FINAL
Site Inspection Report
Springfield Aviation Classification Repair Activity Depot
Springfield, Missouri

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

August 2023

Prepared for:

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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film-forming foam
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
AVCRAD	Aviation Classification Repair Activity Depot
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
DQO	data quality objective
DUA	data usability assessment
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
FTA	Fire Training Area
gpm	gallons per minute
GPRS	Ground Penetrating Radar Systems
GPS	global positioning system
GSE	ground support equipment
HDPE	high-density polyethylene
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
K_{oc}	organic carbon normalized distribution coefficient
LC/MS/MS	liquid chromatography with tandem mass spectrometry
MIL-SPEC	military specification
MOARNG	Missouri Army National Guard
MODNR	Missouri Department of Natural Resources
MS/MSD	matrix spike/matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NOAA	National Oceanic and Atmospheric Administration
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
SOP	standard operating procedure
TCE	trichloroethylene
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
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOCs	volatile organic compounds
WWTP	Wastewater Treatment Plant

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), with an additional AOI (AOI 5) identified during SI field activities, where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations) (AECOM, 2020). 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 Springfield Aviation Classification Repair Activity Depot (AVCRAD) in Springfield, Missouri and determined further investigation is warranted for AOI 1: Hangar 27, AOI 3: Fire Training Area 2, and AOI 4: Ground Support Equipment Building; no further evaluation is warranted for AOI 2 and AOI 5 at this time. The Springfield AVCRAD will also be referred to as the "facility" throughout this document.

The AVCRAD is in Greene County, southwestern Missouri. The AVCRAD is adjacent to the Springfield-Branson National Airport. The AVCRAD is accessible from the north via North Farm Road 115, then Radar Road or North Lester Jones Avenue. The facility can also be accessed from the north via West Farm Road 104, then Radar Road. Currently, the AVCRAD has a total land area of approximately 107.18 acres. This land is owned by the City of Springfield and is leased to the State of Missouri for the use by the Missouri ARNG. The original lease began in 1977 for Hangar 1, while the lease for Hangar 27 and the expansion was issued in 2002 and is valid for a term of 50 years (AECOM, 2022a) (Springfield-Branson National Airport, 2006).

The PA identified four AOIs for investigation during the SI phase, with an additional AOI (AOI 5) identified during SI field activities. SI sampling results from the five 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 (RI) for AOI 1: Hangar 27, AOI 3: Fire Training Area 2, and AOI 4: Ground Support Equipment Building; no further evaluation is warranted for AOI 2 and AOI 5 at this time.

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

Table ES-1 Screening Levels (Soil and Groundwater)

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

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

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

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

Table ES-2 Summary of Site Inspection Findings and Recommendations

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Future Action
1	Hangar 27	◐	●	Proceed to RI
2	FTA 1	◐	◐	No further action
3	FTA 2	◐	●	Proceed to RI
4	GSE Building	◐	●	Proceed to RI
5	FTA 3	◐	N/A	No further action

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

1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G-9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense, 2022). The six compounds listed in the OSD memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS) at ARNG facilities nationwide. The ARNG performed this SI at the Springfield Aviation Classification Repair Activity Depot (AVCRAD) in Springfield, Missouri. The Springfield AVCRAD 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 Springfield AVCRAD (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. During SI field activities, based on information provided by a facility representative, a fifth AOI was identified. 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

The Springfield AVCRAD is in Greene County, southwestern Missouri (**Figure 2-1**). The Cities of Willard, Ash Grove Strafford, Republic, and Rogersville are within 15 miles of the AVCRAD. The AVCRAD is adjacent to the Springfield-Branson National Airport. The AVCRAD is accessible from the north via North Farm Road 115, then Radar Road or North Lester Jones Avenue. The facility can also be accessed from the north via West Farm Road 104, then Radar Road.

Currently, the AVCRAD has a total land area of approximately 107.18 acres. This land is owned by the City of Springfield and is leased to the State of Missouri for the use by the Missouri ARNG (MOARNG). The original lease began in 1977 for Hangar 1, while the lease for Hangar 27 and the expansion was issued in 2002 and is valid for a term of 50 years (Springfield-Branson National Airport, 2006).

2.2 Facility Environmental Setting

Greene County is in southwest Missouri and is located in the Interior Highlands physiographic province, a province characterized by a generally high altitude surrounded by lowlands (**Figure 2-2**) (Fenneman, 1917). The highlands are separated into the Ozark Plateau, in which the Springfield AVCRAD resides, and the Ouachita Plateau to the south (Fenneman, 1928). Structurally, the Ozarks are an uplift, reaching a maximum altitude of 1,772 feet with an asymmetrical dip about its north-south-trending axis. The AVCRAD lies on the gentler sloping western side of the axis, which exhibits a regional dip of 15 to 20 feet per mile to the south-southwest (Waite & Thomson, 1993).

2.2.1 Geology

The Springfield Plateau, a small section in the southwest of the Ozark Uplift, which encompasses the City of Springfield, northern Arkansas, and eastern Kansas and Oklahoma, is composed primarily of Lower to Middle Mississippian carbonates of the Osage Group, including the Lower Warsaw Formation, Keokuk Limestone, Burlington Limestone, Elsey Formation, Reeds Spring Formation, Pierson Limestone, and Fern Glen Formation (**Figure 2-3**) (Starbuck, 2017). The Springfield Plateau Aquifer and all of its formations can be up to 380 feet thick (Waite & Thomson, 1993).

Underlying the Springfield Plateau is the Ozark Confining Unit, which separates the Springfield Plateau Aquifer from the underlying Ozark Aquifer. The Ozark Confining Unit consists of shale, siltstone, limestone, and sandstone within the Northview, Compton, and Bachelor Formations. The Northview formation consists of siltstone and shale, and it thins to approximately 5 feet in the southwest of Greene County. The Compton Limestone, averaging 20 feet thick, is composed of greenish to bluish, finely-crystalline limestone and is identifiable by the green shale partings it contains. The Bachelor Formation is a very thin (2 inches to 2 feet), poorly sorted, green quartz sandstone with rounded black phosphate nodules (Waite & Thomson, 1993).

The Ozark Aquifer comprises the Cotter Dolomite, Jefferson City Formation, Roubidoux Formation, Gasconade Dolomite, Eminence Dolomite, and the Potosi Dolomite. These formations, known as the Canadian Series, consist of dolostone and sandstone, and were laid down in the Lower Ordovician (Miller & Vandike, 1997).

The structural deformation of the carbonate layers in the Uplift introduced prevalent fractures and faulting within Greene County. These lineaments generally trend in a northwest-southeast and

northeast-southwest orientation, with major faults trending northwest-southeast; they range in size from less than 1 mile to greater than 15 miles across. These fractures allow the infiltration of rainwater, giving rise to the karst topography of the region. The bedrock is covered by a thin veneer of residuum (Waite & Thomson, 1993). According to the US Department of Agriculture (USDA) Natural Resource Conservation Service, the residuum at the facility is comprised of gravelly silt to gravelly silty clay (USDA, 2020).

During the SI, low to medium plasticity fines (silt and clay) were observed as the dominant lithology of the unconsolidated sediments below the AVCRAD. Below this layer, finely crystalline limestone was observed as the dominant bedrock, with first encounter between 7 and 29.9 feet below ground surface (bgs). The borings were completed at depths between 15 and 85 feet bgs. Varying quantities of sand and gravel were also observed in the borings, in isolated layers of sandy lean clay and gravely lean clay with thicknesses ranging from 1 foot to 11 feet.

Samples for grain size analyses were collected at five locations, SPRNG-MW01, AOI02-01, AOI03-01, AOI04-02, and AOI05-01, and analyzed via American Society for Testing and Materials (ASTM) Method D-422. The results indicate that the soil samples are comprised primarily of silt (51.82 percent [%] to 75.39%) and clay (18.28% to 26.72%). These results and facility observations are consistent with the reported depositional environment of the region. Boring logs are presented in **Appendix E**, and grain size results are presented in **Appendix F**.

2.2.2 Hydrogeology

The bedrock northwest of Springfield, near the AVCRAD, has one of the highest densities of sinkholes in the county. Sinkholes range in diameter from $2x10^{-3}$ acres to 180 acres and 10 to 60 feet deep. The sinkholes and dissolution along structural fractures allow the communication of surface water with the groundwater system without the typical filtration of the surface water by slow percolation through the soil (Waite & Thomson, 1993). Groundwater recharge is achieved through three mechanisms: infiltration through sinkholes, infiltration in areas where dissolution has increased permeability, and through losing streambeds (Harvey, 1980).

Of the six US Geological Survey (USGS) groundwater monitoring wells in the Springfield Area, one is set within the Osage Group of the Springfield Plateau, and five are set within the Canadian Series of the Ozark Aquifer. Regionally, groundwater depth in the Springfield Plateau Aquifer may be as shallow 20 feet bgs (USGS, 2019) and as deep as 160 to 170 feet bgs (Missouri Department of Natural Resources [MODNR], 2019). At depths greater than this, the wells set within the Ozark Aquifer typically reach a drilled depth of 400 to 600 feet, with groundwater levels reaching between 180 to 360 feet bgs as of 2019. A typical well in the Springfield Plateau Aquifer yields between 5 and 30 gallons per minute (gpm), while wells set in the Ozark Aquifer can reach yields of 500 to 1,200 gpm (Miller & Vandike, 1997).

Information available through the MODNR Geosciences Technical Resource Assessment Tool indicates that groundwater flow in the general vicinity of Springfield AVCRAD is overall towards the northwest but may be slightly radial in nature in the vicinity of the facility, with flow directions additionally slightly to the north and west (MODNR, 2019). However, secondary porosity may alter localized groundwater flow characteristics.

According to the state well data, a domestic well was installed in the early 1990s in a location which is now part of the AVCRAD property. The well was located near the present-day ground support equipment (GSE) building. Limited data is available for this well, but after the SI was completed, MOARNG determined that the well no longer exists on the property and was likely abandoned prior to the construction of the AVCRAD. No other wells exist on the facility property. Several domestic wells are located immediately surrounding and/or presumed downgradient of the facility (**Figure 2-3**). Several of these domestic wells are constructed within the uppermost water bearing unit, the Springfield Plateau Aquifer, which has been primarily used for agricultural

and industrial purposes since the 1950s, when well regulations became stricter (Watershed Committee of the Ozarks, 2019). Static water levels observed following the installation of these wells ranged from 165 to 180 feet bgs. There is one public well that is presumed side gradient to the AVCRAD. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells screened in the deeper Ozark Aquifer (Watershed Committee of the Ozarks, 2019).

Where observed, depths to water measured in March 2022 during the SI ranged from 4.89 to 28.94 feet bgs in the overlying unconsolidated soils and from 23.38 to 68.18 feet bgs in the underlying limestone, suggesting that groundwater within the unconsolidated soils may act as perched groundwater. Due to the nature of the underlying karst system across the AVCRAD, groundwater flow and transport occurs through the network of interconnected fissures, fractures and conduits in the relatively low-permeability rock matrix, while most of the groundwater storage occurs in the matrix. As a result of this potential perched groundwater within the unconsolidated soils and the highly variable static groundwater level, groundwater contours are difficult to formulate. Groundwater elevations from the SI are presented on **Figure 2-4**.

2.2.3 Hydrology

The AVCRAD is very close to the hydrological divide that splits Greene County and lies within the Headwaters Clear Creek watershed (MOARNG, 2019), which drains to Clear Creek, Little Sac River, and the Sac River. These rivers eventually flow into the Osage River to the north, and finally into the Missouri River (Waite & Thomson, 1993). To the west of the facility is Rainier Branch River, which is used for recreational activities. This hydrological framework follows the flow of water from the Springfield Plateau of the Ozark Uplift down into the surrounding lowlands.

The ground surface at much of the facility is generally impermeable, with the hangars, buildings, aircraft apron, roads, driveways, and parking areas paved with concrete or asphalt. The AVCRAD is connected to the City of Springfield municipal sewer system, and all wastewater is conveyed to the Northwest Wastewater Treatment Plant.

Stormwater runoff on the facility drains to two permitted outfalls, one conveying stormwater from the south drainage area (Outfall 001) and another from the north drainage area (Outfall 004). Outfall locations are visible on **Figure 2-5**. Outfall 001 conveys stormwater from the parking lot, tarmac, parking pads, and aircraft hangar roof, and is directed to a drainage swale which likely enters groundwater via a sinkhole. Outfall 004 conveys stormwater into a retention pond, whereby the water exits the facility via a drainage ditch and may discharge either to sinkholes or to Rainier Branch River. (MOARNG, 2019). According to MODNR data, springs have not been observed within facility boundary itself but are frequently found in the surrounding area.

Springs, expulsions of shallow groundwater to the surface due to pressure within an underlying aquifer, are common within Greene County. Although springs generally have a flow of less than 20 cubic feet per day, they can discharge a considerable amount of water because they are continuously flowing (Waite & Thomson, 1993).

Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Therefore, surface water may migrate to the retention pond northeast of Hangar 27 via surficial runoff or groundwater discharge. Additionally, the Rainier Branch River to the west of the facility may receive surface water runoff and/or groundwater discharge from the facility. Surface water features are presented on **Figure 2-5**.

2.2.4 Climate

Climate data were available from the National Oceanic and Atmospheric Administration (NOAA), located 1.15 miles to the southwest of the AVCRAD, at Springfield-Branson National Airport. Missouri has a temperate continental climate. Precipitation in the form of rainfall was recorded at an annual average of 51.6 inches per year, with April being the rainiest month, recording over 7.5 inches. Snowfall precipitation is mild, with an annual average of 6.6 inches; February is the snowiest month, with 2.76 inches. Summer temperatures reach an average temperature of 57.4 degrees Fahrenheit (°F) and have an average maximum of 67.6 °F, with July being the hottest month. Winter months reach an average temperature of 36.6 °F, slightly above freezing. Winter minimum temperatures reach an average low of 26.7 °F, with January being the coldest month (NOAA, 2020).

2.2.5 Current and Future Land Use

Springfield AVCRAD is a controlled access facility and is adjacent to the Springfield Branson National Airport. Reasonably anticipated future land use is not expected to change from the current land use; however, future infrastructure improvements, land acquisitions, and land use controls at the Springfield Branson National Airport and surrounding areas are unknown. New construction of another hangar at the Springfield AVCRAD is underway. The anticipated completion date is unknown.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

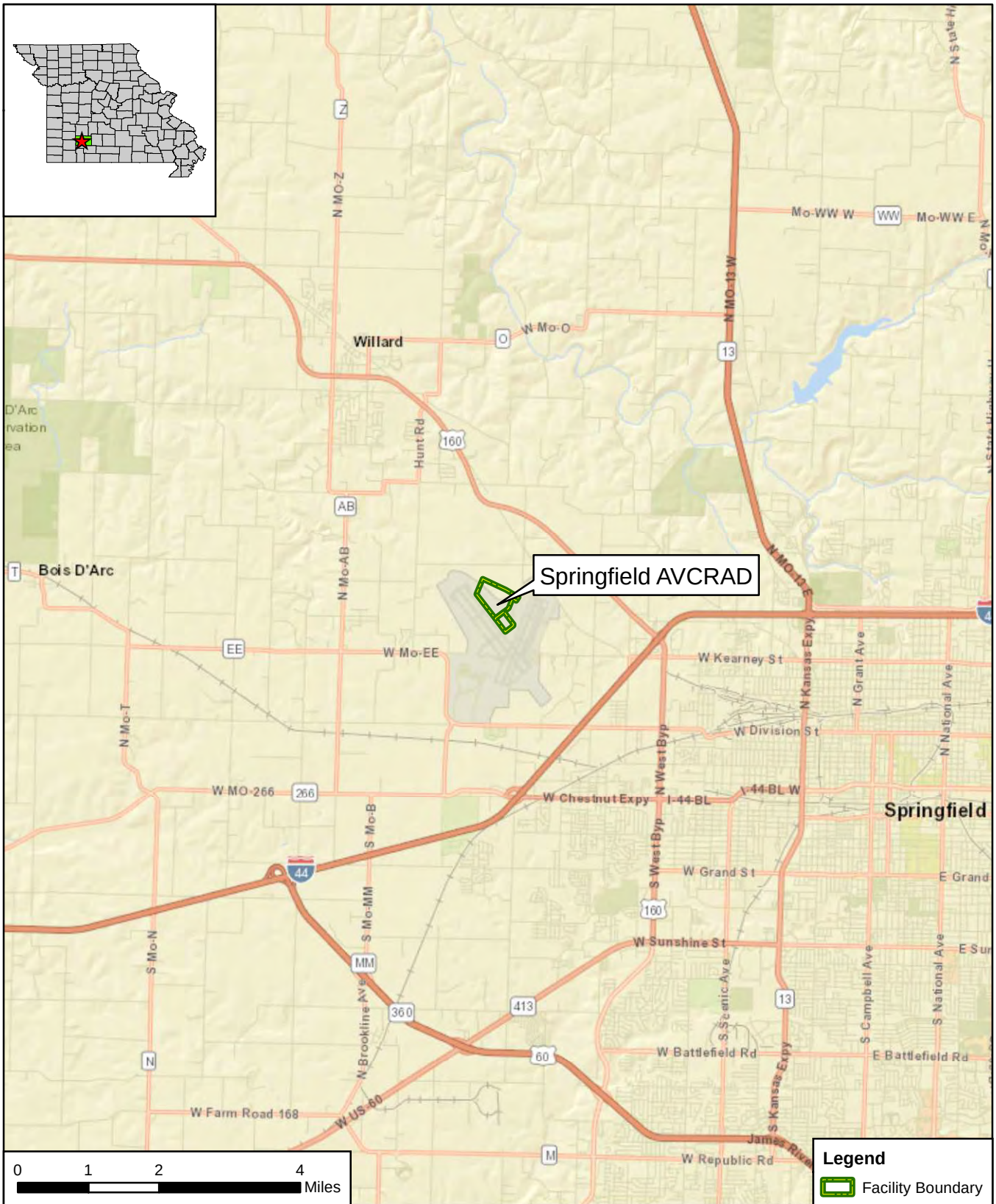
A wildlife survey has not occurred at the facility, and the facility does not have any significant areas of habitat. The following species have not been identified at the facility but may be present in the surrounding area.

