# FINAL
# Site Inspection Report
# Lexington Army Aviation Support Facility #1
# Lexington, Oklahoma

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

May 2023

Prepared for:

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

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# Acronyms and Abbreviations

| | |
|---|---|
| % | percent |
| °C | degrees Celsius |
| °F | degrees Fahrenheit |
| µg/kg | micrograms per kilogram |
| AASF | Army Aviation Support Facility |
| AECOM | AECOM Technical Services, Inc. |
| AFFF | aqueous film-forming foam |
| amsl | above mean sea level |
| AOI | Area of Interest |
| ARNG | Army National Guard |
| bgs | below ground surface |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CoC | chain of custody |
| CSM | conceptual site model |
| DA | Department of the Army |
| DoD | Department of Defense |
| DO | dissolved oxygen |
| DOT | Department of Transportation |
| DQO | data quality objective |
| DUA | data usability assessment |
| ELAP | Environmental Laboratory Accreditation Program |
| EM | Engineer Manual |
| FedEx | Federal Express |
| GPRS | Ground Penetrating Radar Systems |
| HDPE | high-density polyethylene |
| HFPO-DA | hexafluoropropylene oxide dimer acid |
| IDW | investigation-derived waste |
| ITRC | Interstate Technology Regulatory Council |
| LC/MS/MS | liquid chromatography with tandem mass spectrometry |
| MIL-SPEC | military specification |
| NELAP | National Environmental Laboratory Accreditation Program |
| ng/L | nanograms per liter |
| OKARNG | Oklahoma Army National Guard |
| OKIE811 | Oklahoma 811 |
| ORP | oxidation-reduction potential |
| OSD | Office of the Secretary of Defense |
| PA | Preliminary Assessment |
| PFAS | per- and polyfluoroalkyl substances |
| PFBS | perfluorobutanesulfonic acid |
| PFHxS | perfluorohexanesulfonic acid |
| PFNA | perfluorononanoic acid |
| PFOA | perfluorooctanoic acid |
| PFOS | perfluorooctanesulfonic acid |

| | |
|---|---|
| PID | photoionization detector |
| PQAPP | Programmatic UFP-QAPP |
| PVC | polyvinyl chloride |
| QA | quality assurance |
| QAPP | Quality Assurance Project Plan |
| QC | quality control |
| QSM | Quality Systems Manual |
| RI | Remedial Investigation |
| SI | Site Inspection |
| SL | screening level |
| sonic | rotary sonic |
| SOP | standard operating procedure |
| TOC | total organic carbon |
| TPP | Technical Project Planning |
| UFP | Uniform Federal Policy |
| US | United States |
| USACE | United States Army Corps of Engineers |
| USCS | Unified Soil Classification System |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |

# Executive Summary

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

The PA identified four Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for relevant compounds. This SI was completed at the Lexington Army Aviation Support Facility (AASF) #1 in Lexington, Oklahoma and determined further investigation is warranted for AOI 1: Northern Release Areas, AOI 2: Eastern Release Areas, and AOI 3: Mobile Refueler Parking Area. No further evaluation is warranted for AOI 4: Fuel Point at this time. Lexington AASF #1 will also be referred to as the "facility" throughout this document.

Lexington AASF #1 is located at 16201 144 Avenue SE, approximately 30 miles southeast of Oklahoma City and 5 miles east of downtown Lexington, Cleveland County, Oklahoma. The approximately 308-acre facility is situated at the junction of 144 Avenue SE and Oklahoma State Highway 39. Lexington AASF #1 was built in 1973 and acted as a naval base used for aerial gunnery; no naval flight operations took place at this time. In 1975, the ARNG took over the facility. The mission of the facility is to act as a maintenance facility for aviation units, to provide helicopter search and rescue, and assist in wildfire suppression. The facility includes two hangars, a fuel point, storage buildings, a maintenance shop (formally a fire station), administrative and ground support buildings, and parking areas (AECOM Technical Services, Inc., 2020).

The PA identified four AOIs for investigation during the SI phase. SI sampling results from the four AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation for AOI 1, AOI 2, and AOI 3.

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

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

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

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

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

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

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

| AOI | Potential Release Area | Soil – Source Area | Groundwater – Source Area | Groundwater – Facility Boundary | Future Action |
|---|---|---|---|---|---|
| **1** | Northern Release Areas | ◐ | ● | N/A | Proceed to RI |
| **2** | Eastern Release Areas | ● | ● | ◐ | Proceed to RI |
| **3** | Mobile Refueler Parking Area | ● | N/A | N/A | Proceed to RI |
| **4** | Fuel Point | ◐ | N/A | N/A | No further action |

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

# 1. Introduction

## 1.1 Project Authorization

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

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

## 1.2 SI Purpose

A PA was performed at Lexington AASF #1 (AECOM Technical Services, Inc. [AECOM], 2020) that identified four Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on screening levels (SLs) for the relevant compounds.

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

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# 2. Facility Background

## 2.1 Facility Location and Description

Lexington AASF #1 is located at 16201 144 Avenue SE, approximately 30 miles southeast of Oklahoma City and 5 miles east of downtown Lexington, Cleveland County, Oklahoma. The approximately 308-acre facility is situated at the junction of 144 Avenue SE and Oklahoma State Highway 39 (**Figure 2-1**). Lexington AASF #1 was built in 1973 and acted as a naval base used for aerial gunnery; no naval flight operations took place at this time. In 1975, the ARNG took over the facility.

The mission of Lexington AASF #1 is to act as a maintenance facility for aviation units, to provide helicopter search and rescue, and assist in wildfire suppression. The facility includes two hangars, a fuel point, storage buildings, a maintenance shop (formally a fire station), administrative and ground support buildings, and parking areas (AECOM, 2020). The central portion of the facility is developed with paved surfaces and buildings; grassy areas surround the buildings and airfield. The western portion of the facility is largely undeveloped fields and wooded land, and it is bisected by an unnamed tributary, a retention pond, and a section of Little Buckhead Creek. The eastern portion of the facility is also undeveloped and is bisected by an unnamed tributary.

## 2.2 Facility Environmental Setting

Lexington AASF #1 is in the Central Redbed Plains physiographic region, which is characterized by red Permian sedimentary rocks, rolling hills, and flat plains (Tyrl et al., 2007). The topography at the facility slopes predominantly to the east and west, away from the airfield, which forms a topographic high centrally within the facility. Surface elevations range from approximately 1,060 to 1,120 feet above mean sea level (amsl). The lowest elevations at the facility are located in the western portion, where Little Buckhead Creek crosses through the facility, and the highest elevations are located in the northeastern corner of the facility. Several unnamed tributaries to Buckhead Creek form lows adjacent to the airfield to the west and east and appear to be the primary on-facility drainages (**Figure 2-2**).

The area surrounding Lexington AASF #1 is primarily open pasture and woodland. The Lexington Wildlife Management Area is located to the north of Lexington AASF #1, a livestock farm and residential property are located to the south, and the Oklahoma Department of Corrections Lexington Correctional Center is located to the east. The Correctional Center and sparse residential properties occupy much of the developed land within a 1-mile radius of Lexington AASF #1.

### 2.2.1 Geology

The geology at the facility consists of Quaternary alluvial deposits underlain by Permian and Pennsylvanian-aged units (**Figure 2-3**). The alluvium deposits in the region range from 0 to 100 feet thick, have a wide compositional range, and consist of clay, silt, sand, and gravel (Chang and Stanley, 2010; Mashburn et al., 2019). The Permian-aged units, from youngest to oldest, consist of the Sumner, the Chase, the Council Grove, and the Admire Groups. The Pennsylvanian-aged Vanoss Formation underlies the Permian units (Chang and Stanley, 2010; Ellis et al., 2017; Mashburn et al., 2019).

The Permian-aged units in central Oklahoma can generally be described as red to reddish-orange massive and cross-bedded, fine-grained sandstone interbedded with shale and siltstone (Ellis et al., 2017). The Sumner Group consists of the Garber Sandstone and the underlying Wellington Formation. These units are similar and can be difficult to differentiate; consequently, they are often

treated as one unit. The Garber Sandstone and Wellington Formation consist of cross-bedded, fine-grained sandstone with interbedded shale that range up to approximately 280 feet thick (Chang and Stanley, 2010; Mashburn et al., 2019). The Chase, Council Grove, and Admire groups are similar and are composed of cross-bedded, fine-grained sandstone, shale, and thin limestone. The Permian geologic units dip slightly to the west (Mashburn et al., 2019). The Vanoss Formation consists of reddish-brown to gray shale and thin limestone and sandstone beds (Chang and Stanley, 2010; Ellis et al., 2017; Mashburn et al., 2019).

During the SI, soil borings were completed to depths ranging between 20 to 65 feet below ground surface (bgs). Soils observed generally consisted of red to reddish brown silty sand and low plasticity fines (clay and silt), as well as minor concentrations of gravel. Approximately 0.5- to 2-foot interbedded deposits of caliche, a hard calcified soil often associated with arid environments, were observed in four of the five borings. Bedrock was not encountered in the soil borings completed to depths up to 65 feet bgs during the SI; however, remnant structures indicative of highly weathered rock (blocky textures, laminated bedding, and fissures) were observed in several borings and are likely indicative of the Garber Formation, which is mapped as the primary surficial unit in the region. The silt, clay, sands, and minor amount of gravel observed during the SI are also consistent with Quaternary alluvial deposits that consist of, and were deposited atop of, the heavily weathered Garber. Differentiating between the weathered Garber Formation and alluvial deposits is difficult due to the degree of bedrock weathering and shared origin of the alluvium. Topographic position is likely the distinguishing factor, with alluvium being present along the slopes and bottoms of drainages and more intact material forming the topographic highs. Boring logs are presented in **Appendix E**.

One sample for grain size analysis was collected at location LEX-MW002 (11 to 12 feet bgs) and was analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil sample is comprised primarily of silt (50.03 percent [%]) and clay (36.52%), with minor amounts of sand (13.37%) and gravel (0.09%). Grain size results are presented in **Appendix F**.

### 2.2.2 Hydrogeology

The hydrogeology at the facility consists of one underlying aquifer, the Central Oklahoma aquifer. The Canadian River alluvial aquifer is present less than 5 miles to the west of the facility but terminates due to the disappearance of the confining Hennessey Group (Mashburn et al., 2019).

The Central Oklahoma aquifer comprises multiple geologic groups, including (from youngest to oldest): Quaternary-aged deposits and the Sumner, Chase, Council Grove, and Admire Groups (Ellis et al., 2017; Mashburn et al., 2019). Within Cleveland County, the freshwater sourced from the Central Oklahoma aquifer is found in the Sumner Group, although saline water is present in the underlying units (Mashburn et al., 2019). The Vanoss Formation acts as a lower confining unit for the aquifer. The groundwater surface elevation of the Central Oklahoma aquifer near the facility is estimated to be approximately 1,050 feet amsl. Groundwater features in the 4-mile radius surrounding the facility are shown in **Figure 2-3**.

Numerous local groundwater wells within approximately 2 miles of the facility were identified using the database maintained by the Oklahoma Water Resources Board. Over 100 wells were reported as domestic use, 9 were reported as agricultural/irrigation use, and 12 were reported as public water supply use. Domestic wells within the inferred and measured downgradient of the facility have total depths between 65 to over 300 feet bgs. Agricultural/irrigation wells within the inferred and measured downgradient of the facility have reported well depths between 160 to 220 feet bgs (Oklahoma Water Resources Board, 2021).

The drinking water at the facility comes from four supply wells near the Oklahoma Department of Corrections, the closest of which is less than 800 feet east-southeast and side-gradient from the

facility. The total depths of the public supply wells were all over 400 feet bgs. Downgradient public supply wells within a 2-mile radius were not identified (Oklahoma Water Resources Board, 2021).

Groundwater in the vicinity of Lexington AASF #1 was anticipated to be encountered at depths of approximately 30 to 60 feet bgs. Synoptic groundwater level measurements collected during the SI were found to range between 12.75 to 51.08 feet bgs. The shallowest depths to groundwater were observed at AOI 2, in the vicinity of the Lagoons. These locations were topographically the lowest and were located near the tributary drainage on the east side of the facility; however, it is also possible that groundwater could be artificially elevated near the Lagoons. Groundwater elevations, calculated using depth to groundwater measurements and the surveyed ground surface elevation, were generally higher in the east-northeast investigation area and decreased towards the southwest. As a result, the SI findings show an overall southwest groundwater flow direction (**Figure 2-4**).

### 2.2.3 Hydrology

Surface water in the vicinity of the facility consists of small creeks, ponds, and constructed lagoons. The eastern half of AASF #1 drains into small ponds and an unnamed tributary of Buckhead Creek that appears to be intermittent throughout the year, noted to flow primarily during heavy rain events, but had water during the SI. Retention ponds and sanitary lagoons operated by the corrections facility are also found southeast of AASF #1, on the corrections facility property. The western side of AASF #1 includes two parallel, southwestern-flowing creeks that are tributaries of Buckhead Creek. The creek furthest to the east would receive most runoff from the western portion of AASF #1 and is unnamed, while the other is Little Buckhead Creek. These tributaries flow from the facility, into Buckhead Creek, and then southeast into the Canadian River. The Canadian River is approximately 5 miles south of the facility and has an easterly flow direction from the Buckhead Creek outfall. The Canadian River is used for fishing and small size boating (Natural Atlas, 2022), and residences sparsely border both the Buckhead Creek and Canadian River.

Constructed drainage ditches/pathways are present at the facility, especially on the western side of the AASF, and direct surface flow out to a centralized point on the western boundary of the facility, near the unnamed tributary. Surface water features at the facility are presented in **Figure 2-5**.

### 2.2.4 Climate

Climate in eastern Oklahoma is classified as humid subtropical (Oklahoma Climatological Survey, 2011). The average temperature of the City of Purcell, located west of the facility, is 60.05 degrees Fahrenheit (°F). Seasonally, temperatures vary from a summer average monthly high of 94 °F to a winter average monthly low of 23 °F. Average precipitation in Purcell is 41.6 inches (World Climate, 2022).

### 2.2.5 Current and Future Land Use

Lexington AASF #1 encompasses approximately 308 acres of land and is located 5 miles east of Lexington, Oklahoma. The facility is bounded to the north by Lexington Wildlife Management Area, to the east by the Lexington Correctional Center, to the west by Little Buckhead Creek and Buckhead Creek, and to the south by a livestock farm and residential property. Oklahoma State Highway 39 crosses east to west about 0.5-miles south of the operational part of the facility. Lexington AASF #1 is a controlled access facility and currently includes two hangars, a fuel point, storage buildings, a maintenance shop (formally a fire station), administrative and ground support buildings, and parking areas. Reasonably anticipated future land use is not expected to change from the current land use.

### 2.2.6 Sensitive Habitat and Threatened/ Endangered Species

The following mammals, birds, fish, and insects are federally endangered, threatened, proposed, and/or are listed as candidate species in Cleveland County, Oklahoma (US Fish and Wildlife Service [USFWS], 2022).

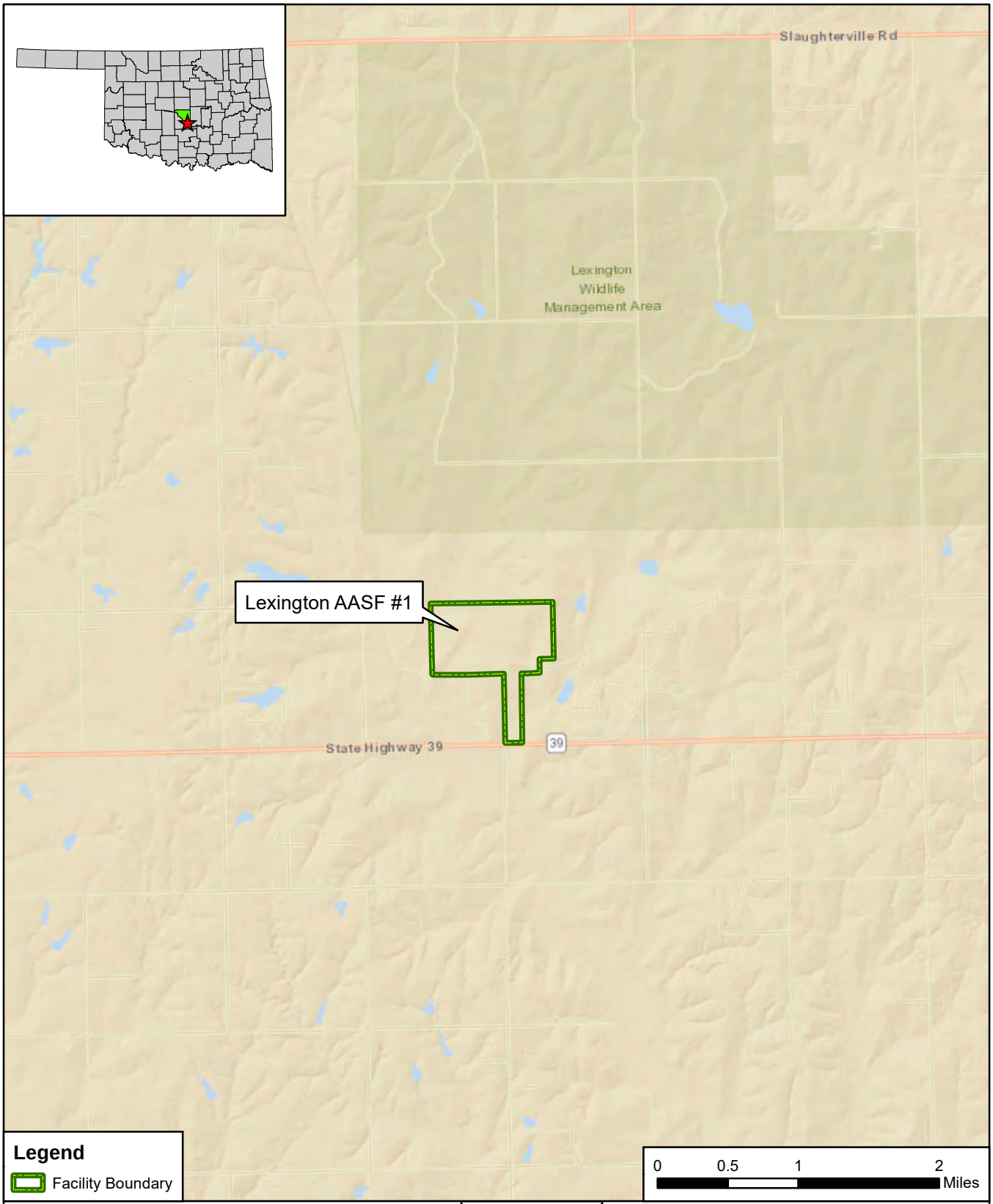
- Mammals: Tricolored bat, *Perimyotis subflavus* (proposed endangered)
- **Birds:** Whooping crane, *Grus americana* (endangered); Red knot, *Calidris canutus rufa* (threatened); Piping Plover, *Charadrius melodus* (threatened)
- **Fish:** Peppered chub, *Macrhybopsis tetranema* (endangered); Arkansas River shiner, *Notropis girardi* (threatened)
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)

## 2.3 History of PFAS Use

Four AOIs were identified in the PA where AFFF may have been used, stored, disposed, or released historically at the Lexington AASF (AECOM, 2020). PFAS-containing materials were potentially released to surface soil within the boundary of Lexington AASF #1 through equipment discharge, accidental leaks and spills, and any potential undocumented fire suppression system testing. The potential release areas were grouped into four AOIs based on proximity to one another and presumed groundwater flow. These areas include:

- AOI 1: Northern Release Areas
- AOI 2: Eastern Release Areas
- AOI 3: Mobile Refueler Parking Area
- AOI 4: Fuel Point

AFFF may have historically been released at the Flight Line and Burn Pit (Northern Release Areas) during fire training activities sometime between the mid to late 1980s to as late as 2008. In the Eastern Release Areas, Hangar 2 houses a fire suppression system, installed in 2001, that is equipped with two 800-gallon tanks of 3% Military Specification AFFF and two 36-gallon AFFF tanks. Additional AFFF releases may also have occurred from incidental spills from AFFF storage, firetruck staging, nozzle testing, and the washing of firetrucks as early as 1986 to as late as 2007. The Lagoons within the AOI 2 received discharge from the Old Wash Rack until 2004, when the Old Wash Rack was removed as part of Oklahoma ARNG (OKARNG) efforts to eliminate storm water drainage to the Lagoons. The holding tank overflow at Hangar 2 may discharge to the Lagoons. The Mobile Refueler Parking Area and Fuel Point were both used for storage of Tri-Max™ 30 extinguishers to as late as 2008, when the units were removed from AASF #1. The potential release areas were grouped into four AOIs based on preliminary data and presumed groundwater flow directions. A description of each AOI is presented in **Section 3**.

