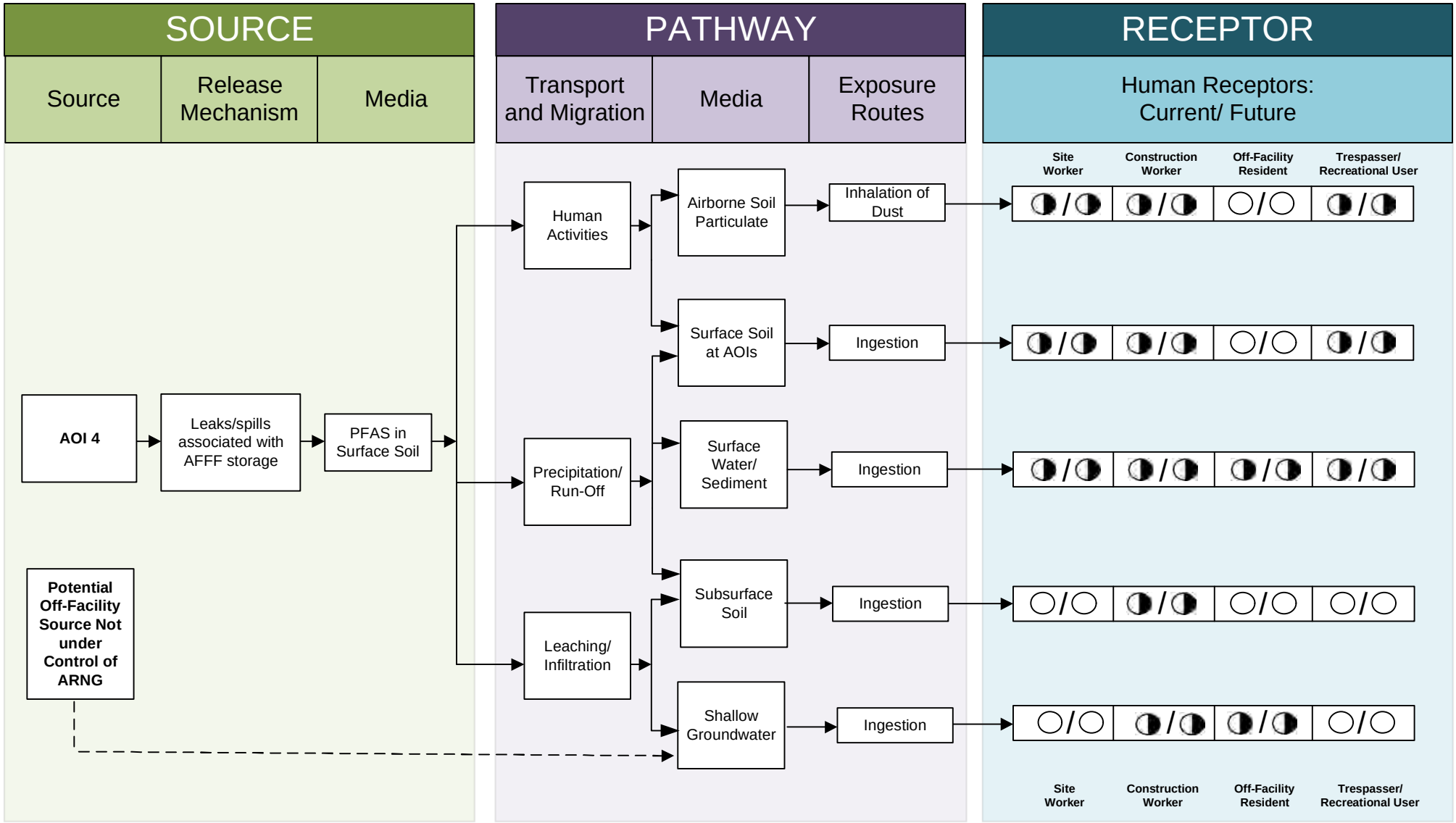


LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-3
Conceptual Site Model, AOI 3
Esler Field AASF, LA



LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS.

Figure 7-4
Conceptual Site Model, AOI 4
Esler Field AASF, LA

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 26 July to 3 August 2021 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, 2021a).

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.7** of this Report.

