FINAL
Site Inspection Report
Salina Army Aviation Support Facility #2
Salina, Kansas

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)
ARNG Installations, Nationwide

September 2023

Prepared for:

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

UNCLASSIFIED

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LIST OF ACRONYMS AND ABBREVIATIONS

°C	Degrees Celsius
%	Percent
µg/kg	Microgram(s) per kilogram
µg/L	Microgram(s) per liter
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	Aqueous Film Forming Foam
amsl	Above mean sea level
ANG	Air National Guard
AOI	Area of Interest
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	Below ground surface
bmsl	Below mean sea level
btoc	Below top of casing
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Chain of Custody
CSM	Conceptual site model
DA	Department of the Army
DoD	Department of Defense
DPT	Direct-push technology
DQI	Data quality indicator
DQO	Data quality objective
DUA	Data usability assessment
EA	EA Engineering, Science, and Technology, Inc., PBC
EB	Equipment Blank
EIS	Extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FB	Field blank
FedEx	Federal Express
ft	Foot (feet)
HDPE	High-density polyethylene
HFPO-DA	Hexafluoropropylene oxide dimer acid
HQ	Hazard Quotient
ICAL	initial calibration
IDW	Investigation-derived waste

ITRC	Interstate Technology Regulatory Council
KDHE	Kansas Department of Health and Environment
LC/MS/MS	Liquid chromatography tandem mass spectrometry
LCS	Laboratory control sample
LCSD	Laboratory control sample duplicate
LOQ	Limit of quantification
MIL-SPEC	military specification
MS	Matrix spike
MSD	Matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
ng/L	Nanogram(s) per liter
No.	Number
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
PVC	polyvinyl chloride
QA	Quality assurance
QAPP	Quality Assurance Project Plan
QC	Quality control
QSM	Quality Systems Manual
RI	Remedial investigation
RPD	Relative percent difference
SI	Site Inspection
SL	Screening level
TCRA	Time Critical Removal Action
TOC	Total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy

USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
Wood	Wood Environment & Infrastructure Solutions, Inc.
WSP	WSP USA Environment & Infrastructure Inc.

EXECUTIVE SUMMARY

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

The PA identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for the AOI location). The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for the relevant compounds. This SI was completed at the Salina Army Aviation Support Facility (AASF) #2 in Salina, Kansas and determined further investigation is warranted for AOI 1: Fire Extinguisher Storage. Salina AASF #2 will also be referred to as the "Facility" throughout this document.

The Facility, operated by the Kansas ARNG (KSARNG), encompasses approximately 11.7 acres in Salina, Kansas. The Facility is located on leased land owned by the Salina Airport Authority. The KSARNG utilizes this Facility as a training location. The Facility is located in the city of Salina, Kansas, southwest of the metropolitan area. Properties surrounding Salina AASF #2 are primarily zoned for commercial and industrial use (City of Salina Global Information Systems (GIS)). Salina AASF #2 is located on a portion of land the KSARNG leased from Salina Regional Airport for a term of 100 years. It has been used as an active military facility since before the current lease signing in 1988. Currently and historically, the Facility has been used for aircraft maintenance as well as administrative duties. The Facility includes an aircraft hangar to house machinery, administrative offices, and repair of KSARNG rotary-winged aircraft. Directly outside of the Facility boundary are airport runways and taxiways. Access to the Facility is via a guarded gate. Future land use is not anticipated to change (AECOM, 2020).

The PA identified one AOI for investigation during the SI phase. SI sampling results from the AOI were compared to OSD SLs. **Table ES-2** summarizes the SI results for the AOI. Based on

[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.

the results of this SI, further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1.

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

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

Notes:
1. Assistant Secretary of Defense. July 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. May 2022.
2. 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.

Abbreviations:
μg/kg = microgram(s) per kilogram
bgs = below ground surface
ng/L = nanogram(s) per liter

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Fire Extinguisher Storage	◐	●	●	Proceed to RI

Legend:
● = detected; exceedance of screening levels
◐ = detected; no exceedance of 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) at ARNG facilities nationwide based on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum regarding Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense (DoD) Cleanup Program (Assistant Secretary of Defense, 2022) from the Office of the Secretary of Defense (OSD) dated 6 July 2022. The six compounds listed in the OSD memorandum will be referred to as “relevant compounds” throughout this document and include perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanesulfonic acid (PFBS), perfluorononanoic acid (PFNA), perfluorohexanesulfonic acid (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA)[1]. The ARNG performed this SI at the Salina Army Aviation Support Facility (AASF) #2 in Salina, Kansas. The Salina AASF #2 is also referred to as the “Facility” throughout this report.

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

1.2 SITE INSPECTION PURPOSE

A PA was performed at the Salina AASF #2 (AECOM Technical Services, Inc. [AECOM], 2020) that identified one Area of Interest (AOI) where PFAS-containing materials may have been used, stored, disposed, or released historically. The objective of the SI is to identify whether there has been a release to the environment from the AOI identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required 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 Facility is in Saline County and occupies 11.7 acres in Salina, Kansas. The Facility is located on leased land owned by the Salina Airport Authority. The KSARNG utilizes this Facility as a training location. The Facility is located in the city of Salina, Kansas, southwest of the metropolitan area (**Figure 2-1).** Properties surrounding Salina AASF #2 are primarily zoned for commercial and industrial use (City of Salina Geographic Information Systems (GIS)). Salina AASF #2 is located on a portion of land the KSARNG leased from Salina Regional Airport for a term of 100 years (AECOM, 2020).

2.2 FACILITY ENVIRONMENTAL SETTING

The Facility is located in northern Saline County, Kansas, southwest of Salina, Kansas and is approximately 1,288 feet (ft) above mean sea level (amsl). Salina AASF #2 is located in the Smoky Hill River Valley **(Figure 2-2)**. The Smoky Hill River flows from higher elevation in the west, from mountains in Colorado, down through Kansas in a general east-southeast trend. Regionally in Kansas, the Smoky Hill River cuts into the surrounding Permian bedrock, resulting in deep valleys partially filled with Quaternary alluvium. Salina AASF #2 overlies this alluvium, which covers a large portion of central and northeast Saline County (National Oceanic and Atmospheric Administration [NOAA], 2019) (AECOM, 2020). The Smoky Hill River generally flows East, into the Kansas River and then joins the Missouri River. Buildings, asphalt, and concrete cover much of the Facility, but green space exists in sparce areas in between lots and structures.

2.2.1 Geology

The 40 to 120 ft thick Quaternary alluvium consists of sand and gravel with lenses of clay and silt. Cretaceous deposits underlying the Quaternary alluvium are up to 400 ft thick and are in places undifferentiated. Where differentiation is apparent, the upper 300 ft are known as the Dakota Formation, which comprises mudstones and channel sandstones; elongate lens-like deposits of sandstone that indicate presence of paleo-river beds (Hattin & Siemers, 1987).

Underlying the Dakota Formation is 30 to 100 ft of the Kiowa Formation, consisting of sandstones, siltstones, and shale. The thickness of the formation directly underlying the site is unknown (KGS, 1988). Cretaceous deposits, namely the Dakota Formation, can be seen outcropping to the west of Salina AASF #2. The Permian Wellington Formation unconformably underlies the Cretaceous deposits. The almost 500-ft thick formation is primarily composed of gray to greenish-gray shale, comprising illite and chlorite clay minerals, and traces of reddish hematite (AECOM, 2020).

During the SI, sandy clays with low to high plasticity were observed as the dominant lithology of the unconsolidated sediments below the Salina AASF #2. The borings were completed at depths between 25 and 37 feet below ground surface (bgs). Samples for grain size analyses were collected at one location, AOI01-01 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 (69.4%) and clay (30%). 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 unconsolidated Smoky Hill River Valley alluvium and the Wellington Formation are the two primary aquifers utilized in the area near Salina AASF #2. No information was readily available for the Dakota Formation, which, while an important aquifer in other parts of Kansas, is not utilized as an aquifer in the areas surrounding Salina AASF #2 (AECOM, 2020). The Smoky Hill aquifer is generally composed of sand and gravel deposits interlayered with silt and clay. The aquifer encompasses areas recharged on Facility by meteoric water and is generally unconfined due to its unconsolidated nature and the limited lateral extent of clay layers within the alluvium. Therefore, surface water and groundwater flow are hydrologically connected in areas within and downgradient from the Facility. According to previous reports, more than a dozen downgradient domestic wells are screened within this aquifer. The total thickness of this aquifer below the Facility is unknown.

The Wellington aquifer is utilized as an aquifer for a few domestic and agricultural wells in the Salina AASF #2 area. Discontinuous beds of evaporites (halite, gypsum, and anhydrite), limestones, channel sandstones, and mudstones (shales and clays) exist within the formation, giving various hydraulic conductivities, confining units, and water chemistry; dissolution of evaporites and limestone can lead to the presence of cavities within the aquifer and the increase of calcium, sodium, chlorine, and sulfate within the groundwater. Potable water quality is therefore highly variable within the Wellington aquifer.

Groundwater depth within the Smoky Hill aquifer, measured from five existing wells on the Facility in 2011, was approximately 24 ft bgs. Based on data for the existing wells, groundwater flow is generally northeast, following surface topography. The Smoky Hill aquifer is recharged mainly by precipitation and occasionally by floodwaters of the Smoky Hill River that overflows its banks and inundates the fluvial plain. The Wellington aquifer is recharged by the Smoky Hill aquifer by infiltration of groundwater and discharges approximately 20 miles northeast of the Facility.

No potable water wells are located within the boundary of Salina AASF #2; however, numerous domestic well types exist within a 4-mile radius of the Facility (**Figure 2-3**). These wells are located in all directions around the Facility. There are U.S. Geological Survey wells in addition to geothermal wells that exist in the area surrounding Salina AASF #2, and several domestic water wells to the east and north of the Facility. Drinking water for Salina AASF #2 is supplied by the City of Salina, which obtains water from 17 groundwater wells within the City of Salina, and from the surface water of the Smoky Hill River as their water source (City of Salina, 2019). Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in the City of Salina public water system above the USEPA Lifetime Health Advisory level that was in effect at the time within 20 miles of the Facility (AECOM, 2020).

Depths to static water measured in July 2021 during the first sampling event of the SI ranged from 6.7 to 18.07 feet bgs. Depths to static water measured in January 2022 during the second sampling event of the SI ranged from 10.69 to 11.06 ft bgs. During drilling, soil moisture that would potentially produce water was observed from depths ranging from 19.5 to 32 feet bgs. While groundwater was encountered at a much lower depth then observed after stabilization, the clay layer overlaying the seam that produced water caused groundwater to be under pressure. This clay layer created pressure that allowed the water to be observed lower while drilling, but also to rise over time with the hole being open. **Figure 2-5** suggests a different groundwater flow direction compared to the regional groundwater flow. The regional groundwater flow based on Schilling Air Force groundwater model is to the north/northeast (Dragun, 2018). Groundwater elevation contours from the SI are presented on **Figure 2-5** and indicate the groundwater flow direction at the Salina AASF #2 was towards the northeast in the southern portion of the Facility then shifts towards the north/northwest in the central to northern portion of the Facility. There is a degree of uncertainty to the local groundwater flow calculations due to the fact that groundwater elevations were collected from temporary monitoring wells rather than permanent developed wells.

2.2.3 Hydrology

Salina AASF #2 is located within the Lower Saline River watershed, in which surface flow is generally north-northeast (**Figure 2-4)**. Tributaries of the Saline River, such as Dry Creek, run into the Solomon River approximately 16 miles northeast. Intermittent stream channels are present near the Facility, indicated by dry but well-formed channels. According to the site Spill Prevention, Control, and Countermeasure Plan, surface flow from the Facility eventually drains into these unnamed, intermittent tributaries of the Saline River (AECOM, 2020).

2.2.4 Climate

Climate data for Salina AASF #2 was available at a weather station located at the Saline Municipal Airport, less than 2,000 yards to the northwest of the Facility. Kansas has a temperate continental climate. Precipitation in the form of rainfall was recorded at an annual average of 30.6 inches per year. Summer temperatures reach an average of 79.8 degrees Fahrenheit (°F) and an average maximum of 91.7°F, with July being the hottest month. Winter months reach an average temperature of 34.7°F. Winter minimum temperatures reach an average low of 23.3°F, with January being the coldest (NOAA, 2019) (AECOM, 2020).

2.2.5 Current and Future Land Use

The Salina AASF #2 currently resides on a portion of land leased from the Salina Regional Airport under the terms of a 100-year lease. It has been an active military facility since before the signing of the lease in 1988. The Facility is currently used for aircraft maintenance and administrative activities. Future land use is not anticipated to change (AECOM, 2020).

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 species are listed as federally endangered, threatened, proposed, and/or candidate species in Salina, Kansas (USFWS, 2021):

- Birds: Whooping Crane, *Grus americana* (Endangered);
- Insects: Monarch Butterfly, *Danaus plexippus* (Candidate);
- Mammals: Northern Long-eared Bat, *Myotis septentrionalis* (Threatened).

2.3 HISTORY OF PFAS USE

One AOI was identified in the PA where AFFF may have been used, stored, disposed, or released historically at the Salina AASF #2 (AECOM, 2020). AFFF may have been historically released even though there was no known release that occurred from the storage of mobile fire extinguishers. A description of the AOI is presented in **Section 3**.