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| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
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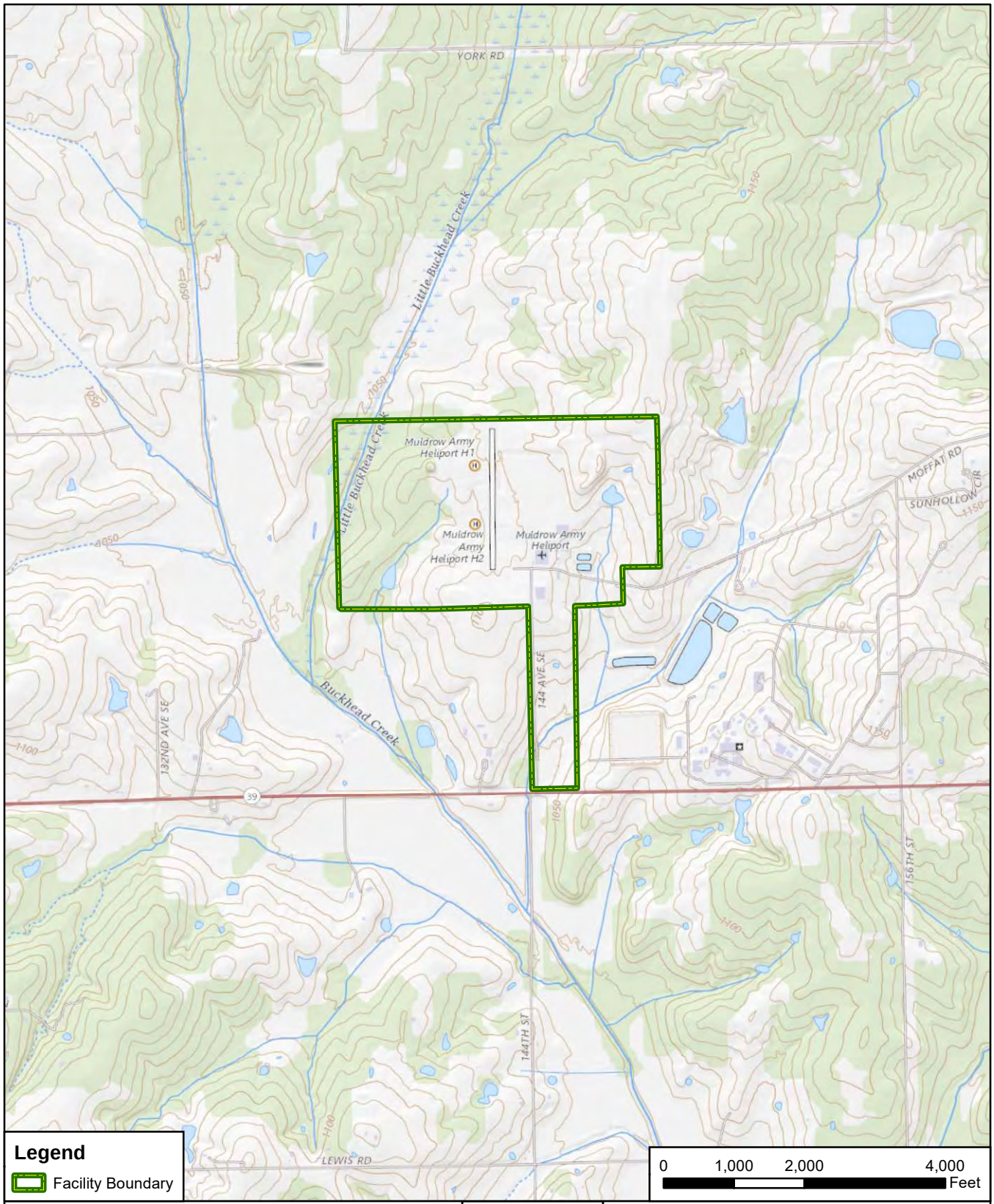
| SCALE | 1:63,360 | CHK BY | VG | 9/20/2022 |
| Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, | | PM | CM | 9/20/2022 |

**Facility Location**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-1**

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| SCALE | 1:24,000 | CHK BY | VG | 9/20/2022 |
| Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, | | PM | CM | 9/20/2022 |

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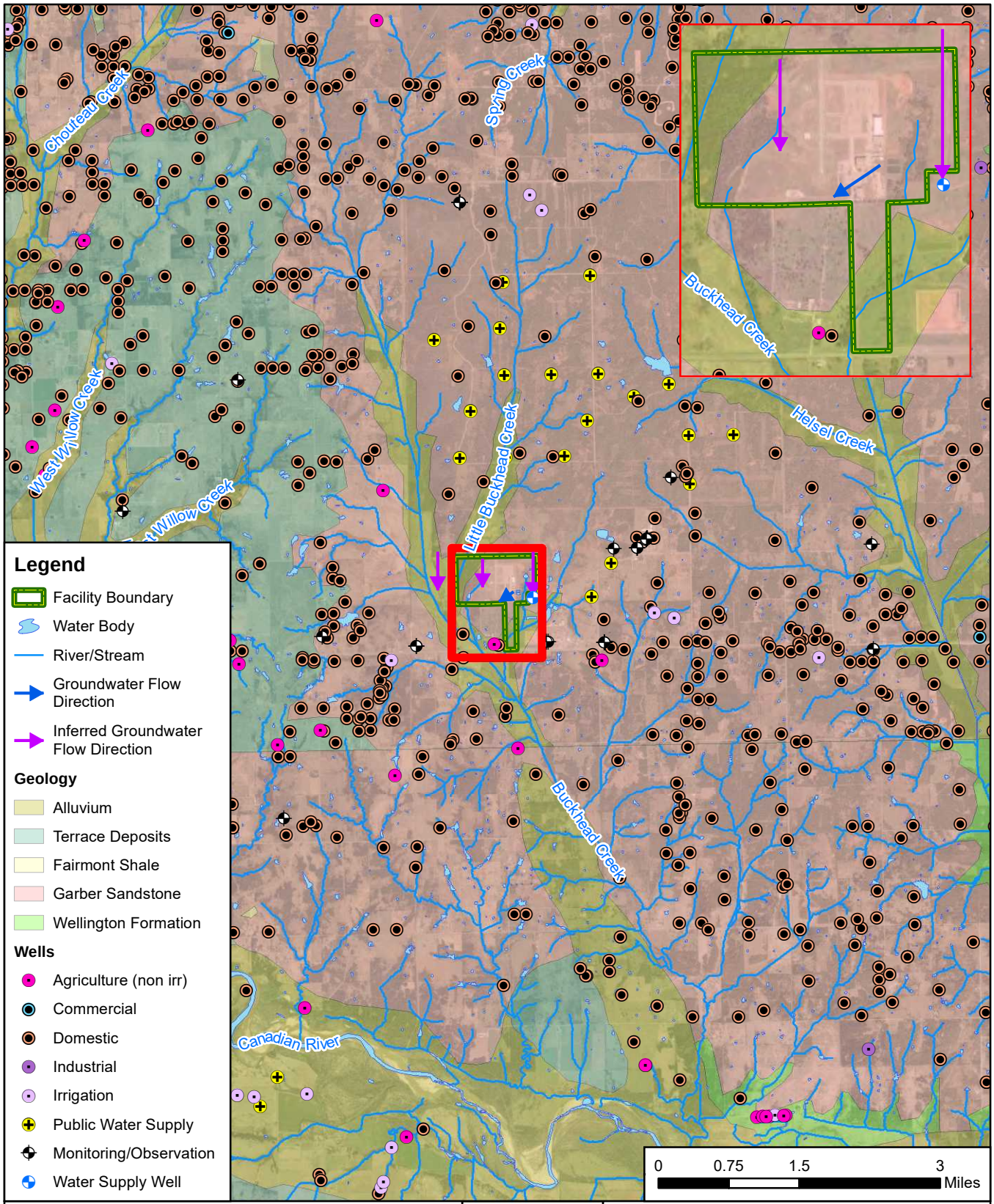
**Facility Topography**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-2**

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| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 11/3/2022 |

**Groundwater Features**

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-3**

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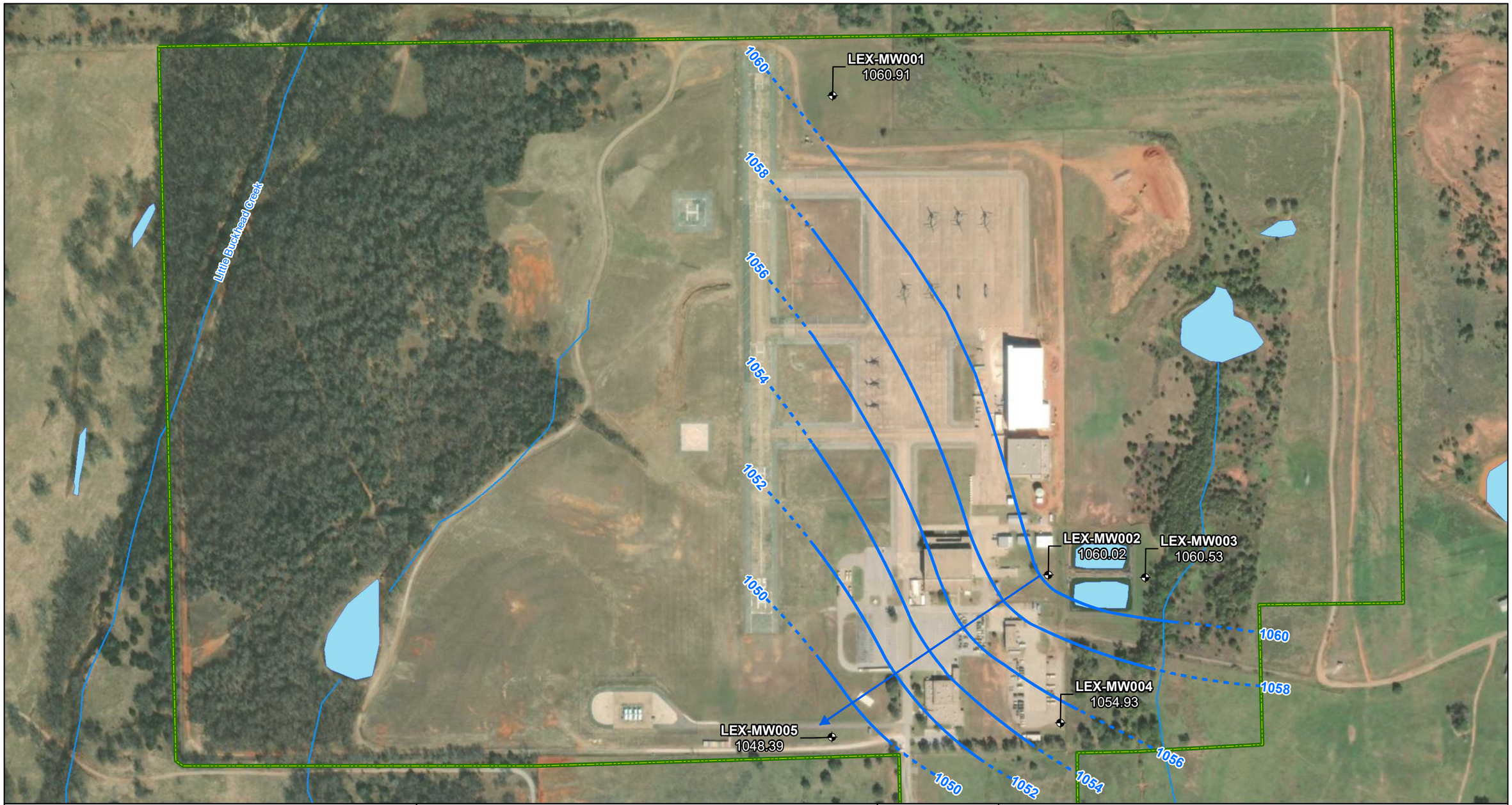


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| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 10/25/2022 |

- Monitoring Well
- Facility Boundary
- Water Body
- River/Stream
- Groundwater Elevation Contour
- Inferred Groundwater Elevation Contour
- Groundwater Flow Direction

0 180 360 720 Feet

Groundwater elevations in ft NAVD88.

N

## Groundwater Elevations, April 2022

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-4**

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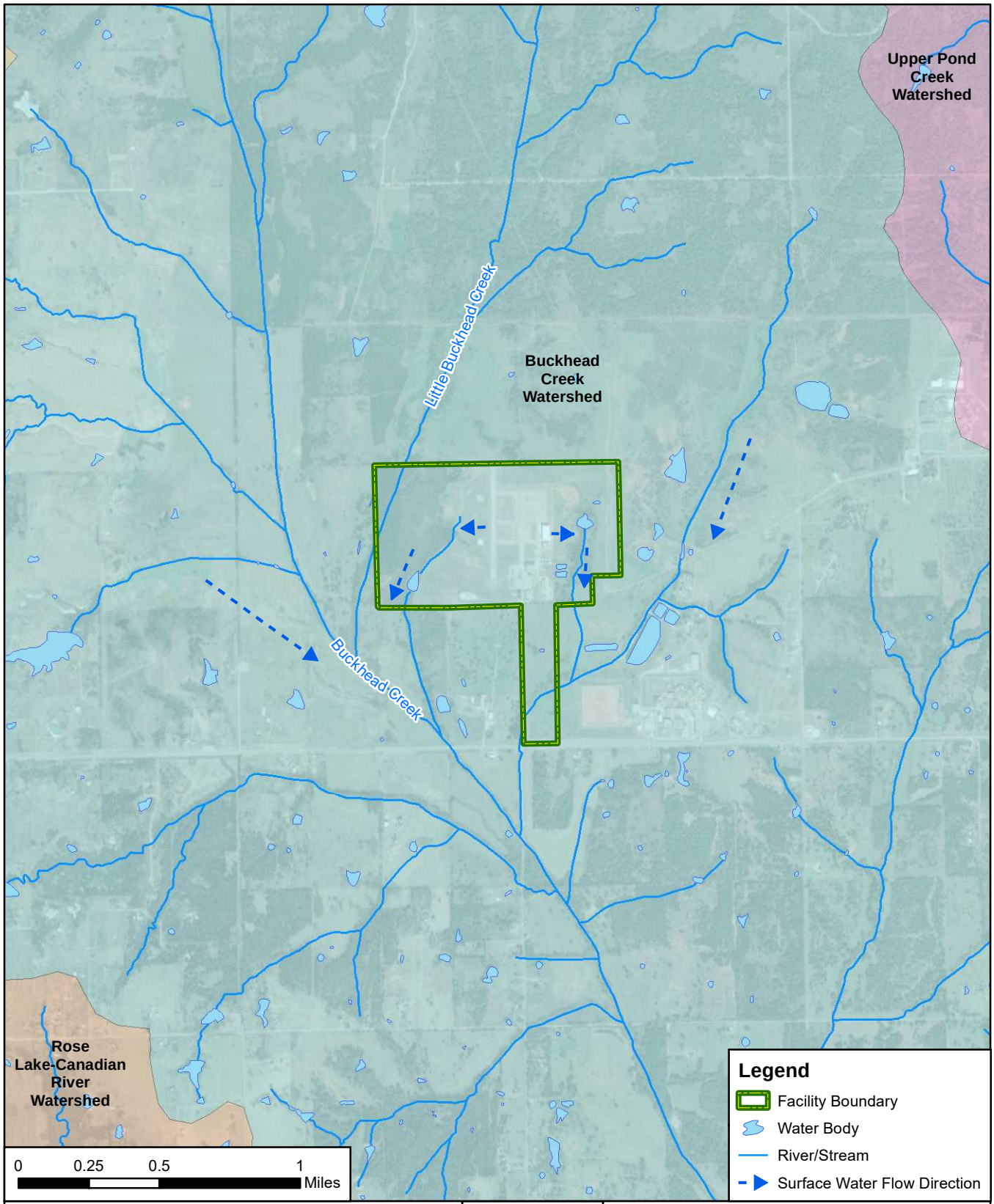


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| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | RG | 9/20/2022 |

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# Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 2-5**

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# 3. Summary of Areas of Interest

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, 11 potential release areas were identified at Lexington AASF and grouped into four AOIs (AECOM, 2020). The potential release areas are shown on **Figure 3-1**.

## 3.1 AOI 1 Northern Release Areas

AOI 1 consists of two potential release areas, as described below. Releases at AOI 1 have occurred on both paved areas and grassy surfaces. Some AFFF releases may have occurred directly onto surface soil but may also have infiltrated to the subsurface soil via cracks in pavement or joints between areas that are paved with different materials. Surface water flows westward via drainage ditches along the western side of the AASF #1 and into the unnamed tributary of Buckhead Creek.

### 3.1.1 Flight Line

The Flight Line is located in the central area of the AASF #1. Fire training activities were conducted with one or two Tri-Max™ 30 extinguishers on the concrete of the Flight Line. The dates of AFFF releases are unknown, but the releases occurred sometime after the firetrucks were acquired in the mid to late 1980s and as late as 2008, when the Tri-Max™ 30 extinguishers were removed from the AASF #1. AFFF released at the Flight Line may have flowed off to the grassy area directly to the west.

### 3.1.2 Burn Pit

The Burn Pit is located west of the flight line and east of the autorotation zone, in the northern half of the facility. During fire training activities, firetrucks discharged AFFF at this location. No information was available on the concentration of AFFF used or when the fire training activities occurred. Around 1986, the AFFF-equipped firetruck with approximately 100-gallons of AFFF was used to put out a fire at the burn pit, but the firetruck caught fire and burned. Documentation was not available to determine the degree the firetruck was burned, but it is believed that the facility's second firetruck, equipped with Purple K, was used to put out the burning firetruck. Training activities on the ramp also included firetrucks equipped with only water and Tri-Max™ extinguishers filled with Dawn® dish soap.

Surface soil in the northern part of the facility, including the Burn Pit, was cut down by 20 feet; the removed soil was used as cover in the immediate vicinity. Any remaining soil was stockpiled east of AOI 1, although much of it has been taken by Cleveland County for road construction. The surface soil remaining at the Burn Pit is native soil, but it is possibly feet below the grade of when the Burn Pit was operational.

## 3.2 AOI 2 Eastern Release Areas

AOI 2 consists of seven potential release areas, as described below. Releases at AOI 2 have occurred on both paved areas and grassy surfaces. Some AFFF releases may have occurred directly onto surface soil but may also have infiltrated to the subsurface soil via cracks in pavement or joints between areas that are paved with different materials.