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

- **Fish:** Niangua darter, *Etheostoma nianguae* (Threaten); Ozark cavefish, *Amblyopsis rosae* (Threaten).
- **Plants:** *Geocarpon minimum* (Threatened) (No common name); Missouri bladderpod, *Physaria filiformis* (Threatened).
- **Insects**: Monarch butterfly, *Danaus plexippus* (Candidate).
- **Mammals**: Northern Long-Eared Bat, *Myotis septentrionalis* (Threatened); Gray bat, *Myotis grisescens* (Endangered); Indiana bat, *Myotis sodalist* (Endangered), Tricolored bat, *Perimyotis subflavus* (Proposed Endangered).
- **Reptiles**: Alligator snapping turtle, *Macrochelys temminckii* (Proposed Threatened).

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 AVCRAD. A fifth AOI was identified after issuance of the PA report, due to the identification of fire training activities and the resulting potential for a release (AECOM, 2020). AFFF may have historically been released at the facility during fire training activities and storage as early as 2007. The potential release areas were grouped into five AOIs based on preliminary data and presumed groundwater flow directions. A description of each AOI is presented in **Section 3**.



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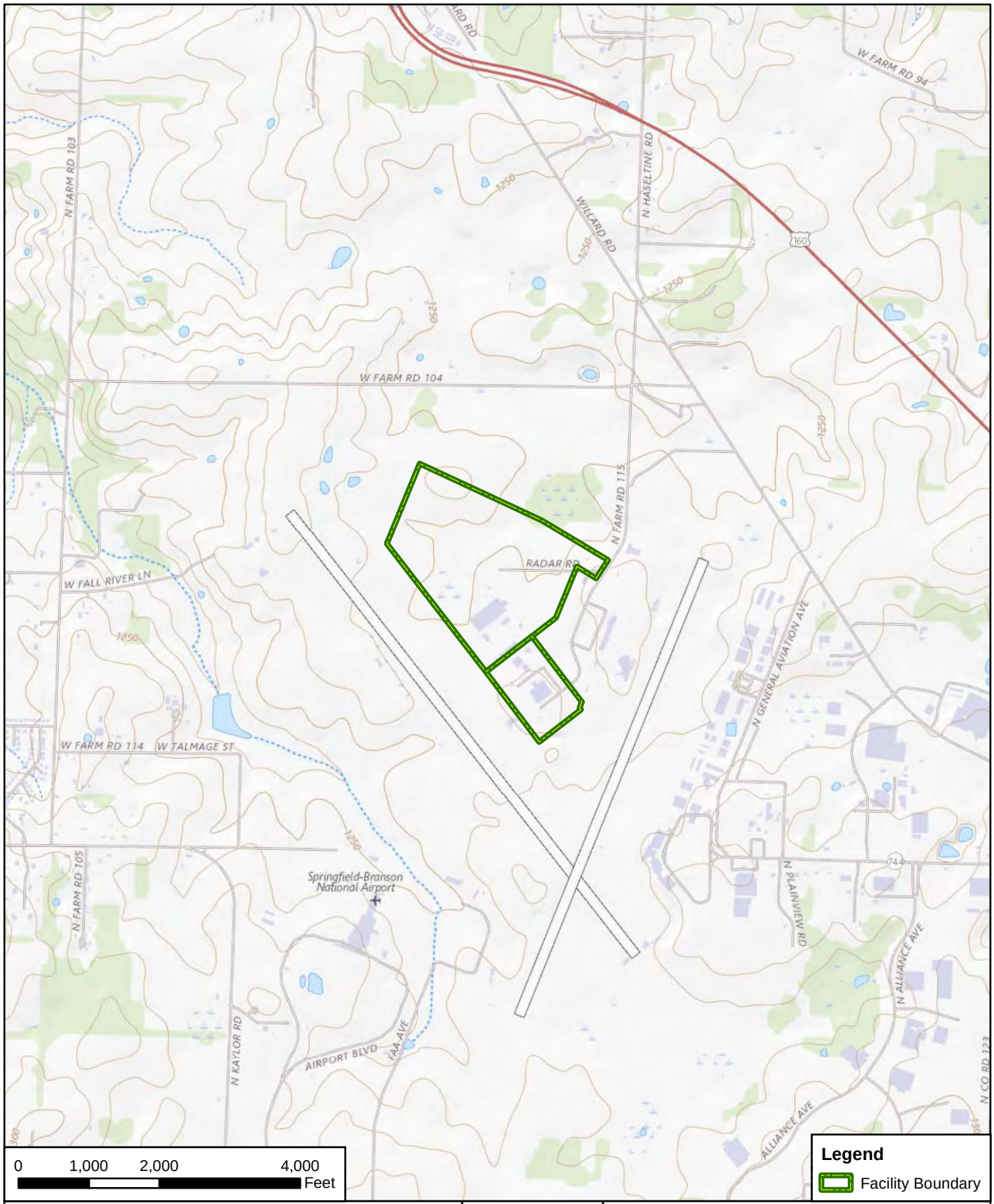
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	9/1/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



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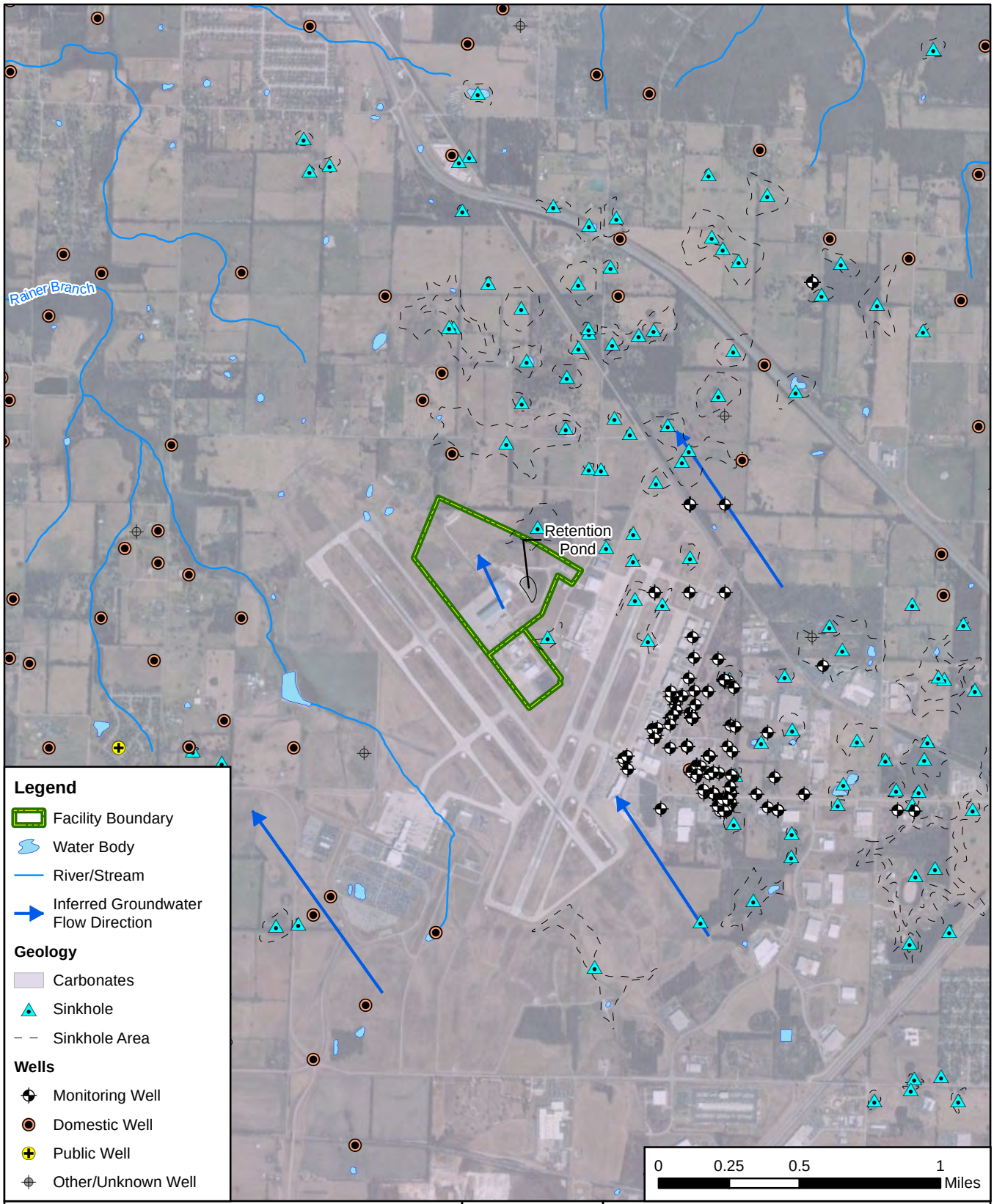
Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	9/1/2022

N

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	3/31/2023

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	3/16/2023	GIS BY	MS	3/16/2023
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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	3/16/2023

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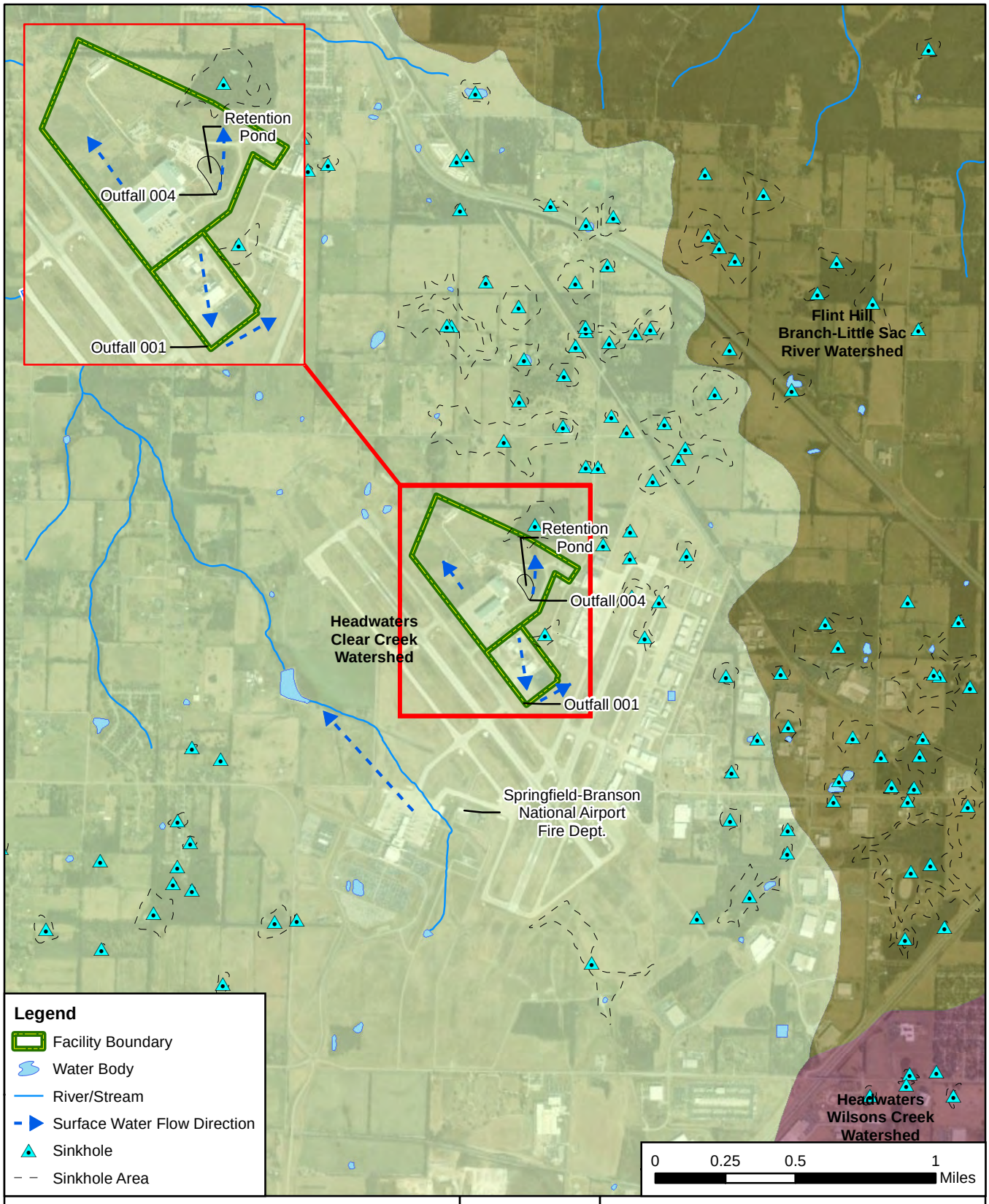
Groundwater Elevations, March 2022

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4



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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	3/20/2023

N

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, four potential release areas were identified at Springfield AVCRAD, with one additional potential release area identified during SI field activities (AOI 5) and grouped into five AOIs (AECOM, 2020). The potential release areas are shown on **Figure 3-1**.

3.1 AOI 1: Hanger 27

AOI 1 is where Hangar 27 contained a fire suppression system supplied by a 800-gallon tank filled with 3% AFFF. Hangar 27 was built in 2011 and upon installation, there was one fire suppression system test conducted by a contractor during which the system dispensing nozzles in the hangar were bypassed, and the AFFF was captured by a vacuum truck to prevent release of AFFF to the environment. Any routine maintenance of the fire suppression system is unknown. In the southwest corner of the hangar, there are 26 55-gallon drums of 3% AFFF in storage for fire suppression system recharge. It is unknown how long the 55-gallon drums have been stored in the hangar. There were no reports of any leaking or spills of AFFF from the 55-gallon drums or the AFFF fire suppression tanks.

3.2 AOI 2: Fire Training Area 1

AOI 2 is fire training area (FTA) 1 that is located immediately south of the fuel farm on the concrete ramp area. In 2007, a one-time fire training event occurred on the concrete, where one 60-gallon Tri-Max™ fire extinguisher was fully dispensed on the ramp area. The 3% AFFF was then allowed to run off the concrete and into the adjacent grass. Every 5 years, the Tri-Max™ fire extinguishers undergo hydrostatic testing off-facility by a contractor. Surface water around FTA 1 flows onto the adjacent grass area and then south via a channelized pathway.

3.3 AOI 3: Fire Training Area 2

AOI 3 is FTA 2 located on the grass immediately off the ramp area to the west of Hangar 27. In 2014, a one-time fire training event occurred with one 60-gallon Tri-Max™ fire extinguisher in which approximately 20 gallons of 3% AFFF were released. The AFFF was then allowed to dissipate in the grass. Since 2015, soap and water have been used for fire training that occurs at the AVCRAD. No remediation activities have occurred at this location. There is a retention pond on the east side of the facility to which all the surface water from north of Hangar 27 and ramp drains. The retention pond discharges north off-facility when it overflows.

3.4 AOI 4: GSE Building

AOI 4 is the GSE Building. The ground support equipment building is located immediately off the ramp area to the southeast of Hangar 27. To prepare for freezing temperatures in winter, AFFF solution in Tri-Max™ fire extinguishers was exchanged for a 3% AFFF Chemguard Low Temperature solution in the GSE building. The removed AFFF solution was containerized in 55-gallon drums and stored in the GSE building. During the warm months, the 3% AFFF Chemguard Low Temperature solution was removed, and the Tri-Max™ fire extinguishers were replaced with the original AFFF solution. It is unknown how many years and how many Tri-Max™ fire extinguishers were exchanged. The GSE building is outfitted with drains that lead to an oil/water separator, then to the sanitary WWTP. No spills or leaks while switching the AFFF solutions were reported.

3.5 AOI 5: Fire Training Area 3

AOI 5 was an historical FTA that was identified by on-facility personnel during SI field activities in March 2022. Based on information provided by facility staff involved with previously unknown historical fire training activities, fire training previously occurred within the concrete and grass immediately off the ramp area at selected locations and the fire suppressant material was allowed to dissipate in the grass. It is not confirmed whether AFFF was used during this event; the amount and concentration of fire suppressant dispensed are also unknown.