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Site Inspection Report
Salina, Kansas

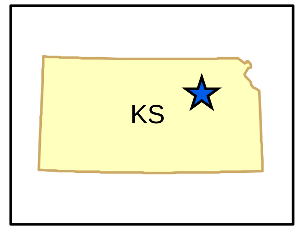
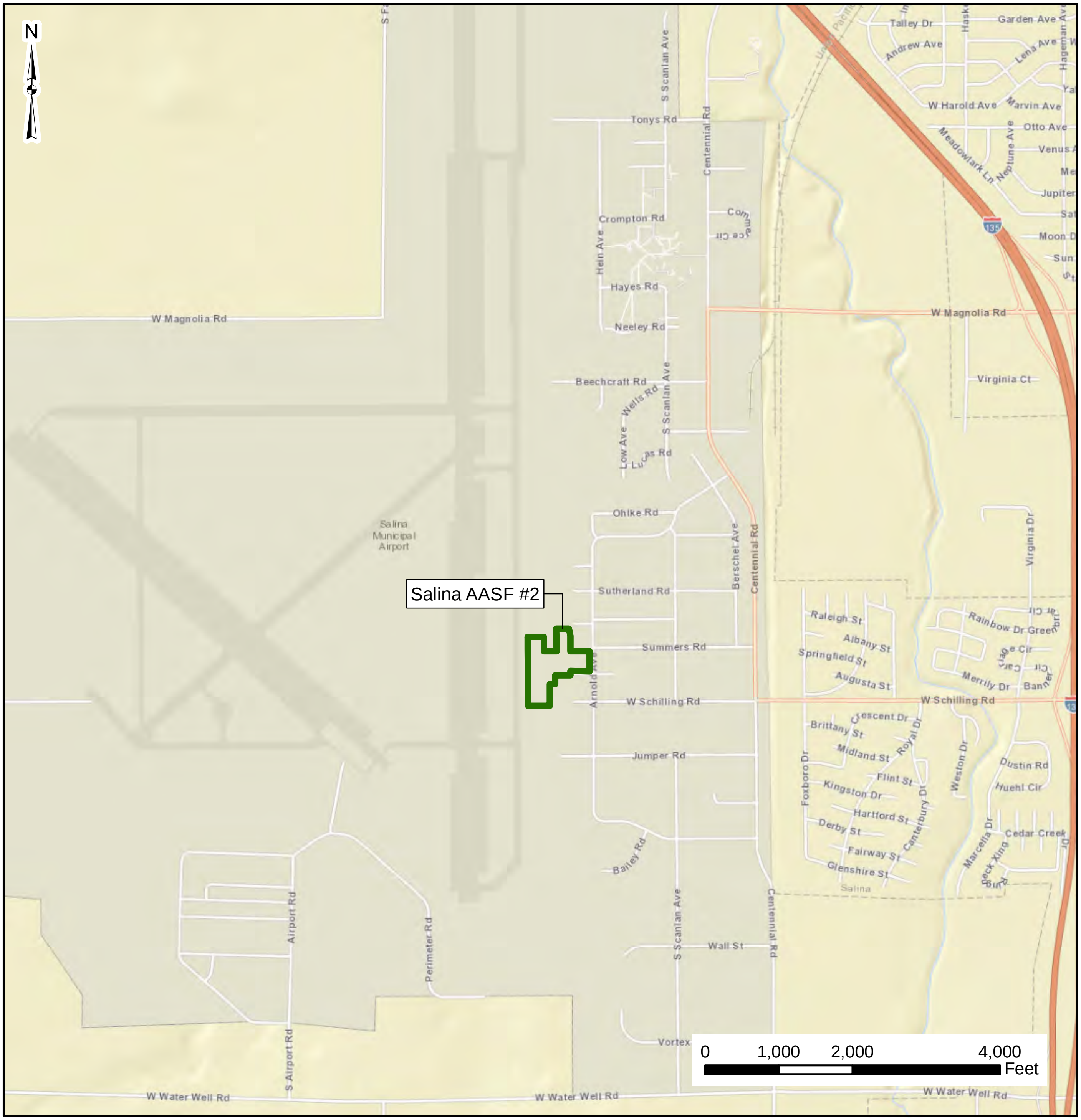


Figure 2-1
Facility Location



Facility Data

Facility Boundary

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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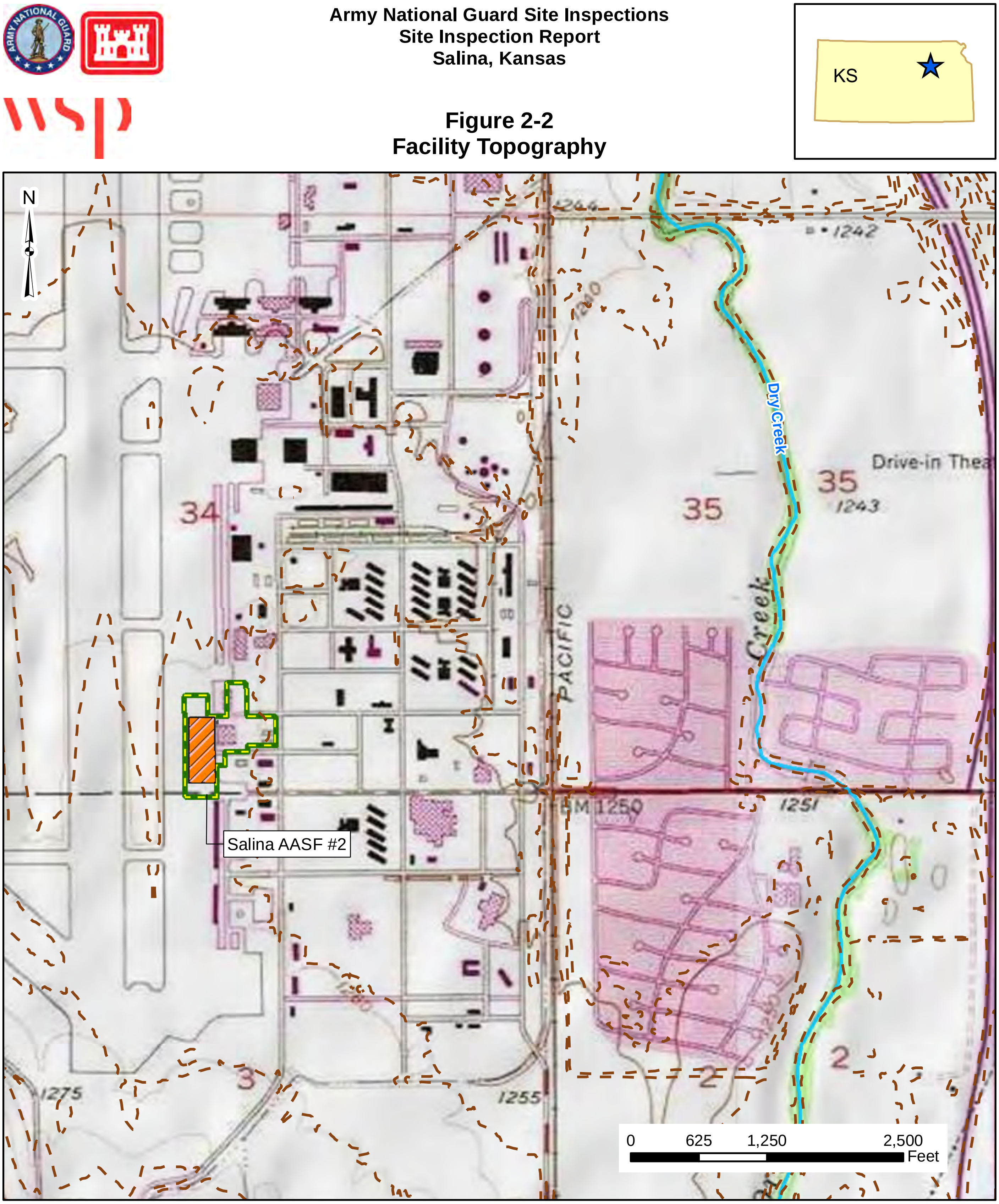
Salina, Kansas

Figure 2-2
Facility Topography



Facility Data

- Facility Boundary
- Potential PFAS Release Site
- Area of Interest (AOI)

Hydrology

- River/Stream

Topography

- Elevation Contour

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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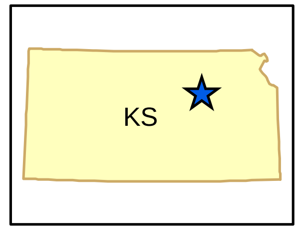
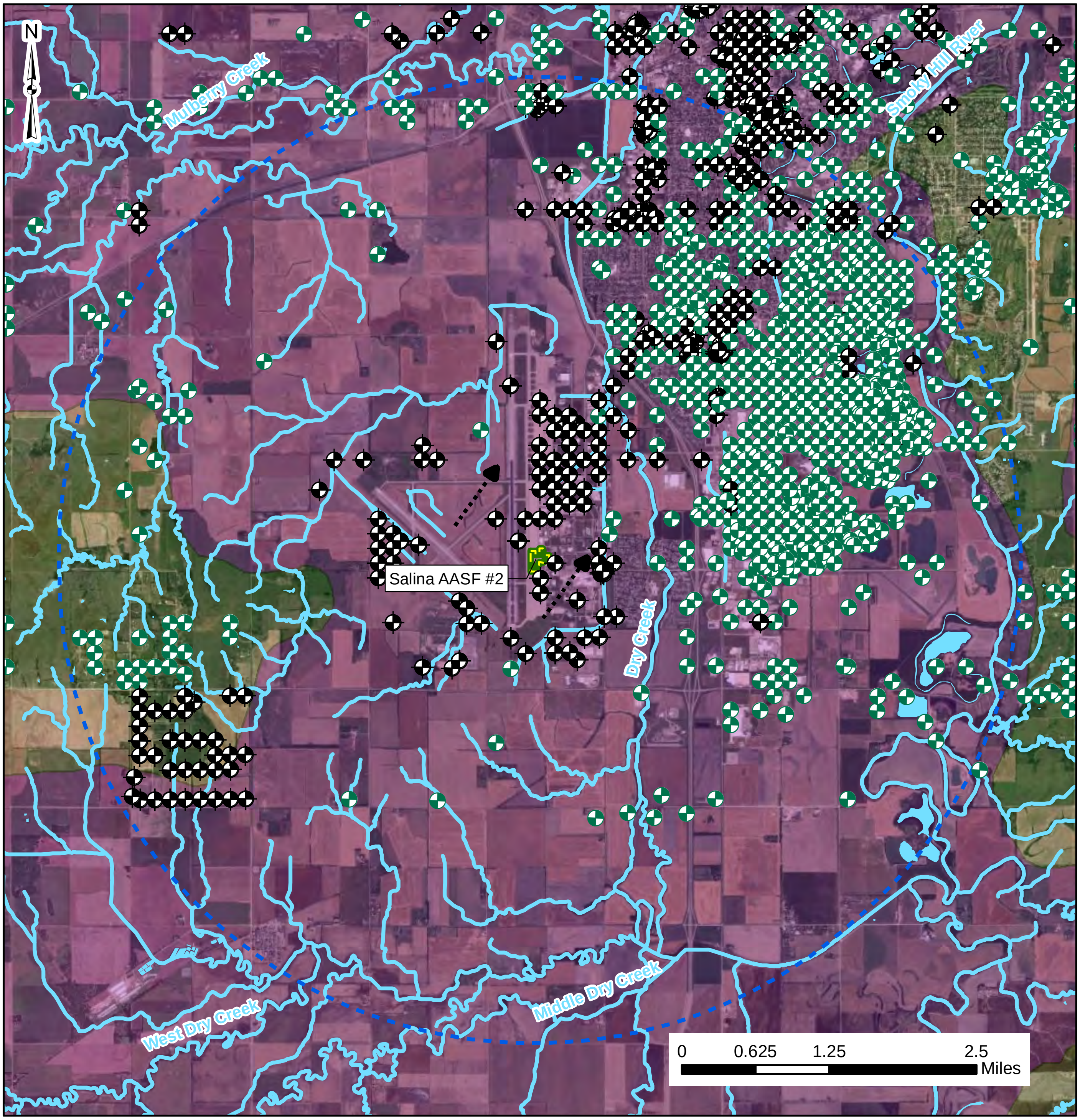


Figure 2-3
Groundwater Features



Facility Data

- Facility Boundary
- Facility Boundary 4 mile Buffer

Hydrology

- Regional Groundwater Flow
- Alluvial Aquifer
- Domestic well
- Monitoring well

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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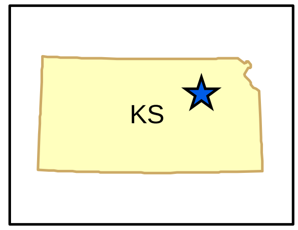