### 3.2.1 Hangar 2

Hangar 2 was constructed in 1999-2000 and is northeast of Hangar 1. Hangar 2 houses a fire suppression system equipped with two 800-gallon tanks of 3% Military Specification AFFF and two 36-gallon AFFF tanks, one on the north side of the hangar and one on the south side. The fire suppression system tanks are located in the mechanical room on the second floor of the hangar. The system was installed in 2001, and as of July 2012, it was reported that no spills or leaks had occurred. A contractor inspects the system every 6 months. In September 2013, the bladder in one of the 800-gallon tanks leaked and resulted in an AFFF spill on the mechanical room floor. After the spill, the contractor removed the remaining contents of the tank and disposed the AFFF at an offsite location. The bladder was subsequently replaced and refilled. Any releases or spills in Hangar 2 would flow to the floor drains, which drain to an underground holding tank on the south side of the hangar. When the holding tank was originally installed, there was no drainpipe or overflow; however, OKARNG personnel indicated that the holding tank may have been retrofitted with an overflow. If the tank were to get too full, it would discharge via the overflow to the sanitary sewer and into the lagoons. The as-builts for the holding tank were never provided to the OKARNG by the contractor to confirm the presence of a drainage pipe. Personnel were not aware of the holding tank ever being full or serviced.

### 3.2.2 Old Fire Station

The Old Fire Station is located east of Hangar 1 and now serves as a maintenance shop. The Old Fire Station housed two firetrucks from before 1987 to 2006/2007. One of the firetrucks contained Purple K, while the second firetruck contained AFFF. According to interviews, the AFFF-equipped firetruck carried 20 5-gallon buckets of AFFF. No information was available on the concentration or type of AFFF used in the firetruck. The AFFF-equipped firetruck reportedly caught fire while carrying up to 100 gallons of AFFF near the Burn Pit. The firetruck was destroyed during the fire and replaced with a new AFFF-equipped firetruck. The arrival date of the new firetruck at AASF #1 is unknown. Additionally, no known leaks or spills of AFFF were reported.

The firetrucks reportedly trained with only water at the Burn Pit; however, during the PA, interviewees indicated that AFFF was pumped from one of the firetrucks, although they were uncertain about the time and location of this event. It was also noted that fire crews tested the nozzles at the Old Wash Rack.

### 3.2.3 Old Wash Rack

The Old Wash Rack is located between Hangar 1 and the Old Fire Station. Once a year, nozzle testing occurred at the Old Wash Rack from 1986 to 2004; however, it was not clear whether AFFF or only water were discharged during these tests. Fire training activities with the Tri-Max™ 30 units occurred twice at the Old Wash Rack. The dates of the training events are unknown, and no information was available on the concentration of AFFF used during these events. Additionally, the Old Wash Rack was used to wash vehicles, including the AFFF-equipped firetruck. The Old Wash Rack drained to the lagoons, but it was removed in 2004 to prevent storm water from entering the sanitary sewer system. A total of 23 Tri-Max™ 30 extinguishers were maintained by a contractor at the facility and serviced every 6 years. When serviced, the AFFF removed from the extinguishers was discharged at the Old Wash Rack before being refilled. The 23 extinguishers were serviced at least two times at the Old Wash Rack.

### 3.2.4 Grassy Area Behind Hangar 1

The Grassy Area Behind Hangar 1 is between the lagoons to the east and Hangar 1 to the west. During one fire training event with a Tri-Max™ 30 extinguisher, AFFF was released to the Grassy

Area Behind Hangar 1. The date of the training event is unknown, and no information was available on the concentration of AFFF used during the event.

### 3.2.5 Storage Building

The Storage Building is located directly east of the Old Fire Station. During the PA site visit, a 265-gallon container of 3% AFFF was observed. It is unknown whether there were any historic spills or leaks. There are no floor drains in the Storage Building.

### 3.2.6 Old AFFF Storage Location

The Old AFFF Storage Location is located east of the Old Fire Station and south of Hangar 2. Historically, 25 5-gallon buckets of AFFF were stored at this location. No information was available on the concentration or type of AFFF stored in the buckets. No known leaks or spills were reported. The Old AFFF Storage Location is an open-sided building with no floor drains.

### 3.2.7 Lagoons

The Lagoons are a two-cell sanitary sewer lagoon system and are located on the east side of AASF #1. The Lagoons are downslope of the Grassy Area Behind Hangar 1, Hangar 2, Old Fire Station, Old Wash Rack, and the Storage Building; however, berms around the Lagoons prevent any stormwater runoff from entering them. The berms direct stormwater to the south and east of the Lagoons to the intermittent tributary of Buckhead Creek. The Lagoons received discharge from the Old Wash Rack until 2004, when the Old Wash Rack was removed as part of OKARNG efforts to eliminate storm water drainage to the Lagoons. The holding tank overflow at Hangar 2 may discharge to the Lagoons.

Wastewater at the Lagoons does not discharge to any other surface water body and eventually evaporates. The Lagoons were originally lined with a clay liner. Around 2006, the lagoon system was renovated. Additional clay was added to the liners to increase the thickness of clay, and a rubberized membrane was put on the sides and tops of the berms to discourage vegetation growth. The liners were noted to be torn in a number of places at the time of the PA site visit. During SI field activities, a leak was observed on the exterior of the dike at the southeast corner of the lagoons and was draining onto the adjacent lowland area.

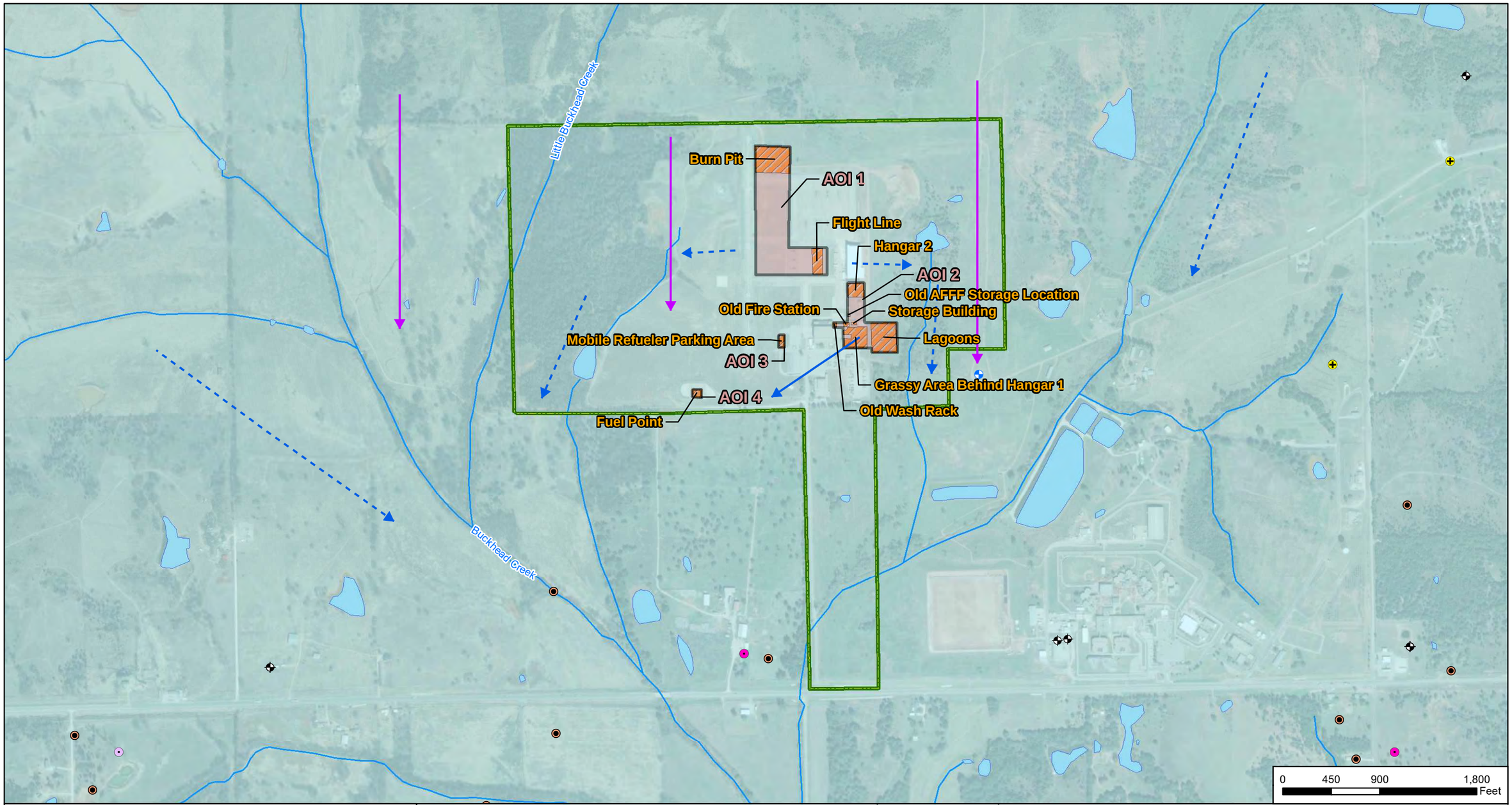
## 3.3 AOI 3 Mobile Refueler Parking Area

AOI 3 consists of one potential release area. The Mobile Refueler Parking Area is a concrete covered area west of Hangar 1. At least one Tri-Max™ 30 extinguisher was historically stored at AOI 3 inside the secondary containment structure. No known or recorded leaks or spills occurred at AOI 3; however, any AFFF releases inside the containment structure would flow to an oil/water separator (OWS) and then toward the eastern side of the facility where the OWS discharges to the ground surface in the grassy area behind Hangar 1. Any AFFF release outside of the secondary containment structure would flow westward, off the concrete, potentially impacting soil. Surface water at AOI 3 flows west toward the unnamed tributary of Buckhead Creek.

## 3.4 AOI 4 Fuel Point

AOI 4 consists of one potential release area. The Fuel Point is located in the southwestern portion of Lexington AASF #1 and houses four 20,000-gallon aboveground storage tanks. Historically, two Tri-Max™ 30 extinguishers were stored at the Fuel Point, one at the southeast corner and one at the northwest corner. No information was available on the concentration or type of AFFF in the Tri-Max™ 30 extinguishers. No leaks or spills were recorded or noted by interviewees. AOI

4 has a concrete surface with two storm drains. AFFF releases at the Fuel Point would drain to the OWS. The OWS and storm drains channel water northward towards a small pond and an unnamed tributary of Buckhead Creek.




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 11/3/2022 | GIS BY | MS | 11/3/2022 |
| SCALE | 1:10,800 | CHK BY | VG | 11/3/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 11/3/2022 |

- Area of Interest
- Potential Release Area
- Facility Boundary
- Water Body
- River/Stream
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Groundwater Flow Direction
- Agriculture (non irr)
- Domestic
- Irrigation
- Public Water Supply
- Monitoring
- Water Supply

N

## Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 3-1**

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# 4. Project Data Quality Objectives

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

## 4.1 Problem Statement

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

## 4.2 Information Inputs

Primary information inputs included:

- The PA for Lexington AASF #1 (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)-QAPP Addendum (AECOM, 2021); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

## 4.3 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). The SI scope was bounded vertically by the observed depths of the surficial groundwater table. Temporal boundaries of the study were limited by seasonal conditions present during the Spring 2022 field work.

## 4.4 Analytical Approach

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

## 4.5 Data Usability Assessment

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

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

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

# 5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Lexington Army Aviation Support Facility #1, Oklahoma* dated October 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Lexington Army Aviation Support Facility #1, Oklahoma* dated September 2021 (AECOM, 2021);
- *Final Site Safety and Health Plan, Lexington Army Aviation Support Facility #1, Oklahoma* dated March 2022 (AECOM, 2022).

The SI field activities were conducted from 6 to 22 April 2022 and consisted of utility clearance, rotary sonic (sonic) drilling, soil sample collection, permanent monitoring well installation, low-flow groundwater sample collection, surface water sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as noted in **Section 5.9**.

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

- Thirty-four (34) soil samples from 24 locations;
- Five (5) low-flow groundwater samples from 5 permanent monitoring wells;
- Two (2) surface water samples from 2 surface water locations; and
- Twenty-two (22) quality assurance (QA)/quality control (QC) samples.

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

## 5.1 Pre-Investigation Activities

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

### 5.1.1 Technical Project Planning

The US Army Corps of Engineers (USACE) TPP Process, Engineer Manual (EM) 200-1-2 (USACE, 2016) defines four phases to project planning: 1.) defining the project phase; 2.)

determining data needs; 3.) developing data collection strategies; and 4.) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 18 August 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, OKARNG, USACE, and Oklahoma Department of Environmental Quality. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021).

A TPP Meeting 3 was held on 3 April 2023 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

Both AECOM and their drilling subcontractor, Environmental Works, Inc., contacted Oklahoma 811 (OKIE811) one-call utility clearance contractor prior to mobilization to notify them of intrusive work. Because OKIE811 locators do not locate private utilities, such as those belonging to Lexington AASF #1, AECOM contracted Ground Penetrating Radar Systems, LLC. (GPRS) to perform utility clearance for private utilities at all boring locations. GPRS performed the utility clearance under the oversight of the AECOM field team on 6 April 2022 using industry standard methods in addition to ground-penetrating radar. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

### 5.1.3 Source Water and Sampling Equipment Acceptability

Two potable water sources at Lexington AASF #1 were sampled on 27 October 2021 to assess usability for decontamination of drilling equipment. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. A third decontamination water sample was collected from the same water source on 21 April 2022 after it had passed through the driller's holding tank. The results of the decontamination water samples used during the SI are provided in **Appendix F**. The decontamination water samples collected in October 2021 displayed concentrations greater than the limit of detection for several target analytes. These results were evaluated prior to the SI mobilization, at which time the results were noted to be below 1/5 of the SLs at that time, as required by the SI QAPP Addendum (AECOM, 2021). As a result, the on-facility decontamination water was determined to be acceptable for use. Comparison of the results to the updated SLs shows the PFOS results for decontamination water samples LEX-DECON-01 and LEX-DECON-02 exceed 1/5 of the current SL. However, results for decontamination water sample LEX-DECON-03, collected during the April 2022 SI mobilization, were below 1/5 of the SL for all target compounds. Sample LEX-DECON-03 is more representative of all decontamination water and drilling water used during SI field activities. A discussion of these sample results is presented in the DUA (**Appendix A**).

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

## 5.2 Soil Borings and Soil Sampling

Soil samples were collected via sonic drilling technology and hand auger in accordance with the SI QAPP Addendum (AECOM, 2021). A GeoProbe® 8150LS sonic sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top 5 feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-1**.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above saturated soil, and one subsurface soil sample at the mid-point between the surface and saturated soil. To supplement the drilled boring locations, additional surface soil samples were collected at other locations using a hand auger.

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

During the SI, soil borings were completed to depths ranging between 20 to 65 feet bgs. Soils observed generally consisted of red to reddish brown silty sand and low plasticity fines (clay and silt), as well as minor concentrations of gravel. Interbedded deposits of caliche were observed in four of the five borings. Blocky textures, laminated bedding, and fissures, as well as remnant structures indicative of weathered rock, were observed in several borings during the SI; however, competent bedrock was not encountered to depths up to 65 feet bgs. The silt, clay, sands, and minor concentrations of gravel are also consistent with Quaternary alluvial deposits environment overlying heavily weathered Garber Formation at the facility.

Difficult drilling conditions at the original LEX-MW004 location caused the drill casing to seize in the borehole at a depth of 45 feet bgs. Multiple attempts were made over several days to free the casing through cooling and over drilling; however, the tooling could not be freed. The casing was disconnected to a depth of 10 feet bgs, and the borehole and interior of the stuck casing were abandoned using a cement-bentonite grout. Location LEX-MW004 was offset approximately 20 feet and drilled, and the permanent monitoring well was installed. The location of the abandoned drill casing is shown on **Figure 5-1**.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15, total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2021).

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

Sonic borings were converted to permanent wells in accordance with the SI QAPP Addendum (AECOM, 2021). Borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

## 5.3 Surface Water Sampling

Surface water samples were collected at AOI 2 within the two sanitary lagoons. AOI02-08-SW was collected from the northern lagoon, and AOI02-09-SW was collected from the southern lagoon. In accordance with the SI QAPP addendum, sediment samples were not collected due to health and safety concerns regarding the sanitary nature of sediments within the lagoons, and to avoid potential damage to the lagoon liners (AECOM, 2021).

Surface water samples were collected from a single point near the bank of each lagoon by dipping the laboratory-supplied bottle into the water and filling from approximately halfway up the water column. Sampling was performed deliberately and methodically to avoid disturbance of bottom sediments and as quickly as possible to ensure a representative sample was collected. Additionally, a subsample of each surface water sample was collected in a separate container, and a shaker test was completed to identify if there were any foaming. No foaming was noted on any of the surface water subsamples.

After collection of the surface water samples from each location, general water quality parameters (i.e., temperature, pH, conductivity, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were collected with a water quality meter and recorded on the field sampling form (**Appendix B2**). The surface water locations are shown on **Figure 5-1**, and sample information is provided in **Table 5-1**.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory for analysis by LC/MS/MS compliant with QSM 5.1 Table B-15. Sediment samples were also analyzed for TOC (USEPA Method 9060A) and pH (USEPA Method 9045D), in accordance with the SI QAPP Addendum (AECOM, 2021).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 6°C during shipment.

## 5.4 Permanent Well Installation and Groundwater Sampling

During the SI, five permanent monitoring wells were installed within or downgradient of potential source areas. The locations of the wells are shown on **Figure 5-2**.

A GeoProbe® 8150LS drill rig was used to install five 2-inch diameter monitoring wells. The monitoring wells were constructed with Schedule 40 PVC, flush threaded 10-foot sections of riser, 0.010-inch slotted well screen, and a threaded bottom cap. A filter pack of #1 Filter Sand was installed in the annulus around the well screen to a minimum of 2 feet above the well screen. A 3- to 7-foot-thick bentonite seal was placed above the filter sand and hydrated in lifts with water. Bentonite-cement grout was placed in the well annulus from the top of the bentonite seal to ground surface. The bentonite-cement grout was allowed to set for 24 hours prior to well completion in accordance with the SI QAPP Addendum (AECOM, 2021). All monitoring wells were completed with flush mount well vaults set in concrete pads. The screen interval of each of the groundwater monitoring wells is provided in **Table 5-2**.

Development and sampling of wells was completed in accordance with the SI QAPP Addendum (AECOM, 2021). The newly installed monitoring wells were developed no sooner than 24 hours

following installation by pumping and surging using a variable speed submersible pump. Samples were collected no sooner than 24 hours following development via low-flow sampling methods using a submersible or peristaltic pump with disposable PFAS-free, HDPE tubing. New tubing was used at each well, and the pumps were decontaminated between each well. The wells were purged at a rate determined in the field to reduce draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, DO, and ORP) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**). Water levels were measured to the nearest 0.01 inch and recorded. Additionally, a subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there were any foaming. No foaming was noted in any of the groundwater subsamples.

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

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. Because non-dedicated sampling equipment was required due to the use of a submersible pump at several locations, equipment rinsate blanks were collected at a rate of 5% and analyzed for the same parameters as the groundwater 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.

## 5.5 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 22 April 2022. Groundwater elevation measurements were collected from the five new permanent monitoring wells. Water level measurements ranged between 12.75 to 51.08 feet bgs. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data is provided in **Table 5-3**.

## 5.6 Surveying

The northern side of each well casing was surveyed by Oklahoma-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021). Survey data from the newly installed wells on the facility were collected on 21 April 2022 in the applicable North American Datum 1983 (NAD83, horizontal) in Oklahoma State Plane (3501) South Zone and North American Vertical Datum 1988 (NAVD88, vertical). The surveyed well data are provided in **Appendix B3**.