3.6 Adjacent Sources

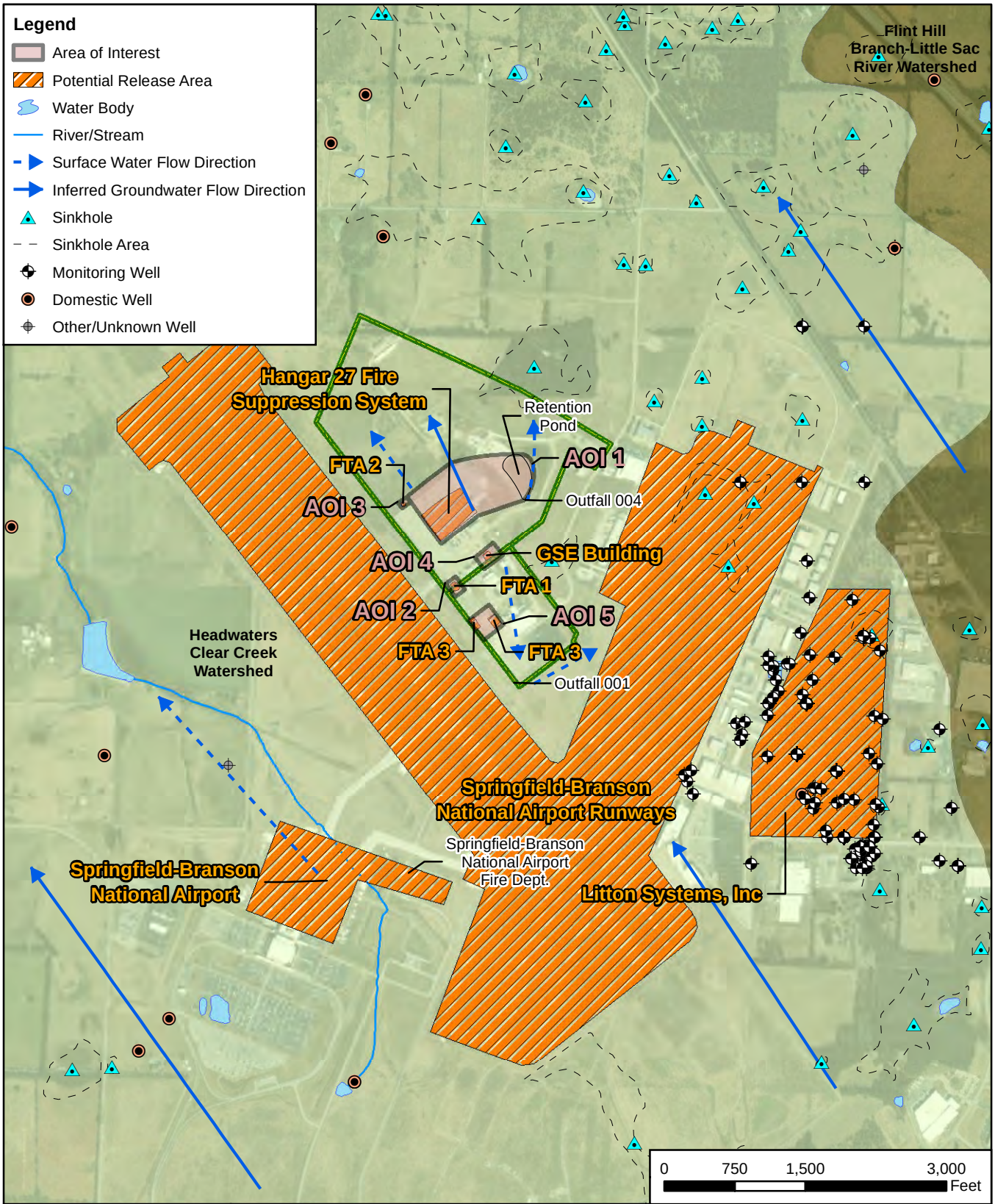
One off-facility, potential source was identified adjacent to the AVCRAD during the PA and is not associated with ARNG activities. An additional off-facility, potential source was identified adjacent to the AVCRAD during the SI planning and is not associated with ARNG activities. The adjacent potential sources are shown on **Figure 3-1** and described in the following sections for informational purposes only and will not be investigated as part of this SI.

3.6.1 Springfield-Branson National Airport

The Springfield-Branson National Airport geographic coordinates are 37°14'27.41"N and 93°23'33.30"W. The current Springfield-Branson Airport was constructed in 1944 and is owned and operated by the City of Springfield. The AVCRAD is adjacent to the Springfield-Branson National Airport. The airport has a fire department that responds to emergencies at the airport and the AVCRAD. Springfield-Branson National Airport Fire Department requires response testing and equipment testing by the Federal Aviation Administration. Due to the mandatory requirements, the Springfield-Branson National Airport Fire Department has been identified as an adjacent potential source to the AVCRAD. Additionally, due to uncertainty regarding the location of the Fire Department's equipment testing, the runways at Springfield-Branson National Airport have also been identified as an adjacent potential source.

3.6.2 Litton Systems Inc.

The former Litton Systems Inc. site is located on approximately 70 acres, just east of the Springfield-Branson National Airport. From the 1960s to 2007, the site was used to manufacture printed circuit boards. The facility was demolished in 2008 and now consists of a vacant lot with only a concrete building slab remaining. The site is owned by Northop Grumman Corporation, which acquired the site from Litton Systems Inc. in 2001 During its operation, the facility produced waste materials containing heavy metals, predominantly copper, and volatile organic compounds (VOCs), mainly trichloroethylene (TCE). The contaminated waste materials were placed in unlined lagoons, waste piles and pits on the Litton property until the early 1980’s. Releases of TCE into the environment during operations resulted in soil and groundwater contamination at the site and in the surrounding area. Numerous investigations of onsite soils, onsite and offsite shallow and deep groundwater and vapor intrusion have been conducted on the Litton property and surrounding area. Investigations by Northop Grumman are ongoing (MODNR, 2022).



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	3/31/2023	GIS BY	MS	3/31/2023
SCALE	1:18,000	CHK BY	AP	3/31/2023
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	3/31/2023

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, 2022a), 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 Springfield AVCRAD (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, 2022a); 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). Temporal boundaries were limited to the spring season, which was the earliest available time field resources were available to complete the study.

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, 2022a).

4.5 Data Usability Assessment

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

Based on the DUA, the environmental data collected during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUA and its associated data validation reports. These data are of sufficient quality to meet the objectives and requirements of the SI QAPP Addendum (AECOM, 2022a).

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, Springfield Aviation Classification Repair Activity Depot, Springfield, Missouri* dated March 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Springfield Aviation Classification Repair Activity Depot, Springfield, Missouri* dated February 2021 (AECOM, 2022a); and
- *Final Site Safety and Health Plan, Springfield Aviation Classification Repair Activity Depot, Springfield, Missouri* dated February 2021 (AECOM, 2022b).

The SI field activities were conducted from 14 March to 1 April 2022 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2022a), 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-eight (38) soil samples from 18 boring locations;
- Seven grab groundwater samples from nine temporary well locations;
- Two groundwater samples from two permanent well locations;
- Twenty-three (23) 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**, monitoring well development forms are provided in **Appendix B3**, field change request forms are provided in **Appendix B4**, land survey data are provided in **Appendix B5**, and investigation-derived waste (IDW) polygons are provided in **Appendix B6**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 8 December 2020, 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, MOARNG, MODNR, and USACE. 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, 2022a).

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

5.1.2 Utility Clearance

Prior to any beginning field activities, AECOM placed a ticket with the USA north 811 “Call Before You Dig” Missouri utility clearance provider to notify them of intrusive work on 14 March 2022. Additional tickets were placed to extend the duration of this ticket and to extend the coverage area based on the addition of a new AOI. Additionally, AECOM contracted Ground Penetrating Radar Systems (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 14 March 2022 and 22 March 2022 with input from the AECOM field team and AVCRAD facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a vacuum truck to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and Sampling Equipment Acceptability

One potable water source at AVCRAD was sampled on 21 October 2021 to assess usability for decontamination of drilling equipment. Results of the sample collected at the outdoor spigot (SPRNG-DECON-01) confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the samples were analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample associated with the outdoor spigot source used during the SI are provided in **Appendix F**. A discussion of the results is presented in the DUA (**Appendix A**).

Materials that were used within the sampling zone were confirmed as acceptable for use in the sampling environment. The checklist of acceptable materials for use in the sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the SI QAPP Addendum (AECOM, 2022a). Prior to the start of field work each day, a Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Borings were installed in grass areas where applicable, to avoid disturbing concrete or asphalt surfaces. Soil samples were collected via rotary sonic, in accordance with the SI QAPP Addendum

(AECOM, 2022a). A Boart Longyear® MiniSonic LS250 or Boart Longyear® LS600 continuous core sampling system was used to collect continuous soil cores to the target depth. Additionally, a hand auger was used to collect surface soil samples. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-1**. Several boring locations were adjusted within a 50-feet offset for reasons such as drill rig access, utility avoidance, and bias toward sampling within observed drainage features.

In general, three discrete soil samples were collected from the vadose zone for chemical analysis from each soil boring: one surface soil sample (0 to 2 feet bgs), one subsurface soil sample approximately 2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table.

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

Soil borings completed during the SI found low to medium plasticity fines (silt and clay) as the dominant lithology of the unconsolidated sediments below the AVCRAD. Finely crystalline limestone was observed as the dominant bedrock below the AVCRAD, with first encountered depths between 7 and 29.9 feet bgs. The borings were completed at depths between 15 and 85 feet bgs. Varying quantities of sand and gravel were also observed in the borings, specifically, isolated layers of sandy lean clay and gravely lean clay with thicknesses ranging from 1 foot to 11 feet. These observations are consistent with the understood depositional environment of the region.

Each soil sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15, total organic carbon (TOC) (USEPA Method 9060A), pH (USEPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the SI QAPP Addendum (AECOM, 2022a).

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.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a Boart Longyear® MiniSonic LS250 or Boart Longyear® LS600 continuous core sampling system. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected after a period of time following well installation to allow groundwater to infiltrate and recharge the temporary well screen intervals. After the recharge

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

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2022a).

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

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2022a) by removing the PVC and backfilling the hole with bentonite chips. Upon completion of well abandonment, the ground surface at each location was patched to match existing surrounding conditions.

5.4 Permanent Well Installation and Groundwater Sampling

During the SI, two permanent monitoring wells were installed within or downgradient of potential source areas. The locations of the wells are shown on **Figure 5-1**.

A Boart Longyear® MiniSonic LS250 and Boart Longyear® LS600 drill rig were used to install two 2-inch diameter monitoring wells. The monitoring wells were constructed with Schedule 40 PVC, flush threaded 20-foot sections of riser, 0.010-inch slotted well screen, and a threaded bottom cap. The depth of the permanent wells was determined based on the depth at which groundwater was first encountered within the bedrock beneath the facility. A filter pack of 20/40 silica sand was installed in the annulus around the well screen to a minimum of 2-feet above the well screen.

A 2-foot thick hydrated bentonite seal was placed above the filter sand. Bentonite grout was placed in the well annulus from the top of the bentonite seal to ground surface. The bentonite grout was allowed to set for 24 hours prior to well completion in accordance with the SI QAPP Addendum (AECOM, 2022a). All monitoring wells were completed with flush-mount well vaults. The screen interval of each of the groundwater monitoring wells is provided in **Table 5-3**.

Development and sampling of wells was completed in accordance with the SI QAPP Addendum (AECOM, 2022a). The newly installed monitoring wells were developed no sooner than 24 hours following installation by pumping and surging using a surge block and a variable speed submersible pump. Samples were collected no sooner than 24 hours following development via low-flow sampling methods using either a PFAS-free disposable bailer or a bladder 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 was any foaming. No foaming was noted in any of the groundwater samples.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory and analyzed by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2022a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. One field reagent blank was collected in accordance with the PQAPP (AECOM, 2022a). 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 29 March 2022. Groundwater elevation measurements were collected from the nine new temporary monitoring wells and two new permanent monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater elevation map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.6 Surveying

The northern side of each well casing was surveyed by Missouri-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2022a). Survey data from the newly installed wells on the facility were collected on 30 March 2022 in the applicable Universal Transverse Mercator zone projection with Missouri Coordinate System of 1983 (CCS83) datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B5**.

5.7 Investigation-Derived Waste

As of the date of this report, the disposal of IDW is not regulated federally. IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (AECOM, 2022a) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Soil IDW (i.e., soil cuttings) generated during the SI activities were left in-place at the point of the source. The soil cuttings were distributed on the downgradient side of the borehole. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were discharged directly to the ground surface slightly downgradient of the source. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location.

Geographic coordinates were collected using a global positioning system (GPS) around each location where IDW was placed. The approximate footprint of IDW discharged to the ground surface are displayed on the figure in **Appendix B6**.

Additionally, rock core generated during drilling were containerized in properly labeled 55-gallon drums. These drums were stored at a location designated by Springfield AVCRAD Environmental

Manager and MOARNG. ARNG will coordinate waste profiling, transportation, and disposal of this solid IDW.

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

5.8 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 SI QAPP Addendum

Five deviations from the SI QAPP Addendum occurred during SI field activities. The deviations are noted below and are documented in Field Change Request Forms (**Appendix B4**):

- Based on visual observations of disturbed/reworked soil from ongoing construction of nearby addition to facility and proximity to hangar and potential historical release within, AOI01-02 was moved approximately 165 feet south-southwest. Location was considered based on nearby utilities and meeting data quality objectives.
- Permanent monitoring well SPRNG-MW01 was moved approximately 125 feet southeast, closer to an area of historical fire training, as conducted by and reported by on-facility staff (Richard Lawrence). Location was considered based meeting data quality objectives.
- The original AOI02-01 and AOI02-02 locations were moved approximately 60 feet southeast, based on historical fire training activities as indicated by on-facility staff involved with training. Locations were considered based on nearby utilities and meeting data quality objectives.
- Based on information provided by facility staff involved with previously unknown historical fire training activities, an additional AOI (AOI 5) and sampling locations were added.
- Based on additional details provided by facility staff involved with historical fire training activities, additional surface soil sampling was added to the existing AOI 2.

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Springfield AVCRAD, Missouri

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	3/15/2022 8:50	0 - 2	x				
AOI01-01-SB-00-02-D	3/15/2022 8:50	0 - 2	x				FD
AOI01-01-SB-00-02-MS	3/15/2022 8:50	0 - 2	x				MS
AOI01-01-SB-00-02-MSD	3/15/2022 8:50	0 - 2	x				MSD
AOI01-01-SB-08-09	3/16/2022 15:00	8 - 9	x				
AOI01-01-SB-13-14	3/16/2022 15:15	13 - 14	x				
AOI01-02-SB-00-02	3/21/2022 14:55	0 - 2	x	x	x		TOC/pH
AOI01-02-SB-13-15	3/28/2022 11:45	13 - 15	x				
AOI01-02-SB-25-27	3/28/2022 11:55	25 - 27	x				
AOI02-01-SB-00-02	3/17/2022 13:00	0 - 2	x				
AOI02-01-SB-00-02-D	3/17/2022 13:00	0 - 2	x				FD
AOI02-01-SB-6.5-7.5	3/17/2022 13:45	6.5 - 7.5	x				
AOI02-01-SB-12-12.5	3/17/2022 13:50	12 - 12.5	x			x	Grain Size
AOI02-02-SB-00-1.5	3/23/2022 14:14	0 - 1.5	x	x	x		TOC/pH
AOI02-02-SB-00-1.5-D	3/23/2022 14:14	0 - 1.5	x				FD
AOI02-02-SB-14-15	3/28/2022 14:10	14 - 15	x				
AOI02-02-SB-15-16.1	3/28/2022 15:15	15 - 16.1	x				
AOI02-03-SB-00-1.8	3/24/2022 10:50	0 - 1.8	x				
AOI02-04-SB-00-1.7	3/23/2022 16:30	0 - 1.7	x				
AOI02-05-SB-00-1.4	3/22/2022 11:35	0 - 1.4	x				
AOI02-06-SB-00-02	3/23/2022 16:55	0 - 2	x				
AOI03-01-SB-00-02	3/17/2022 9:30	0 - 2	x				
AOI03-01-SB-9.5-10.5	3/17/2022 11:55	9.5 - 10.5	x	x	x	x	TOC/pH, Grain Size
AOI03-01-SB-9.5-10.5-D	3/17/2022 11:55	9.5 - 10.5	x				FD
AOI03-01-SB-9.5-10.5-MS	3/17/2022 11:55	9.5 - 10.5	x				MS
AOI03-01-SB-9.5-10.5-MSD	3/17/2022 11:55	9.5 - 10.5	x				MSD
AOI03-01-SB-29-30	3/17/2022 11:45	29 - 30	x				
AOI04-01-SB-00-02	3/17/2022 17:25	0 - 2	x				
AOI04-01-SB-08-09	3/17/2022 15:30	8 - 9	x				
AOI04-01-SB-13.5-14.5	3/17/2022 15:40	13.5 - 14.5	x				
AOI04-02-SB-00-02	3/17/2022 17:45	0 - 2	x				
AOI04-02-SB-6.5-7.5	3/17/2022 16:30	6.5 - 7.5	x				
AOI04-02-SB-09-10	3/17/2022 16:45	9 - 10	x				
AOI04-02-SB-11.5-12	3/17/2022 16:45	11.5 - 12				x	Grain Size
AOI05-01-SB-00-02	3/23/2022 15:20	0 - 2	x				
AOI05-01-SB-08-10	3/28/2022 16:36	8 - 10				x	Grain Size
AOI05-01-SB-13-15	3/28/2022 15:50	13 -15	x				
AOI05-01-SB-28-30	3/28/2022 16:00	28 - 30	x				
AOI05-02-SB-00-02	3/22/2022 16:20	0 - 2	x				
AOI05-03-SB-00-01	3/24/2022 15:35	0 - 1	x	x	x		TOC/pH
AOI05-03-SB-05-07	3/28/2022 16:55	5 - 7	x				
AOI05-04-SB-00-01	3/24/2022 15:00	0 - 1	x				
SPRNG-MW01-00-02	3/14/2022 16:25	0 - 2	x				
SPRNG-MW01-11-12	3/15/2022 11:15	11 - 12	x				
SPRNG-MW01-17-18	3/15/2022 12:00	17 - 18	x	x	x	x	TOC/pH, Grain Size
SPRNG-MW01-17-18-D	3/15/2022 12:00	17 - 18		x	x		TOC/pH FD
SPRNG-MW01-17-18-MS	3/15/2022 12:00	17 - 18		x	x		TOC/pH MS
SPRNG-MW01-17-18-MSD	3/15/2022 12:00	17 - 18		x	x		TOC/pH MSD
SPRNG-MW02-SB-00-02	3/23/2022 12:40	0 - 2	x				
SPRNG-MW02-SB-5.5-6.5	3/22/2022 12:15	5.5 - 6.5	x				
SPRNG-MW02-SB-08-09	3/22/2022 12:25	8 - 9	x				

