FINAL
Site Inspection Report
Lansing Hangar, Michigan

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

May 2022

Prepared for:

Army National Guard Bureau
111 S. George Mason Drive
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UNCLASSIFIED

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Table of Contents

Appendices

Figures

Tables

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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARFF	Aircraft Rescue and Firefighting Facility
ARNG	Army National Guard
ASTM	American Society for Testing and Materials
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CRAA	Capital Region Airport Authority
CSM	conceptual site model
DA	Department of the Army
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct push technology
DQI	data quality indicator
DQO	data quality objective
DUA	data usability assessment
DVR	data validation report
EGLE	Michigan Department of Environment, Great Lakes, and Energy
EIS	extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
ERB	equipment rinsate blank
FedEx	Federal Express
FRB	field reagent blank
FTA	Fire Training Area
gps	global positioning system
HA	Health Advisory
HQ	Hazard Quotient
HDPE	high-density polyethylene
IDW	investigation-derived waste
IIS	injection internal standards
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control spike

LCSD	laboratory control spike duplicate
LOQ	limit of quantitation
MDL	method detection limit
MDOT	Michigan Department of Transportation
MIARNG	Michigan Army National Guard
MPART	Michigan PFAS Action Response Team
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
ORP	oxidation-reduction potential
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic acid
PID	photoionization detector
PQAPP	Programmatic UFP-QAPP
PVC	poly-vinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCRA	Time-Critical Removal Action
TOC	total organic carbon
TPP	Technical Project Planning

UCMR 3	Unregulated Contaminant Monitoring Rule 3
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

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Executive Summary

The Army National Guard (ARNG) G9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs). An SI was completed at the Lansing Hangar in Lansing, Michigan. The Lansing Hangar will also be referred to as the “facility” or “C-12 Hangar” throughout this document.

Lansing Hangar at Capital Region International Airport, 3700 Capital City Boulevard, is located in the City of Lansing, Michigan, in south central Clinton County, close to the junction of Ingham County, Clinton County, and Eaton County. The facility is surrounded by Capital Region International Airport property, south of the runways and terminal. Lansing Hangar consists of a one-story, cinderblock office building and an attached single-bay hangar. Michigan ARNG (MIARNG) operations in Lansing Hangar currently include aircraft maintenance and aircraft support for the National Guard.

During the PA for PFAS, one potential PFAS release area, the C-12 Hangar, was identified due to an existing data gap regarding historical activities at the hangar (AECOM, 2020). An additional potential PFAS release area, the Extinguisher Training Area, was identified after completion of the PA. PFAS-containing aqueous film-forming foam (AFFF) may have been released during a familiarization training exercise with a fire extinguisher. The potential PFAS release areas were grouped into one AOI, AOI 1, which was investigated during the SI. The field activities were conducted from 22 to 30 July 2021 and included the collection of soil and groundwater samples.

To fulfill the project Data Quality Objectives set forth in the approved SI Quality Assurance Project Plan Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of 18 PFAS by liquid chromatography with tandem mass spectrometry compliant with Quality Systems Manual 5.3 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.7** of this Report.

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

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

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

- At AOI 1, PFOA in groundwater at the C-12 Hangar exceeded the SL of 40 nanograms per liter (ng/L), at a concentration of 80.1 ng/L at the most downgradient temporary well location, AOI01-03. Based on the results of the SI, further evaluation of AOI 1 is warranted in the Remedial Investigation (RI).

- The detected concentrations of PFOA, PFOS, and PFBS in soil at AOI 1 were below the SLs.

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

Table ES-3 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1.

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

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

Notes:

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

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area
1	C-12 Hangar	◐	●
	Extinguisher Training Area	◐	◐

Legend:

N/A = not applicable

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

Table ES-3: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	C-12 Hangar	One exceedance of an SL in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
	Extinguisher Training Area	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil. Uncertainty remains regarding exact location of release.	