## 5.7 Investigation-Derived Waste

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

Soil IDW (i.e., soil cuttings) were generated during the SI activities from the six soil boring locations, including the abandoned LEX-MW004 location. No soil IDW was generated at the surface soil sample locations. The soil IDW generated during the SI activities were contained in eight labeled, 55-gallon Department of Transportation (DOT)-approved steel drums and left onsite in the northeast portion of the facility in the Connex Storage Yard, east of Hangar 2, pending laboratory analysis. The soil IDW was not sampled and assumes the PFAS characteristics of the

associated soil samples collected from that source location. ARNG will coordinate the transportation and disposal of the solid IDW in accordance with the Army Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were contained in two labeled, 55-gallon DOT-approved steel drums, and left onsite within the Connex Storage Yard pending laboratory analysis. Due to the minimal amount of IDW generated, liquid IDW from all locations was consolidated into two drums. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location. ARNG will further manage liquid IDW in accordance with the Army Guidance for Addressing Releases of PFAS, Q18 (DA, 2018). Based on laboratory results, containerized liquid IDW will be managed and disposed by ARNG (either by offsite disposal or onsite disposal, with treatment as appropriate) under a separate contract in accordance with *SOP No. 042A for Treating Liquid Investigation-Derived Material (Purge water, drilling water, and decontamination fluids)* (EA Engineering, Science, and Technology, Inc., 2021). ARNG will further coordinate to ensure proper disposal in accordance with state requirements and the Army Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

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

## 5.8 Laboratory Analytical Methods

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

## 5.9 Deviations from the SI QAPP Addendum

One deviation from the SI QAPP Addendum was identified during review of the field documentation. The deviation is noted below and is documented in a Nonconformance and Corrective Action Report (**Appendix B3**):

- During sonic drilling activities, the mid-point subsurface soil sample was collected from 19 to 20 feet bgs at boring LEX-MW001. The approved SI QAPP Addendum states that mid-point subsurface soil samples would be collected from 13 to 15 feet bgs if depth to water were greater than 30 feet bgs. Water was encountered at approximately 40 feet bgs during drilling, and the mid-point samples were inadvertently collected at depths greater than 15 feet bgs. Consequently, the analytical results of the collected mid-point sample (19 to 20 feet bgs), as well as the surface soil samples at AOI 1, were used to make conservative assumptions for the CSM. This action was documented in a nonconformance and corrective action report provided in **Appendix B3**.

**Table 5-1**
**Site Inspection Samples by Medium**
**Site Inspection Report, Lexington AASF #1, Oklahoma**

| Sample Identification | Sample Collection Date/Time | Sample Depth (feet bgs) | LC/MS/MS compliant with QSM 5.3 Table B-15 | TOC (USEPA Method 9060A) | pH (USEPA Method 9045D) | Grain Size (ASTM D-422) | Comments |
|---|---|---|---|---|---|---|---|
| **Soil Samples** | | | | | | | |
| AOI01-01-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| AOI01-02-SB-00-02 | 4/12/2022 | 0-2 | x | x | x | | |
| AOI01-02-SB-00-02-MS | 4/12/2022 | 0-2 | | x | x | | MS/MSD |
| AOI01-02-SB-00-02-MSD | 4/12/2022 | 0-2 | | x | x | | MS/MSD |
| AOI01-03-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| AOI01-04-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-04-SB-00-02-D | 4/14/2022 | 0-2 | x | | | | Duplicate |
| AOI01-05-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-06-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-07-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-08-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-09-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI01-10-SB-00-02 | 4/14/2022 | 0-2 | x | | | | |
| AOI02-01-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| AOI02-02-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| AOI02-03-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| AOI02-04-SB-00-02 | 4/12/2022 | 0-2 | x | x | x | | |
| AOI02-04-SB-00-02-D | 4/12/2022 | 0-2 | | x | x | | Duplicate |
| AOI02-05-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| AOI02-06-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| AOI02-07-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| AOI03-01-SB-00-02 | 4/14/2022 | 0-2 | x | x | x | | |
| AOI03-01-SB-00-02-D | 4/14/2022 | 0-2 | x | | | | Duplicate |
| AOI04-01-SB-00-02 | 4/12/2012 | 0-2 | x | x | x | | |
| AOI04-01-SB-00-02-D | 4/12/2012 | 0-2 | x | | | | Duplicate |
| LEX-MW001-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| LEX-MW001-SB-19-20 | 4/20/2022 | 19-20 | x | | | | |
| LEX-MW001-SB-19-20-MS | 4/20/2022 | 19-20 | x | | | | MS/MSD |
| LEX-MW001-SB-19-20-MSD | 4/20/2022 | 19-20 | x | | | | MS/MSD |
| LEX-MW001-SB-39-40 | 4/20/2022 | 39-40 | x | | | | |
| LEX-MW001-SB-34-35 | 4/20/2022 | 34-35 | | | | x | |
| LEX-MW002-SB-00-02 | 4/12/2022 | 0-2 | x | | | | |
| LEX-MW002-SB-09-10 | 4/15/2022 | 9-10 | x | | | | |
| LEX-MW002-SB-11-12 | 4/15/2022 | 11-12 | | | | x | |
| LEX-MW002-SB-19-20 | 4/15/2022 | 19-20 | x | | | | |
| LEX-MW003-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| LEX-MW003-SB-00-02-D | 4/15/2022 | 0-2 | x | | | | Duplicate |
| LEX-MW003-SB-05-06 | 4/15/2022 | 5-6 | x | | | | |
| LEX-MW003-SB-10-11 | 4/15/2022 | 10-11 | x | | | | |
| LEX-MW004-SB-00-02 | 4/18/2022 | 0-2 | x | | | | |
| LEX-MW004-SB-14-15 | 4/19/2022 | 14-15 | x | | | | |
| LEX-MW004-SB-28-29 | 4/19/2022 | 28-29 | x | | | | |
| LEX-MW005-SB-00-02 | 4/15/2022 | 0-2 | x | | | | |
| LEX-MW005-SB-14-15 | 4/19/2022 | 14-15 | x | | | | |
| LEX-MW005-SB-14-15-MS | 4/19/2022 | 14-15 | x | | | | MS/MSD |
| LEX-MW005-SB-14-15-MSD | 4/19/2022 | 14-15 | x | | | | MS/MSD |
| LEX-MW005-SB-59-60 | 4/19/2020 | 59-60 | x | | | | |
| LEX-MW005-SB-34-35 | 4/19/2022 | 34-35 | | | | x | |

**Table 5-1**
**Site Inspection Samples by Medium**
**Site Inspection Report, Lexington AASF #1, Oklahoma**

| Sample Identification | Sample Collection Date/Time | Sample Depth (feet bgs) | LC/MS/MS compliant with QSM 5.3 Table B-15 | TOC (USEPA Method 9060A) | pH (USEPA Method 9045D) | Grain Size (ASTM D-422) | Comments |
|---|---|---|---|---|---|---|---|
| **Groundwater Samples** | | | | | | | |
| LEX-MW001-042222 | 4/22/2022 | NA | x | | | | |
| LEX-MW001-042222-MS | 4/22/2022 | NA | x | | | | MS/MSD |
| LEX-MW001-042222-MSD | 4/22/2022 | NA | x | | | | MS/MSD |
| LEX-MW002-042122 | 4/21/2022 | NA | x | | | | |
| LEX-MW003-042122 | 4/21/2022 | NA | x | | | | |
| LEX-MW003-042122-D | 4/21/2022 | NA | x | | | | Duplicate |
| LEX-MW004-042222 | 4/22/2022 | NA | x | | | | |
| LEX-MW005-042222 | 4/22/2022 | NA | x | | | | |
| **Surface Water Samples** | | | | | | | |
| AOI02-08-SW | 4/20/2022 | NA | x | | | | |
| AOI02-08-SW-D | 4/20/2022 | NA | x | | | | Duplicate |
| AOI02-08-SW-MS | 4/20/2022 | NA | x | | | | MS/MSD |
| AOI02-08-SW-MSD | 4/20/2022 | NA | x | | | | MS/MSD |
| AOI02-09-SW | 4/20/2022 | NA | x | | | | |
| **Blank Samples** | | | | | | | |
| LEX-FRB-01 | 4/21/2022 | NA | x | | | | |
| LEX-ERB-01 | 4/12/2022 | NA | x | | | | |
| LEX-ERB-02 | 4/15/2022 | NA | x | | | | |
| LEX-ERB-03 | 4/21/2022 | NA | x | | | | |
| LEX-ERB-04 | 4/22/2022 | NA | x | | | | |
| LEX-DECON-01 | 10/27/2021 | NA | x | | | | |
| LEX-DECON-02 | 10/27/2021 | NA | x | | | | |
| LEX-DECON-03 | 4/21/2022 | NA | x | | | | |

**Notes:**
ASTM = American Society for Testing and Materials
bgs = below ground surface
ERB = equipment rinsate blank
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

**Table 5-2**
**Soil Boring Depths and Permanent Well Screen Intervals**
**Site Inspection Report, Lexington AASF #1, Lexington, Oklahoma**

| Area of Interest | Boring Location | Monitoring Well ID | Soil Boring Depth (feet bgs) | Permanent Well Screen Interval (feet bgs) |
|---|---|---|---|---|
| 1 | LEX-MW001 | LEX-MW001 | 50 | 35-45 |
| 2 | LEX-MW002 | LEX-MW002 | 30 | 19.6-29.6 |
| | LEX-MW003 | LEX-MW003 | 20 | 8-18 |
| | LEX-MW004 | LEX-MW004 | 37 | 25-35 |
| | LEX-MW005 | LEX-MW005 | 65 | 55-65 |

**Notes:**
AASF = Army Aviation Support Facility
bgs = below ground surface
LEX = Lexington
ID = identification

**Table 5-3**
**Depths to Water and Groundwater Elevations in Permanent Wells**
**Site Inspection Report, Lexington AASF #1, Lexington, Oklahoma**

| Location ID | Permanent 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) |
|---|---|---|---|---|---|---|
| LEX-MW001 | 35-45 | 1099.13 | 1099.48 | 38.22 | 38.57 | 1060.91 |
| LEX-MW002 | 19.6-29.6 | 1080.64 | 1080.91 | 20.02 | 20.29 | 1060.62 |
| LEX-MW003 | 8-18 | 1072.81 | 1073.28 | 12.28 | 12.75 | 1060.53 |
| LEX-MW004 | 25-35 | 1078.71 | 1079.01 | 23.78 | 24.08 | 1054.93 |
| LEX-MW005 | 55-65 | 1099.17 | 1099.47 | 50.78 | 51.08 | 1048.39 |

**Notes:**

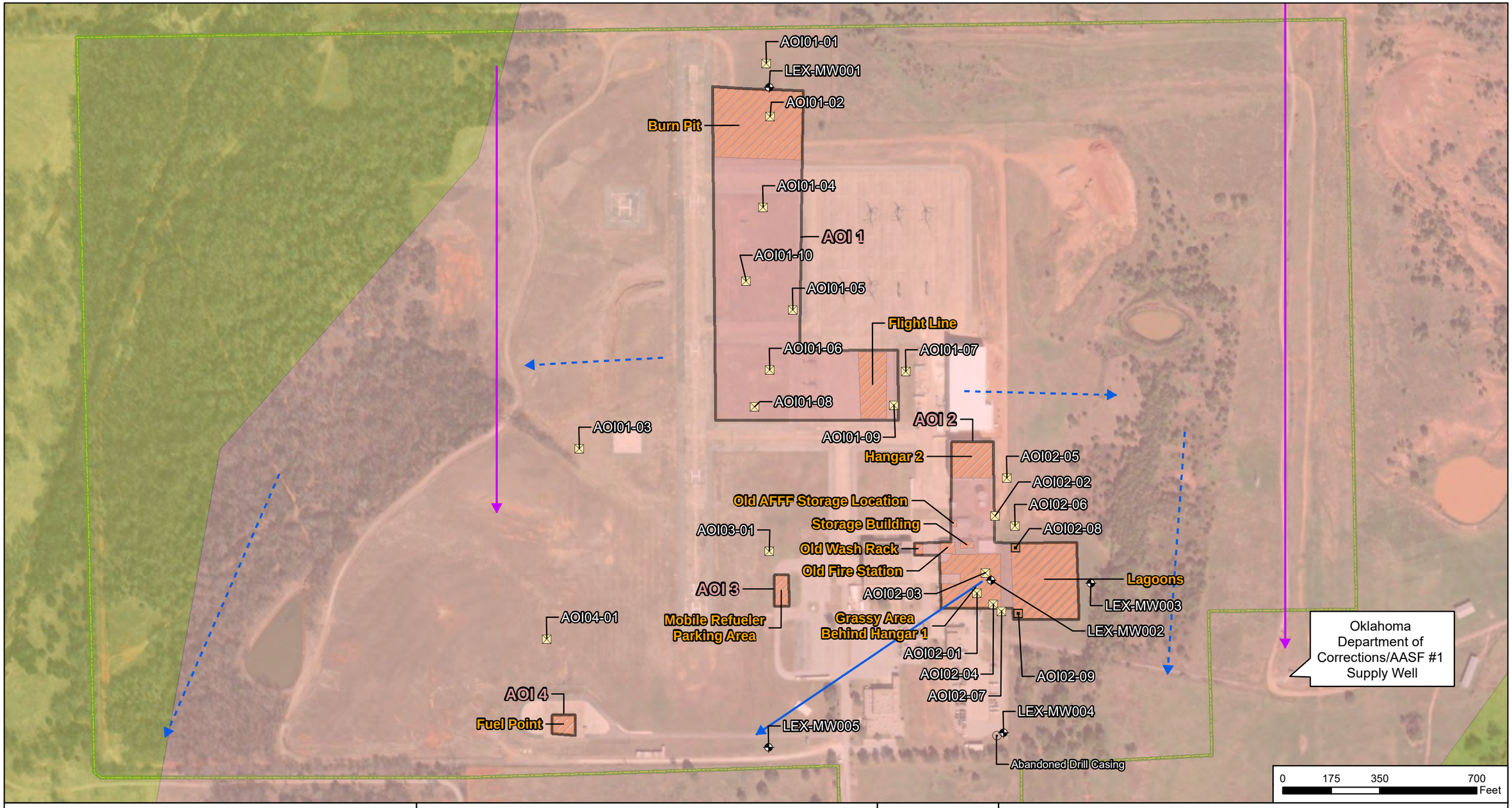
AASF = Army Aviation Support Facility

bgs = below ground surface

btoc = below top of casing

ID = identification

NAVD88 = North American Vertical Datum 1988




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 1/9/2023 | GIS BY | MS | 1/9/2023 |
| SCALE | 1:4,200 | CHK BY | MC | 1/9/2023 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 1/9/2023 |

- Monitoring Well
- Surface Soil Sample
- Surface Water
- Abandoned Drill Casing
- Area of Interest
- Potential Release Area
- Facility Boundary
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Groundwater Flow Direction
- Alluvium
- Garber Sandstone

N

## Site Inspection Sample Locations

AECOM 12420 Milestone Center Drive Germantown, MD 20876

**Figure 5-1**

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# 6. Site Inspection Results

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

## 6.1 Screening Levels

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

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

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

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

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

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

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

## 6.2 Soil Physicochemical Analyses

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

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

## 6.3 AOI 1

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

### 6.3.1 AOI 1 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs from AOI01-01 to AOI01-10 and LEX-MW001. Deep subsurface soil was sampled from LEX-MW001 (19 to 20 feet bgs and 39 to 40 feet bgs). As discussed in **Section 5.9**, shallow subsurface soil samples, defined as samples collected between 2 and 15 feet bgs for comparison to the industrial/commercial worker SL, were not collected at LEX-MW001.

AOI01-01, AOI01-02, and LEX-MW001 were collected in the vicinity of the Burn Pit. AOI01-04, AOI01-05, and AOI01-10 were located across the taxiway south of the burn pit. In the vicinity of the Flight Line fire training area, AOI01-06 and AOI01-08 were located to the west, while AOI01-07 and AOI01-09 were located to the east. AOI01-03 was located in the dry swale west-southwest of AOI 1, where most of the surface runoff from AOI 1 appeared to flow before accumulating in a ditch. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface soil at AOI 1, at concentrations below the SLs. PFOS was generally the highest relevant compound detected in surface soil at AOI 1, with a maximum concentration of 9.37 micrograms per kilogram (µg/kg) at LEX-MW001. With the exception of PFNA at AOI01-01 (1.83 µg/kg), all other relevant compounds detected were below 1 µg/kg.

In deep subsurface soil (> 15 feet bgs), PFOA, PFOS, PFHxS, and PFNA were detected. The maximum concentration detected was PFOA, at 1.53 µg/kg at LEX-MW001 (19 to 20 feet bgs).

### 6.3.2 AOI 1 Groundwater Analytical Results

Groundwater was sampled from LEX-MW001. **Figure 6-6** and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

PFOS exceeded the 4 nanograms per liter (ng/L) SL, at a concentration of 7.93 ng/L at LEX-MW001. PFOA, PFBS, PFHxS, and PFNA were detected below their SLs, at concentrations of 5.07 ng/L, 2.56 J ng/L, 8.90 ng/L, and 2.54 J ng/L, respectively.

### 6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil, below their SLs. PFOS was detected in groundwater, at concentrations above the SL. Based on the exceedance of the SL for PFOS in groundwater, further evaluation at AOI 1 is warranted.

## 6.4 AOI 2

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2: Eastern Release Areas. The results for the surface water samples are also presented. The results in soil, groundwater, and surface water are summarized on **Table 6-2** through **Table 6-6**. Soil, groundwater, and surface water results are presented on **Figure 6-1** through **Figure 6-9**.

### 6.4.1 AOI 2 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs from AOI02-01 to AOI02-07 and LEX-MW002 to LEX-MW005. Soil was also sampled from the shallow subsurface soil (9 to 15 feet bgs) from LEX-MW002 to LEX-MW005 and deep subsurface soil (19 to 60 feet bgs) from LEX-MW002, LEX-MW004, and LEX-MW005.

LEX-MW002, AOI02-01, AOI02-03, AOI02-04, and AOI02-07 were located in the Grassy Area Behind Hangar 1. AOI02-02, AOI02-05, AOI02-06, and AOI02-08 were located east and downslope of Hangar 2. LEX-MW003 was located east of the Lagoons, between AOI 2 and the Oklahoma Department of Corrections/AASF #1 Supply Well. LEX-MW004 was located south of AOI 2, and LEX-MW005 was located southwest of AOI 2. LEX-MW005 was not associated with a specific AOI in the SI QAPP Addendum; however, it is now linked to AOI 2 based on the observed groundwater flow direction during the SI. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** through **Table 6-4** summarize the soil results.

PFOS exceeded the SL in surface soil. PFOA, PFHxS, and PFNA were detected below their SLs in surface and subsurface soil, and PFOS was detected below the SL in subsurface soil. PFBS was not detected in soil at AOI 2.

In surface soil at AOI 2, PFOS was detected above the 13 µg/kg SL at AOI02-03 (22.6 µg/kg), AOI02-07 (15.3 µg/kg), and LEX-MW003 (22.8 µg/kg). PFOA, PFHxS, and PFNA were detected at concentrations below their SLs. The maximum concentration detected of these three compounds was PFOA at 7.43 µg/kg at AOI02-05. PFBS was not detected in surface soil.

In shallow subsurface soil, PFOA, PFOS, PFHxS, and PFNA were detected at concentrations below their SLs. The maximum concentration detected of these four compounds was PFOS at 37.6 µg/kg at LEX-MW003 (5 to 6 feet bgs). PFBS was not detected in shallow subsurface soil.