Figure 2-4
Surface Water Features

Facility Data

Facility Boundary

Surface Water Flow Direction

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:...........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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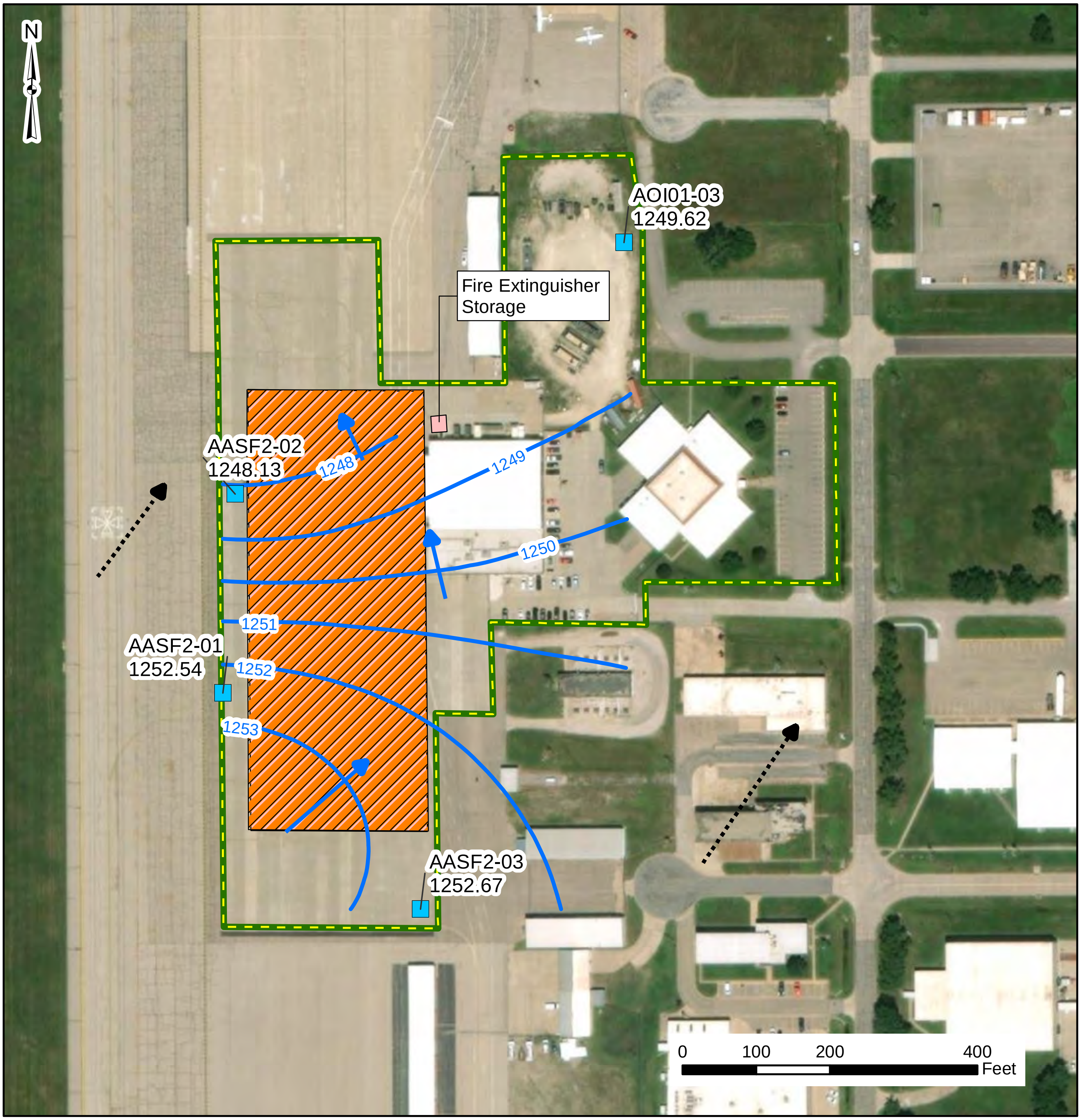
Figure 2- 5
Groundwater Elevations, January 2022



Facility Data
- Facility
- Potential PFAS Release
- Area of Interest

Sample Locations
- Temporary Groundwater Well

Hydrology
- Groundwater Contours
- Local Groundwater Flow
- Regional Groundwater Flow

Data Sources:
ESRI 2020

Note: Only wells installed in 2022 are included in the groundwater flow calculation.

Date:....................September 2022
Prepared By:.........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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3. SUMMARY OF AREAS OF INTEREST

The PA evaluated areas where PFAS-containing materials may have been used, stored, disposed, or released historically. Based on the PA findings, one AOI was identified at the Facility: AOI 1, Fire Extinguisher Storage. AOI 1 is shown on **Figure 3-1**.

3.1 AOI 1 – FIRE EXTINGUISHER STORAGE

The Facility housed seven 33-gallon Ansul™ Alcohol-Resistant AFFF (Ansul™ AR-33-D) mobile fire extinguishers with 15 percent AFFF and one water-based fire extinguisher in various locations on the ramp area (**Figure 3-1**) from approximately 2001 to 2015. In 2015, Purple K fire extinguishers were placed on the ramp areas, and the Ansul™ AR-33-D fire extinguishers were stored outside on the northwest perimeter of the main hangar. The Ansul™ AR-33-D fire extinguishers were never dispensed on the ramp area, and there were no reports of spills or leaks from the fire extinguishers.

The seven Ansul™ AR-33-D fire extinguishers and one water-based fire extinguisher were stored outside the main hangar until August 2019 (**Figure 3-1**). The AFFF solution in the seven fire extinguishers and one water-based extinguisher were containerized into 55-gallon drums and properly disposed of through the Defense Logistics Agency contract. The empty fire extinguishers were shipped to the U.S. Property and Fiscal Office/Quality Recycling Program in Topeka, Kansas for recycling as scrap metal. There were no reported spills or leaks when the AFFF solution was containerized (AECOM, 2020). AOI 1 includes the location of the fire extinguisher storage, including the ramp area. It is possible that leaks, spills or disposal activities could have occurred and were not reported.

3.2 ADJACENT SOURCES

Three potential off-facility sources of PFAS are adjacent to the Facility and are not under the control of the KSARNG. A description of each off-facility source is presented below and shown on **Figure 3-1**.

3.2.1 Salina Airport Authority Fire Department

The Salina Airport Authority Fire Department was reported to have AFFF and Purple K firefighting capabilities during KSARNG interviews, but no records prove the existence or absence of PFAS-containing firefighting materials on site (**Figure 3-1**).

3.2.2 Salina Wastewater Services Facility

Municipal sewer and wastewater treatment plants have the potential to receive PFAS from any source within the treatment district. The Salina Wastewater Services location is located over a mile northeast of the Facility, however, no information regarding treatment or discharge of wastewater by the Salina Wastewater Services was gathered during the 2020 PA. It is unknown if the wastewater treatment plant may be a source of PFAS.

3.2.3 Former Schilling Air Force Base

The EDR Report referenced PFAS detected north of the Facility in 2017 at the Former Schilling Air Force Base (EDR, 2019). Kansas Department of Health and Environment (KDHE) subsequently provided a figure showing suspected plumes of contamination at the Salina airport. As identified on **Figure 3-1**, Plumes A and F are located downgradient and side gradient (respectively) of the Facility and contain PFAS at concentrations greater than 1,000 micrograms per liter (µg/L). Based on the plumes' relation to the AOI and current understanding of groundwater flow, these two off-facility plumes are not expected to affect PFAS concentrations at the Facility.

One upgradient plume was identified in the Supplemental Remedial Investigation #3 Report (Dragun Corporation, 2018). This plume is labeled as Plume I and has two monitoring wells DMW3024i-32.5 and DMW3059i-32.5 that were sampled in 2017 for PFAS. At monitoring well DMW3024i-32.5 concentrations of PFOS were detected at 47 nanograms per liter (ng/L) which exceeds the SL. Concentrations of PFBS, PFHxS, and PFOA were also detected but below the SLs. PFNA was not detected during the sampling event. Monitoring well DMW3059i-32.5 was also sampled in 2017 for PFAS. Only PFBS and PFHxS were detected during the event, however, they were below the SLs. PFOA, PFOS and PFNA were not detected during the sampling event.

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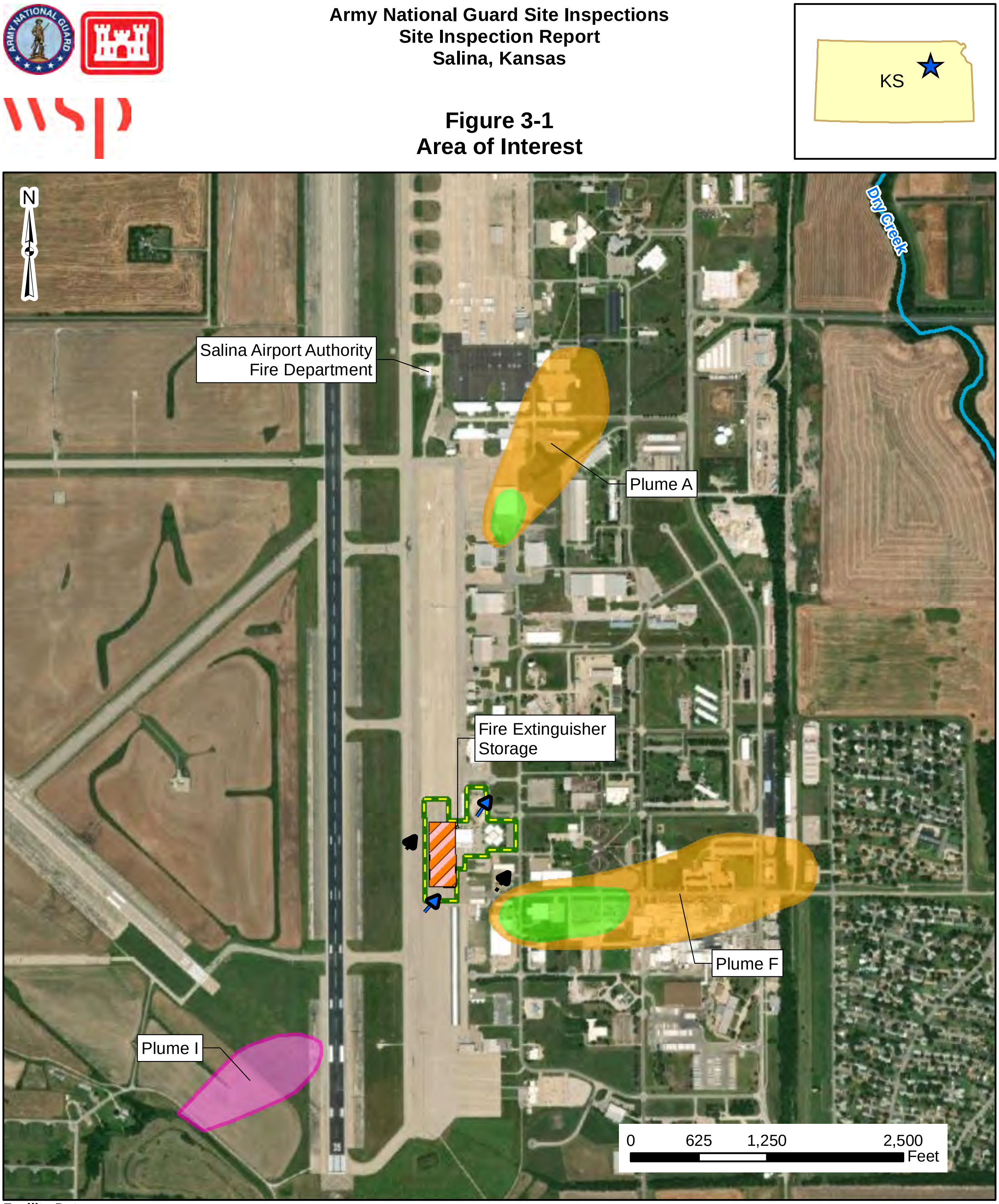
Figure 3-1
Area of Interest



Facility Data

- Facility Boundary
- Surface Water Flow Direction
- Inferred Shallow Groundwater Flow Direction
- Potential PFAS Release Site
- Area of Interest (AOI)

Approximate Groundwater PFAS Plume*

- >1000 ug/L
- >100 ug/L
- >5 ug/L

* Plume outline provided by Kansas Department of Health and Environment, extracted from the 2018 "Supplemental Remedial Investigation Report" at the Former Schilling Air Force Base

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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4. PROJECT DATA QUALITY OBJECTIVES

As identified during the Data Quality Objective (DQO) process and outlined in the SI Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (EA/Wood, 2021) and the Supplemental SI Addendum to UFP-QAPP (EA/Wood, 2022), the objective of the SI is to identify whether there has been a release to the environment at the AOI identified in the PA. For the 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 the presence or absence of relevant compounds at the sampled AOI.

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 for the SI include the following:

- The PA Report for Salina AASF #2 (AECOM, 2020);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific UFP – QAPP Addendum (EA/Wood, 2021a) and the Supplemental SI Addendum to UFP-QAPP (EA/Wood, 2022);
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.3 STUDY BOUNDARIES

The scope of the SI was bounded horizontally by the property limits of the Facility (**Figure 2-2**). The scope of the SI was bounded vertically by the depth of temporary monitoring wells installed within groundwater, where encountered (maximum depth of 37 feet bgs). 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 earliest available time field resources were available to complete the study.

4.4 ANALYTICAL APPROACH

Samples were analyzed by Eurofins Lancaster, accredited under the DoD Environmental Laboratory Accreditation Program (DoD ELAP; Accreditation Number 1.01) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 021). Data were compared to applicable SLs within this document and decision rules as defined in the UFP-QAPP Addendum (EA/Wood, 2021a) and Supplemental SI Addendum to UFP-QAPP (EA/Wood, 2022).

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 UFP-QAPP (EA, 2020a).

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 was implemented in accordance with the following approved documents.

- *Final Preliminary Assessment Report, Salina AASF #2, Kansas,* dated July 2020 (AECOM, 2020)
- *Final Programmatic Uniform Federal Policy-Quality Assurance Project Plan, Site Inspections for Per- and Polyfluoroalkyl Substances Impacted Sites, ARNG Installations, Nationwide,* dated December 2020 (EA, 2020a)
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Salina AASF#2, Kansas* dated August 2021 (EA/Wood, 2021a)
- *Final Supplemental Site Inspection Addendum to Uniform Federal Policy-Quality Assurance Project Plan, Salina AASF#2, Kansas* dated January 2022 (EA/Wood, 2022)
- *Final Programmatic Accident Prevention Plan, Revision 1,* dated November 2020 (EA, 2020b)
- *Final Accident Prevention Plan Site Safety and Health Plan, Salina AASF#2, Kansas,* dated August 2021 (EA/Wood, 2021b).

The SI field activities were conducted in two sampling events: the first from 17 August to 19 August 2021 and the second from 25 January to 27 January 2022. The SI field activities consisted of utility clearance, DPT or rotosonic boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection and land surveying. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a) and Supplemental SI Addendum to UFP-QAPP (EA/Wood, 2022), except as noted in **Section 5.8**.

The following samples were collected during the SI and analyzed for 24 compounds via liquid chromatography/tandem mass spectrometry (LC/MS/MS) compliant with QSM Version 5.3 Table B-15 to fulfill the project DQOs:

- Twelve (12) soil samples from four boring locations;
- Seven (7) grab groundwater samples from 7 temporary well locations;
- Eleven (11) 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 medium. Field documentation is provided in **Appendix B**. A log of Daily Notice of Field Activity was completed throughout the SI field activities, which is provided in **Appendix B1**. Sampling forms are provided in

Appendix B2, land survey data are provided in **Appendix B3**. 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 of these activities are presented below.