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Springfield AVCRAD, Missouri

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							
AOI01-01-GW	3/18/2022 13:20	NA	x				
AOI01-01-GW-D	3/18/2022 13:20	NA	x				FD
AOI01-02-GW	3/29/2022 11:05	NA	x				
AOI02-01-GW	3/18/2022 16:45	NA	x				
AOI02-02-GW	3/29/2022 11:55	NA	x				
AOI03-01-GW	3/18/2022 14:45	NA	x				
AOI04-01-GW	3/21/2022 11:10	NA	x				
AOI04-01-GW-MS	3/21/2022 11:10	NA	x				MS
AOI04-01-GW-MSD	3/21/2022 11:10	NA	x				MSD
AOI04-02-GW	3/21/2022 13:10	NA	x				
SPRNG-MW01-GW	4/1/2022 13:12	NA	x				
SPRNG-MW02-GW	4/1/2022 12:35	NA	x				
Quality Control Samples							
SPRNG-ERB-01	3/14/2022 15:30	NA	x				hand auger
SPRNG-ERB-02	3/17/2022 10:15	NA	x				4" sonic cutting shoe
SPRNG-ERB-03	3/17/2022 16:00	NA	x				hand trowel
SPRNG-ERB-04	3/23/2022 13:40	NA	x				submersible pump
SPRNG-ERB-05	3/26/2022 12:15	NA	x				stainless steel bailer
SPRNG-ERB-06	3/28/2022 18:06	NA	x				4" cutting shoe truck rig
SPRNG-ERB-07	3/29/2022 13:00	NA	x				pump from drillers
SPRNG-ERB-08	3/29/2022 13:15	NA	x				stainless steel surge block from drillers
SPRNG-FRB-01	3/14/2022 17:00	NA	x				field reagent black
SPRNG-DECON-01	10/21/2021 12:00	NA	x				decon water, outdoor spigot
SPRNG-DECON-02	3/17/2022 16:10	NA	x				decon water, via drill rig
SPRNG-DECON-03	3/28/2022 17:10	NA	x				decon water, via drill rig

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

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, Groundwater Elevations, and Bedrock Elevations
Site Inspection Report, Springfield AVCRAD, Missouri

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Stickup Height (feet)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)	Depth to Bedrock (feet bgs)	Bedrock Surface Elevation (feet NAVD 88)
1	AOI01-01	15	10 - 15	1161.68	1160.40	13.99	1.28	12.71	1147.69	14.00	1146.40
	AOI01-02	30	20 - 30	1161.99	1161.70	24.69	0.29	24.40	1137.30	29.90	1131.80
2	AOI02-01	30	19 - 29	1159.41	1158.60	14.45	0.81	13.64	1144.96	NE	NE
	AOI02-02	30	20 - 30	1159.47	1158.90	29.51	0.57	28.94	1129.96	16.10	1142.80
3	AOI03-01	30	25 - 30	1163.49	1160.20	19.61	3.29	16.32	1143.88	NE	NE
4	AOI04-01	19	14 - 19	1164.14	1159.20	20.48	4.94	15.54	1143.66	NE	NE
	AOI04-02	16	11 - 16	1162.3	1159.50	7.69	2.80	4.89	1154.61	16.00	1143.50
5	AOI05-01	30	20 - 30	1164.83	1164.00	DRY	0.83	DRY	DRY	NE	NE
	AOI05-03B	30	20 - 30	1163.69	1163.10	DRY	0.59	DRY	DRY	7.00	1156.10
Facility-Wide	SPRNG-MW01	80	see Table 5-3		1160.0	see Table 5-3				18.00	1142.00
	SPRNG-MW02	85	see Table 5-3		1157.7	see Table 5-3				11.00	1146.70

Notes:

AVCRAD = Aviation Classification Repair Activity Depot
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

Table 5-3
Permanent Well Screen Intervals and Groundwater Elevations
Site Inspection Report, Springfield AVCRAD, Missouri

Area of Interest	Boring Location	Permanent Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Stickup Height (feet)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
Facility-Wide	SPRNG-MW01	60 - 80	1159.73	1160.0	67.91	-0.27	68.18	1091.82
	SPRNG-MW02	62 - 82	1157.41	1157.7	23.09	-0.29	23.38	1134.32

Notes:

AVCRAD = Aviation Classification Repair Activity Depot
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

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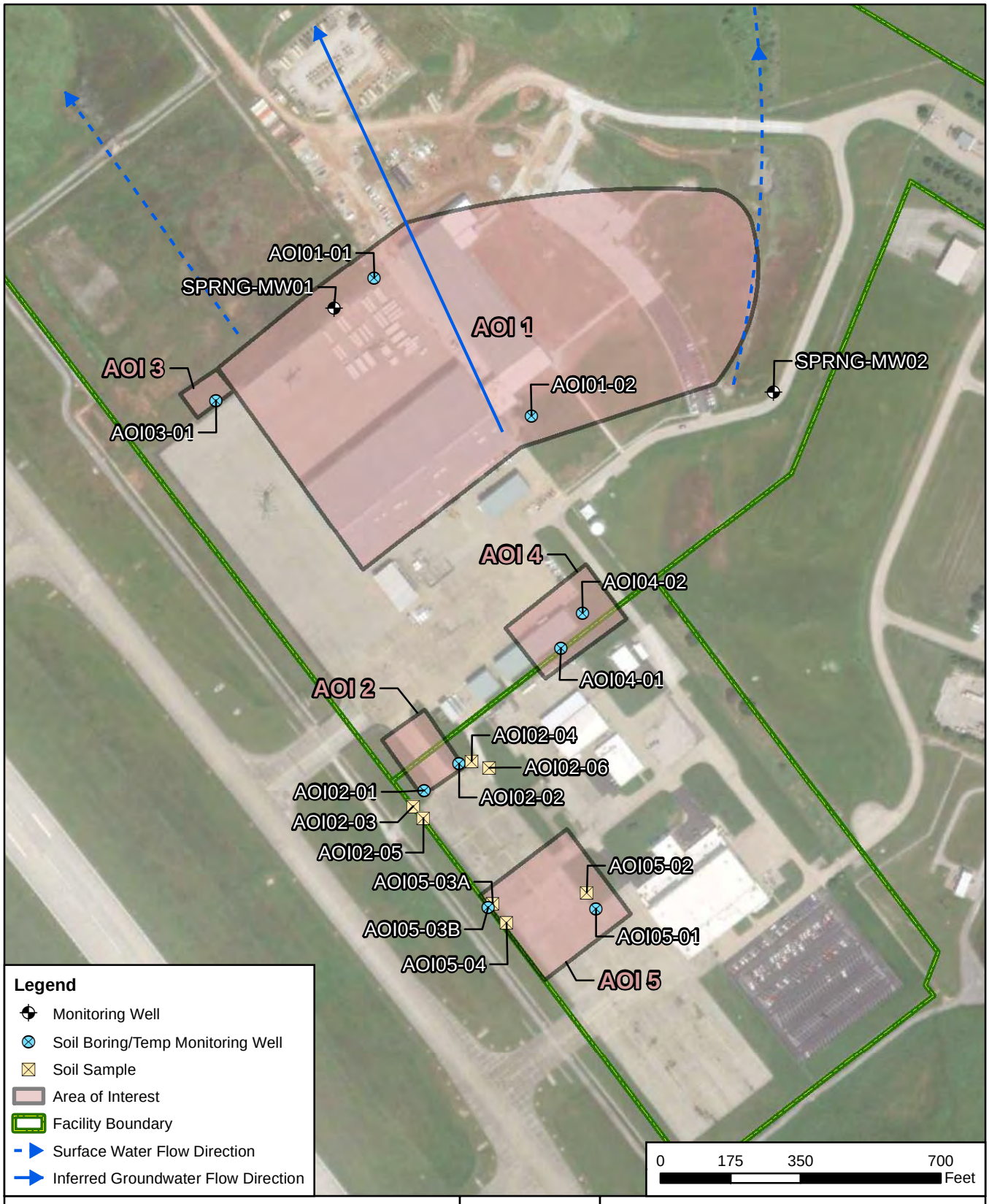

CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	11/29/2022	GIS BY	MS	11/29/2022
SCALE	1:4,200	CHK BY	AP	11/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	11/29/2022

N

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

6. Site Inspection Results

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

6.1 Screening Levels

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

Table 6-1 Screening Levels (Soil and Groundwater)

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

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

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

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

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

6.2 Soil Physicochemical Analyses

To provide basic soil parameter information, soil samples were analyzed for TOC, 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: Hangar 27. 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

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.

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI01-01, AOI01-02, SPRNG-MW01, and SPRNG-MW02. Soil was also sampled from shallow subsurface soil between (8 to 15 feet bgs) from boring locations AOI01-01, AOI01-02, SPRNG-MW01, and SPRNG-MW02 and deep subsurface soil interval (27 feet bgs) from boring locations AOI01-02 and SPRNG-MW01. Detections in soil at AOI 1 are as follows:

- PFOA, PFOS, PFHxS, PFNA, and PFBS were detected below their respective SLs in surface soil, with maximum concentrations of 0.161 J- micrograms per kilogram (µg/kg), 0.818 J µg/kg, 0.538 J- µg/kg, 0.075 J µg/kg, and 0.049 J- µg/kg, respectively.
- PFOS and PFHxS were detected in shallow subsurface soil several orders of magnitude less than their SLs, with maximum concentrations of 0.517 J µg/kg and 0.143 J µg/kg, respectively. PFOA, PFNA, and PFBS were not detected in shallow subsurface soil.
- PFOS, PFHxS, and PFBS were detected in deep subsurface soil at SPRNG-MW01, with concentrations of 0.099 J µg/kg, 0.380 J µg/kg, and 0.082 J µg/kg, respectively.
- PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in deep subsurface soil at AOI01-02.

6.3.2 AOI 1 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI01-01 and AOI01-02 and permanent wells SPRNG-MW01 and SPRNG-MW02. The following exceedances of the SLs were measured:

- PFOA was detected above the SL of 6 nanograms per liter (ng/L) at AOI01-01, with a concentration of 10.2 ng/L.
- PFOS was detected above the SL of 4 ng/L at AOI01-01 and SPRNG-MW01, with concentrations of 45.6 ng/L and 7.31 ng/L, respectively.

PFHxS was detected below its SL at AOI01-01 and SPRNG-MW01, with concentrations of 23.7 ng/L and 20.2, respectively. PFBS was detected at concentrations several orders of magnitude less than its SL, with the highest detection occurring at SPRNG-MW02, with a concentration of 3.84 J ng/L. PFNA was not detected at AOI01-01, AOI01-02, SPRNG-MW01, or SPRNG-MW02.

6.3.3 AOI 1 Conclusions

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

6.4 AOI 2

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

6.4.1 AOI 2 Soil Analytical Results

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.

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI02-01 through AOI02-06, shallow subsurface soil between (6.5 to 15 feet bgs) from boring locations AOI02-01 and AOI02-02, and deep subsurface soil (15 to 16.1 feet bgs) from boring location AOI02-02. Detections in soil at AOI 2 are as follows:

- PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in surface soil, at concentrations at least one order of magnitude less than their SLs.
- PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil.
- PFOA, PFOS, PFHxS, and PFNA were detected in the deep subsurface soil at AOI02-02, with concentrations ranging from 0.037 J µg/kg to 0.536 J µg/kg. PFBS was not detected in deep subsurface soil at AOI 2.

6.4.2 AOI 2 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI2-01 and AOI2-02. PFOA, PFOS, PFNA, and PFBS were all detected below their respective SLs in groundwater:

- PFOA was detected below the SL of 6 ng/L, at concentrations of 4.04 ng/L and 1.72 J ng/L.
- PFOS was detected below the SL of 4 ng/L, at concentrations of 3.89 J ng/L and 1.97 J ng/L.
- PFNA was detected below the SL of 6 ng/L at AOI02-01, with a concentration of 1.16 J ng/L. PFNA was not detected in groundwater at AOI02-02.
- PFBS was detected below the SL of 601 ng/L, at concentrations of 0.891 J ng/L and 0.864 J ng/L.
- PFHxS was not detected in groundwater at either AOI02-01 or AOI02-02.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil below their SLs; PFOA, PFOS, PFNA, and PFBS were detected in groundwater. Therefore, further evaluation at AOI 2 is not warranted.

6.5 AOI 3

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

6.5.1 AOI 3 Soil Analytical Results

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.

Soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (9.5 to 10.5 feet bgs), and deep subsurface soil (29 to 30 feet bgs) from boring location AOI03-01. Detections in soil at AOI 3 are as follows:

- PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in the surface soil at AOI03-01.
- PFOS was detected in shallow subsurface soil, at a concentration several orders of magnitude below its SL. PFOA, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil at AOI03-01.
- PFHxS was detected in the deep subsurface soil at AOI03-01, with a concentration of 0.048 J µg/kg. PFOA, PFOS, PFNA, and PFBS were not detected in deep subsurface soil.

6.5.2 AOI 3 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring well AOI03-01. The following exceedance of the SL was measured:

- PFOS was detected above the SL of 4 ng/L at AOI03-01, with a concentration of 8.04 ng/L.

PFOA, PFHxS, and PFBS were all detected below their SLs in groundwater:

- PFOA was detected below the SL of 6 ng/L at AOI03-01, with a concentration of 2.07 J ng/L.
- PFHxS was detected below the SL of 39 ng/L at AOI03-01, with a concentration of 4.71 ng/L.
- PFBS was detected below the SL of 601 ng/L at AOI03-01, with a concentration of 1.99 J ng/L.

PFNA was not detected in groundwater at AOI03-01.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOS was detected in soil at concentrations below the SL; PFHxS was detected in deep subsurface soil (>15 feet bgs). PFOS was detected in groundwater at a concentration above the SL. Based on the exceedance of this SL in groundwater, further evaluation at AOI 3 is warranted.

6.6 AOI 4

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 4: GSE Building. The results in soil and groundwater are presented in **Table 6-2** through **Table 6-5**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.6.1 AOI 4 Soil Analytical Results

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.

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI04-01 and AOI04-02, and from shallow subsurface soil between (8 to 14.5 feet bgs). Deep subsurface soil was not sampled at either AOI04-01 or AOI04-02.

PFOS, PFNA, and PFBS were detected in surface soil, at concentrations several orders of magnitude below their SLs. PFHxS and PFOA were not detected in surface soil.

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in shallow subsurface soil at concentrations several orders of magnitude below their respective SLs.

6.6.2 AOI 4 Groundwater Analytical Results

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

Groundwater was sampled from temporary monitoring wells AOI04-01 and AOI04-02. The following exceedance of the SLs was measured:

- PFOS was detected above the SL of 4 ng/L at AOI04-01, with a concentration of 5.86 ng/L.

PFOA, PFHxS, and PFBS were all detected below their SLs in groundwater:

- PFOA was detected below the SL of 6 ng/L, with concentrations ranging from 1.04 J ng/L to 1.88 J ng/L.
- PFHxS was detected below the SL of 39 ng/L at AOI04-02, with a concentration of 1.64 ng/L.

- PFBS was detected below the SL of 601 ng/L, with concentrations ranging from 1.37 J ng/L to 1.85 J ng/L.

PFNA was not detected in groundwater.

6.6.3 AOI 4 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil at concentrations below their SLs. PFOS was detected in groundwater at a concentration above its SL. Based on the exceedance of this SL in groundwater, further evaluation at AOI 4 is warranted.

6.7 AOI 5

This section presents the analytical results for soil in comparison to SLs for AOI 5: FTA 3. The results in soil are presented in **Table 6-2** and **Table 6-4**. Soil results are presented on **Figure 6-1** through **Figure 6-5**.