In deep subsurface soil, PFOA and PFHxS were detected at only one location, LEX-MW002 (19 to 20 feet bgs), at concentrations of 0.103 J µg/kg and 0.810 J µg/kg. No other detections of PFOA, PFOS, PFBS, PFHxS, or PFNA were reported. Soil was not sampled in the deep subsurface soil interval (> 15 feet bgs) at LEX-MW003 because groundwater was encountered above this depth. The intermediate and deep soil samples from LEX-MW003 are captured in the shallow subsurface results.

### 6.4.2 AOI 2 Groundwater Analytical Results

Groundwater was sampled from LEX-MW002 to LEX-MW005. **Figure 6-6** and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-5** summarizes the groundwater results.

PFOA, PFOS, and PFHxS were detected in groundwater, at concentrations exceeding their SLs. PFBS and PFNA were detected below their SLs.

PFOA was detected above the 6 ng/L SL, at concentrations of 250 ng/L at LEX-MW002 and 804 ng/L at LEX-MW003. PFOS was detected above the 4 ng/L SL, at a concentration of 18.8 ng/L at LEX-MW003. PFHxS was detected above the 39 ng/L SL, at concentrations of 2,680 ng/L at LEX-MW002 and 4,220 ng/L at LEX-MW003. No exceedances were observed at LEX-MW004 and LEX-MW005.

PFBS and PFNA were detected below the SLs, at maximum concentrations of 190 ng/L and 1.46 J ng/L, respectively. Both maximum concentrations were detected at LEX-MW003.

### 6.4.3 AOI 2 Surface Water Analytical Results

Surface water was sampled along the shoreline of the two lagoons. AOI02-08-SW was collected from the northern lagoon, and AOI02-09-SW was collected from the southern lagoon. **Figure 6-8** and **Figure 6-9** present the ranges of detections in surface water. **Table 6-6** summarizes the surface water results.

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in both surface water samples. PFOA was reported at a maximum concentration of 203 ng/L at AOI02-09. PFOS was reported at a maximum concentration of 80.0 ng/L at AOI02-09. PFBS was reported at a maximum concentration of 26.4 ng/L at AOI02-09. PFHxS was reported at a maximum concentration of 231 ng/L at AOI02-09. PFNA was reported at a maximum concentration of 29.4 ng/L at AOI02-08. There are no established SLs for surface water; therefore, the results are only used to inform the CSM.

### 6.4.4 AOI 2 Conclusions

Based on the results of the SI, PFOS was detected in soil, above the SL. PFOA, PFOS, and PFHxS were detected in groundwater, at concentrations above their SLs. PFOA, PFOS, PFBS, PFHxS, and PFNA were also detected in surface water samples collected at AOI 2. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 2 is warranted.

## 6.5 AOI 3

This section presents the analytical results for surface soil in comparison to SLs for AOI 3: Mobile Refueler Parking Area. The results in surface soil are presented in **Table 6-2**. Soil results are presented on **Figure 6-1** through **Figure 6-4**. Subsurface soil and groundwater were not sampled at AOI 3, consistent with the sampling plan provided in the SI QAPP Addendum (AECOM, 2021).

### 6.5.1 AOI 3 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs at AOI03-01. AOI03-01 was located north of the Mobile Refueler Area, within the stormwater flow path. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** summarizes the soil results.

In surface soil, PFOS was detected above the 13 µg/kg SL, at a concentration of 18.5 µg/kg. PFOA, PFHxS, and PFNA were detected below their SLs, at concentrations less than 1 µg/kg. PFBS was not detected in surface soil.

### 6.5.2 AOI 3 Conclusions

Based on the results of the SI, PFOS was detected in surface soil, above the SL. Subsurface soil and groundwater were not sampled. Based on the exceedances of the SL for PFOS in surface soil, further evaluation at AOI 3 is warranted.

## 6.6 AOI 4

This section presents the analytical results for soil in comparison to SLs for AOI 4: Fuel Point. The results in soil are presented in **Table 6-2**. Soil results are presented on **Figure 6-1** through **Figure 6-4**. Subsurface soil and groundwater were not sampled at AOI 4, consistent with the sampling plan provided in the SI QAPP Addendum (AECOM, 2021).

### 6.6.1 AOI 4 Soil Analytical Results

Surface soil was sampled from 0 to 2 feet bgs at AOI04-01. AOI04-01 was located at the surface discharge of the OWS storm drains at the Fuel Point. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** summarizes the soil results.

In surface soil at AOI 4, PFOA, PFOS, PFHxS, and PFNA were detected at concentrations at least one order of magnitude below their SLs. The maximum concentration detected of these four compounds was PFOS, at 1.30 µg/kg. PFBS was not detected in surface soil.

### 6.6.2 AOI 4 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, and PFNA were detected at concentrations at least one order of magnitude below their SLs. Subsurface soil and groundwater were not sampled. Based on the detections below the SLs in soil, further evaluation at AOI 4 is not warranted.

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**Table 6-2**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | | AOI01 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | AOI01-01-SB-00-02 | | AOI01-02-SB-00-02 | | AOI01-03-SB-00-02 | | AOI01-04-SB-00-02 | | AOI01-04-SB-00-02-D | | AOI01-05-SB-00-02 | | AOI01-06-SB-00-02 | | AOI01-07-SB-00-02 | | AOI01-08-SB-00-02 | | AOI01-09-SB-00-02 | |
| Sample Date | | 04/12/2022 | | 04/12/2022 | | 04/12/2022 | | 04/14/2022 | | 04/14/2022 | | 04/14/2022 | | 04/14/2022 | | 04/14/2022 | | 04/14/2022 | | 04/14/2022 | |
| Depth | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 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, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| PFBS | 1900 | ND | U | 0.048 | J | ND | U | 0.029 | J | ND | UJ | ND | U | ND | U | ND | U | 0.094 | J | ND | U |
| PFHxS | 130 | 0.112 | J | 0.583 | J | 0.130 | J | 0.146 | J | 0.071 | J | ND | U | 0.053 | J | 0.229 | J | 0.172 | J | 0.149 | J |
| PFNA | 19 | 1.83 | | 0.287 | J | 0.092 | J | ND | UJ | 0.030 | J | 0.057 | J | ND | U | 0.105 | J | 0.142 | J | 0.787 | J |
| PFOA | 19 | 0.566 | J | 0.363 | J | 0.100 | J | ND | U | ND | U | ND | U | ND | U | 0.219 | J | 0.328 | J | 0.477 | J |
| PFOS | 13 | 6.09 | | 2.14 | | 1.94 | | 0.486 | J | 0.453 | J | 0.271 | J | ND | U | 0.330 | J | 0.324 | J | 6.30 | |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

**Table 6-2**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | | AOI01 | | | | AOI02 | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | AOI01-10-SB-00-02 | | LEX-MW001-SB-00-02 | | AOI02-01-SB-00-02 | | AOI02-02-SB-00-02 | | AOI02-03-SB-00-02 | | AOI02-04-SB-00-02 | | AOI02-05-SB-00-02 | | AOI02-06-SB-00-02 | | AOI02-07-SB-00-02 | | LEX-MW002-SB-00-02 | |
| Sample Date | | 04/14/2022 | | 04/12/2022 | | 04/12/2022 | | 04/15/2022 | | 04/12/2022 | | 04/12/2022 | | 04/15/2022 | | 04/15/2022 | | 04/15/2022 | | 04/12/2022 | |
| Depth | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 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, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | | | | | | |
| PFBS | 1900 | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| PFHxS | 130 | ND | U | 0.237 | J | ND | U | 0.144 | J | 0.181 | J | 0.109 | J+ | 0.153 | J | 0.125 | J | 0.348 | J | ND | U |
| PFNA | 19 | ND | U | 0.556 | J | 0.111 | J | 0.758 | J | 0.927 | J | 0.212 | J | 1.90 | | 1.55 | | 0.152 | J | 0.058 | J |
| PFOA | 19 | ND | U | 0.265 | J | 0.112 | J | 0.459 | J | 0.177 | J | 0.106 | J | 7.43 | | 1.54 | | 0.127 | J | 0.095 | J |
| PFOS | 13 | ND | U | 9.37 | | 1.53 | | 6.07 | | 22.6 | | 2.71 | | 0.982 | J | 3.43 | | 15.3 | | 1.14 | |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

**Table 6-2**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | | AOI02 | | | | | | | | AOI03 | | | | AOI04 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | LEX-MW003-SB-00-02 | | LEX-MW003-SB-00-02-D | | LEX-MW004-SB-00-02 | | LEX-MW005-SB-00-02 | | AOI03-01-SB-00-02 | | AOI03-01-SB-00-02-D | | AOI04-01-SB-00-02 | | AOI04-01-SB-00-02-D | |
| Sample Date | | 04/15/2022 | | 04/15/2022 | | 04/18/2022 | | 04/15/2022 | | 04/14/2022 | | 04/14/2022 | | 04/12/2022 | | 04/12/2022 | |
| Depth | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | | 0-2 ft | |
| **Analyte** | **OSD Screening Level [a]** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** | **Result** | **Qual** |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | | | | | | | |
| PFBS | 1900 | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U | ND | U |
| PFHxS | 130 | 0.230 | J | 0.244 | J | 0.052 | J | 0.242 | J | 0.363 | J | 0.467 | J | 0.033 | J | ND | UJ |
| PFNA | 19 | 0.466 | J | 0.535 | J | 0.031 | J | 0.031 | J | 0.155 | J | 0.205 | J | 0.091 | J | 0.115 | J |
| PFOA | 19 | 0.362 | J | 0.424 | J | 0.089 | J | ND | U | 0.221 | J | 0.278 | J | 0.096 | J | 0.129 | J |
| PFOS | 13 | 21.9 | | 22.8 | | 0.422 | J | 0.657 | J | 14.4 | | 18.5 | | 1.13 | | 1.30 | |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

**Table 6-3**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Shallow Subsurface Soil**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | | AOI02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | | LEX-MW002-SB-09-10 | | LEX-MW003-SB-05-06 | | LEX-MW003-SB-10-11 | | LEX-MW004-SB-14-15 | | LEX-MW005-SB-14-15 | |
| Sample Date | | 04/15/2022 | | 04/15/2022 | | 04/15/2022 | | 04/19/2022 | | 04/19/2022 | |
| Depth | | 9-10 ft | | 5-6 ft | | 10-11 ft | | 14-15 ft | | 14-15 ft | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | | |
| PFBS | 25000 | ND | U | ND | U | ND | U | ND | U | ND | U |
| PFHxS | 1600 | 0.052 | J | 2.06 | | 1.44 | | ND | UJ | ND | U |
| PFNA | 250 | ND | U | 1.56 | | ND | U | ND | UJ | ND | U |
| PFOA | 250 | ND | U | 1.64 | | 0.504 | J | ND | UJ | ND | U |
| PFOS | 160 | ND | U | 37.6 | | ND | U | ND | U | ND | U |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

**Table 6-4**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | AOI01 | | | | AOI02 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | LEX-MW001-SB-19-20 | | LEX-MW001-SB-39-40 | | LEX-MW002-SB-19-20 | | LEX-MW004-SB-28-29 | | LEX-MW005-SB-59-60 | |
| Sample Date | 04/20/2022 | | 04/20/2022 | | 04/15/2022 | | 04/19/2022 | | 04/19/2022 | |
| Depth | 19-20 ft | | 39-40 ft | | 19-20 ft | | 28-29 ft | | 59-60 ft | |
| Analyte | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual |
| **Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)** | | | | | | | | | | |
| PFBS | ND | U | ND | U | ND | U | ND | U | ND | U |
| PFHxS | 1.26 | | ND | U | 0.810 | J | ND | U | ND | U |
| PFNA | 0.065 | J | ND | U | ND | U | ND | U | ND | U |
| PFOA | 1.53 | | ND | U | 0.103 | J | ND | U | ND | U |
| PFOS | 0.233 | J | ND | U | ND | U | ND | U | ND | U |

Interpreted Qualifiers

J = Estimated concentration

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

| | |
|---|---|
| AASF | Army Aviation Support Facility |
| AOI | Area of Interest |
| DL | detection limit |
| ft | feet |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LEX | Lexington |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| SB | soil boring |
| µg/kg | micrograms per kilogram |

**Table 6-5**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater**
**Site Inspection Report, Lexington AASF #1**

| | Area of Interest | AOI01 | | AOI02 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sample ID | LEX-MW001-042222 | | LEX-MW002-042122 | | LEX-MW003-042122 | | LEX-MW003-042122-D | | LEX-MW004-042222 | | LEX-MW005-042222 | |
| | Sample Date | 04/22/2022 | | 04/21/2022 | | 04/21/2022 | | 04/21/2022 | | 04/22/2022 | | 04/22/2022 | |
| Analyte | OSD Screening Level [a] | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual | Result | Qual |
| **Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)** | | | | | | | | | | | | | |
| PFBS | 601 | 2.56 | J | 141 | | 190 | | 181 | | 3.72 | J | 8.28 | |
| PFHxS | 39 | 8.90 | | 2680 | | 4220 | | 4090 | | 9.13 | | 3.58 | J |
| PFNA | 6 | 2.54 | J | ND | U | 1.46 | J | 1.36 | J | ND | U | ND | U |
| PFOA | 6 | 5.07 | | 250 | | 804 | | 786 | | ND | U | ND | U |
| PFOS | 4 | 7.93 | | ND | U | 18.8 | | 16.9 | | ND | U | ND | U |

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

**Table 6-6**
**PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Water**
**Site Inspection Report, Lexington AASF #1**

| Area of Interest | AOI02 | | | | | |
|---|---|---|---|---|---|---|
| Sample ID | AOI02-08-SW | | AOI02-08-SW-D | | AOI02-09-SW | |
| Sample Date | 04/20/2022 | | 04/20/2022 | | 04/20/2022 | |
| Analyte | Result | Qual | Result | Qual | Result | Qual |
| **Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)** | | | | | | |
| PFBS | 10.0 | | 10.7 | | 26.4 | |
| PFHxS | 67.8 | | 74.2 | | 231 | |
| PFNA | 26.8 | | 29.4 | | 25.2 | |
| PFOA | 76.0 | | 83.1 | | 203 | |
| PFOS | 72.2 | | 78.9 | | 80.0 | |

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

| | |
|---|---|
| AASF | Army Aviation Support Facility |
| AOI | Area of Interest |
| D | duplicate |
| DL | detection limit |
| ID | identification |
| LCMSMS | liquid chromatography with tandem mass spectrometry |
| LOD | limit of detection |
| ND | analyte not detected above the LOD |
| QSM | Quality Systems Manual |
| Qual | interpreted qualifier |
| ng/l | nanogram per liter |
| SW | surface water |

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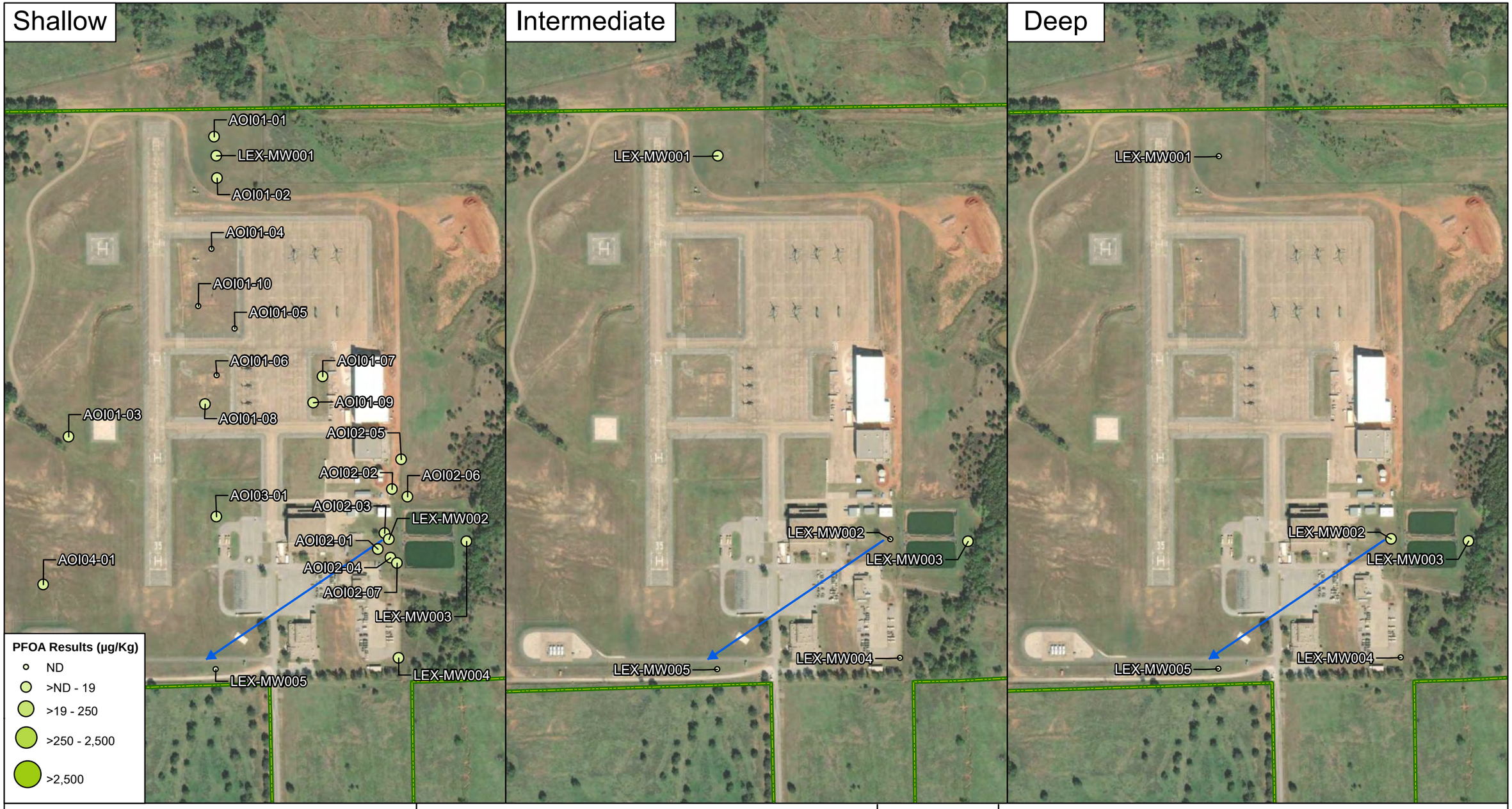



| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/21/2022 | GIS BY | MS | 9/21/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 9/21/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/21/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 225 450 900 Feet