5.1.1 Technical Project Planning

The USACE TPP Process, Engineers Manual (EM) 200-1-2 (DA, 2016a) 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 AOI identified in the PA.

A combined TPP Meeting 1 and 2 was held on 21 May 2021, prior to SI field activities. A supplemental meeting was conducted on 10 December 2021. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include ARNG, KSARNG, USACE, KDHE, and representatives familiar with the Facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the UFP-QAPP Addendum (EA/Wood, 2021a).

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 results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

WSP USA Environment & Infrastructure Inc. (WSP), previously doing business as Wood Environment & Infrastructure Solutions, Inc., contacted the Kansas One Call Center to notify them of intrusive work at the Facility. WSP contracted GPRS, a private utility location service, to perform utility clearance at the Facility. Utility clearance was performed at each of the proposed boring locations on 19 August 2021 and 25 January 2022 with input from the WSP field team. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 ft of each boring were pre-cleared by one of WSP's drilling subcontractors, Robert's Environmental and Cascade Environmental, using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to meet acceptability criteria, as defined in the UFP-QAPP Addendum, prior to the start of field activities. A sample from a potable water source at an outdoor spigot at the Facility was collected on 28 July 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (DoD, 2020). The results of the sample of the potable water source used for decontamination of drilling equipment 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 PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures appendix to the Programmatic UFP-QAPP (EA, 2020a).

5.2 SOIL BORINGS AND SOIL SAMPLING

During the first sampling event in August 2021, soil samples were collected via DPT drilling methods in accordance with Standard Operating Procedure 047 *Direct-Push Technology Sampling* (EA, 2021a). A Geoprobe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. During the second sampling event in January 2022, soil samples were collected via rotosonic drilling. The Sonic 10-0145 core barrel system was used to collect continuous soil cores to the target depth. During both sampling events, a hand auger was used to collect soil from the top 5 ft of the boring in compliance with utility clearance procedures. The soil boring locations are shown on **Figure 5-1**, and boring sample depths are provided in **Table 5-1**. Several boring locations were adjusted within a 10-feet offset for reasons including drill rig access, utility avoidance and bias toward sampling within observed drainage features.

Three discrete soil samples were collected for chemical analysis from each soil boring: one sample at the surface (0 to 2 ft bgs) and two subsurface soil samples. One subsurface soil sample was collected approximately 1 ft above the groundwater table, and one collected at the midpoint between the surface and the groundwater table (not to exceed 15 ft bgs). Groundwater was encountered at depths ranging from 19.5 to 24 ft bgs during drilling. Total boring completion depths, to accommodate temporary well installation, ranged from 25 to 37 ft bgs.

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

Each sample was collected into a laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottle and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard COC procedures to the laboratory and analyzed for PFAS (LC/MS/MS compliant with QSM Version 5.3 Table B-15), Total organic carbon (TOC) (EPA Method 9060A), pH (EPA Method 9045D), and grain size (ASTM Method D-422) in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a). During the SI, sandy clays with low to high plasticity were observed as the dominant lithology of the unconsolidated sediments below the Salina AASF #2. The borings were completed at depths between 25 and 37 feet bgs.

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

The borings were converted to temporary wells, which were subsequently abandoned after sampling and surveying in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a). After removal of the casings, boreholes were abandoned using bentonite chips.

5.3 TEMPORARY WELL INSTALLATION AND GROUNDWATER GRAB SAMPLING

Temporary wells were installed using a Geoprobe® 7822DT dual-tube sampling system or Sonic 10-0145. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-ft section of 1-inch Schedule 40 polyvinyl chloride (PVC) screen with sufficient casing to reach the ground surface. New PVC pipe and screen were used at each location to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

Groundwater samples were collected using a peristaltic pump with PFAS-free HDPE tubing. Samples were collected after a period of time following well installation to allow groundwater to infiltrate and recharge the temporary well intervals. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen, and oxidation-reduction potential) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) before each grab sample was collected in a separate container. 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 in laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard COC procedures to the laboratory and analyzed for PFAS by LC/MS/MS compliant with QSM Version 5.3 Table B-15 in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. Two FBs were collected in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a). In instances when non-dedicated sampling equipment was used, such as a water level indicator, one EB was collected a day and analyzed for the same parameters as the groundwater samples. A temperature blank was placed in each cooler for use in confirming 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 UFP-QAPP Addendum (EA/Wood, 2021a) by removing the PVC and backfilling the hole with bentonite chips.

5.4 SYNOPTIC WATER LEVEL MEASUREMENTS

Synoptic water level measurements were taken in the temporary monitoring wells installed for each of the two sampling events. The first sampling event did not provide a consistent groundwater flow with what is reported at surrounding sites. The synoptic groundwater gauging during the second sampling event was performed on January 27, 2022. Groundwater elevation measurements were collected from the four new temporary monitoring wells installed during that event. Water level measurements were taken from the survey mark on the northern side of the well casing. The synoptic water level measurements from the second sampling event indicated a general groundwater flow towards the northeast at the southern portion of the Facility then shifting towards the north/northwest in the central to northern portion of the Facility. Groundwater elevation data is provided in **Table 5-3**. A groundwater flow contour map is provided as **Figure 2-5**.

5.5 SURVEYING

A certified surveyor, Garber Surveying Service, was contracted to complete the surveying for both sampling events. The northern side of each new temporary well casing was surveyed using a TOPCON Hiper V global positioning system with FC-5000 data collection software. Positions were collected in the applicable Universal Transverse Mercator zone projection with World Geodetic System 1984 datum (horizontal) and North American Vertical Datum 1988 (vertical). Surveying data were collected on 19 August 2021 and 27 January 2022 and are provided in **Appendix B3**.

5.6 INVESTIGATION-DERIVED WASTE

As of the date of this report, the disposal of PFAS investigation-derived water (IDW) is not regulated federally. IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a).

Soil IDW (i.e., soil cuttings) generated during the SI activities were contained in labeled, 55-gallon Department of Transportation-approved steel drums and left onsite in a designated waste storage area. The soil IDW was not sampled and assumes the characteristics of the associated soil samples collected from that source location.

Liquid IDW generated during SI activities (i.e., purge water, development water, and decontamination fluids) were contained in labeled, 55-gallon Department of Transportation-approved steel drums and left onsite in a designated waste storage area. The liquid IDW was not sampled and assumes the characteristics of the associated groundwater samples collected from that source location.

The IDW disposal is being managed separately under a contract with EA Engineering, Science, and Technology, Inc. Specifics on the disposal of solid and liquid IDW will be addressed in an IDW Technical Memorandum.

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

5.7 LABORATORY ANALYTICAL METHODS

Samples were analyzed by LC/MS/MS, compliant with QSM Version 5.3 Table B-15, at Eurofins in Lancaster, Pennsylvania, a DoD ELAP and NELAP-certified laboratory.

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

5.8 Deviations from SI UFP-QAPP Addendum

Two deviations from the SI QAPP Addendum were identified during review of the field documentation. The deviations are noted below:

Well screens were installed at and below the point of observed saturation during drilling. Based on the depth of the water-bearing unit and the confining lithology, water elevations rose over time while the hole was open, and hence the screen was below the water table after drilling.

One sample that was collected as a duplicate deviated from the standard nomenclature that was set forth in the UFP-QAPP. It was labeled Dup-03 with the parent sample being AOI01-03-SB-0-2.

Table 5-1. Site Inspection Samples by Medium
Salina AASF #2, Salina, Kansas
Site Inspection Report

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table 5-15)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
Soil Samples							
AOI01-01-SB-0-1	8/18/2021	0-1	X				
AOI01-01-SB-5-8	8/18/2021	5-8		X	X	X	
AOI01-01-SB-10-12	8/18/2021	10-12	X				
AOI01-01-SB-23-24	8/18/2021	23-24	X				
AOI01-02-SB-0-1	8/17/2021	0-1	X				Parent Sample of AOI01-Dup-01
AOI01-SB-DUP01	8/17/2021	0-1	X				Field Duplicate
AOI01-02-SB-10-12	8/17/2021	10-12	X				
AOI01-02-SB-19-20	8/17/2021	19-20	X				MS/MSD Collected
AOI01-03-SB-0-2	1/25/2022	0-2	X				Parent Sample of AOI01-Dup-03
AOI01-SB-DUP03	1/25/2022	0-2	X				Field Duplicate
AOI01-03-SB-8-9	1/25/2022	8-9	X				MS/MSD Collected
AOI01-03-SB-18-19	1/25/2022	18-19	X				
AOI01-04-SB-0-1	8/17/2021	0-1	X				
AOI01-04-SB-10-12	8/17/2021	10-12	X				
AOI01-04-SB-19-20	8/17/2021	19-20	X				
Groundwater Samples							
AOI01-01-GW	8/19/2021		X				MS/MSD Collected, Parent sample of AASF2-DUP-04
AOI01-02-GW	8/19/2021		X				
AOI01-03-GW	1/26/2022		X				MS/MSD Collected
AOI01-04-GW	8/17/2021		X				
AASF2-01-GW	1/26/2022		X				Parent Sample of AASF2-Dup-04
AASF2-DUP-04	1/26/2022						Field Duplicate of AASF2-01-GW
AASF2-02-GW	1/27/2022		X				
AASF2-03-GW	1/26/2022		X				
Blank Samples							
AASF2-EB-02-HA	8/19/2021		X				Equipment Blank Collected from Hand Auger
AASF2-FB-01	8/19/2021		X				Field Blank
AASF2-EB-03-WL	1/26/2022		X				Equipment Blank Collected from Water Level Meter
AASF2-FB-02	1/26/2022		X				Field Blank
AASF2-EB-04-HA	1/26/2022		X				Equipment Blank Collected from Hand Auger

Sample Identification	Sample Collection Date	Sample Depth (ft bgs)	PFAS (LC/MS/MS compliant with QSM 5.3 Table 5-15)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D422)	Comments
AASF2-EB-01-HOSE	8/19/2021		X				Equipment Blank Collected from Hose
KSAASF2-DECON-BLANK	7/28/2021		X				Potable Water Sample

AASF = Army Aviation Support Facility
ASTM = American Society for Testing and Materials
bgs = below ground surface
Dup= field duplicate
ft = feet
MS/MSD = matrix spike/ matrix spike duplicate
TOC = Total Organic Carbon
USEPA = United States Environmental Protection Agency

Table 5-2. Soil Boring Depths and Temporary Well Screen Intervals
Salina AASF #2, Salina, Kansas
Site Inspection Report

Area of Interest	Boring Location	Soil Boring Depth (ft bgs)	Temporary Well Screen Interval (ft bgs)
1	AOI01-01	31	26.0-31.0
	AOI01-02	27.5	22.0-27.0
	AOI01-03	25	20.0-25.0
	AOI01-04	26.0	21.0-26.0
Boundary Wells	AASF2-01	30	24.0-29.0
	AASF2-02	37	32.0-37.0
	AASF2-03	30	23.0-28.0

Notes:
[1] Temporary well screen set above total depth to capture groundwater interface
AASF = Army Aviation Support Facility
bgs = below ground surface
ft = feet

Table 5-3. Groundwater Elevation
Salina AASF #2, Salina, Kansas
Site Inspection Report

Monitoring Well ID	Top of Casing (TOC) Elevation (ft NAVD88)	Depth to Water (ft btoc)	Depth to Water (ft bgs)	Groundwater Elevation (ft NAVD 88)
AOI01-01	1266.37	18.07	13.57	1248.3
AOI01-02	1264.85	6.7	3.59	1258.15
AOI01-03	1260.68	11.06	10.37	1249.62
AOI01-04	1266.54	15.39	10.95	1251.15
AASF2-01	1263.58	11.04	10.41	1252.54
AASF2-02	1263.91	15.78	14.94	1248.13
AASF2-03	1263.36	10.69	8.88	1252.67

Notes:
AASF = Army Aviation Support Facility
bgs = below ground surface
btoc = below top of casing
ft = feet
NAVD88 = North American Vertical Datum 1988
TOC = top of casing