- Thirty (30) soil samples from 16 boring locations;
- Seven (7) grab groundwater samples from seven (7) temporary well locations; and
- Fourteen (14) QA/QC samples.

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

8.2 SI Goals Evaluation

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

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

   PFOA, PFOS, and PFBS were detected at the Site in soil and groundwater. PFOA, PFOS, and PFBS were detected at AOI 1 and AOI 4, whereas PFOS and PFBS were detected at AOI 2 and AOI 3. PFBS was also detected in groundwater at the upgradient location ESLR-01. PFBS was also detected in groundwater, at concentrations several orders of magnitude below the SL of 600 ng/L, at location ESLR-01, which is upgradient of the AOIs. The detected concentrations of PFOA, PFOS, and PFBS in soil and groundwater did not exceed their respective SLs in any of the collected samples.

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

   Six potential PFAS release areas were removed from further consideration based on the groundwater and soil data collected during this SI: Sewage Oxidation Pond in AOI 1; North Ramp/Wash Rack and Hangar Buildings 6001 and 6002 in AOI 2; South Ramp in AOI 3; and Firehouse Building 6004 and Storage Building 6067/6068 in AOI 4. PFOA, PFOS, and PFBS were not detected in groundwater and/ or soil above the SLs in any of these areas; therefore, these areas pose no significant threat to human health or the environment.

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

   Based on the data collected during this SI, there is a potentially complete pathway between the potential PFAS release areas and downgradient drinking water receptors using the active domestic well approximately 2 miles southeast of the facility boundary.

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

   The geological data collected as part of the SI indicate a relatively impermeable and low conductivity environment, with sandy lenses of relatively high permeability and conductivity observed in the deeper subsurface.

   The relatively impermeable subsurface soil is characterized by 10 to 26 feet-thick silt and clay. Lenses of sand, ranging from 0.5 to 6 feet in thickness, underly the silt and clay. These lenses are characterized as fine-grained, poorly graded sand to clayey/silty sand and represent the most permeable portions of the subsurface. Groundwater in the subsurface would, therefore, preferentially flow through these areas of high conductivity creating probable flow paths for PFAS in groundwater. These observations are consistent with the fluviatile silts and sands of the Dough Hills Member.

   Depth to water at the Esler Field AASF ranges from 6.12 to 19.93 feet bgs. Groundwater flow direction at Esler Field AASF is to the southeast, towards Flagon Bayou. These geologic and hydrogeologic observations inform the development of the technical approach for future work.

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

   Based upon the evaluation of groundwater and soil results in comparison to SLs, in combination with the groundwater flow direction analysis, the results of the SI indicate that the source of detected concentrations of PFOA, PFOS, and PFBS at the facility is likely attributable to ARNG activities and the fire departments (i.e., Holloway VFD and Holloway Village Fire Department) that used the Firehouse Building 6004 and trained on the North and South Ramps.

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

   Detections of PFOA, PFOS, and PFBS in soil and groundwater at source areas and the facility boundary indicate there is a potentially complete pathway between source and receptor.

8.3 Outcome

Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1 through AOI 4 from sources on facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs for PFOA, PFOS, and PFBS in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1, PFOA, PFOS, and PFBS were detected in groundwater at the Sewage Oxidation Pond potential PFAS release area but were below the SLs concentrations of 5.13 ng/L, 0.810 J ng/L, and 0.856 J ng/L. Based on the results of the SI, further evaluation of AOI 1 is not warranted.
- At AOI 2, PFOA, PFOS, and PFBS were not detected in groundwater at the North Ramp/Wash Rack and Hangar Buildings 6001 and 6002 potential PFAS release areas. Based on the results of the SI, further evaluation of AOI 2 is not warranted.
- At AOI 3, PFOS and PFBS were detected in groundwater at the South Ramp at concentrations below the SLs. The maximum detection of PFOS was 1.41 J ng/L at AOI03-02, whereas PFBS was only detected at AOI03-03, with a concentration of 7.57 ng/L. PFOA was not detected in any of the three temporary well locations. Based on the results of the SI, further evaluation of AOI 3 is not warranted.
- At AOI 4, no groundwater samples were collected. At the Storage Building 6067/6068, PFOA, PFOS, and PFBS were not detected in soil. At the Firehouse Building 6004, PFOA, and PFOS were detected at concentrations below the SLs. Based on the results of the SI, further evaluation of AOI 4 is not warranted.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs.