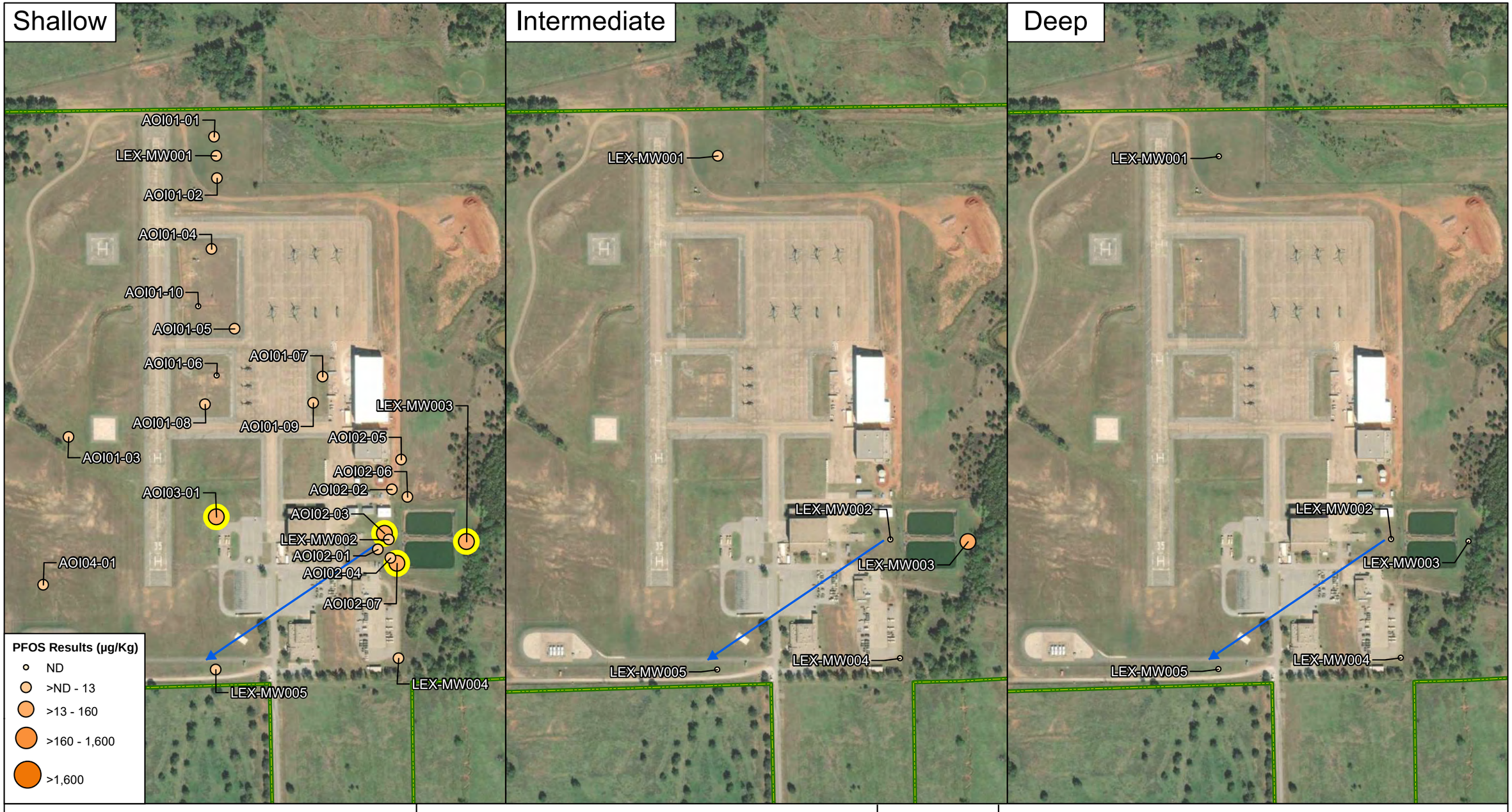
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

## PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-1**




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/21/2022 | GIS BY | MS | 9/21/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 9/21/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/21/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 225 450 900 Feet

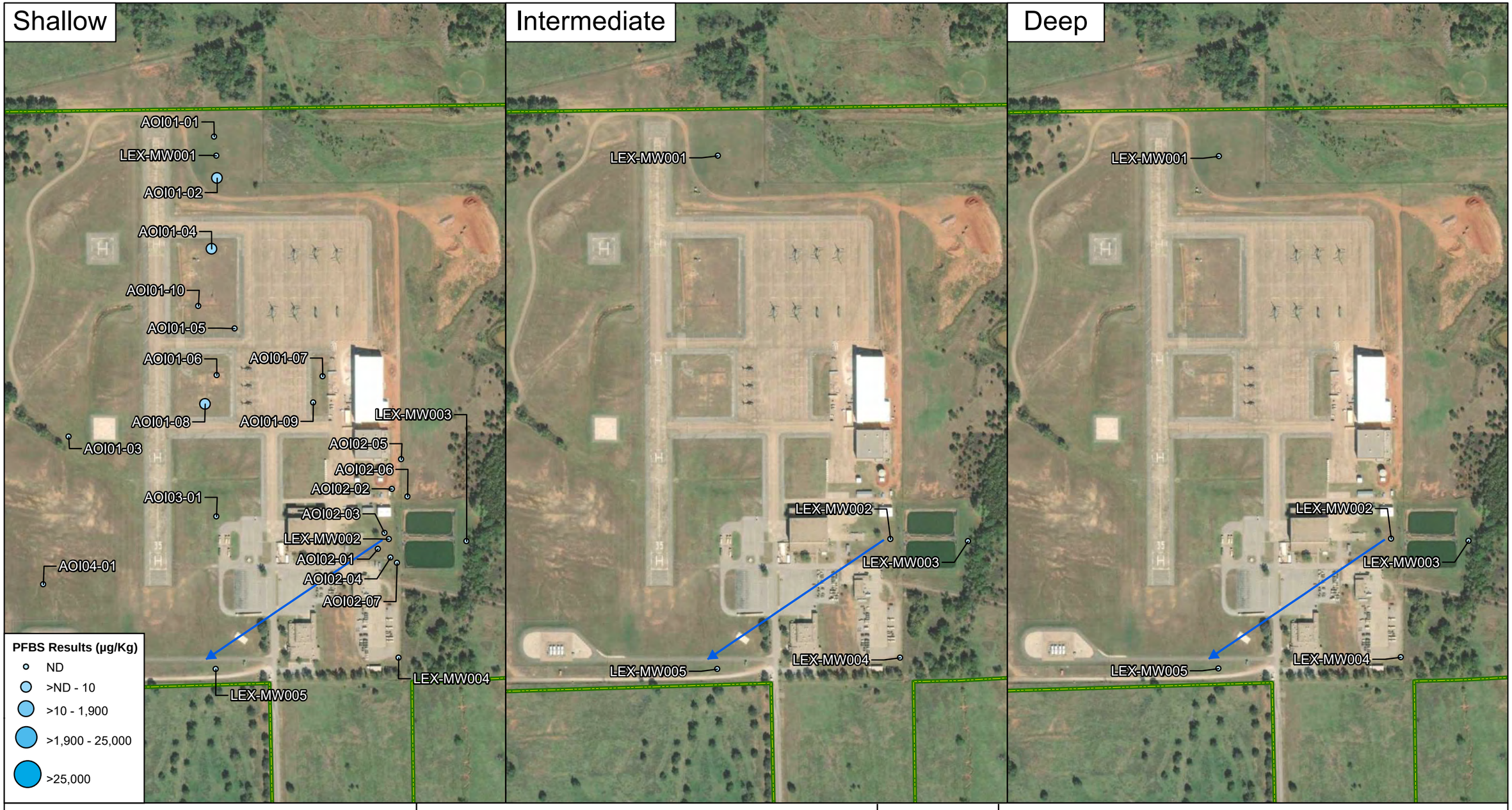
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

## PFOS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

**Figure 6-2**




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/21/2022 | GIS BY | MS | 9/21/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 9/21/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/21/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 225 450 900 Feet

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

N

## PFBS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

**Figure 6-3**

Shallow

Intermediate

Deep

AOI01-01
LEX-MW001
AOI01-02
AOI01-04
AOI01-10
AOI01-05
AOI01-06
AOI01-07
AOI01-08
AOI01-09
LEX-MW003
AOI01-03
AOI02-05
AOI02-06
AOI02-02
AOI03-01
AOI02-03
LEX-MW002
AOI04-01
AOI02-01
AOI02-04
AOI02-07
LEX-MW004
LEX-MW005

LEX-MW001
LEX-MW002
LEX-MW003
LEX-MW004
LEX-MW005

LEX-MW001
LEX-MW002
LEX-MW003
LEX-MW004
LEX-MW005

**PFHxS Results (µg/Kg)**

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

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/21/2022 | GIS BY | MS | 9/21/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 9/21/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/21/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 225 450 900 Feet

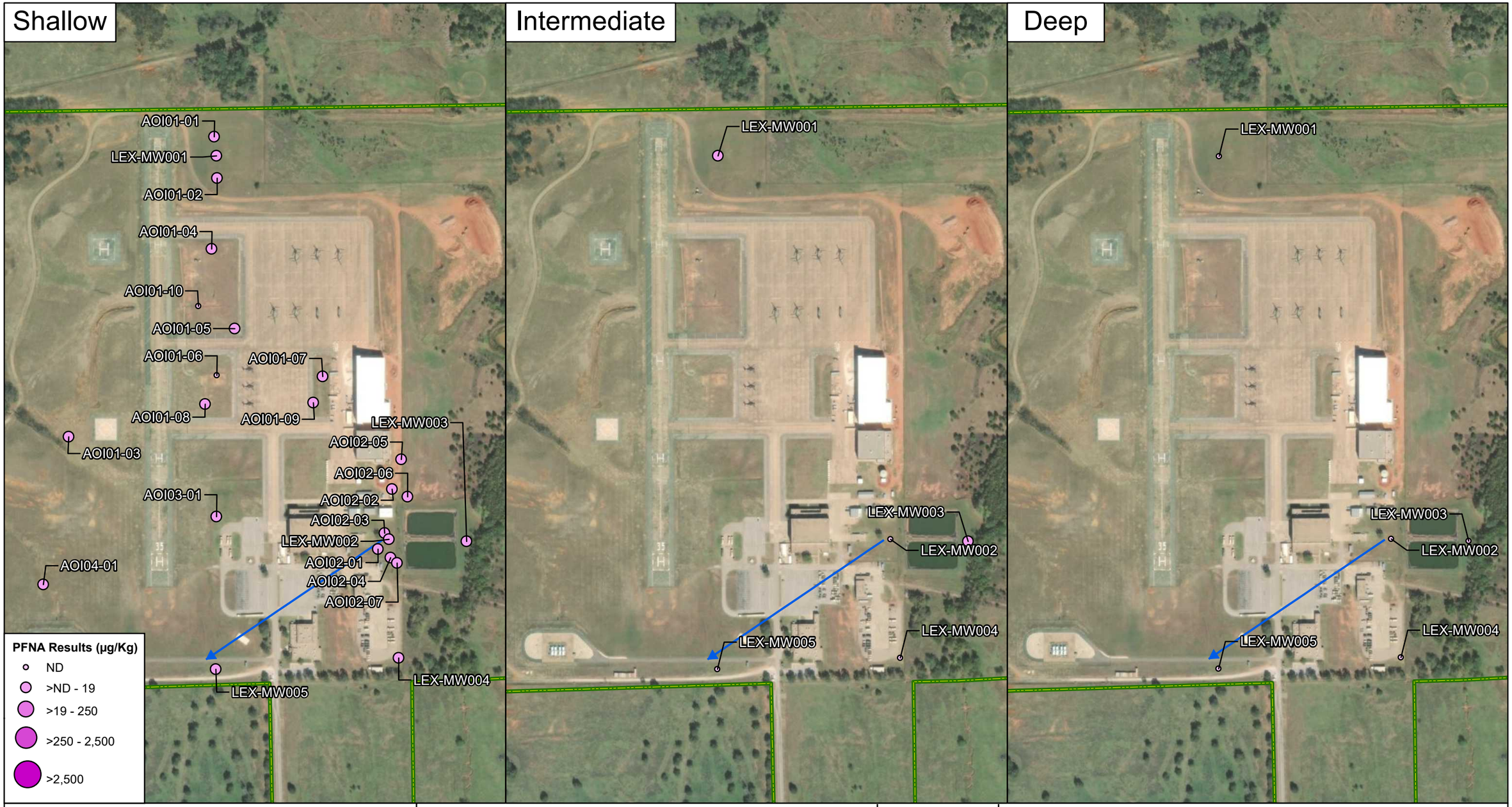
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

# PFHxS Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-4**

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|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 11/4/2022 | GIS BY | MS | 11/4/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 11/4/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 11/4/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 225 450 900 Feet

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

N

# PFNA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-5**

PFOA

PFOS

PFBS

LEX-MW001

LEX-MW002

LEX-MW003

LEX-MW004

LEX-MW005

**PFOA Results (ng/L)**

- ND
- >ND - 6
- >6 - 40
- >40 - 70
- >70

**PFOS Results (ng/L)**

- ND
- >ND - 4
- >4 - 40
- >40 - 70
- >70

**PFBS Results (ng/L)**

- ND
- >ND - 100
- >100 - 601
- >601 - 2,000
- >2,000

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 10/6/2022 | GIS BY | MS | 10/6/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 10/6/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 10/6/2022 |

**Legend**

- Facility Boundary
- Groundwater Flow Direction

0 225 450 900 Feet

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

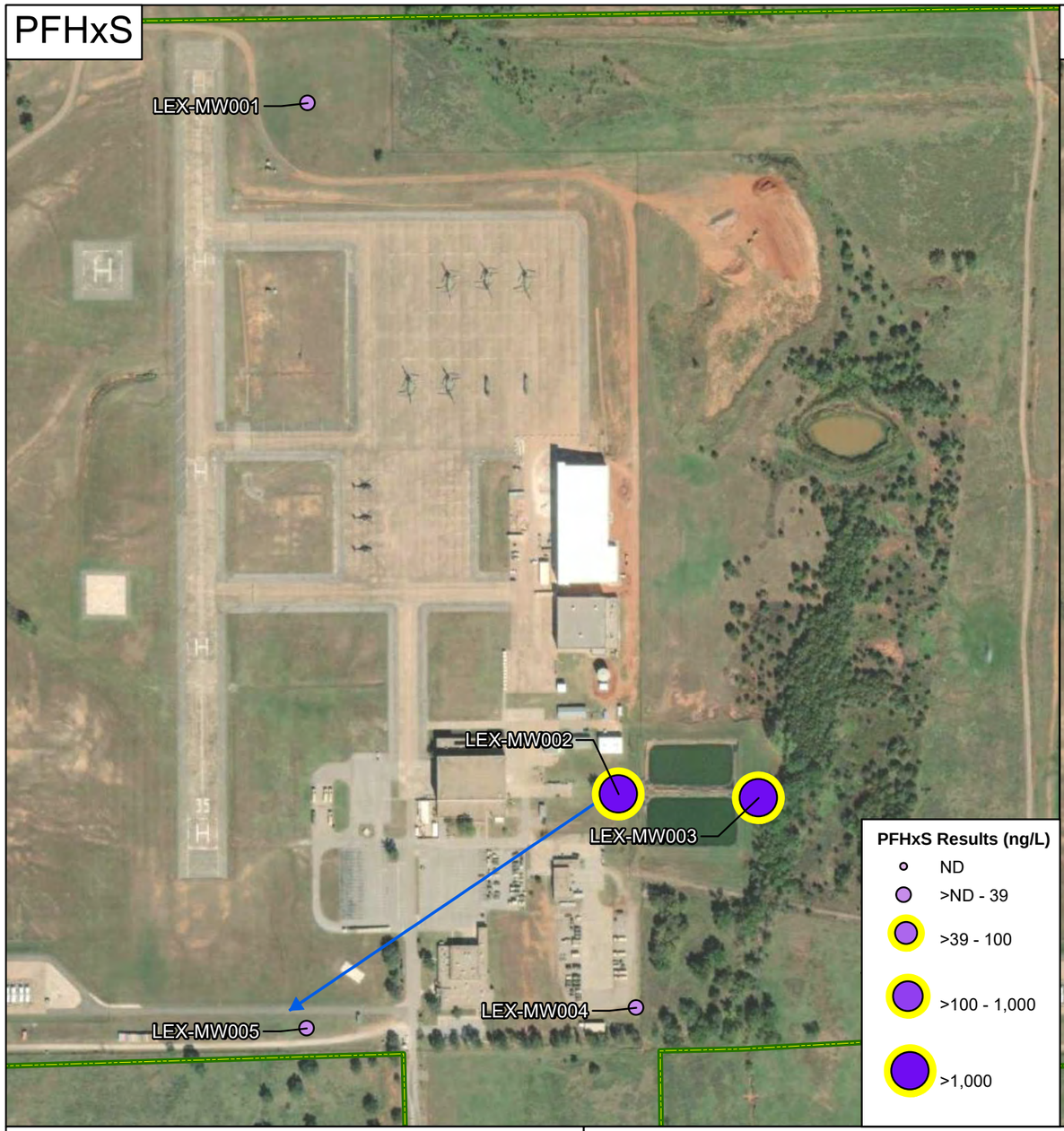
N

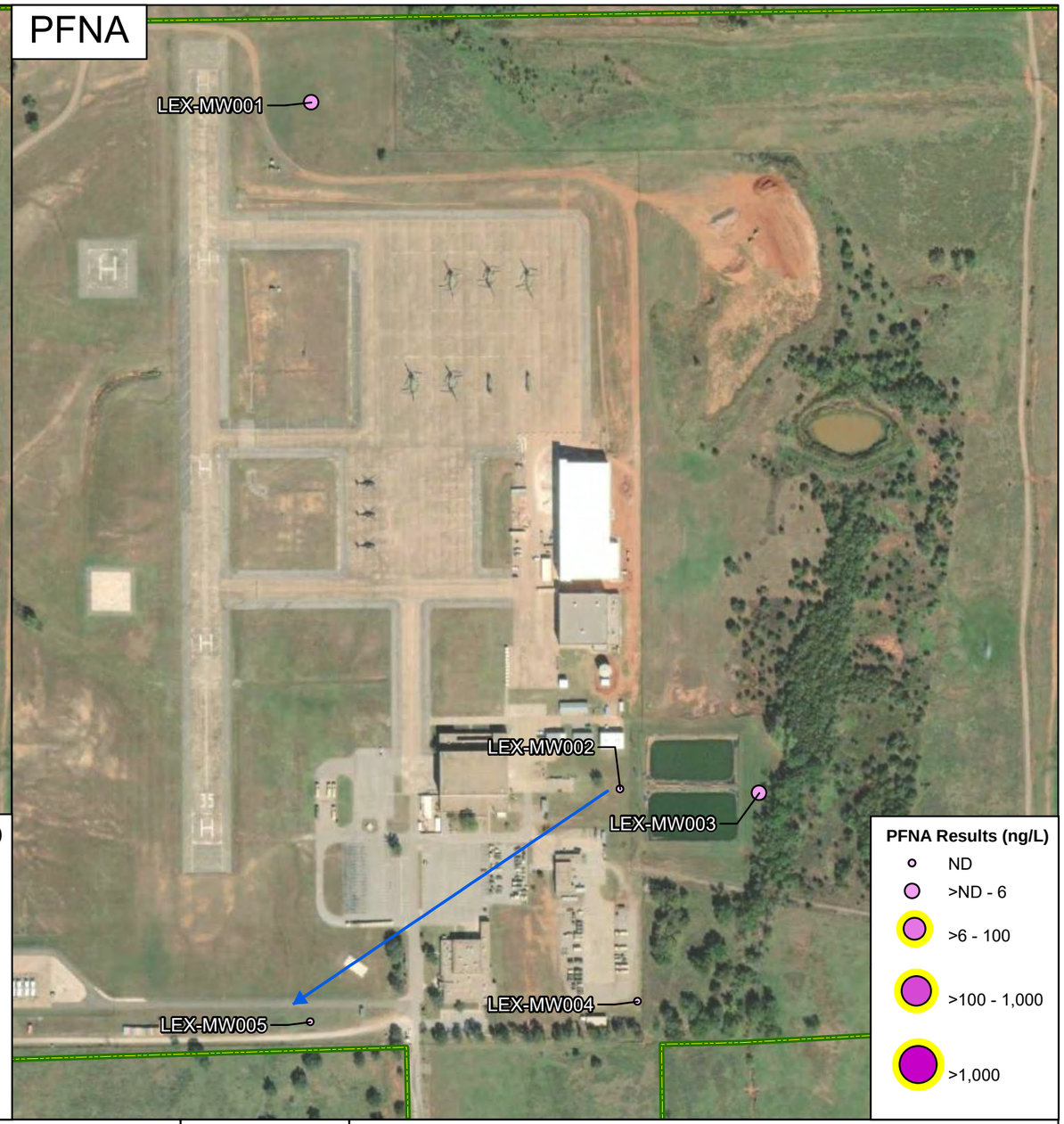
# PFOA, PFOS, and PFBS Detections in Groundwater