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1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites, ARNG Installations, Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at the Lansing Hangar in Lansing, Michigan. The Lansing Hangar is also referred to as the “facility” or “C-12 Hangar” throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; United States Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as per- and polyfluoroalkyl substances (PFAS). The term PFAS is used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

A PA was performed at Lansing Hangar (AECOM, 2020) that identified one potential PFAS release area at the facility. One additional potential PFAS release area was discovered following the PA, and both potential PFAS release areas were grouped into one Area of Interest (AOI). The objective of the SI is to identify whether there has been a release to the environment from the AOI and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

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

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

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

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2. Facility Background

2.1 Facility Location and Description

Lansing Hangar at Capital Region International Airport, 3700 Capital City Boulevard, is located in the City of Lansing, Michigan, in south-central Clinton County, close to the junction of Ingham County, Clinton County, and Eaton County. The facility is bordered in the immediate area by Capital City Boulevard and Port Lansing Road in the south-central portion of the airport (**Figure 2-1**). The facility is surrounded by Capital Region International Airport property, south of the runways and terminal. Undeveloped land and agricultural farmlands are located to the north of the airport, a public golf course and cemetery are located to the west, and residential and business districts are located to the east and south. The Capital Region International Airport was originally built in 1927-1928 and has undergone major expansions since that time. In 1980, an airport fire station was built (Capital Region Airport Authority [CRAA], 2006).

Lansing Hangar consists of a one-story, cinderblock office building and an attached single-bay hangar. The office building was constructed in 1966, and the single-bay hangar was added in 1992. The total facility area is approximately 10,000 square feet, and the original office building construction was first occupied by the Jackson National Insurance Company. Michigan ARNG (MIARNG) has leased the building and hangar from the Michigan Department of Transportation (MDOT) since 13 December 1992 (MDOT, 1992). The original lease spanned from December 1992 to December 2012, at which point the lease was extended for 10 years with an option to extend further, if deemed necessary (MDOT, 2012).

2.2 Facility Environmental Setting

The Capital Region International Airport, formerly Lansing Capital City Airport, is located in the lower peninsula of Michigan, in the Central Lowlands Physiographic Province. The province is part of the Interior Plains division of the US and is characterized by flat lands with glacial geomorphic remnants at elevations of 2,000 feet or less (National Park Service, 2017). The terrain is relatively flat due to glacial scouring and deposition of glacial till, with the elevation at Capital Region International Airport ranging from 840 to 860 feet above mean sea level and possessing a gentle gradient to the north and east (US Geological Survey [USGS], 2018) (**Figure 2-2**).

2.2.1 Geology

The facility area is underlain by Quaternary-aged medium-textured glacial till ranging 10 to 30 meters in thickness. The till may either present as a till plan or as an end moraine with small areas of outwash (Farrand and Bell, 1982).

Bedrock units in the area are the Lower Pennsylvanian-aged Saginaw Formation and the Upper Pennsylvanian-aged Grand River Formation. The Saginaw Formation is approximately 400-feet thick and is composed mainly of an upper shale unit, main coal unit, lower shale unit, and underlying quartz sandstone unit, which vary in thickness and presence across Michigan (Stark and McDonald, 1980). The depositional environment of the Saginaw represents a typical marine beach and backwater lagoon setting, where the wave- and wind-worked sands and low-energy black muds of the sandstone and shale were deposited respectively. The low-energy environment of the lagoon also accounts for the deposition of the coal lenses and black limestones found within the formation (Milstein, 1987).

The overlying geologic unit is primarily the Grand River Formation, which is composed of sandstone with minor interbedded shale. Bedrock is found beginning approximately 30 to 50 feet below ground surface (bgs) at the facility (ABF Environmental, 2016). The Grand River, formed after the retreat of the last Pleistocene glaciers, likely cuts its current course through joint structures in the bedrock (Milstein, 1987). Red bed deposits from the Jurassic age are also known to exist in the central Basin area in isolated occurrences. These red beds were formed entirely under glacial cover and consist of sandstone, shale, and minor limestone and gypsum (Gillespie, Harrison, and Grammer, 2008).

Soil borings completed during the SI found a lithology of predominately unconsolidated clays and silts overlying and underlying 1 to 9.8-foot lenses of fine- to medium-grained sands with varying amounts of fines. The borings were completed at depths between 20 and 27 feet bgs within lean clay. The soils with a clay and silt matrix are representative of glacial till, whereas the layers of well-sorted sands may represent glacial outwash.