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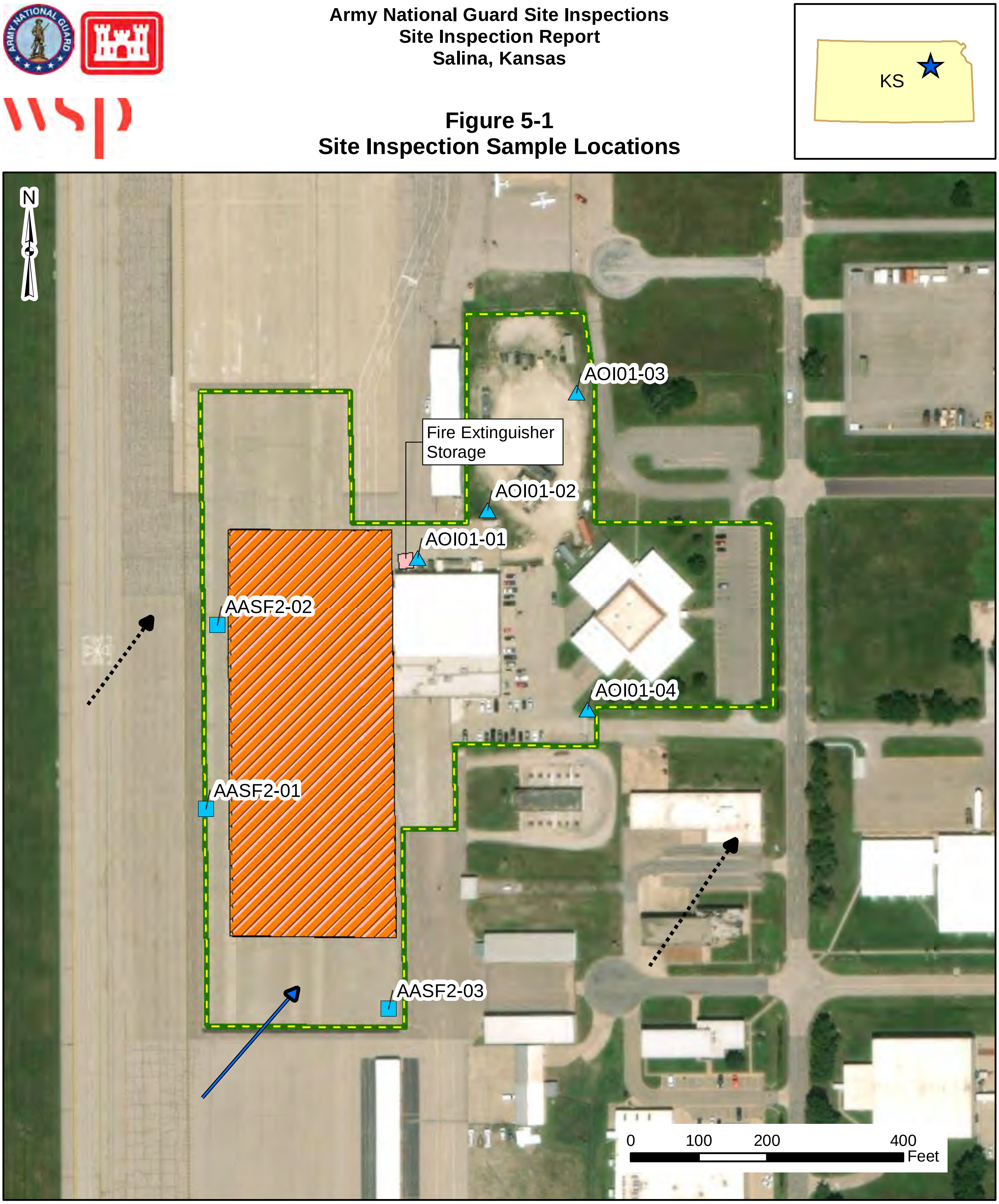
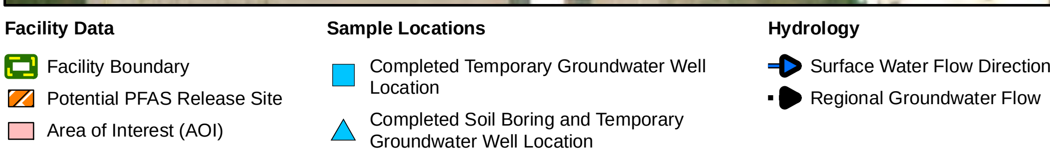
Army National Guard Site Inspections
Site Inspection Report
Salina, Kansas

Figure 5-1
Site Inspection Sample Locations





Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

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6. SITE INSPECTION RESULTS

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1** and **Table 6-1**. A discussion of the results for the AOI is provided in **Section 6.3**. **Tables 6-2** through **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 (Assistant Secretary of Defense, 2022). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed the next phase under CERCLA. The SLs established in the OSD memorandum apply to the five compounds presented on **Table 6-1**.

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

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

Notes:
1. Assistant Secretary of Defense. July 2022. Risk Based Screening Levels in Groundwater and Soil using USEPA's Regional Screening Level Calculator. Hazard Quotient (HQ)=0.1. May 2022.
2. 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.

Abbreviations:
µg/kg = microgram(s) per kilogram
bgs = below ground surface
ng/L = nanogram(s) per liter

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

6.2 SOIL PHYSICOCHEMICAL ANALYSES

To provide basic soil parameter information, soil samples were analyzed for TOC, pH, and grain size, which are important for evaluating transport through the soil medium. **Appendix F** contains the results of the TOC, 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 PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors. At relevant environmental pH values, certain PFAS are present as organic anions, and are therefore relatively mobile in groundwater (Xiao et al., 2015), but tend to associate with the organic carbon fraction that may be present in soil or sediment (Higgins and Luthy, 2006; Guelfo and Higgins, 2013). When sufficient organic carbon is present, organic carbon normalized distribution coefficients (K_{oc} values) can help in evaluating transport potential, though other geochemical factors (for example, pH and presence of polyvalent cations) may also affect PFAS sorption to solid phases (ITRC, 2018).

6.3 AOI 1

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

6.3.1 Soil Analytical Results

Tables 6-2 through **6-4** summarize the detected compounds in soil. **Figures 6-1 through 6-5** present the ranges of detections in soil.

Surface soil (0 to 2 ft bgs) was sampled from boring locations AOI01-01 through AOI01-04. Soil was also sampled from shallow subsurface soil (5 to 15 ft bgs) and deep subsurface soil intervals (18 to 24 ft bgs) from boring locations AOI01-01 through AOI01-04. PFNA and PFOA were detected in surface soil at concentrations below their respective SLs. PFNA concentrations were identified at AOI01-02 and AOI01-04, with concentrations ranging from 0.87 µg/kg to 1.2 µg/kg. PFOA concentrations were identified at AOI01-03 and AOI01-04, with concentrations ranging from 0.34 J µg/kg to 0.8 J+ µg/kg. PFBS, PFHxS and PFOA were not detected in any of the surface soil samples.

PFBS, PFHxS, PFNA, PFOS and PFOA were not detected in any of the shallow or deep subsurface soil samples collected.

6.3.2 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 well locations AOI01-01 through AOI01-04. PFNA, PFOS and PFOA were detected at concentrations exceeding their respective SLs. PFNA was detected in all four locations at concentrations exceeding the SL, with concentrations ranging from 15 to 530 ng/L [duplicate result, primary result is 500 ng/L]. PFOS was detected in four locations at concentrations exceeding the SL, with concentrations ranging from 5.6 ng/L to 58 ng/L [duplicate result, primary result is 55 ng/L]. PFOA was detected in three of the four locations at concentrations exceeding the SL, with concentrations ranging from 63 to 860 ng/L [duplicate result, primary result is 850 ng/L]; PFOA did not exceed the SL in one location AOI01-04. PFBS was detected at three locations at concentrations below its respective SL, with concentrations ranging from 1.6 J ng/L to 6 J+ ng/L. PFHxS was detected at four locations at concentrations ranging from 9.3 ng/L to 33 ng/L, which are below the SL.

6.3.3 Conclusions

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

6.4 BOUNDARY SAMPLE LOCATIONS

This section presents the analytical results for soil and groundwater in comparison to SLs for samples collected at the upgradient Facility boundary. The detected compounds are summarized in **Tables 6-2 through 6-5**. Soil and groundwater results are presented on **Figures 6-1 through 6-7**.

6.4.1 Soil Analytical Results

No soil samples were collected from the upgradient boundary locations.

6.4.2 Groundwater Analytical Results

Groundwater was sampled from three temporary monitoring well locations AASF2-01 through AASF2-03, located along the upgradient boundary of the Facility. PFHxS was detected at concentrations exceeding its respective SL. PFHxS was detected at three locations at concentrations ranging from 2.3 ng/L to 66 ng/L [64 ng/L in the sample duplicate]; PFHxS exceeds the SL at one location (AASF2-01). PFBS, PFOA, PFOS, and PFNA were detected in at least one of the three boundary locations at concentrations below their respective SLs. PFNA was detected in one location (AASF2-03) at a concentration of 1.5 J ng/L. PFOS was detected in three locations at concentrations ranging from 1.8 ng/L to 3.1 ng/L. PFOA was detected in one location (AASF2-01) at concentration of 0.72 J ng/L. PFBS was detected in three locations at concentrations ranging from 0.62 J ng/L to 1.5 J ng/L.

6.4.3 Conclusions

Based on the results of the SI, PFHxS was detected in boundary groundwater samples at concentrations above its SL. Based on the exceedances of the SL for PFHxS in groundwater flowing onto the facility, upgradient off-site contributions should be considered for AOI 1.

Table 6-2
PFOA, PFOS, PFBS, PFNA and PFHxS Results in Surface Soil
Site Inspection Report Salina Army Aviation Support Facility #2, Salina, KS

	Area of Interest	AOI01											
	Location ID	AOI01-01		AOI01-02		AOI01-02		AOI01-03		AOI01-03		AOI01-04	
	Sample Name	AOI01-01-SB-0-1-08182021		AOI01-02-SB-0-1-08172021		AOI01-Dup-01-08172021		AOI01-03-SB-0-2-01252022		Dup-03		AOI01-04-SB-0-1-08172021	
	Parent Sample ID					AOI01-02-SB-0-1-08172021				AOI01-03-SB-0-2-01252022			
	Depth	0 - 1 ft		0 - 1 ft		0 - 1 ft		0 - 2 ft		0-2		0 - 1 ft	
	Sample Date	8/17/2021		8/17/2021		8/17/2021		1/25/2022		1/25/2022		8/17/2021	
Analyte	**Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (µg/kg)													
PFBS	1,900	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	19	ND	U	0.87		0.88		ND	U	ND	U	1.2	
PFOS	13	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	19	ND	U	ND	U	ND	U	0.34	J	0.37		0.8	J+

Grey Fill — Detected concentration exceeded OSD Screening Levels

Notes

a. Assistant Secretary of Defense, 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.

J = Estimated concentration

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

J+ = The result is an estimated quantity, but the result may be biased high

Chemical Abbreviations

PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOS	Perfluorooctanesulfonic acid
PFOA	Perfluorooctanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
Dup	duplicate
ft	feet
HQ	Hazard Quotient
ID	identification
LOD	limit of detection
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of Defense
PFAS	per- and polyfluoralkyl substances
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms/kilogram

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Table 6-3
PFOA, PFOS, PFBS, PFNA and PFHxS Results in Shallow Subsurface Soil
Site Inspection Report Salina Army Aviation Support Facility #2, Salina, KS

	Area of Interest	AOI-01							
	Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-04	
	Sample Name	AOI01-01-SB-10-12-08182021		AOI01-02-SB-10-12-08172021		AOI01-03-SB-8-9-01252022		AOI01-04-SB-10-12-08172021	
	Parent Sample ID								
	Depth	10-12 ft		10-12 ft		8 - 9 ft		10-12 ft	
	Sample Date	8/18/2021		8/17/2021		1/25/2022		8/17/2021	
Analyte	**Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (µg/kg)									
PFBS	25,000	ND	U	ND	U	ND	U	ND	U
PFHxS	1,600	ND	U	ND	U	ND	U	ND	U
PFNA	250	ND	U	ND	U	ND	U	ND	U
PFOS	160	ND	U	ND	U	ND	U	ND	U
PFOA	250	ND	U	ND	U	ND	U	ND	U

Grey Fill — Detected concentration exceeded OSD Screening Levels

Notes

a. Assistant Secretary of Defense, 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

Chemical Abbreviations

PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOS	Perfluorooctanesulfonic acid
PFOA	Perfluorooctanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
Dup	duplicate
ft	feet
HQ	Hazard Quotient
ID	identification
LOD	limit of detection
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of Defense
PFAS	per- and polyfluoralkyl substances
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms/kilogram

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Table 6-4
PFOA, PFOS, PFBS, PFNA and PFHxS Results in Deep Subsurface Soil
Site Inspection Report Salina Army Aviation Support Facility #2, Salina, KS

Area of Interest	AOI-01							
Location ID	AOI01-01		AOI01-02		AOI01-03		AOI01-04	
Sample Name	AOI01-01-SB-23-24-08182021		AOI01-02-SB-19-20-0817202		OI01-03-SB-18-19-012520		AOI01-04-SB-19-20-08172021	
Parent Sample ID								
Depth	23-24 ft		19-20 ft		18 - 19 ft		19-20 ft	
Sample Date	8/18/2021		8/17/2021		1/25/2022		8/17/2021	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (µg/kg)								
PFBS	ND	U	ND	U	ND	U	ND	U
PFHxS	ND	U	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U
PFOS	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U

Grey Fill

Notes

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

Chemical Abbreviations

PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOS	Perfluorooctanesulfonic acid
PFOA	Perfluorooctanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
Dup	duplicate
ft	feet
HQ	Hazard Quotient
ID	identification
LOD	limit of detection
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of Defense
PFAS	per- and polyfluoralkyl substances
QSM	Quality Systems Manual
Qual	interpreted qualifier
SB	soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms/kilogram

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Table 6-5 Groundwater
PFOA, PFOS, PFBS, PFNA and PFHxS Detections in Groundwater, Site Inspection Report
Salina Army Aviation Support Facility #2, Salina, KS

		Location ID	AOI01-01		AOI01-02		AOI01-02		AOI01-03		AOI01-04		AASF2-01		AASF2-01		AASF2-02		AASF2-03	
		Sample Name	AOI01-01-GW-08192021		AASF-Dup-02-08192021		AOI01-02-GW-08192021		AOI01-03-GW-01262022		AOI01-04-GW-08172021		AASF2-01-GW-01262022		AASF2-DUP-04-01262022		AASF2-02-GW-01262022		AASF2-03-GW-01262022	
		Parent Sample ID			AOI01-02-GW-08192021										AASF2-01-GW-01262022					
		Sample Date	8/19/2021		8/19/2021		8/19/2021		1/26/2022		8/17/2021		1/26/2022		1/26/2022		1/27/2022		1/26/2022	
Analyte	**CAS#**	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Water, PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 (ng/L)																				
PFBS	375-73-5	601	3.7	J+	ND		ND		1.6	J	6.0	J+	1.5	J	1.3	J	0.82	J	0.62	J
PFHxS	355-46-4	39	9.3		14	J	13	J	29		33		66		64		5.1		2.3	
PFNA	375-95-1	6	45		530		500		100		15		ND		ND		ND		1.5	J
PFOS	1763-23-1	4	13		58		55		5.6		9.9		3.1		3.0		ND		1.8	
PFOA	335-67-1	6	78		860		850		63		ND	U	ND		ND		ND		0.72	J

Notes

Grey Fill Detected concentration exceeded OSD Screening Levels
J = Estimated concentration
J+ = Estimated concentration, bias high.
J- = Estimated concentration, bias low
U = The analyte was not detected at a level greater than or equal to the adjusted detection limit (DL)
ng/L = Nanogram(s) per liter
a. Assistant Secretary of Defense, 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. July 2022. Groundwater Screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated groundwater.