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-6**




| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/22/2022 | GIS BY | MS | 9/22/2022 |
| SCALE | 1:4,200 | CHK BY | MC | 9/22/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/22/2022 |

**Legend**

Facility Boundary

Groundwater Flow Direction

0 175 350 700 Feet

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

N

## PFHxS and PFNA Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

**Figure 6-7**

PFOA

PFOS

PFBS

AOI02-08

AOI02-09

**PFOA Results (ng/L)**

- ND
- >ND - 6
- >6 - 40
- >40 - 70
- >70

**PFOS Results (ng/L)**

- ND
- >ND - 4
- >4 - 40
- >40 - 70
- >70

**PFBS Results (ng/L)**

- ND
- >ND - 100
- >100 - 601
- >601 - 2,000
- >2,000

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 10/6/2022 | GIS BY | MS | 10/6/2022 |
| SCALE | 1:5,400 | CHK BY | MC | 10/6/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 10/6/2022 |

**Legend**

- Facility Boundary
- Surface Water Flow Direction

0 225 450 900 Feet

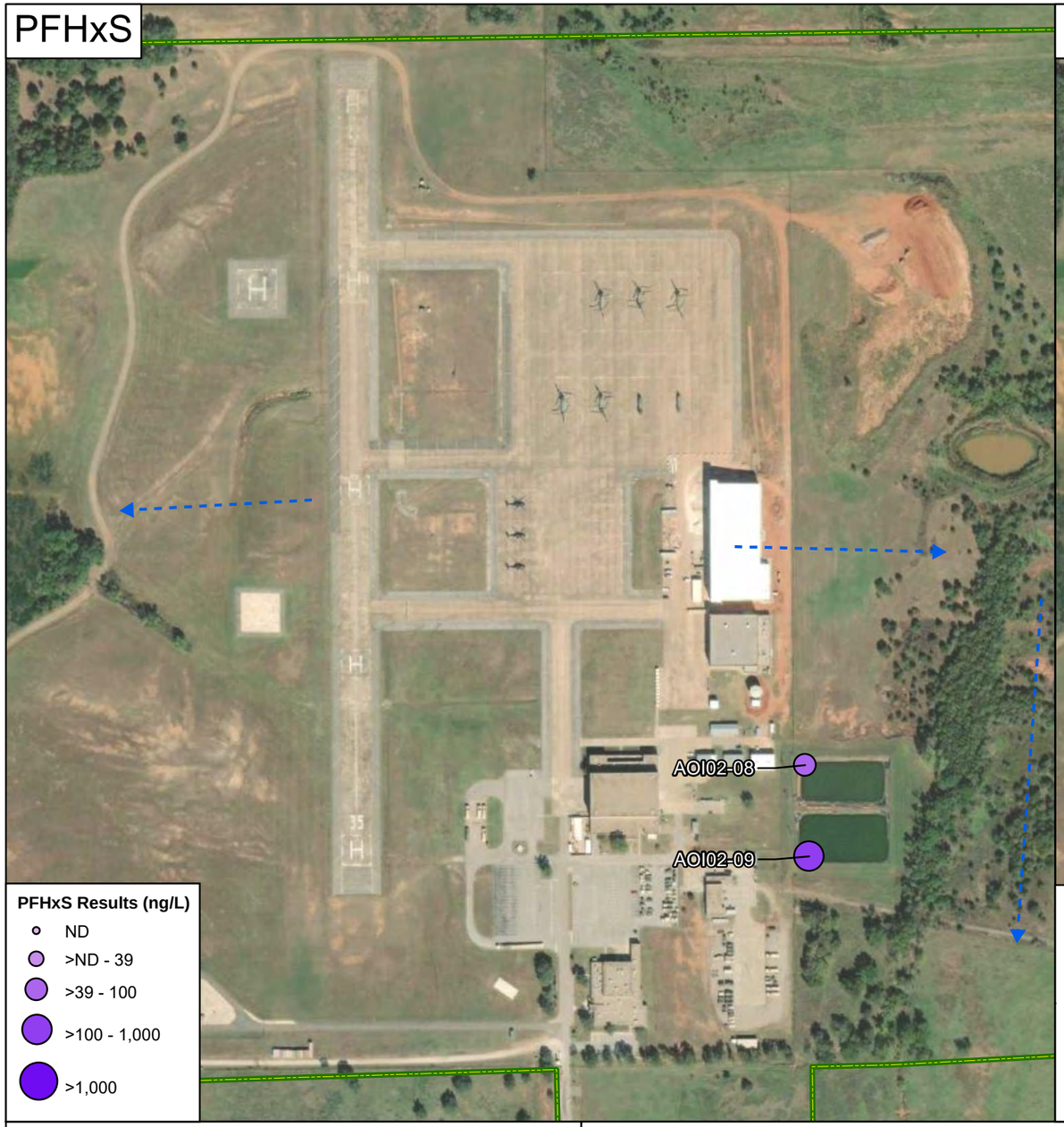
N

# PFOA, PFOS, and PFBS Detections in Surface Water

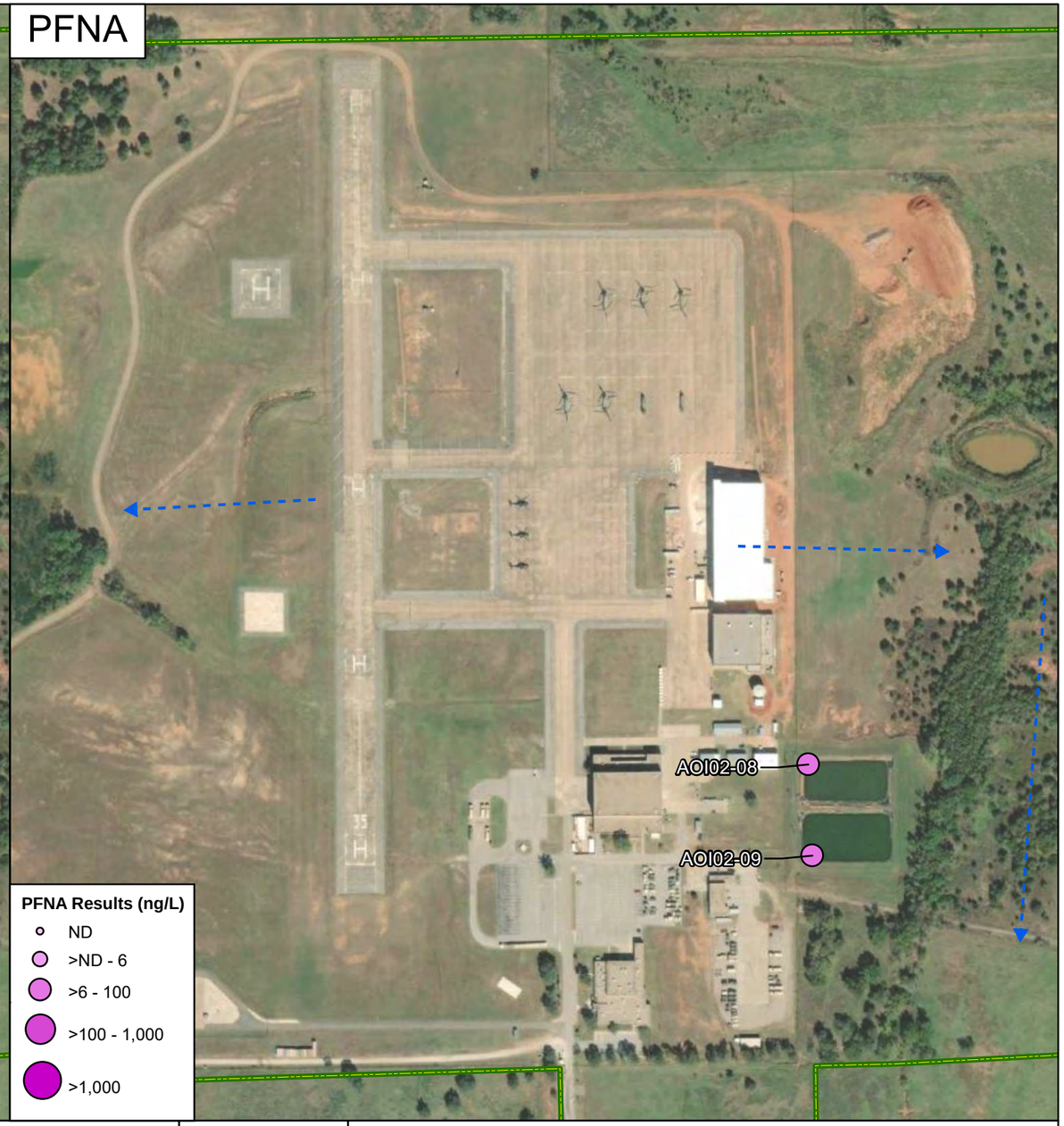
AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-8**

PFHxS




PFNA




**PFHxS Results (ng/L)**

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

**PFNA Results (ng/L)**

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

| | | | | |
|---|---|---|---|---|
| CLIENT | ARNG | | | |
| PROJECT | Site Inspection at Lexington AASF #1, OK | | | |
| REVISED | 9/22/2022 | GIS BY | MS | 9/22/2022 |
| SCALE | 1:4,200 | CHK BY | MC | 9/22/2022 |
| Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community | | PM | CM | 9/22/2022 |

**Legend**

- Facility Boundary
- Surface Water Flow Direction

0 175 350 700 Feet

N

## PFHxS and PFNA Detections in Surface Water

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

**Figure 6-9**

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# 7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-4**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

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

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

## 7.1 Soil Exposure Pathway

The SI results in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1, AOI 2, AOI 3, and AOI 4 based on the aforementioned criteria.

### 7.1.1 AOI 1

At AOI 1, fire training activities were conducted at the Flight Line and nearby Burn Pit sometime between the mid to late 1980s to as late as 2008. Releases at AOI 1 have occurred on both paved areas and grassy surfaces. Some AFFF releases may have occurred directly onto surface soil but may also have infiltrated to the subsurface soil via cracks in pavement or joints between areas

that are paved with different materials. Surface water flows overland primarily to drainages along the western side of the AASF #1 and into the unnamed tributary of Buckhead Creek.

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface soil at AOI 1, at concentrations below the SLs. No ongoing construction was observed at the facility during the SI. Site workers and future construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathways for site workers and future construction workers are potentially complete. The facility is gated, and there are no immediately adjacent residential structures; however, the Lexington Wildlife Management area is located just north of the Burn Pit. Therefore, the incidental ingestion and inhalation of dust exposure pathways for the trespasser and residential receptors are considered incomplete but are potentially complete for the recreational user. Shallow subsurface soil was not sampled at AOI 1; however, in deep subsurface soil, PFOA, PFOS, PFHxS, and PFNA were detected. The construction worker exposure scenario assumes excavation occurs at depths at or above 15 feet bgs. Based on the compounds detected in the surface soil and deep subsurface soil, it can be conservatively assumed that these compounds would be encountered in the shallow subsurface soil. Therefore, construction workers could contact constituents in subsurface soil via incidental ingestion, and the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

### 7.1.2 AOI 2

At AOI 2, the Old Fire Station housed two firetrucks from before 1987 to 2006/2007. Once a year, nozzle testing occurred at the Old Wash Rack from 1986 to 2004. One reported fire training activity was conducted at the Grassy Area Behind Hangar 1; however, the date of the training event is unknown. Hangar 2, constructed in 1999-2000, houses a fire suppression system equipped with two AFFF 800-gallon tanks and two 36-gallon AFFF tanks. In September 2013, the bladder in one of the 800-gallon tanks leaked. The Lagoons are downslope of the Grassy Area Behind Hangar 1, Hangar 2, Old Fire Station, Old Wash Rack, and the Storage Building; however, berms around the Lagoons prevent any stormwater runoff from entering them. The Lagoons received discharge from the Old Wash Rack until 2004. Releases at AOI 2 have occurred on both paved areas and grassy surfaces. Some AFFF releases may have occurred directly onto surface soil but may also have infiltrated to the subsurface soil via cracks in pavement or joints between areas that are paved with different materials.

PFOA, PFOS, PFHxS, and PFNA were detected in surface and subsurface soil at AOI 2. Additionally, PFOS exceeded the residential SL. Site workers and future construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathways for site workers and future construction workers are potentially complete. The incidental ingestion and inhalation of dust exposure pathways for the trespasser and residential receptors are considered incomplete for the same reasons established for AOI 1. The recreational user is also considered incomplete at AOI 2 due to the distance to the Lexington Wildlife Management Area. Construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 2 is presented on **Figure 7-2**.

### 7.1.3 AOI 3

AOI 3 is a Mobile Refueler Parking Area where at least one Tri-Max™ 30 extinguisher was historically stored at AOI 3 inside the secondary containment structure. No known or recorded leaks or spills occurred at AOI 3; however, any AFFF releases inside the parking area would flow to an OWS and flow toward the fence on the eastern side of the facility. Any AFFF release outside of the parking area would flow north-northwest, off the pavement, and potentially impact soil. Surface water at AOI 3 flows west toward the unnamed tributary of Buckhead Creek.

PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at AOI 3. Additionally, PFOS exceeded the residential SL. Site workers and future construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete with exceedance of SL. The incidental ingestion and inhalation of dust exposure pathways for the trespasser, residential, and recreational user receptors are considered incomplete for the same reasons established for AOI 2. The subsurface soil was not sampled at AOI 3; therefore, the pathways for subsurface soil ingestion for all receptors cannot be directly evaluated but could be conservatively considered to be similar to AOI 1 and AOI 2 due to the presence of relevant compounds in surface soil. The CSM for AOI 3 is presented on **Figure 7-3**.

### 7.1.4 AOI 4

AOI 4 is the Fuel Point where two Tri-Max™ 30 extinguishers were historically stored. No leaks or spills were recorded or noted by interviewees. AOI 4 has a concrete surface with two storm drains. AFFF releases would drain to the OWS. The OWS and storm drains channel water northward to a surface discharge, which then drains overland to a pond and unnamed tributary of Buckhead Creek.

PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at AOI 4, at concentrations below their SLs. Site workers and future construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete. The incidental ingestion and inhalation of dust exposure pathways for the trespasser, residential, and recreational user receptors are considered incomplete for the same reasons established for AOI 2 and AOI 3. The subsurface soil was not sampled at AOI 4; therefore, the pathways for subsurface soil ingestion for all receptors cannot be directly evaluated but could be conservatively considered to be similar to AOI 1 and AOI 2 due to the presence of relevant compounds in surface soil. The CSM for AOI 4 is presented on **Figure 7-4**.

## 7.2 Groundwater Exposure Pathway

The SI results in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors based on the aforementioned criteria. Drinking water at the facility is supplied by a well located on the adjacent Oklahoma Department of Corrections facility to the east. Numerous domestic, agricultural, and public supply wells were located within a 2-mile radius of the facility. Downgradient public supply wells within a 2-mile radius of the facility were not identified; however, a well designated as domestic use was identified on the property located immediately south of AASF #1 (Oklahoma Water Resources Board, 2021).

### 7.2.1 AOI 1

PFOA, PFOS PFBS, PFHxS, and PFNA were detected in groundwater at AOI 1; PFOS was measured at a concentration above the SL.

The facility water supply well is located approximately 2,800 feet east-southeast and side-gradient from the well sampled at AOI 1. Additionally, decontamination water source samples collected from the facility's potable water had detections of relevant compounds below their SLs. Therefore, the pathway for exposure to site workers via ingestion of groundwater is considered potentially complete, but it is incomplete for trespassers because the facility is secure. Due to the presence of downgradient wells within 2 miles of the facility, with total depths as shallow as 65 feet bgs, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Depth to water measured at AOI 1 in April 2022 during the SI was 38.57 feet bgs. The construction worker exposure scenario assumes excavation occurs at depths at or above 15 feet

bgs. Based on the depth to groundwater at AOI 1, the incidental ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

### 7.2.2 AOI 2

PFOA, PFOS PFBS, PFHxS, and PFNA were detected in groundwater at AOI 2; PFOA, PFOS, and PFHxS were measured at concentrations above their SLs.

The facility water supply well is located approximately 800 feet east-southeast and side-gradient from AOI 2. Therefore, the pathway for exposure to site workers via ingestion of groundwater is considered potentially complete. The ingestion of groundwater exposure pathways for the residential receptors are considered potentially complete and incomplete for trespassers, for the same reasons established for AOI 1. Depths to water measured during the SI in April 2022 were as shallow as 12.75 feet bgs; therefore, the incidental ingestion exposure pathway for future construction workers is considered potentially complete. The CSM for AOI 2 is presented on **Figure 7-2**.

### 7.2.3 AOI 3

Groundwater samples were not collected at AOI 3. Groundwater was not sampled at this AOI; therefore, the groundwater exposure pathway cannot be directly evaluated, but it is conservatively considered similar to AOI 1 and AOI 2 based on the detections of relevant compounds in surface soil and the groundwater flow direction; therefore, the ingestion of groundwater exposure pathway for site workers and residential receptors is potentially complete. The CSM for AOI 3 is presented on **Figure 7-3**.

### 7.2.4 AOI 4

Groundwater samples were not collected at AOI 4. Since groundwater was not sampled at this AOI, the groundwater exposure pathway cannot be directly evaluated. There were no exceedances in surface soil at AOI 4 as at AOI 3, and uncertainty in groundwater flow in this part of the facility; therefore, the ingestion of groundwater exposure pathway for all receptors 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 in surface water and sediment were used to determine whether a potentially complete pathway exists between the source and potential receptors at each AOI based on the aforementioned criteria. Surface water samples were only collected at AOI 2. At AOIs where surface water and/or sediment samples were not collected, the SI results in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

### 7.3.1 AOI 1

PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. Because PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil and groundwater at AOI 1, it is possible that these compounds may have migrated from soil and groundwater to the tributaries to the west. The tributaries then flow into Buckhead Creek and then southwest into the Canadian River. Based on the recreational use of the Canadian River, the surface water and sediment ingestion exposure pathways for off-facility recreational users are considered potentially complete. Surface water is not used as drinking water in the vicinity, so the surface water ingestion

pathway for residential receptors is incomplete. Due to the presence of constructed drainage ditches/pathways at the facility, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

### 7.3.2 AOI 2

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface water samples collected in the Lagoons. Wastewater in the Lagoons does not discharge to any other surface water body and is designed to evaporate. However, the liners were noted to be torn in a number of places during the PA and, during the SI, the dike was observed to be leaking to the lowland area southeast of the lagoons. Additionally, PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in soil and groundwater at AOI 2. The surface water and sediment exposure pathways for off-facility recreational user receptors are considered potentially complete for the same reasons established for AOI 1. The ingestion of surface water exposure pathways for the off-facility residential receptors are considered incomplete for the same reasons established for AOI 1. Due to the presence of constructed drainage ditches/pathways at the facility, as well as the Lagoons from which the surface water was sampled, the surface water and sediment ingestion exposure pathway for site workers and future construction workers is considered potentially complete. The CSM is presented on **Figure 7-2**.

### 7.3.3 AOI 3 and AOI 4

PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface soil at AOI 3 and AOI 4. Subsurface soil and groundwater were not sampled at these AOIs during the SI. It is possible that those compounds may have migrated from surface soil via runoff to the tributaries to the west, and subsequently to Buckhead Creek and Canadian River. The surface water and sediment exposure pathways for off-facility recreational user, site worker, and future construction worker receptors are considered potentially complete for the same reasons established for AOI 1 and AOI 2, and they are considered incomplete for off-facility residential receptors. The CSM for AOI 3 is presented on **Figure 7-3,** and the CSM for AOI 4 is presented on **Figure 7-4**.