6.7.1 AOI 5 Soil Analytical Results

Figure 6-1 through **Figure 6-5** present the ranges of detections in soil. **Tables 6-2** through **Table 6-4** summarize the soil results.

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI05-01 through AOI05-04, from shallow subsurface soil (between 5 to 15 feet bgs) from AOI05-01 and AOI05-03B, and from deep subsurface soil (28 to 30 feet bgs) from boring location AOI05-01. Detections in soil at AOI 5 are as follows:

- PFOA, PFOS, PFHxS, and PFNA were detected in surface soil, at concentrations several orders of magnitude below their SLs. PFBS was not detected in surface soil at AOI 5.
- PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil and deep subsurface soil at AOI 5.

6.7.2 AOI 5 Groundwater Analytical Results

Groundwater wells AOI05-01 and AOI05-03B were dry during sampling; therefore, no samples were collected.

6.7.3 AOI 5 Conclusions

Based on the results of the SI, PFOA, PFOS, PFHxS, and PFNA were detected in soil, at concentrations below their SLs. Therefore, further evaluation at AOI 5 is not warranted. However, groundwater could not be sampled at AOI 5 due to lack of recharge in the two temporary wells installed, which represents a data gap that may be reevaluated during the RI.

Table 6-2
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Surface Soil
Site Inspection Report, Springfield AVCRAD

	Area of Interest	AOI01										AOI02									
	Sample ID	AOI01-01-SB-00-02		AOI01-01-SB-00-02-D		AOI01-02-SB-00-02		SPRNG-MW01-00-02		SPRNG-MW02-SB-00-02		AOI02-01-SB-00-02		AOI02-01-SB-00-02-D		AOI02-02-SB-00-1.5		AOI02-02-SB-00-1.5-D		AOI02-03-SB-00-1.8	
	Sample Date	03/15/2022		03/15/2022		03/21/2022		03/14/2022		03/23/2022		03/17/2022		03/17/2022		03/23/2022		03/23/2022		03/24/2022	
	Depth	0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-1.5 ft		0-1.5 ft		0-1.8 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	0.049	J-	0.034	J-	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.538	J-	0.263	J-	0.095	J	0.099	J	ND	U	ND	UJ	0.047	J	ND	U	ND	U	ND	U
PFNA	19	ND	UJ	ND	UJ	0.023	J	0.050	J	0.075	J	0.153	J	0.140	J	0.258	J	0.180	J	0.347	J
PFOA	19	0.161	J-	0.120	J-	ND	U	ND	U	0.154	J	0.160	J	0.168	J	0.374	J	0.361	J	0.443	J
PFOS	13	0.643	J-	0.287	J-	0.240	J	0.818	J	0.308	J	0.203	J	0.186	J	0.240	J	0.224	J	0.081	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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
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
SPRNG	Springfield
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, Springfield AVCRAD

Area of Interest		AOI02						AOI03		AOI04				AOI05							
Sample ID		AOI02-04-SB-00-02		AOI02-05-SB-00-1.4		AOI02-06-SB-00-02		AOI03-01-SB-00-02		AOI04-01-SB-00-02		AOI04-02-SB-00-02		AOI05-01-SB-00-02		AOI05-02-SB-00-02		AOI05-03-SB-00-01		AOI05-04-SB-00-01	
Sample Date		03/23/2022		03/24/2022		03/23/2022		03/17/2022		03/17/2022		03/17/2022		03/23/2022		03/23/2022		03/24/2022		03/24/2022	
Depth		0-1.7 ft		0-1.4 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-1 ft		0-1 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	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	0.023	J	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.166	J	0.044	J	ND	U	ND	U	ND	U	ND	U	ND	U	0.045	J	ND	U	0.125	J
PFNA	19	2.00		1.55		0.076	J	ND	U	ND	U	0.032	J	0.338	J	0.148	J	0.395	J	0.149	J
PFOA	19	2.03		1.78		0.119	J	ND	U	ND	U	ND	U	0.393	J	0.147	J	0.675	J	0.316	J
PFOS	13	1.83		0.338	J	0.206	J	ND	U	0.067	J	0.135	J	0.220	J	0.801	J	0.439	J	0.946	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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
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
SPRNG	Springfield
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, Springfield AVCRAD

Area of Interest		AOI01												AOI02						AOI03	
Sample ID		AOI01-01-SB-08-09		AOI01-01-SB-13-14		AOI01-02-SB-13-15		SPRNG-MW01-11-12		SPRNG-MW02-SB-5.5-6.5		SPRNG-MW02-SB-08-09		AOI02-01-SB-6.5-7.5		AOI02-01-SB-12-12.5		AOI02-02-SB-14-15		AOI03-01-SB-9.5-10.5	
Sample Date		03/16/2022		03/16/2022		03/28/2022		03/15/2022		03/23/2022		03/22/2022		03/17/2022		03/17/2022		03/28/2022		03/17/2022	
Depth		8-9 ft		13-14 ft		13-15 ft		11-12 ft		5.5-6.5 ft		8-9 ft		6.5-7.5 ft		12-12.5 ft		14-15 ft		9.5-10.5 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	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**	**E537M**
PFBS	25000	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	1600	0.143	J	0.094	J	ND	U	0.077	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	160	0.517	J	0.379	J	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	UJ

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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
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
SPRNG	Springfield
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, Springfield AVCRAD

Area of Interest		AOI03		AOI04								AOI05			
Sample ID		AOI03-01-SB-9.5-10.5-D		AOI04-01-SB-08-09		AOI04-01-SB-13.5-14.5		AOI04-02-SB-6.5-7.5		AOI04-02-SB-09-10		AOI05-01-SB-13-15		AOI05-03-SB-05-07	
Sample Date		03/17/2022		03/17/2022		03/17/2022		03/17/2022		03/17/2022		03/28/2022		03/28/2022	
Depth		9.5-10.5 ft		8-9 ft		13.5-14.5 ft		6.5-7.5 ft		9-10 ft		13-15 ft		5-7 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)															
PFBS	25000	ND	U	ND	U	ND	U	0.039	J	2.34		ND	U	ND	U
PFHxS	1600	ND	U	ND	U	ND	U	0.470	J	10.5		ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U	0.040	J	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U	0.597	J	ND	U	ND	U
PFOS	160	0.077	J	ND	U	ND	U	0.544	J	0.377	J	ND	U	ND	U

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Notes

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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
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
SPRNG	Springfield
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, Springfield AVCRAD

Area of Interest	AOI01				AOI02		AOI03		AOI05	
Sample ID	AOI01-02-SB-25-27		SPRNG-MW01-17-18		AOI02-02-SB-15-16.1		AOI03-01-SB-29-30		AOI05-01-SB-28-30	
Sample Date	03/28/2022		03/15/2022		03/28/2022		03/17/2022		03/28/2022	
Depth	25-27 ft		17-18 ft		15-16.1 ft		29-30 ft		28-30 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	0.082	J	ND	U	ND	U	ND	U
PFHxS	ND	U	0.380	J	0.536	J	0.048	J	ND	U
PFNA	ND	U	ND	U	0.037	J	ND	U	ND	U
PFOA	ND	U	ND	U	0.188	J	ND	U	ND	U
PFOS	ND	U	0.099	J	0.457	J	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
D	duplicate
DL	detection limit
ft	feet
ID	identification
LCMSMS	liquid chromatography with tandem mass spectrometry
LOD	limit of detection
ND	analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
SPRNG	Springfield
µg/kg	micrograms per kilogram

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Springfield AVCRAD

Area of Interest		AOI01										AOI02				AOI03		AOI04	
Sample ID		AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		SPRNG-MW01-GW		SPRNG-MW02-GW		AOI02-01-GW		AOI02-02-GW		AOI03-01-GW		AOI04-01-GW	
Sample Date		03/18/2022		03/18/2022		03/29/2022		04/01/2022		04/01/2022		03/18/2022		03/29/2022		03/18/2022		03/21/2022	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)																			
PFBS	601	1.94	J	1.97	J	2.04	J	2.35	J	3.84	J	0.891	J	0.864	J	1.99	J	1.37	J
PFHxS	39	23.7		22.9		ND	U	20.2		ND	U	ND	U	ND	U	4.71		ND	U
PFNA	6	ND	U	ND	U	ND	U	ND	U	ND	U	1.16	J	ND	U	ND	U	ND	U
PFOA	6	10.2		9.92		ND	U	2.71	J	2.96	J	4.04		1.72	J	2.07	J	1.04	J
PFOS	4	45.6		42.0		1.97	J	7.31		3.00	J	3.89	J	1.97	J	8.04		5.86	

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
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
SPRNG	Springfield
USEPA	United States Environmental Protection Agency
ng/l	nanogram per liter

Table 6-5
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Springfield AVCRAD

	Area of Interest	AOI04	
	Sample ID	AOI04-02-GW	
	Sample Date	03/21/2022	
Analyte	OSD Screening Level [a]	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)			
PFBS	601	1.85	J
PFHxS	39	1.64	J
PFNA	6	ND	U
PFOA	6	1.88	J
PFOS	4	3.46	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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
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
SPRNG	Springfield
USEPA	United States Environmental Protection Agency
ng/l	nanogram per liter

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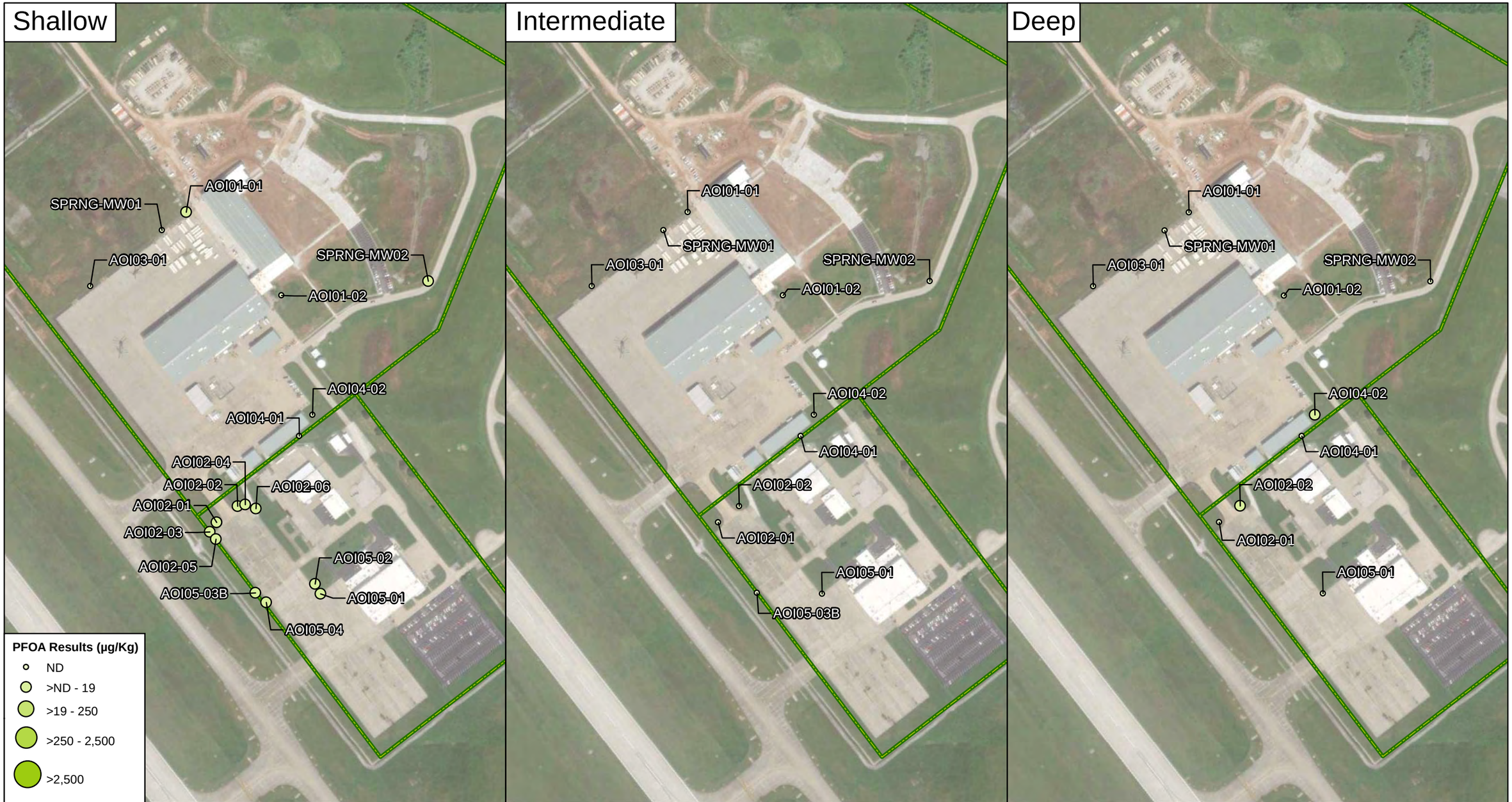

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PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	9/6/2022	GIS BY	MS	9/6/2022
SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 Feet

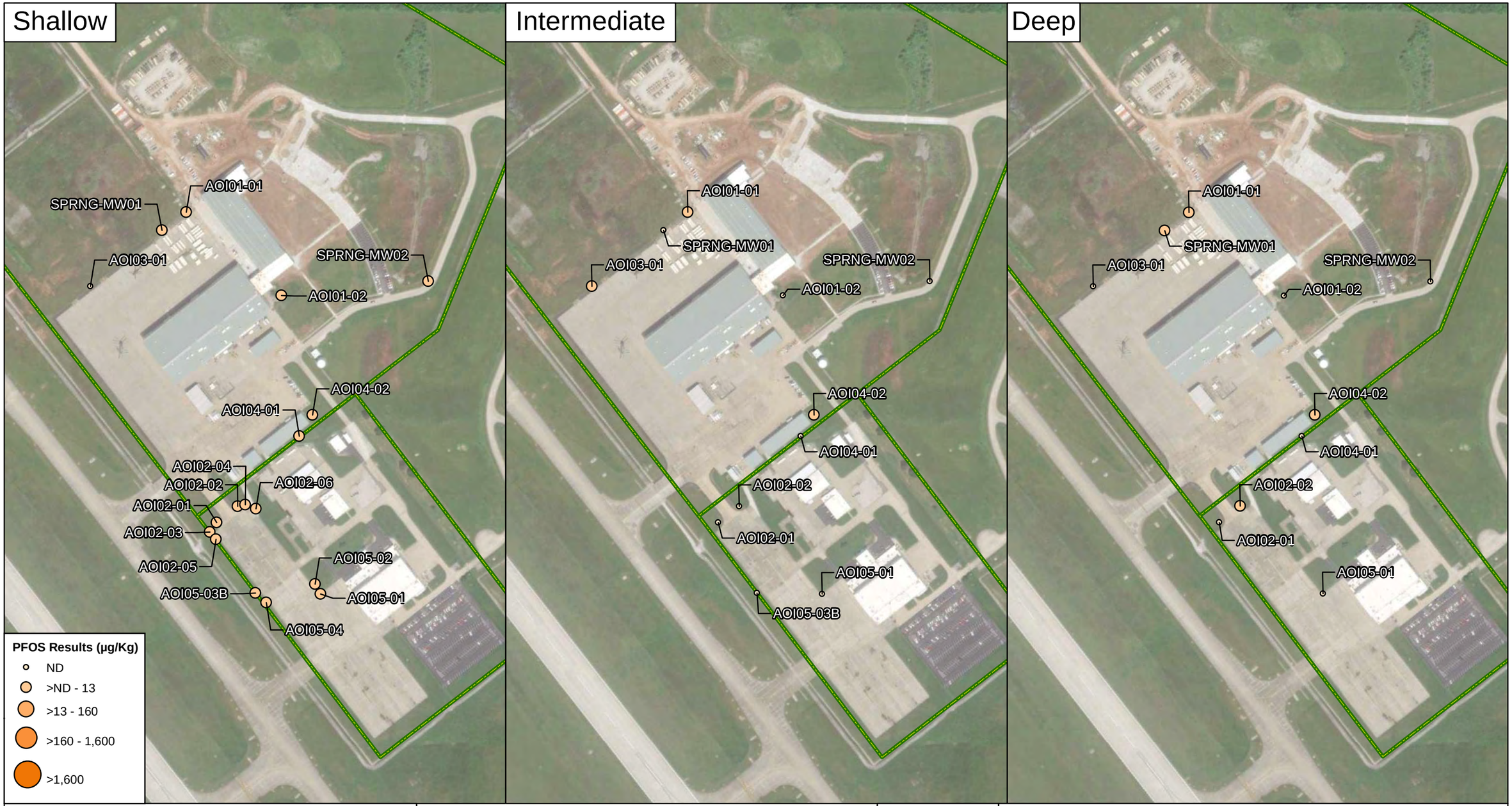
Exceedances of the OSD SL are depicted with a yellow halo.
Depth intervals shown represent respective sampling position within a given soil boring location.