Chemical Abbreviations

PFBS	Perfluorobutanesulfonic acid
PFHxS	Perfluorohexanesulfonic acid
PFNA	Perfluorononanoic acid
PFOS	Perfluorooctanesulfonic acid
PFOA	Perfluorooctanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
DL	Detection limit
HQ	Hazard Quotient
ID	identification
LCMSMS	liquid chromatography with tandem mass spectometry
LOD	limit of detection
ND	analyte not detected above the LOD (LOD values are presented in Appendix F)
OSD	Office of the Secretary of Defense
PFAS	per- and polyfluoralkyl substances
QSM	Quality Systems Manual
Qual	interpreted qualifier
USEPA	United States Environmental Protection Agency

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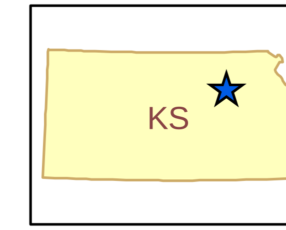
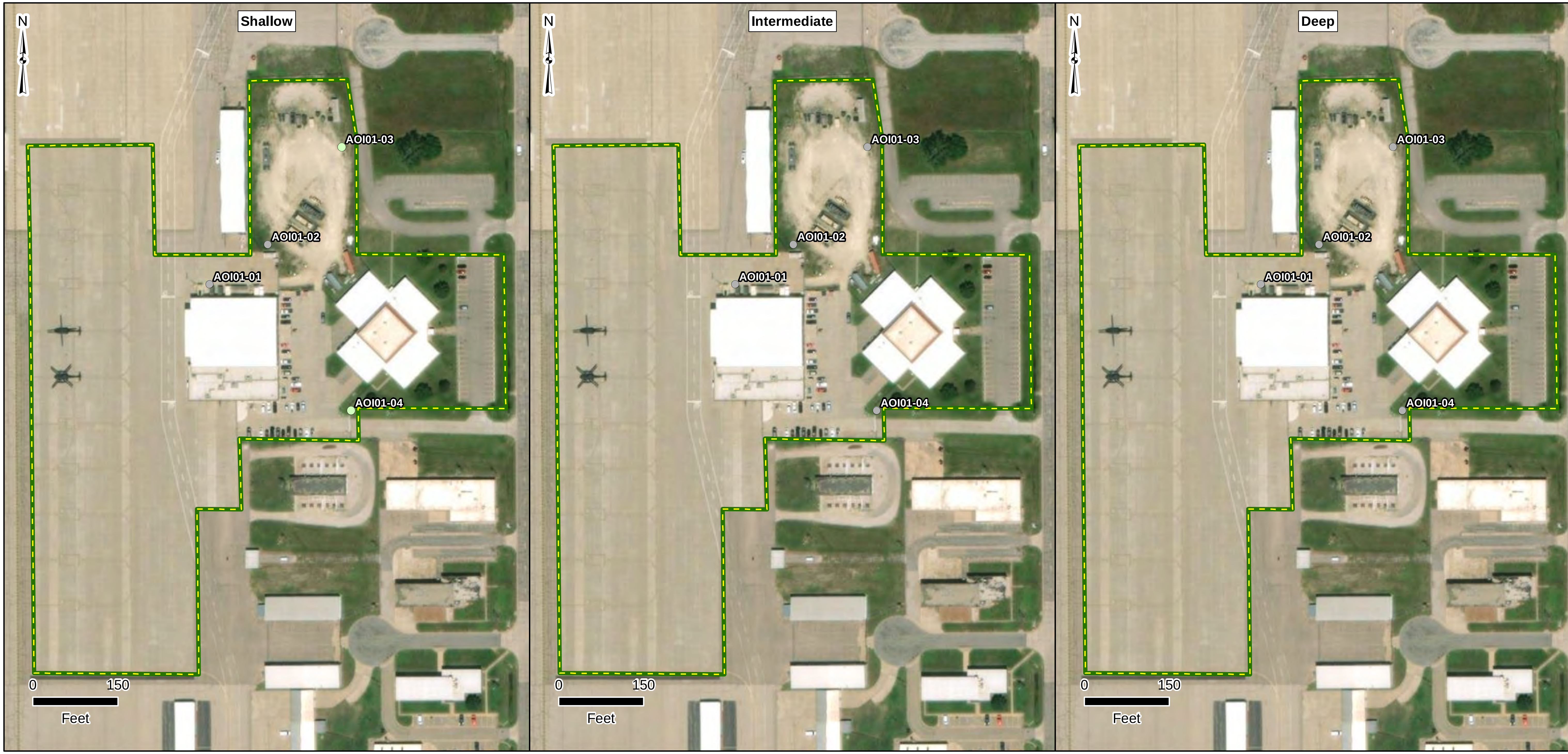
Salina, Kansas

Figure 6-1
PFOA Detections in Soil





Facility Data

Facility Boundary

PFOA Results (µg/Kg)

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

NOTES:
PFOA = perfluorooctanoic acid
ND = Non-Detect
(µg/Kg) = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-1 - PFOA Detections in Soil.mxd - stephane.descombes - 9/22/2022 - 3:55:43 PM

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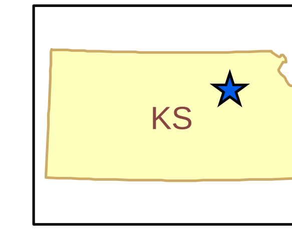
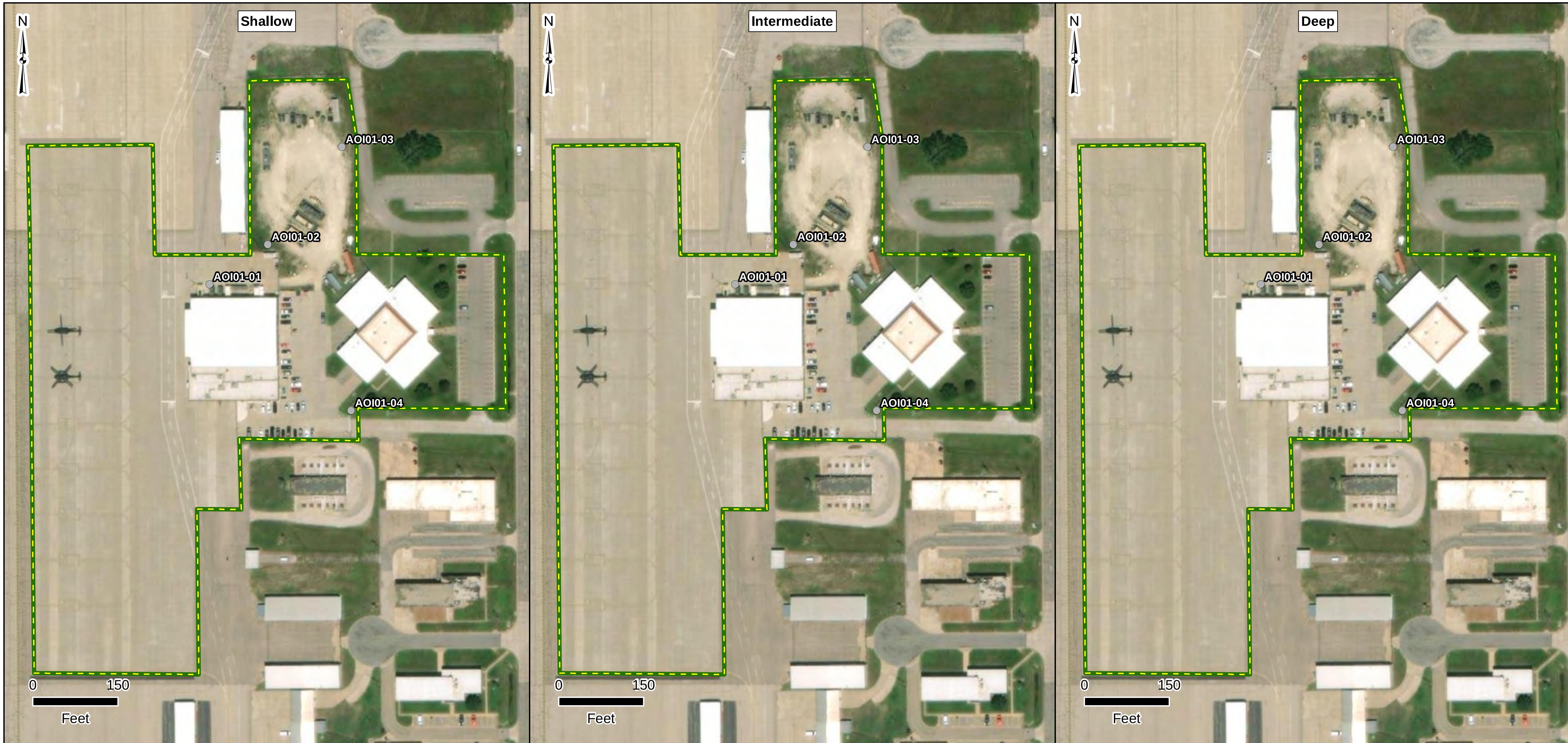


Figure 6-2
PFOS Detections in Soil



Facility Data

Facility Boundary

PFOS Results (µg/Kg)

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

NOTES:
PFOS = perfluorooctanesulfonic acid
ND = Non-Detect
(µg/Kg) = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-2 - PFOS Detections in Soil.mxd - stephane.descombes - 9/22/2022 - 3:55:24 PM

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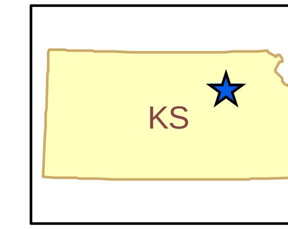
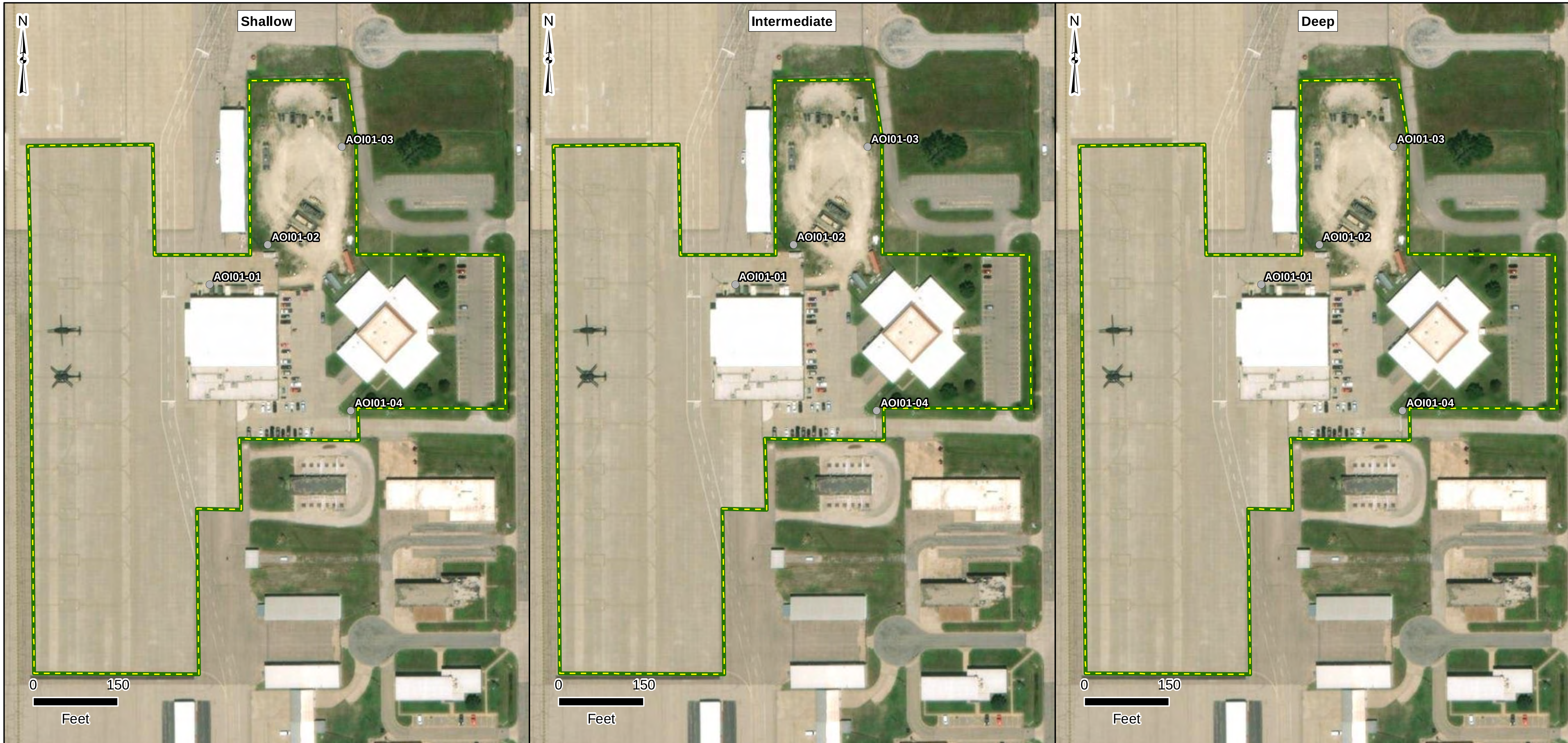


Figure 6-3
PFBS Detections in Soil



Facility Data

Facility Boundary

PFBS Results (µg/Kg)