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

Table 8-2 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is not warranted for AOI 1: Sewage Oxidation Pond, AOI 2: North Ramp/Wash Rack, AOI 2: Hangar Buildings 6001 and 6002, AOI 3: South Ramp, AOI 4: Storage Buildings 6067/6068, and AOI 4: Firehouse Building 6004.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Sewage Oxidation Pond	◐	◐	N/A
2	North Ramp/Wash Rack	◐	○	N/A
	Hangar Buildings 6001 & 6002	◐	○	N/A
3	South Ramp	◐	◐	◐
4	Firehouse Building 6004	◐	N/A	N/A
	Storage Building 6067/6068	○	N/A	N/A

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

Table 8-2: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Sewage Oxidation Pond	PFOA, PFOS, and PFBS detected in groundwater at source area below the SLs. No exceedances of SLs in soil.	No further action
2	North Ramp/Wash Rack	No detections of PFOA, PFOS, and PFBS in groundwater. No exceedances of SLs in soil.	No further action
	Hangar Buildings 6001 & 6002	No detections of PFOA, PFOS, and PFBS in groundwater. No exceedances of SLs in soil.	No further action
3	South Ramp	Detections of PFOS and PFBS in groundwater below the SLs. No detections of PFOA in groundwater. No exceedances of SLs in soil.	No further action
4	Firehouse Building 6004	No exceedances of SLs in soil.	No further action
	Storage Building 6067/6068	No detections of PFOA, PFOS, or PFBS in soil.	No further action

9. References

AECOM. 2018a. *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide Contract No. W912DR-12-D-0014/ W912DR17F0192*. 9 March.

AECOM. 2018b. *Final Programmatic Accident Prevention Plan, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide Contract No. W912DR-12-D-0014/W912DR17F0192.* July.

AECOM. 2020. *Final Preliminary Assessment Report, Esler Field Army Aviation Support Facility*, Louisiana. July.

AECOM. 2021a. *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Esler Field Army Aviation Support Facility, Louisiana, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide.* July.

AECOM. 2021b. *Final Site Safety and Health Plan, Esler Field Army Aviation Support Facility, Louisiana, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide*. July.

Assistant Secretary of Defense. 2021. *Investigation Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program*. United States Department of Defense. 15 September.

Charrier, Roy. 2020. Telephone communication. 10 January 2020.

DA. 2016. *Army Guidance to Address Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) Contamination*. August.

DA. 2018. *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances.* 4 September.

DoD. 2019a. *Department of Defense (DoD), Department of Energy (DOE) Consolidated Quality Systems Manual (QSM) for Environmental Laboratories, Version 5.3*.

DoD. 2019b. *General Data Validation Guidelines. Environmental Data Quality Workgroup*. 4 November.

EA Engineering Science and Technology, 2021. *SOP No. 042A for Treating Liquid Investigation-Derived Material (Purge water, drilling water, and decontamination fluids).*

EDR ™ (Environmental Data Resources, Inc.™). 2019. *Radius Map Report with GeoCheck® Addendum, Esler Field, LA*. April

French, James. 2020. *Telephone communication*. 10 January 2020.

Horst, Jerald. 2019. *Defining Lake Catahoula,* Louisiana Sportsman. Accessed December 2019 at https://www.louisianasportsman.com/hunting/waterfowl-duck-hunting/defining-lake-catahoula/.

Guelfo, J.L. and Higgins, C.P. 2013. *Subsurface Transport Potential of Perfluoroalkyl Acids at Aqueous Film-Forming Foam (AFFF)-Impacted Sites*. Environmental Science and Technology 47(9): 4164-71.

Higgins, C.P., and Luthy, R.G. 2006. *Sorption of Perfluorinated Surfactants on Sediments*. Environmental Science and Technology 40 (23): 7251-7256.

ITRC. 2018. *Environmental Fate ant Transport for Per- and Polyfluoroalkyl Substances*. March.

LAARNG (Louisiana Army National Guard). n.d. *Esler Field History*. (Accessed November 2019 at https://geauxguard.la.gov/installations/camp-beauregard/esler-field/.

LAARNG. 2007. *Final Integrated Natural Resources Management Plan, Louisiana Army National Guard, Camp Beauregard, Louisiana, Fiscal Years 2006–2010*. February.