N

PFOA Detections in Soil

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	9/6/2022	GIS BY	MS	9/6/2022
SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 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

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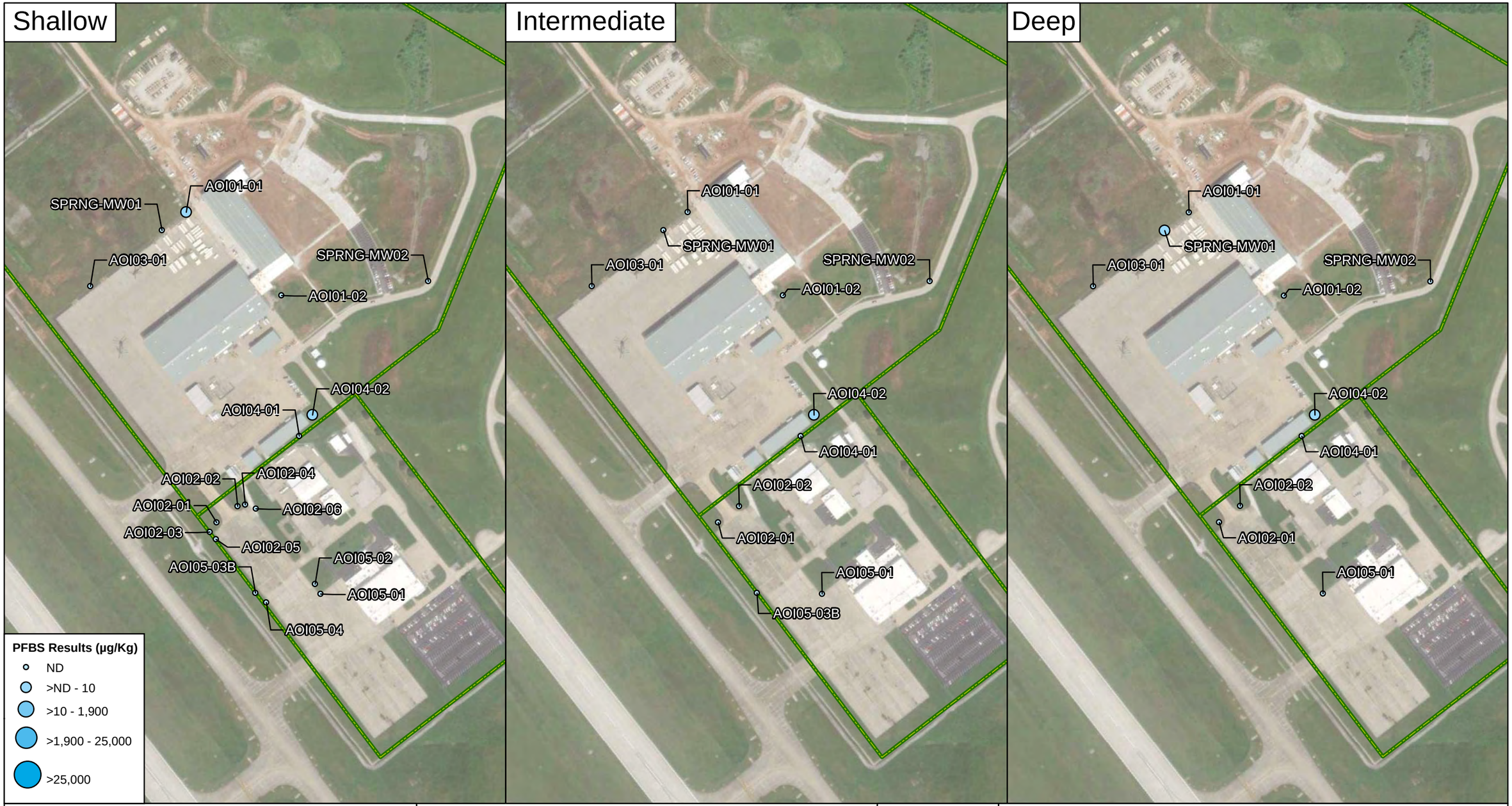
Germantown, MD 20876

Figure 6-2



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PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	9/6/2022	GIS BY	MS	9/6/2022
SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 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

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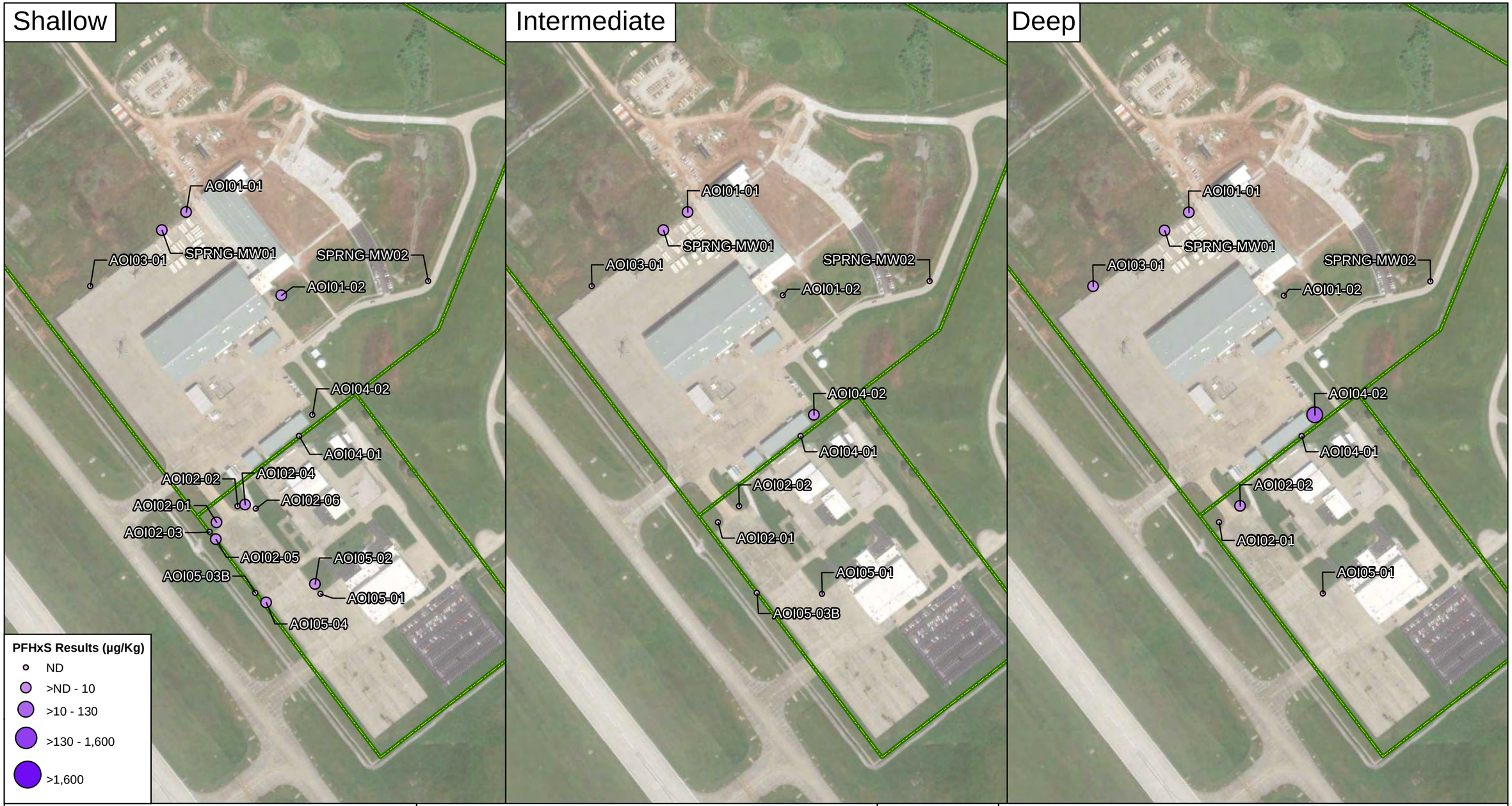
Germantown, MD 20876

Figure 6-3



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
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SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 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

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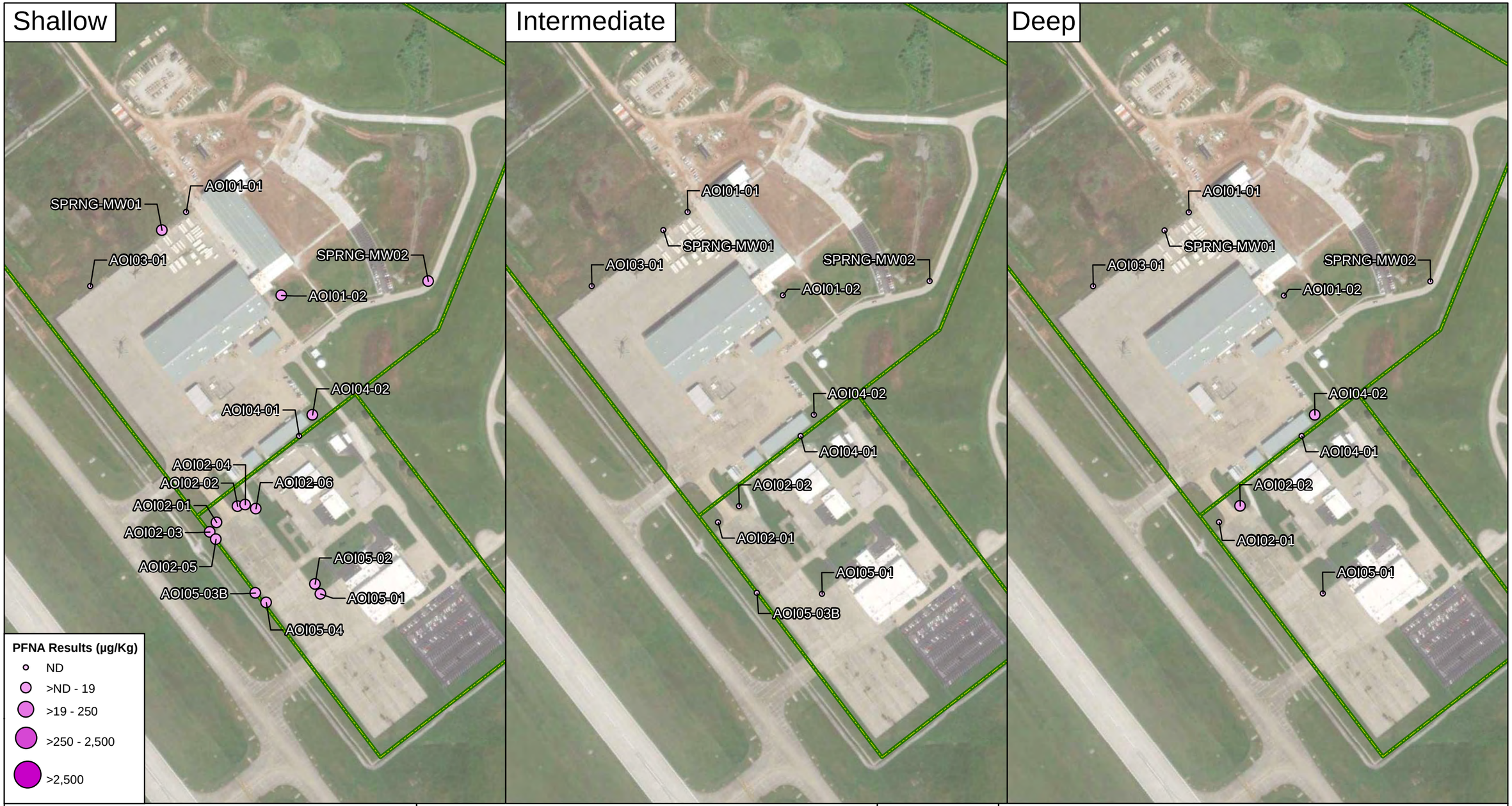
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	9/6/2022	GIS BY	MS	9/6/2022
SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 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

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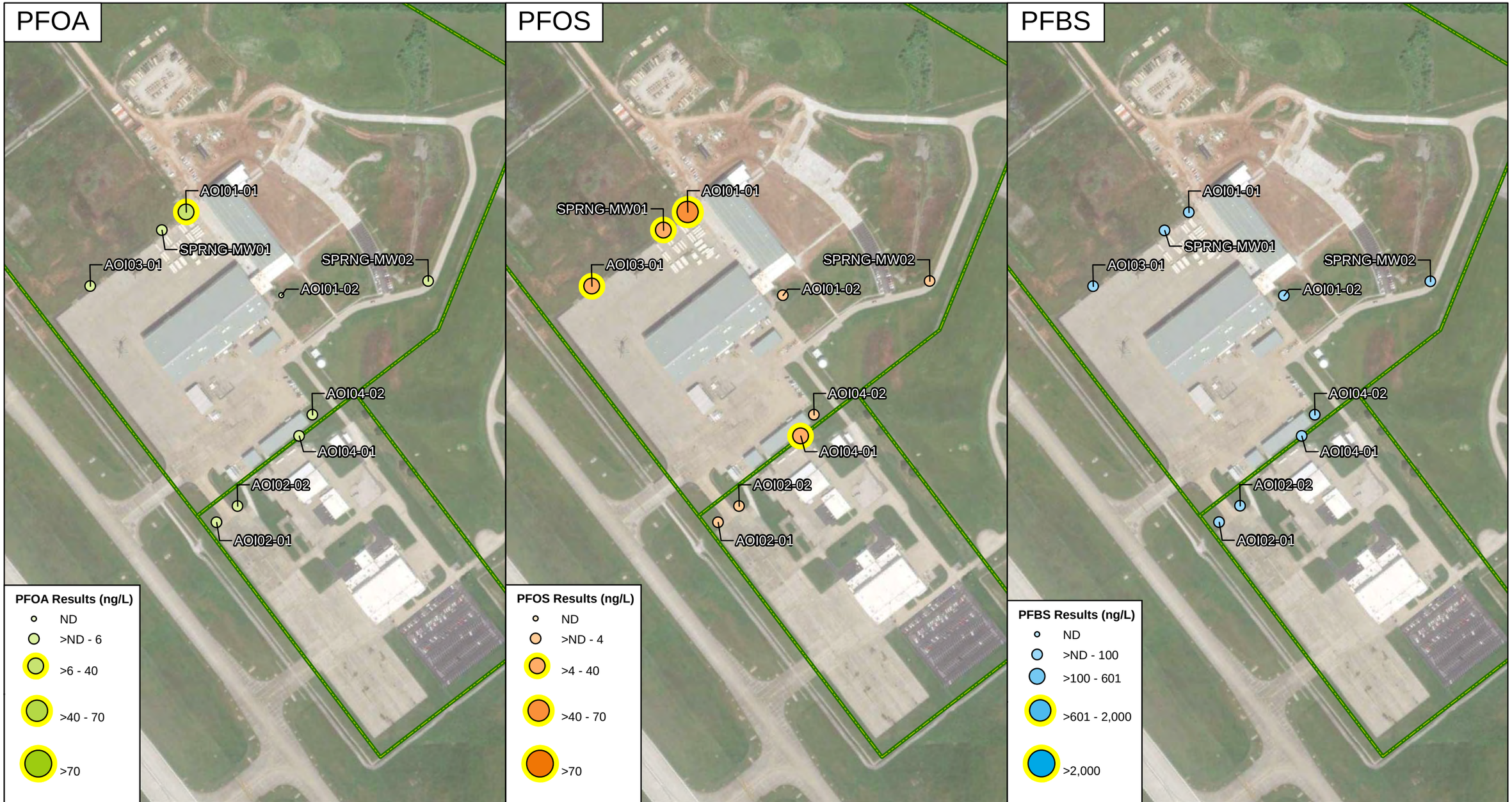
Germantown, MD 20876

Figure 6-5



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	10/6/2022	GIS BY	MS	10/6/2022
SCALE	1:4,800	CHK BY	AP	10/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/6/2022