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

NOTES:
PFBS = perfluorobutanesulfonic acid
ND = Non-Detect
(µg/Kg) = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-3 - PFBS Detections in Soil.mxd - patrick.mccarthy - 9/23/2022 - 1:35:14 PM

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Salina, Kansas

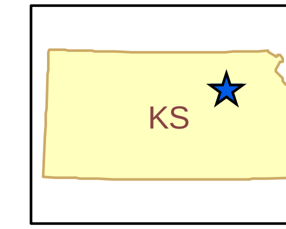
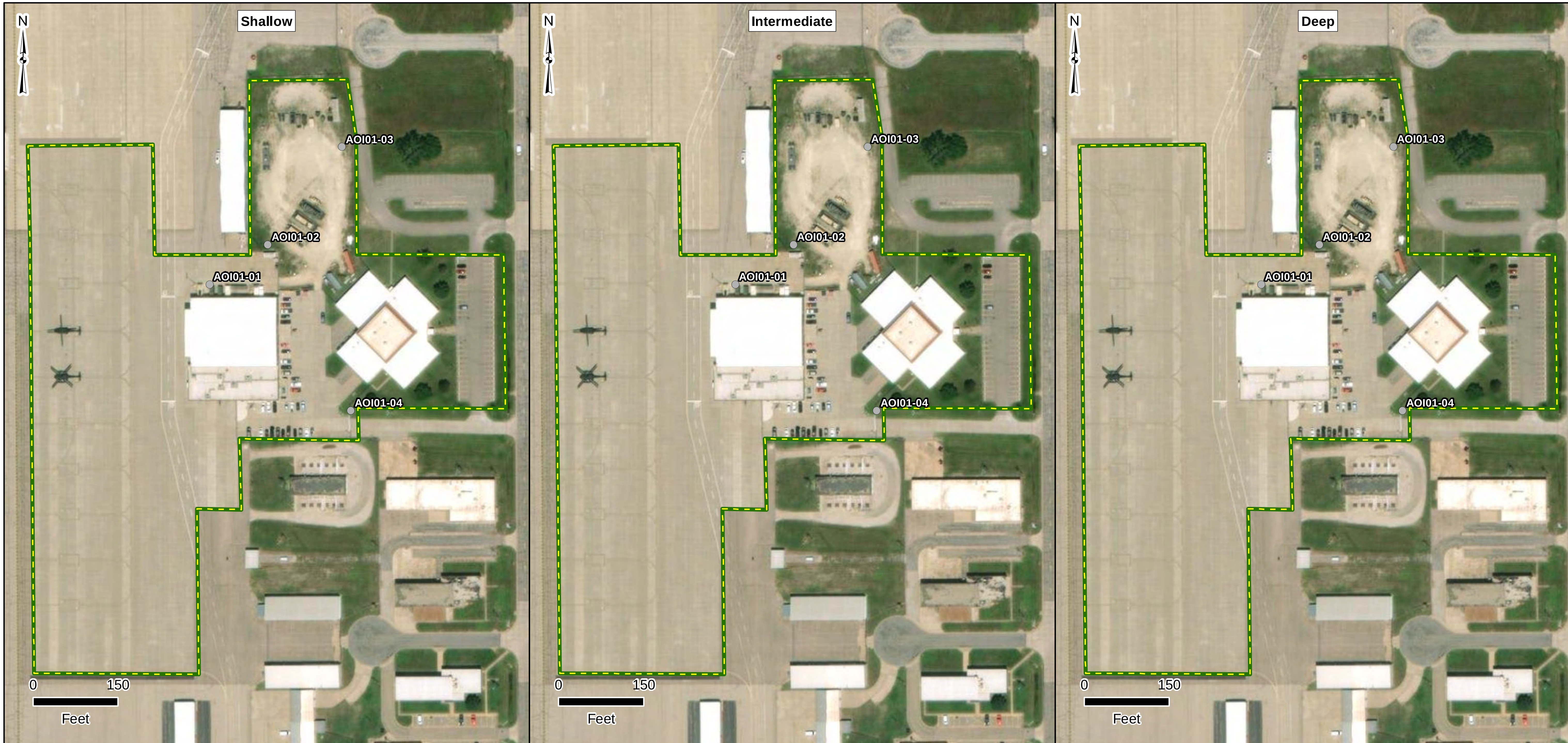


Figure 6-4
PFHxS Detections in Soil



Facility Data

Facility Boundary

PFHxS Results (µg/Kg)

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

NOTES:
PFHxS = Perfluorohexanesulfonic acid
ND = Non-Detect
(µg/Kg) = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:......................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-4 - PFHxS Detections in Soil.mxd - patrick.mccarthy - 9/23/2022 - 1:33:18 PM

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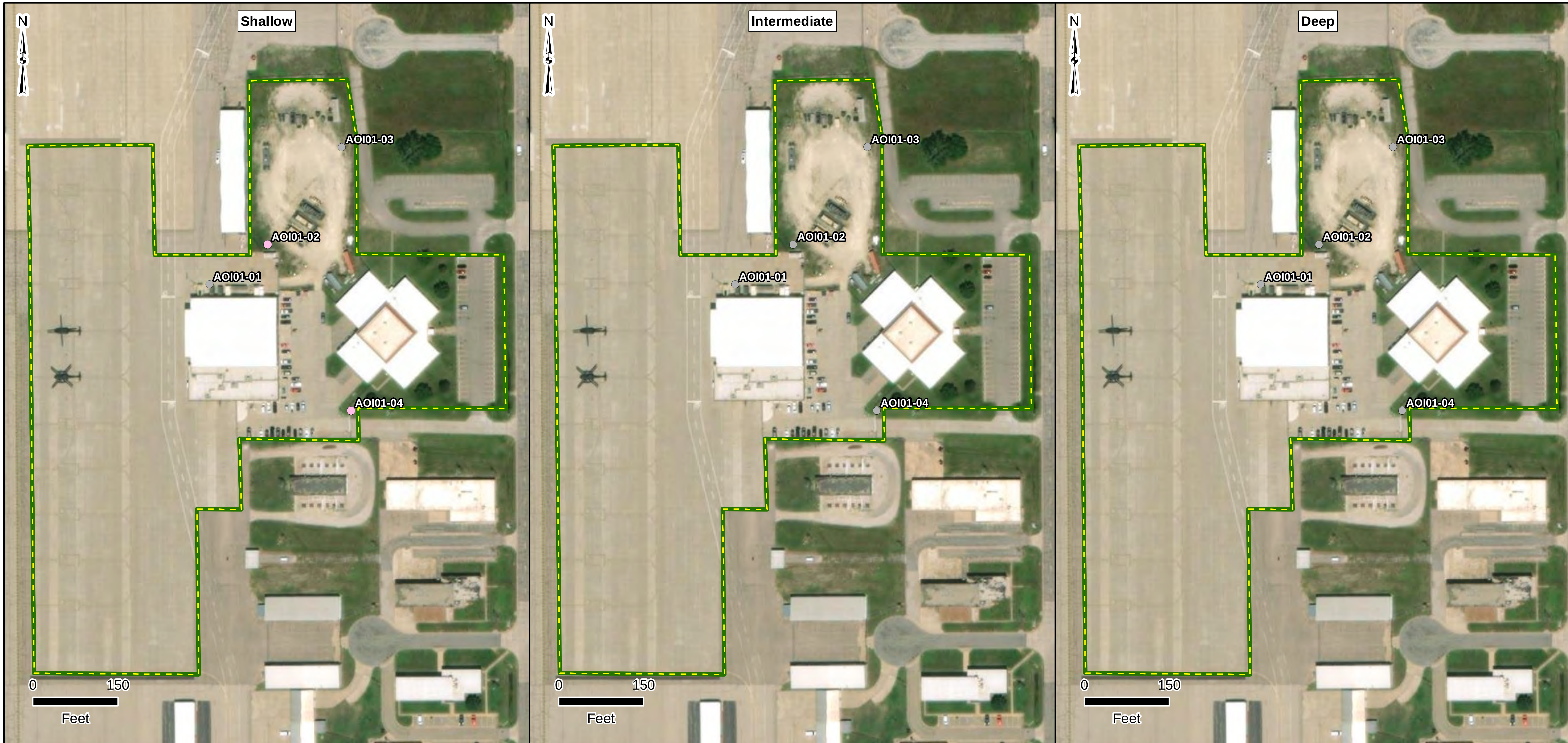
Salina, Kansas

Figure 6-5
PFNA Detections in Soil



Facility Data

Facility Boundary

PFNA Results (µg/Kg)

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

NOTES:
PFNA = Perfluorononanoic acid
ND = Non-Detect
(µg/Kg) = Microgram(s) per Kilogram
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-5 - PFNA Detections in Soil.mxd - stephane.descombes - 9/22/2022 - 3:54:20 PM

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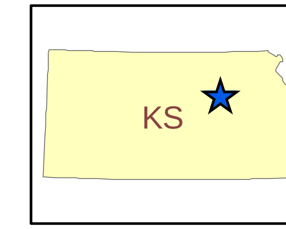
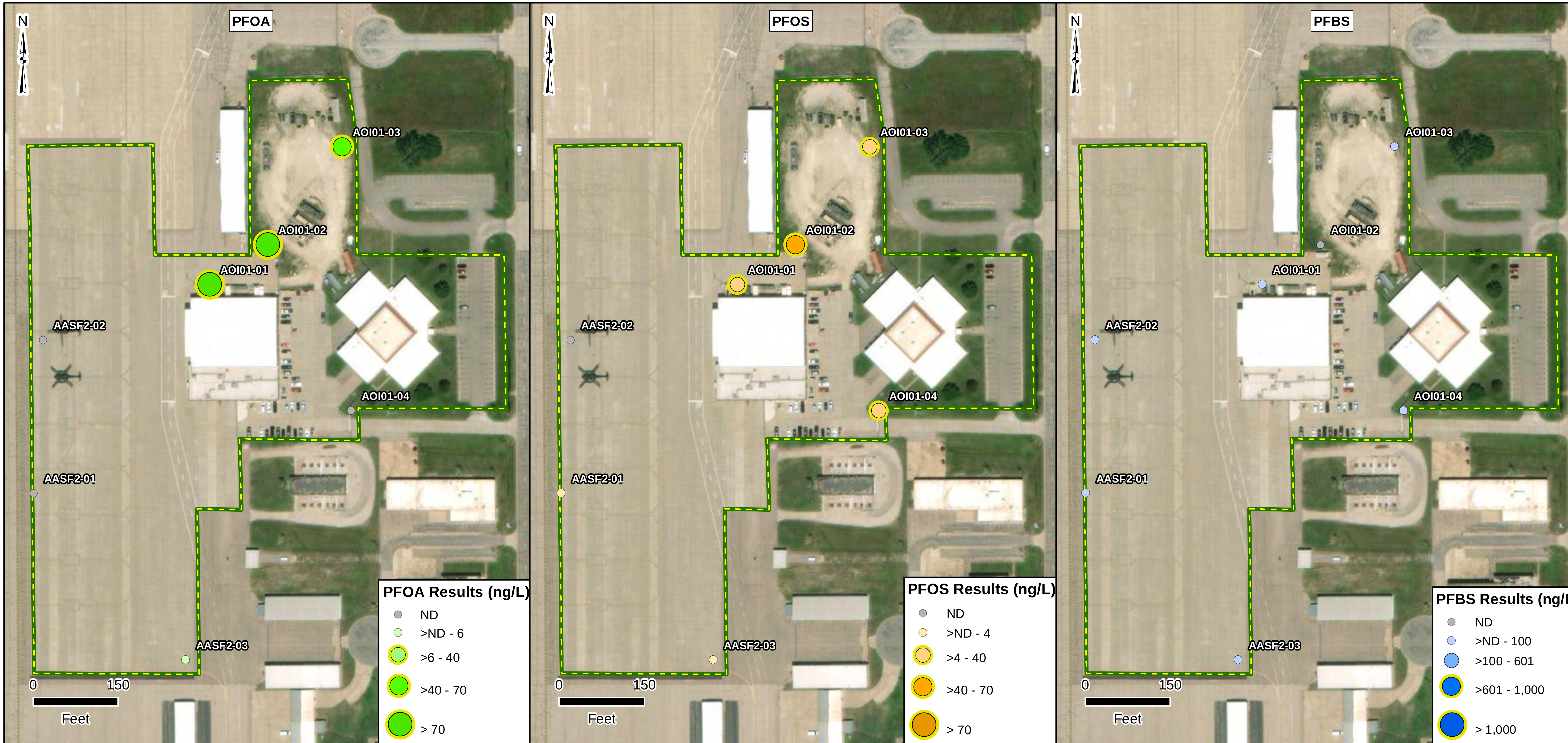
Salina, Kansas

Figure 6-6
PFOA, PFOS, and PFBS Detections in Groundwater





Facility Data

Facility Boundary

NOTES:
PFOS = perfluorooctanesulfonic acid
PFOA = perfluorooctanoic acid
PFBS = perfluorobutanesulfonic acid
ND = Non-Detect
ng/L = nanogram(s) per liter
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:.....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-6 - PFOA_PFOS_PFBS_Detections in Groundwater.mxd - patrick.mccarthy - 9/23/2022 - 1:24:59 PM