Louisiana Department of Natural Resources. 2021. *SONRIS^{NG} Interactive Maps – Oil/Gas*. Accessed 18 May 2021 at http://sonris-www.dnr.state.la.us/gis/agsweb/IE/JSViewer/index.html?TemplateID=181.

NOAA (National Oceanic and Atmospheric Administration). 1982. *Mean Monthly, Seasonal and Annual Pan Evaporation for the United States, December*. Accessed January 2020 at https://www.nws.noaa.gov/oh/hdsc/PMP_related_studies/TR34.pdf.

NOAA. 2019. *Climate Information for Alexandria Esler Field Rapides Parish Louisiana*. Accessed December 2019 at https://www.weather.gov/lch/KESF.

Tomaszewski, D.J. 2009. *Ground-water Resources in Rapides Parish, Louisiana, 2005*: Louisiana Department of Transportation and Development Water Resources Technical Report no. 78. 54 p.

USACE (US Army Corps of Engineers). 2014. *Operational Range Assessment Phase II Report, Camp Beauregard, Louisiana*. July.

USACE. 2016. *Technical Project Planning Process*, EM-200-1-2. 26 February.

USACHPPM (US Army Center for Health Promotion and Preventative Medicine). Army Operational Range Assessment Team. 2004. *Range Condition Assessment No. 38-EH-02RN-04, Louisiana Army National Guard, Major Training Area Camp Beauregard, Louisiana*. 16-19 March.

USAEHA (US Army Environmental Hygiene Agency). 1994. *Site Assessment Survey No. 38-26-1333-94, Camp Beauregard, Louisiana Army National Guard*. 18–22 July.

USDA (U.S. Department of Agriculture), Soil Conservation Service. 1980. *Soil Survey of Rapides Parish, Louisiana*.

USDA. Natural Resources Conservation Service. 2019. *Web Soil Survey*. https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx (Accessed December 2019).

USEPA. 1980. *Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)*.

USEPA. 1994. *National Oil and Hazardous Substances Pollution Contingency Plan (Final Rule)*. 40 CFR Part 300; 59 Federal Register 47384. September.

USEPA. 2001. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments)*. December.

USEPA. 2005. Federal Facilities Remedial Site Inspection Summary Guide.

USEPA. 2006. *Guidance on Systematic Planning using the Data Quality Objectives Process*. February.

USEPA. 2016a. *Drinking Water Health Advisory for Perfluorooctanoic Acid (PFOA). Office of Water (4304T).* Health and Ecological Criteria Division, Washington, DC 20460. US USEPA Document Number: 822-R-16-005. May 2016.

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

USEPA. 2017a. *UCMR 3 (2013-2015) Occurrence Data by State. Occurrence Data for the Unregulated Contaminant Monitoring Rule.* Accessed 9 July 2019 at https://www.epa.gov/dwucmr/occurrence-data-unregulated-contaminant-monitoring-rule. January.

USEPA. 2017b. *National Functional Guidelines for Organic Superfund Data Review*. OLEM 9355.0-136, EPA-540-R-2017-002. Office of Superfund Remediation and Technology Innovation. January.

USFWS. 2021. *Listed Species Believed to or Known to Occur in Rapides, Louisiana.* Environmental Conservation Online System (ECOS). Accessed 25 August 2021 at https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=22079.

USGS. 2019a. *Geology of Avoyelles and Rapides Parishes: Louisiana Geological Survey, Geological Bulletin GB-18, scale 1:62,500* (original data source referenced as Fisk, H.N., 1940). National Geologic Map Database. Accessed December 2019 at https://ngmdb.usgs.gov/ngm-bin/pdp/zui_viewer.pl?id=2566.

USGS. 2019b. *Groundwater Atlas of the United States, Arkansas, Louisiana, Mississippi*. Accessed December 2019 at https://pubs.usgs.gov/ha/ha730/ch_f/F-text3.html.

Xiao, F., Simcik, M. F., Halbach, T. R., and Gulliver, J. S. 2015, *Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoate (PFOA) in Soils and Groundwater of a U.S. Metropolitan Area: Migration and Implications for Human Exposure.* Water Research 72: 64-74.

THIS PAGE INTENTIONALLY BLANK