Legend

Facility Boundary

0 200 400 800 Feet

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

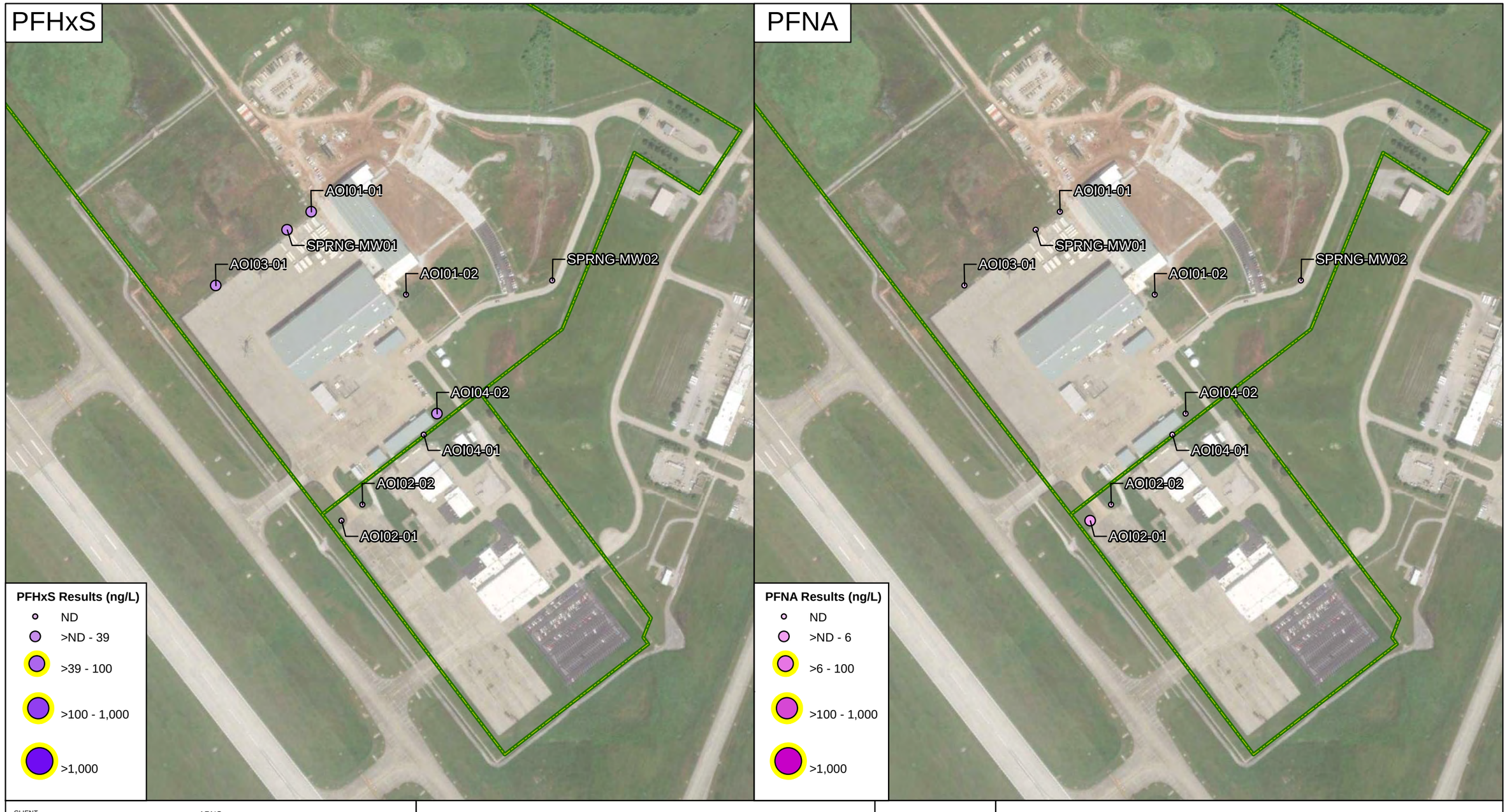
N

PFOA, PFOS, and PFBS Detections in Groundwater

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-6



CLIENT	ARNG			
PROJECT	Site Inspection at Springfield AVCRAD, MO			
REVISED	9/6/2022	GIS BY	MS	9/6/2022
SCALE	1:4,800	CHK BY	AP	9/6/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/6/2022

Legend

Facility Boundary

0 200 400 800 Feet

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

N

PFHxS and PFNA Detections in Groundwater

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Germantown, MD 20876

Figure 6-7

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7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-5**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

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

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

7.1 Soil Exposure Pathway

The SI results in soil were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1, AOI 2, AOI 3, AOI 4, and AOI 5 based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 is Hangar 27, where a fire suppression system test was conducted by a contractor during which the AFFF was captured by a vacuum truck to prevent release to the environment.

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

inhalation of dust. Therefore, the surface soil exposure pathway for site workers and construction workers is potentially complete. PFOS and PFHxS were detected in shallow subsurface soil at AOI 1. At the time of the SI, construction activities were occurring on and adjacent to the facility. Construction workers could contact constituents in shallow subsurface soil via incidental ingestion, and therefore, the subsurface soil exposure pathway for current and future construction workers is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 is FTA 1. In 2007, a one-time fire training event occurred on the concrete, where one 60-gallon Tri-Max™ fire extinguisher was fully dispensed on the ramp area. The 3% AFFF was then allowed to run off the concrete and into the adjacent grass. Furthermore, based on details also provided from on-facility base personnel for other, previously unknown historical fire training activities, additional surface soil sampling was added to at the northwestern end of the ramp (nearby AOI02-01 and AOI02-04).

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in surface soil at AOI 2. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. At the time of the SI, construction activities were occurring on and adjacent to the facility. Therefore, the surface soil exposure pathway for site workers and current and future construction workers is potentially complete. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil at AOI 2; therefore, all exposure pathways are considered incomplete. The CSM for AOI 2 is presented on **Figure 7-2**.

7.1.3 AOI 3

AOI 3 is FTA 2. In 2014, a one-time fire training event occurred with one 60-gallon Tri-Max™ fire extinguisher, and approximately 20 gallons of 3% AFFF were released. The AFFF was then allowed to dissipate in the grass.

PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in surface soil at AOI 3; therefore, all exposure pathways are considered incomplete. PFOS was detected in shallow subsurface soil at AOI 3. Construction workers could contact constituents in subsurface soil via incidental ingestion. At the time of the SI, construction activities were occurring on and adjacent to the facility. Therefore, the subsurface soil exposure pathway for current and future construction workers is potentially complete. The CSM for AOI 3 is presented on **Figure 7-3**.

7.1.4 AOI 4

AOI 4 is the GSE Building. In preparation for freezing temperatures in winter, AFFF solution in Tri-Max™ fire extinguishers was exchanged for a 3% AFFF Chemguard Low Temperature solution. The removed AFFF solution was containerized in 55-gallon drums and stored in the GSE building. During the warm months, the 3% AFFF Chemguard Low Temperature solution was removed, and the Tri-Max™ fire extinguishers were replaced with the original AFFF solution.

PFOS, PFNA, and PFBS were detected in surface soil at AOI 4. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and construction workers is potentially complete. PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in shallow subsurface soil at AOI 4. Construction workers could contact constituents in subsurface soil via incidental ingestion. At the time of the SI, construction activities were occurring on and adjacent to the facility. Therefore, the subsurface soil exposure pathway for current and future construction workers is potentially complete. The CSM for AOI 4 is presented on **Figure 7-4**.

7.1.5 AOI 5

AOI 5 was an historical FTA that was identified by on-facility base personnel during SI field activities. Based on information provided by facility staff involved with previously unknown historical fire training activities, AOI 5 was added to the SI field investigation.

PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at AOI 5. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. At the time of the SI, construction activities were occurring on and adjacent to the facility. Therefore, the surface soil exposure pathway for site workers and current and future construction workers is potentially complete. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in shallow subsurface soil; therefore, all exposure pathways are considered incomplete. The CSM for AOI 5 is presented on **Figure 7-5**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

PFOA and PFOS were detected above their SLs in groundwater samples collected at AOI 1.

Several domestic wells are located immediately surrounding the facility. Several of these domestic wells are constructed within the uppermost water bearing unit, the Springfield Plateau Aquifer, which has not been a primary source of drinking water for Springfield since the 1950s. There is one public well that is presumed cross-gradient to the AVCRAD. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells screened in the deeper Ozark Aquifer.

The City of Springfield sources potable water from surface water sources, which are understood to be hydraulically connected to the shallow Springfield Plateau Aquifer due to the presence of abundant karst features. Therefore, the pathway for exposure to site workers and off-facility residents via ingestion of groundwater is considered potentially complete. Depths to water measured at AOI 1 in March 2022 during the SI ranged from 12.71 to 24.40 feet bgs in the overlying unconsolidated soils and 23.38 to 67.91 feet bgs in the underlying limestone. Therefore, the ingestion exposure pathway for future construction workers is considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in groundwater samples collected at AOI 2, at concentrations below their SLs. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells. As discussed in **Section 7.2.1**, surface water and groundwater at the facility are understood to be hydraulically connected. Therefore, the pathway for exposure to site workers and off-facility residents via ingestion of groundwater is considered potentially complete. Depths to water measured in March 2022 during the SI ranged from 13.64 to 28.94 feet bgs. Therefore, the 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

PFOS was detected above its SL in groundwater samples collected at AOI 3. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells. As discussed in **Section 7.2.1**, surface water and groundwater at the facility are understood to be hydraulically connected. Therefore, the pathway for exposure to site workers and off-facility residents via ingestion of groundwater is considered potentially complete. Depth to water measured in March 2022 during the SI was 16.32 feet bgs. Therefore, the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 3 is presented on **Figure 7-3**.

7.2.4 AOI 4

PFOS was detected above the SL in groundwater samples collected at AOI 4. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells. As discussed in **Section 7.2.1**, surface water and groundwater at the facility are understood to be hydraulically connected. Therefore, the pathway for exposure to site workers and off-facility residents via ingestion of groundwater is considered potentially complete.

Depths to water measured in March 2022 during the SI ranged from 4.89 to 15.54 feet bgs. Therefore, the ingestion exposure pathway for future construction workers is considered potentially complete. The CSM for AOI 4 is presented on **Figure 7-4**.

7.2.5 AOI 5

Groundwater wells AOI05-01 and AOI05-03B were dry during sampling and both wells are screened from 20 to 30 feet bgs. However, these wells are not believed to be representative of the local groundwater conditions at the site, particularly due to karst features underlying the facility, which can cause localized variations in hydrologic conditions. Drinking water for the AVCRAD is supplied by the City of Springfield, which sources most of the water from the surface water in surrounding lakes and rivers, and the rest from groundwater wells. As discussed in **Section 7.2.1**, surface water and groundwater at the facility are understood to be hydraulically connected. Therefore, the pathway for exposure to site workers, future construction workers, and off-facility residents via ingestion of groundwater is considered potentially complete. The CSM for AOI 5 is presented on **Figure 7-5.**

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. At AOIs where surface water and sediment samples were not collected, data from downgradient AOIs or 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. Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Because PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 1, it is possible that those compounds may have migrated from soil and groundwater to the retention pond northeast of Hangar 27 via surficial

run-off or groundwater discharge. Therefore, the surface water and sediment ingestion exposure pathway for future construction workers or trespassers is considered potentially complete. Facility workers are unlikely to access the retention pond, so the exposure pathway is considered incomplete. Due to potential recreational use of the Rainer Branch River to the west of the facility, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.3.2 AOI 2

Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Because PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 2, it is possible that those compounds may have migrated from soil and groundwater to the retention pond northeast of Hangar 27 via surficial run-off or groundwater discharge. Therefore, the surface water and sediment ingestion exposure pathway for future construction workers or trespassers is considered potentially complete. Facility workers are unlikely to access the retention pond, so the exposure pathway is incomplete. Due to potential recreational use of the Rainer Branch River to the west of the facility, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete. The CSM for AOI 2 is presented on **Figure 7-2**.

7.3.3 AOI 3

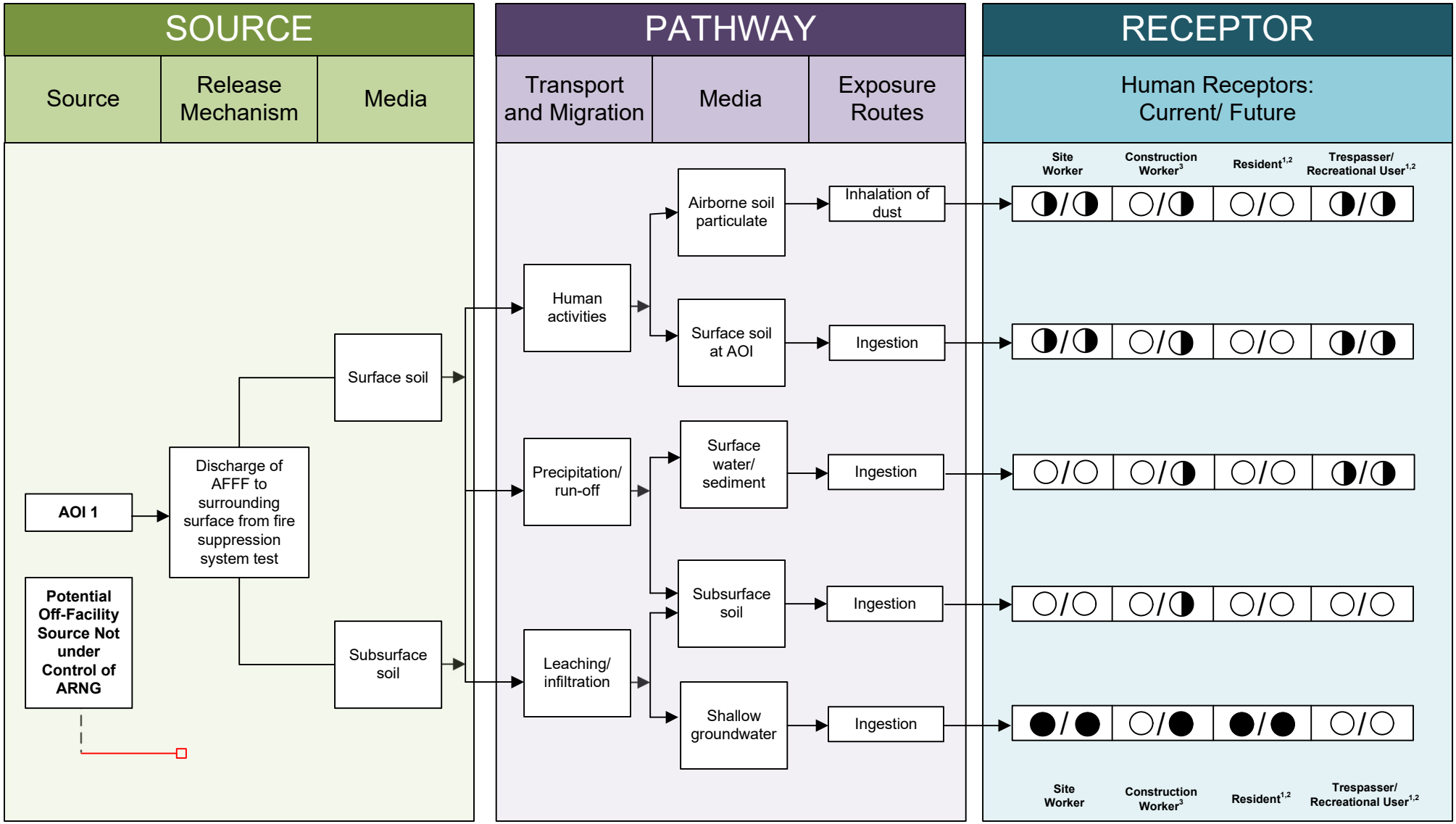
Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Because PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil and groundwater at AOI 3, it is possible that those compounds may have migrated from soil and groundwater to the retention pond northeast of Hangar 27 via surficial run-off or groundwater discharge. Therefore, the surface water and sediment ingestion exposure pathway for future construction workers or trespassers is considered potentially complete. Facility workers are unlikely to access the retention pond, so the exposure pathway is incomplete. Due to potential recreational use of the Rainer Branch River to the west of the facility, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete. The CSM for AOI 3 is presented on **Figure 7-3**.

7.3.4 AOI 4

Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Because PFOS, PFNA, and PFBS were detected in soil and groundwater at AOI 4, it is possible that those compounds may have migrated from soil and groundwater to the retention pond northeast of Hangar 27 via surficial run-off or groundwater discharge. Therefore, the surface water and sediment ingestion exposure pathway for future construction workers or trespassers is considered potentially complete. Facility workers are unlikely to access the retention pond, so the exposure pathway is incomplete. Due to potential recreational use of the Rainer Branch River to the west of the facility, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete. The CSM for AOI 4 is presented on **Figure 7-4**.

7.3.5 AOI 5

Groundwater and surface water within Greene County are hydraulically connected due to the downward infiltration of surface water into sinkholes and dissolution fractures and the upward movement of shallow groundwater from springs. Because PFOA, PFOS, PFHxS, and PFNA were detected in soil at AOI 5, it is possible that those compounds may have migrated from soil to the retention pond northeast of Hangar 27 via surficial run-off. Therefore, the surface water and sediment ingestion exposure pathway for future construction workers or trespassers is considered potentially complete. Facility workers are unlikely to access the retention pond, so the exposure pathway is incomplete. Due to potential recreational use of the Rainer Branch River to the west of the facility, the surface water and sediment ingestion exposure pathway for off-facility residents and recreational users is also considered potentially complete. The CSM for AOI 5 is presented on **Figure 7-5**.