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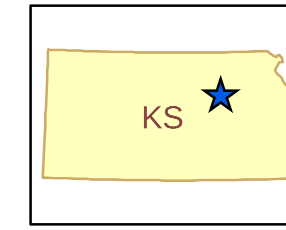
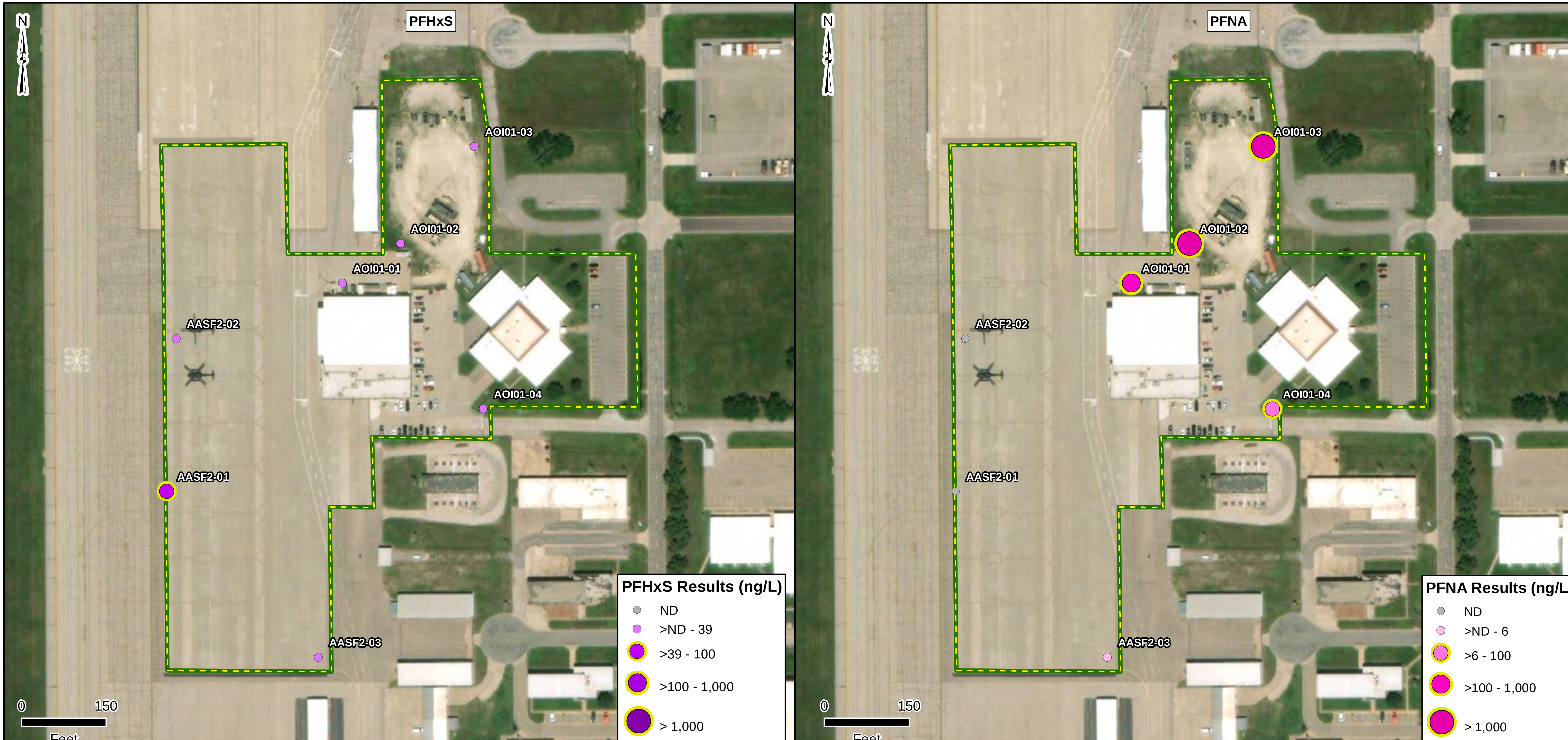
Salina, Kansas

Figure 6-7
PFHxS, and PFNA Detections in Groundwater





Facility Data

Facility Boundary

NOTES:
PFHxS = Perfluorohexanesulfonic acid
PFNA = Perfluorooctanoic acid
ND = Non-Detect
ng/L = nanogram(s) per liter
Exceedances of the OSD SL are depicted with a yellow halo

Data Sources:
ESRI 2020

Date:....................September 2022
Prepared By:..........................WSP
Prepared For:....................USACE
Projection:........NAD 83 StatePlane

K:\NGB Contract\ARNG PFAS SI\Salinas AASF\13.0 GIS\Figure 6-7 - PFHxS_PFNA_Detections in Groundwater.mxd - stephane.descombes - 9/22/2022 - 3:53:28 PM

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7. EXPOSURE PATHWAYS

The Conceptual Site Model (CSM) for the AOI, revised based on the SI findings, is presented on **Figure 7-1**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to RI or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the Facility 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 no identified complete 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 the relevant compounds above the SLs. Areas with an identified potentially complete pathway and a complete pathway may warrant further investigation. Although the CSMs indicate whether potentially complete exposure pathways may exist, the recommendation for future study in a 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 EPA guidance for risk screening (EPA, 2001). Receptors at the Facility include site workers (e.g., Facility staff and visiting soldiers), construction workers, trespassers, recreational users outside the Facility boundary, and off-site residents.

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 the AOI based on the aforementioned criteria.

7.1.1 AOI 1

AOI 1 is located within the Facility boundary (**Figure 3-1**). There were no documented releases of PFAS to the ground surface, but PFAS-containing fire suppressants were stored at various locations on the ramp area. PFNA and PFOA were detected in the surface soil at concentrations below SLs at three boring locations (AOI01-02, AOI01-03 and AOI01-04). Site workers, trespassers 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, trespassers and construction workers are potentially complete. Relevant compounds were not detected in subsurface soil at AOI 1; therefore, the exposure pathways to subsurface soil are incomplete. The CSM is presented on **Figure 7-1**.

7.2 GROUNDWATER EXPOSURE PATHWAY

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

7.2.1 AOI 1

PFNA, PFOS and PFOA were detected above their respective SLs in groundwater samples collected at AOI 1. PFHxS was detected in boundary samples upgradient of AOI 1 at concentrations exceeding its SL. Based on the results of the SI at AOI 1, ground disturbing activities that extend to the water table could result in construction worker exposure to PFHxS, PFNA, PFOA and PFOS via incidental ingestion. The concentration at the potential point of exposure for off-site residents is not known, therefore, the exposure pathway for ingestion is potentially complete for off-site residential receptors. Drinking water for Salina AASF #2 is supplied by the City of Salina; therefore, the pathway for ingestion of shallow groundwater by a site worker and trespasser is incomplete. The CSM is presented in **Figure 7-1**.

7.3 SURFACE WATER AND SEDIMENT EXPOSURE PATHWAY

There is no surface water located at the Facility, however, tributaries of the Saline River, such as Dry Creek, run into the Solomon River approximately 16 miles northeast. Intermittent stream channels are present near the Facility, indicated by dry but well-formed channels. According to the site Spill Prevention, Control, and Countermeasure Plan, surface flow from the Facility eventually drains into these unnamed, intermittent tributaries of the Saline River. Stormwater has the potential to transport AFFF or PFAS-impacted soils to water bodies. No surface water or sediment samples were collected as part of the SI.

7.3.1 AOI 1

There were no documented releases of PFAS to the ground surface outside the hangar, but PFAS-containing fire suppressants were stored at the Facility, and there is the potential for PFAS at the Facility. There are no documented incidents of PFAS-containing (or potentially containing) fire suppressants being discharged to the stormwater system. Due to the presence of PFAS in surface soil (PFNA and PFOA detected at concentrations below SLs), there is the potential for stormwater to transport PFAS-impacted soil particles to Dry Creek and unnamed, intermittent tributaries of the Saline River, and ultimately to the Saline River and expose the potential recreational user by ingestion of surface water. The CSM is presented in **Figure 7-1**.

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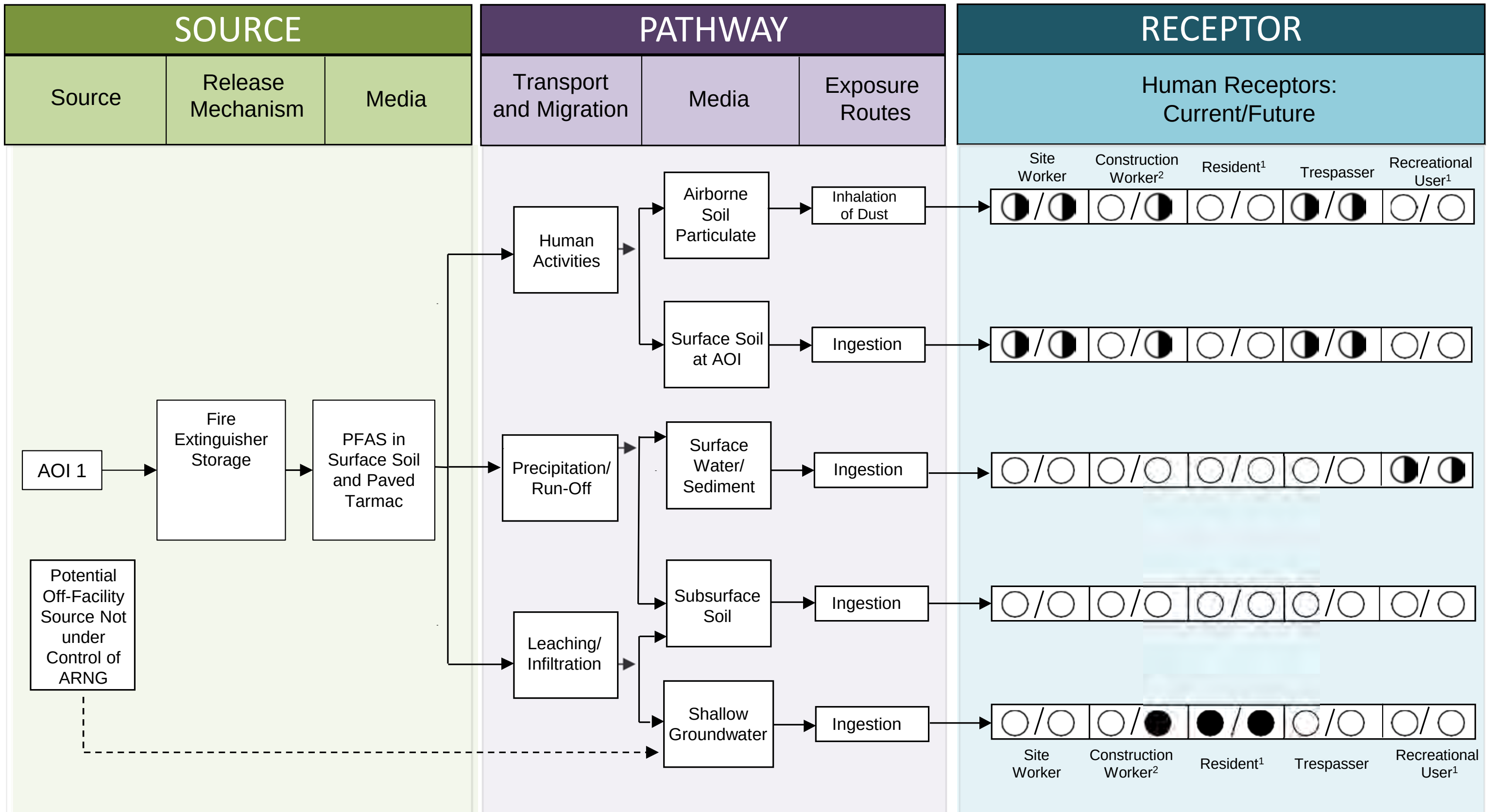

LEGEND

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

Notes:

1. The resident and recreational user refer to off-facility receptors.
2. No active construction was occurring within AOI 1 at the time of demobilization following SI field work completion.

Figure 7-1
Conceptual Site Model, AOI 1
Salina AASF #2, Kansas

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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 at the Facility were conducted in two sampling events; the first from 17 August to 19 August 2021 and the second one from 25 January to 27 January 2022. The SI field activities included soil and groundwater sampling. Field activities were conducted in accordance with the UFP-QAPP Addendum (EA/Wood, 2021a) and Supplemental SI Addendum to UFP-QAPP, except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI UFP-QAPP Addendum (EA/Wood, 2021a), samples were collected and analyzed for 24 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows.

- Twelve (12) soil grab samples from four boring locations
- Seven (7) grab groundwater samples from seven temporary well locations
- Eleven (11) QA/QC samples.

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

8.2 OUTCOME

Based on the results of this SI, further evaluation under CERCLA in the form of a RI is warranted for AOI 1. Based on the CSM developed and revised based on the SI findings, there is potential for exposure to site workers, construction workers, and trespassers during surface soil-disturbing activities in AOI 1. Additionally, groundwater may flow towards nearby municipal drinking water resources; however, multiple adjacent sources of PFAS in groundwater are present surrounding the Facility and may comingle (**Section 3.2**).

Sample analytical concentrations collected during the SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to SLs is as follows:

At AOI 1:

- PFOA, PFOS, PFNA, PFHxS and PFBS were detected in groundwater in the AOI 1 source area and near the upgradient Facility boundary. PFOA, PFOS, PFNA and/or PFHxS exceeded the SL in groundwater in five of the seven temporary wells. PFOA had maximum concentration of 860 ng/L. PFOS had a maximum concentration of 58 ng/L. PFNA had a maximum concentration of 530 ng/L. PFHxS had a maximum concentration of 66 ng/L. PFBS did not exceed the SL. The maximum PFHxS concentration was detected in upgradient boundary monitoring well AASF2-01, whereas the maximum concentrations of the other relevant compounds exceeding SLs were identified in monitoring well AOI01-02 associated with AOI 1. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.

- There is a degree of uncertainty to the local groundwater flow calculations due to the fact that groundwater elevations were collected from temporary monitoring wells rather than permanent developed wells. The groundwater modeling report, prepared for the Former Schilling Air Force Base and the region around it, including the Facility, is a more reliable indication of the local/regional groundwater flow as it included numerous permanent groundwater wells screened at different interval. The groundwater modeling report shows that the regional groundwater flow is to the northeast (Dragun Corporation, 2018).

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 and the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI.

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Fire Extinguisher Storage	◐	●	●	Proceed to RI

Legend:
● = Detected; exceedance of screening levels
◐ = Detected; no exceedance of screening levels
○ = Not detected

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