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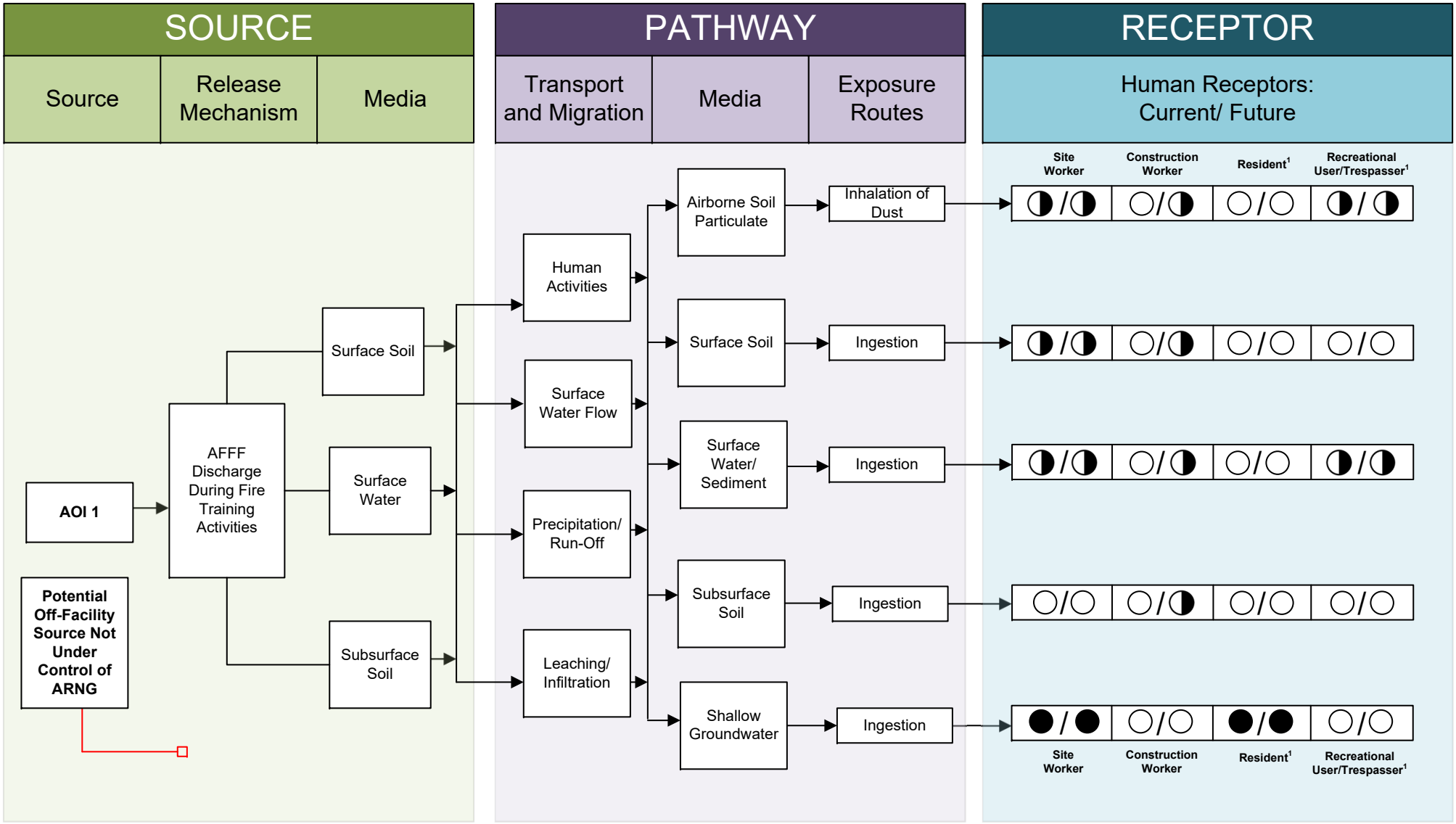


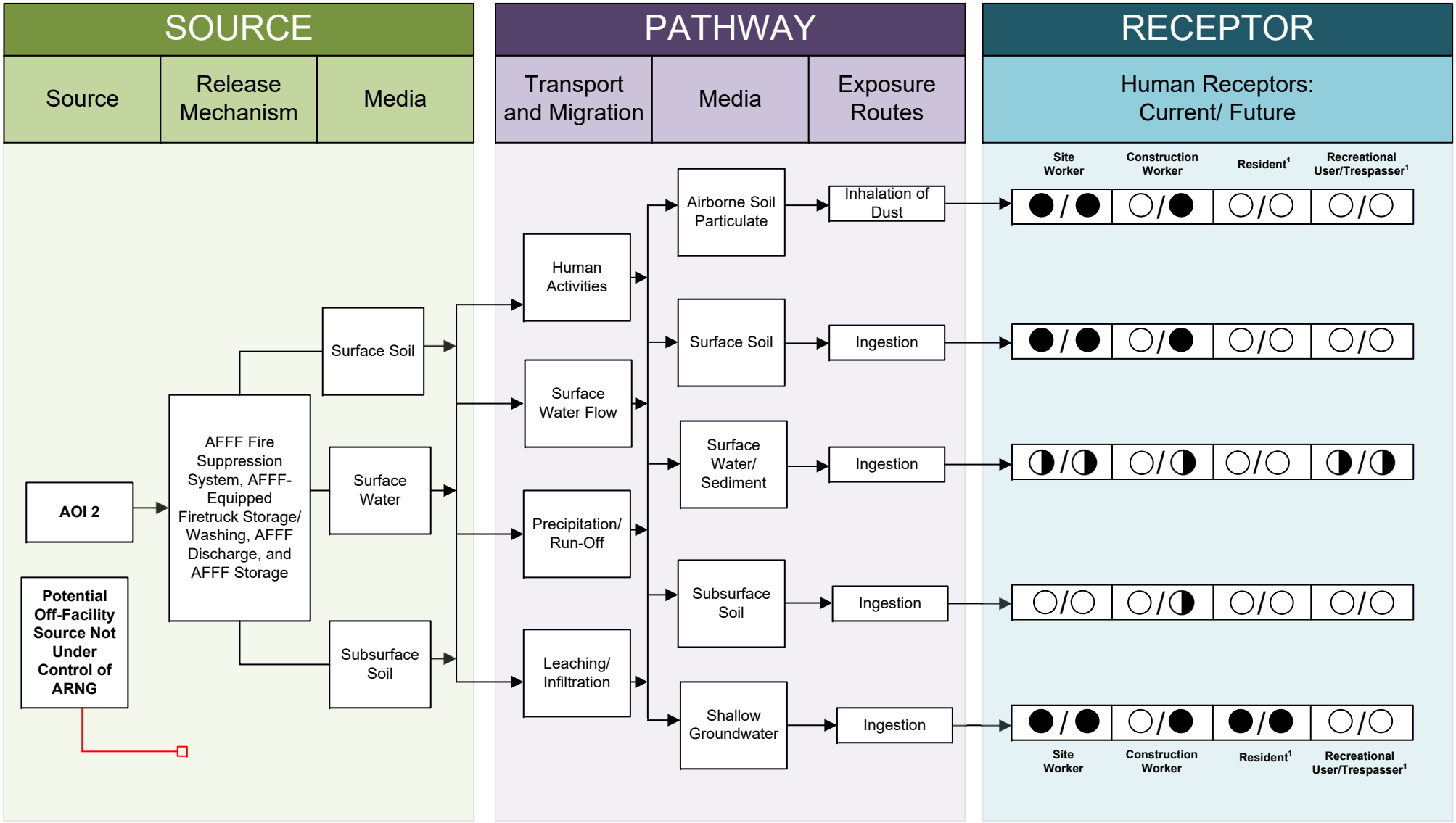

**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Construction was not observed during SI field activities.

**Figure 7-1**
Conceptual Site Model, AOI 1
Lexington AASF #1, Lexington, Oklahoma



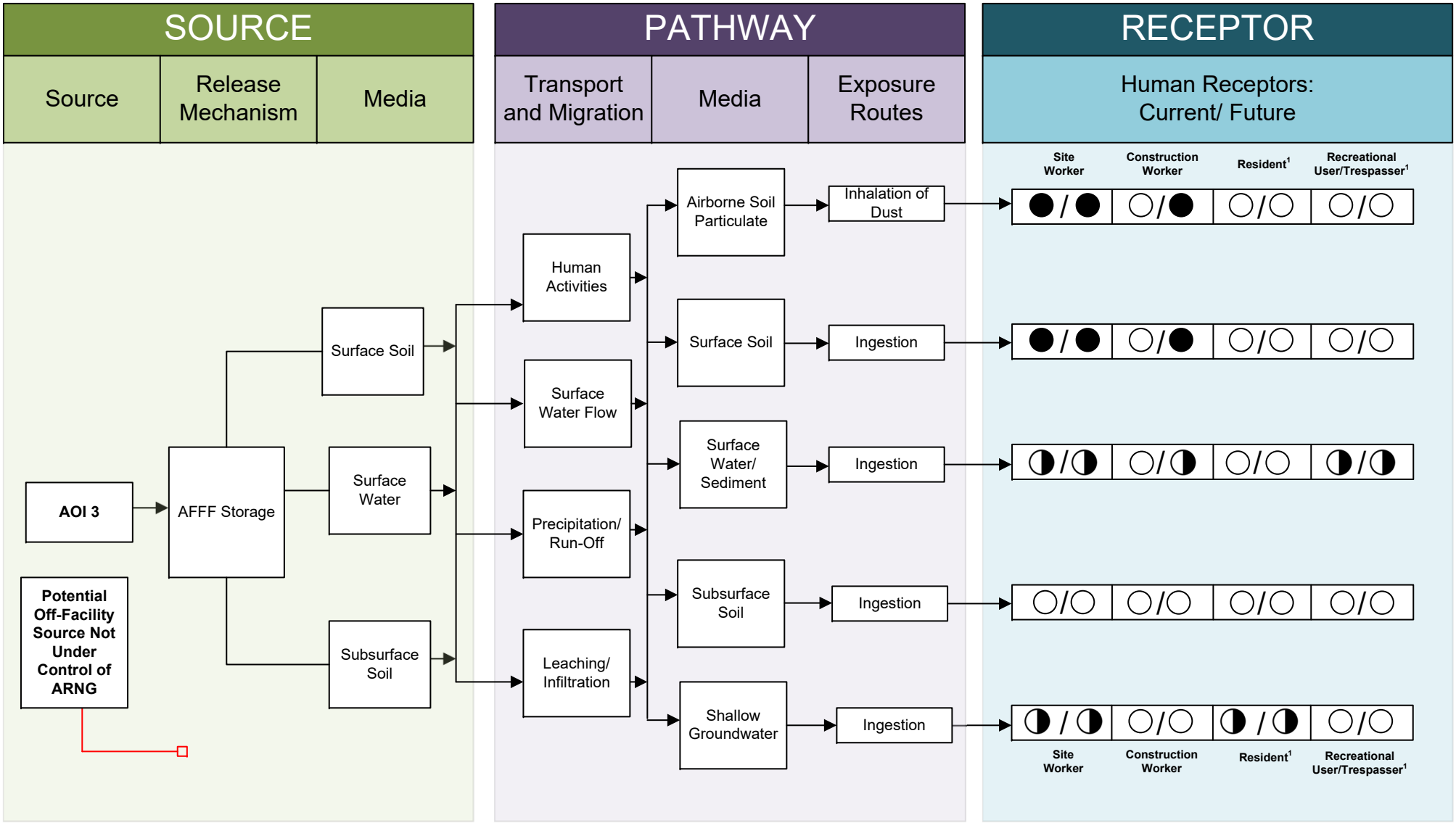

**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Construction was not observed during SI field activities.

**Figure 7-2**
Conceptual Site Model, AOI 2
Lexington AASF #1, Lexington, Oklahoma



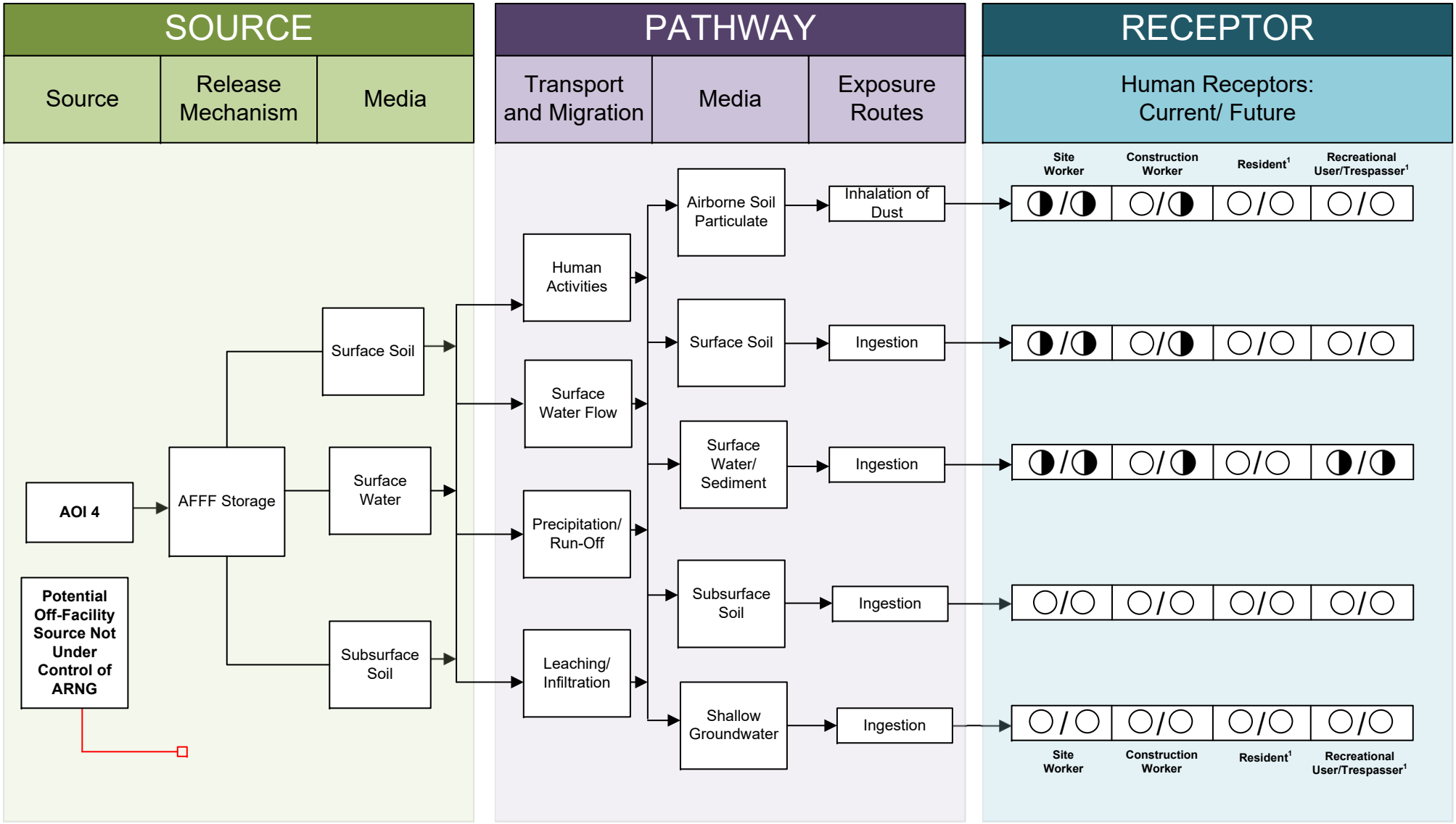

**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors
2. Subsurface soil and groundwater was not sampled at AOI 3.
3. Construction was not observed during SI field activities.

**Figure 7-3**
Conceptual Site Model, AOI 3
Lexington AASF #1, Lexington, Oklahoma




**LEGEND**

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

**NOTES**

1. The resident and recreational users refer to off-site receptors.
2. Subsurface soil and groundwater was not sampled at AOI 4.
3. Construction was not observed during SI field activities.

**Figure 7-4**
Conceptual Site Model, AOI 4
Lexington AASF #1, Lexington, Oklahoma

# 8. Summary and Outcome

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

## 8.1 SI Activities

The SI field activities were conducted from 6 to 22 April 2022 and consisted of utility clearance, sonic drilling, soil sample collection, permanent monitoring well installation, low-flow groundwater sample collection, surface water sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021), except as previously noted in **Section 5.9**.

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

- Thirty-four (34) soil samples from 24 locations;
- Five (5) low-flow groundwater samples from 5 permanent monitoring wells;
- Two (2) surface water samples from 2 surface water locations; and
- Twenty-two (22) QA/QC samples.

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

## 8.2 Outcome

Based on the results of this SI, further evaluation is warranted in an RI for AOI 1: Northern Release Areas, AOI 2: Eastern Release Areas, and AOI 3: Mobile Refueler Parking Area. No further evaluation is warranted for AOI 4: Fuel Point at this time. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from sources on the facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared to the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1:
    - The detected concentrations of PFOA, PFOS, PFBS, PFHxS, and PFNA in soil at AOI 1 were below their SLs.
    - PFOS in groundwater exceeded the 4 ng/L SL, at a concentration of 7.93 ng/L at LEX-MW001. PFOA, PFBS, PFHxS, and PFNA were detected in groundwater, below their SLs.
    - Based on the results of the SI, further evaluation of AOI 1 is warranted in an RI.

- At AOI 2:
    - PFOS exceeded the 13 µg/kg SL in surface soil, at a maximum concentration of 22.8 µg/kg at LEX-MW003. The detected concentrations of PFOA, PFBS, PFHxS, and PFNA in soil at AOI 2 were below their SLs.
    - In groundwater, PFOA exceeded the 6 ng/L SL, with a maximum concentration of 804 ng/L. PFOS exceeded the 4 ng/L SL, with a maximum concentration of 18.8 ng/L. PFHxS exceeded the 39 ng/L SL, with a maximum concentration of 4,220 ng/L. The maximum concentrations were all detected at LEX-MW003. PFBS and PFNA were detected in groundwater below their SLs at AOI 2.
    - PFOA, PFOS, PFBS, PFHxS, and PFNA were detected in surface water. The maximum concentration detected was PFHxS, at 231 ng/L at AOI02-09.
    - Based on the results of the SI, further evaluation of AOI 2 is warranted in an RI.
- At AOI 3:
    - PFOS exceeded the 13 µg/kg SL in surface soil, at a concentration of 18.5 µg/kg at AOI03-01. PFOA, PFHxS, and PFNA were detected at concentrations at least two orders of magnitude below their SLs, and PFBS was not detected. Subsurface soil was not sampled.
    - Groundwater was not sampled at AOI 3.
    - Based on the results of the SI, further evaluation of AOI 3 is warranted in an RI.
- At AOI 4:
    - The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at AOI 4 were below their SLs. PFBS was not detected. Subsurface soil was not sampled.
    - Groundwater was not sampled at AOI 4.
    - Based on the results of the SI, further evaluation of AOI 4 is not warranted at this time.

Groundwater in the vicinity of the facility was anticipated to flow south. Based on the results of the SI, local groundwater at the facility flows southwest. The shallowest depths to groundwater were observed at AOI 2 in the vicinity of the Lagoons.

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

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

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

| AOI | Potential Release Area | Soil – Source Area | Groundwater – Source Area | Groundwater – Facility Boundary | Future Action |
|---|---|---|---|---|---|
| **1** | Northern Release Areas | ◐ | ● | N/A | Proceed to RI |
| **2** | Eastern Release Areas | ● | ● | ◐ | Proceed to RI |
| **3** | Mobile Refueler Parking Area | ● | N/A | N/A | Proceed to RI |
| **4** | Fuel Point | ◐ | N/A | N/A | No further action |

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

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