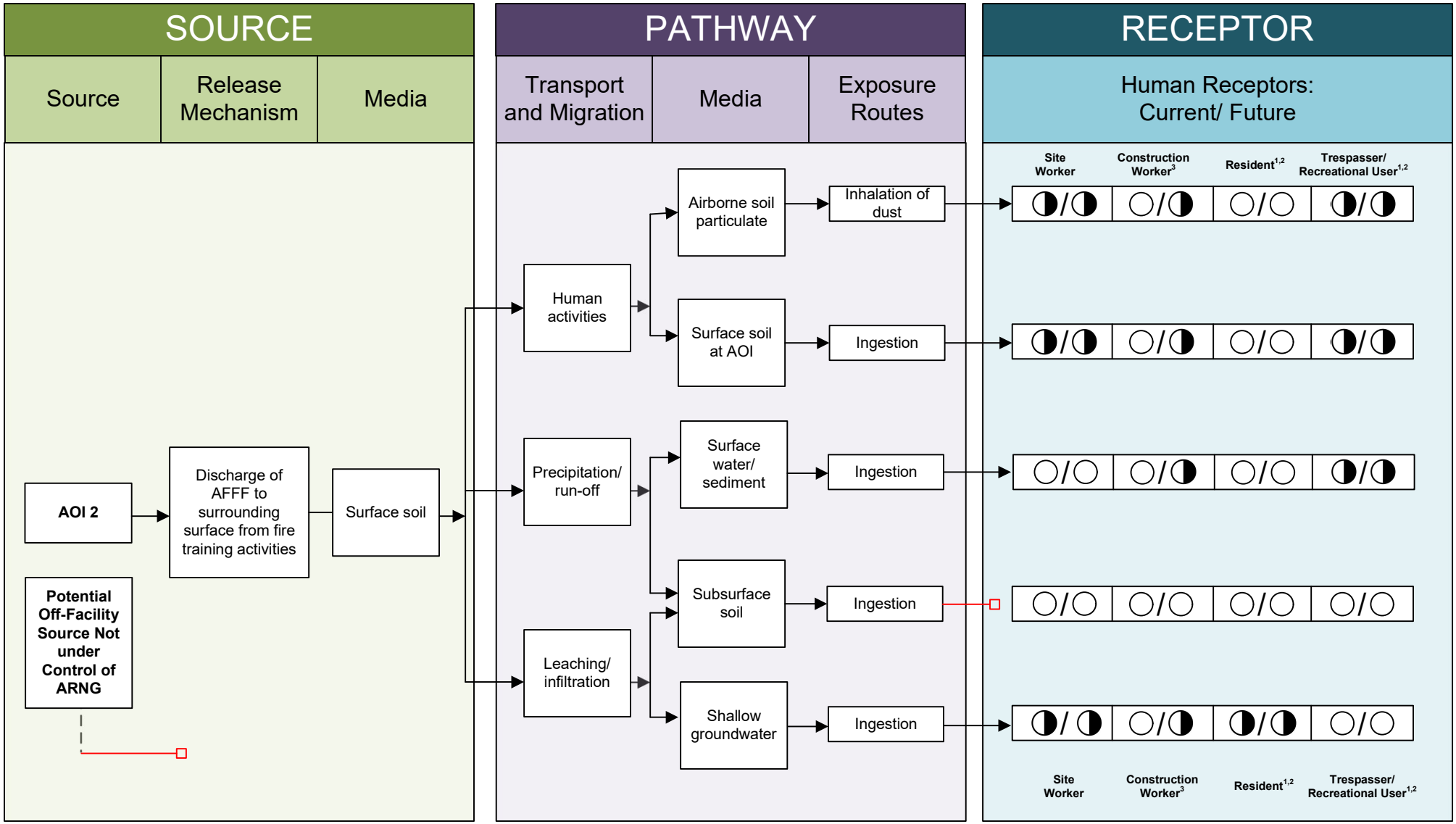
LEGEND

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

Notes:

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

Figure 7-1
Conceptual Site Model, AOI 1
Springfield Aviation Classification Repair Activity Depot, MO



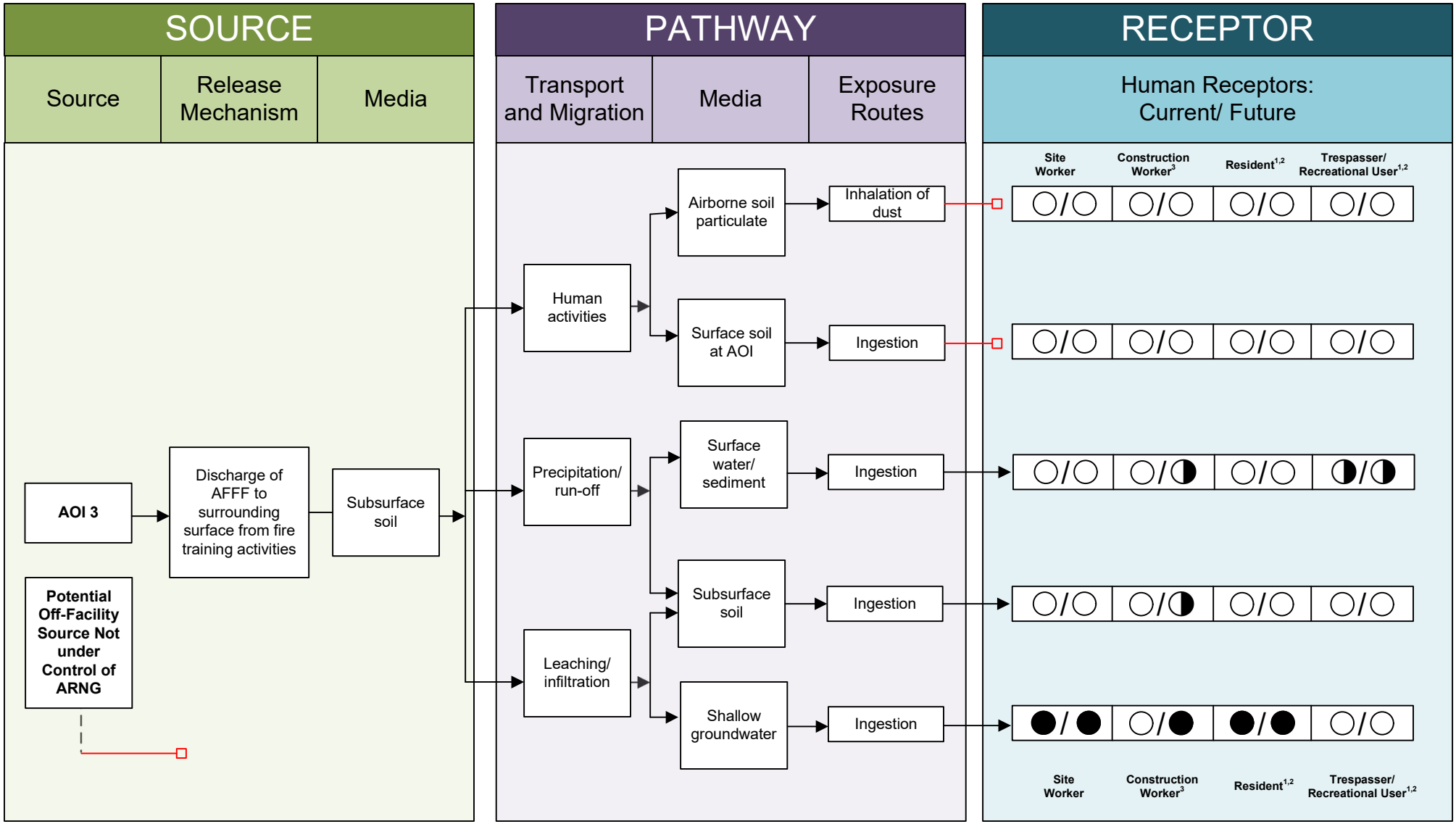
LEGEND

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

Notes:

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

Figure 7-2
Conceptual Site Model, AOI 2
Springfield Aviation Classification Repair Activity Depot, MO



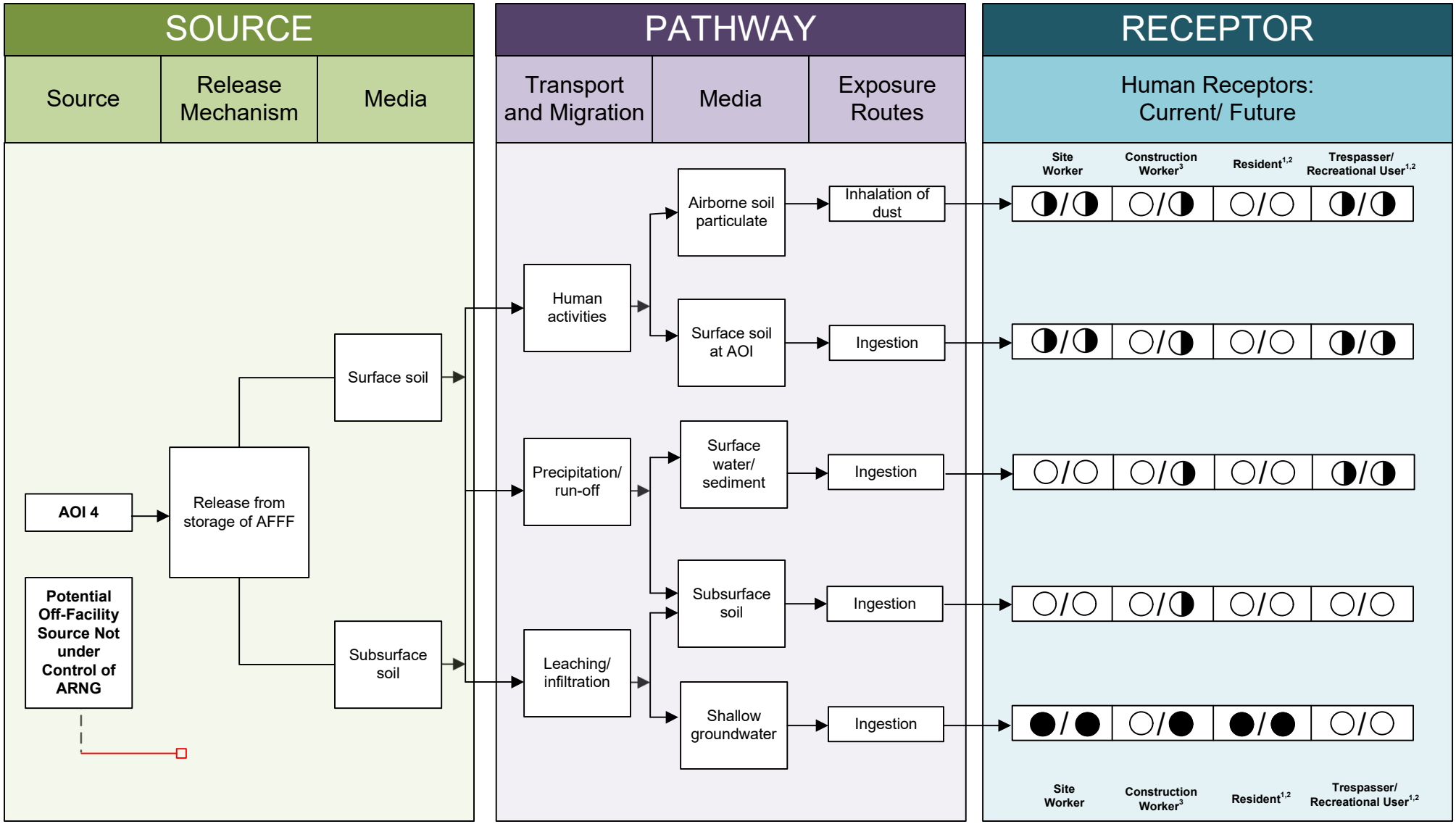
LEGEND

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

Notes:

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

Figure 7-3
Conceptual Site Model, AOI 3
Springfield Aviation Classification Repair Activity Depot, MO



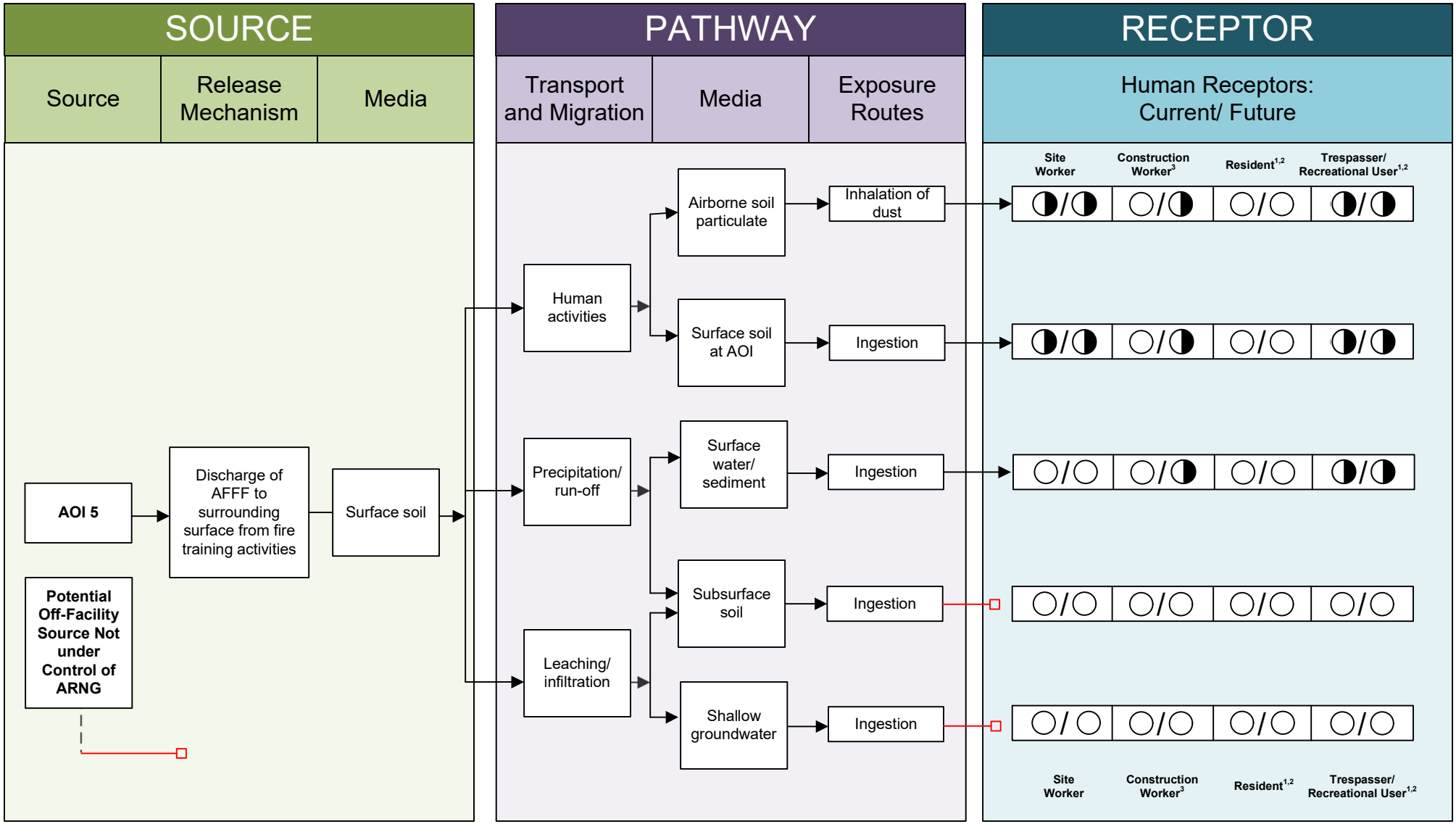
LEGEND

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

Notes:

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

Figure 7-4
Conceptual Site Model, AOI 4
Springfield Aviation Classification Repair Activity Depot, MO



LEGEND

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

Notes:

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

Figure 7-5
Conceptual Site Model, AOI 5
Springfield Aviation Classification Repair Activity Depot, MO

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted from 14 March to 1 April 2022 and consisted of utility clearance, rotary sonic boring, soil sample collection, temporary monitoring well installation and grab groundwater sample collection, permanent well installation and groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2022a), except as noted in **Section 5.9**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2022a), 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-eight (38) soil samples from 18 boring locations;
- Seven grab groundwater samples from nine temporary well locations;
- Two groundwater samples from two permanent well locations;
- Twenty-three (23) 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: Hangar 27, AOI 3: FTA 2, and AOI 4: GSE Building; no further evaluation is warranted for AOI 2 and AOI 5 at this time. However, as groundwater could not be sampled from AOI 5 due to insufficient recharge, a data gap exists for this AOI which may be addressed during the RI. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1, AOI 3, and AOI 4 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, PFHxS, PFNA and PFBS in soil at AOI 1 were below their SLs.
    - PFOA and PFOS in groundwater exceeded their SLs. PFOA was detected above its SL of 6 ng/L at AOI01-01, with a concentration of 10.2 ng/L. PFOS was detected above the SL of 4 ng/L at AOI01-01 and SPRNG-MW01, with concentrations of

45.6 ng/L and 7.31 ng/L, respectively. Based on the results of the SI, further evaluation of AOI 1 is warranted in an RI.

- At AOI 2:
    - The detected concentrations of PFOA, PFOS, PFHxS, PFNA and PFBS in soil at AOI 2 were below their SLs.
    - Detected concentrations in groundwater were below SLs. Based on the results of the SI, no further evaluation of AOI 2 is warranted.
- At AOI 3:
    - The detected concentrations of PFOS and PFHxS in soil at AOI 3 were below their SLs.
    - PFOS in groundwater exceeded its SL. PFOS was detected above the SL of 4 ng/L at AOI03-01, with a concentration of 8.04 ng/L. 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, PFNA, and PFBS in soil at AOI 4 were below their SLs.
    - PFOS in groundwater exceeded the respective SL. PFOS was detected above its SL of 4 ng/L at AOI04-01, with a concentration of 5.86 ng/L. Based on the results of the SI, further evaluation of AOI 4 is warranted in an RI.
- At AOI 5:
    - The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at AOI 5 were below their respective SLs. Based on the results of the SI, no further evaluation of AOI 5 is warranted.
    - Groundwater was not sampled at AOI 5 due to lack of available groundwater, representing a data gap for this AOI.

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	Future Action
1	Hangar 27	◐	●	Proceed to RI
2	FTA 1	◐	◐	No further action
3	FTA 2	◐	●	Proceed to RI
4	GSE Building	◐	●	Proceed to RI
5	FTA 3	◐	N/A	No further action

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

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