2.2.2 Hydrogeology

The bedrock formations of the Lower Michigan Basin are typically sedimentary deposits of Carboniferous age, and the bedrocks of the Lansing area fall under this classification. Structural deformation in the region was limited to the actions of the last glacial advance and retreat, resulting only in minor jointing of the bedrock; therefore, aquifer conductivity is dependent on the primary porosity of the unit. The aforementioned Saginaw Formation is one such deposit that acts as the main aquifer for much of central Michigan including Michigan's capital, Lansing. Using online resources, such as state and local Geographic Information System databases, wells were researched to a 4-mile radius of the facility. The depth to groundwater is approximately 30-40 feet bgs, based on static water level data for nearby private and public drinking water wells screened in bedrock (Michigan Department of Environment, Great Lakes, and Energy [EGLE], 2022). Perched groundwater at Capital Region International Airport was observed in monitoring wells as shallow as 2 feet bgs to as deep as 23 feet bgs (SME, 2015).

Drinking water in the surrounding area is primarily sourced by groundwater wells that are situated in the Saginaw aquifer. Drinking water for the facility is provided by the municipality (Michigan Department of Military and Veteran Affairs, 2016). There are 15 groundwater wells within 1 mile of the facility (**Figure 2-3**), two of which are potable wells within the boundaries of the Capital Region International Airport used to service the Aircraft Rescue and Firefighting Facility (ARFF). Three Type I public wells and one commercial well are situated downgradient from the facility. The remaining wells are domestic wells except for one commercial well (EGLE, 2022). Regional groundwater is assumed to flow generally south/southeast, following the surface topography towards the Grand River, which is 1.2 miles south of the facility.

Additionally, the Unregulated Contaminant Monitoring Rule 3 (UCMR 3) data were assessed for public water systems within 20 miles of the facility. Under the UCMR 3 regulations, six PFAS compounds are analyzed. All six PFAS compounds were reported as non-detect in UCMR 3 samples (USEPA, 2017a). PFAS analyses performed in 2016 had method detection limits (MDLs) that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR 3 but might be detected if analyzed today.

Depths to water measured in July 2021 during the SI ranged from 15.2 to 23.5 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-4** and indicate groundwater flow direction is generally to the southeast.

2.2.3 Hydrology

The Lansing area is located approximately 75 miles southwest of Saginaw Bay and approximately 82 miles east of Lake Michigan. The Grand River is 1.2 miles south of the facility. The entirety of the facility falls within the Grand River Watershed, and the ground cover is predominately paved with some grassy areas (**Figure 2-5**).

Storm water from paved areas flows into various catchments on the ground that drain into the Grand River or are collected in a retention pond on the southwest corner of the Capital Region International Airport. Edwards Drain is located to the west, and Reynolds Drain is located to the east. Both drains are part of a separate storm water drainage system authorized by the MS4 Watershed General Permit (CRAA, 2006). Reynolds Drain captures the majority of the airport's storm water runoff and conveys the storm water to the Grand River. The Capital Region International Airport is serviced by the Lansing Board of Water and Light for water and sewage utilities.

2.2.4 Climate

Clinton County is located in the Southeastern Lake Michigan River Basin, within the South-Central Lower Michigan Climatic Division, which is bounded by the Indiana and Ohio borders to the south and includes the cities of Lansing, St. Johns, and Owosso to the north. The South-Central Lower Michigan Climatic Division is designated as predominately continental, with large seasonal variations characterized by hot summers and cold winters. Compared to areas at the same latitude near the Great Lakes, the climatic division has larger temperature variations and minimal lake effects that lead to increased cloudiness during late fall and early winter (Great Lakes Integrated Sciences and Assessments, n.d.).

The area of Clinton County experiences seasonal temperatures, varying from summer highs of 80.8 degrees Fahrenheit (°F) to winter lows of 26.4 °F; the average annual temperature is 48.6 °F. Prolonged periods of hot, humid weather in the summer and extreme cold weather in the winter are not typical for the area (National Oceanic and Atmospheric Administration, 2021).

Precipitation is unevenly distributed during the year, falling primarily as snowfall in the winter months well into April, with an average annual of 50.2 inches of snowfall; the remainder falls as rain, distributed evenly throughout the year, with an average annual of 33.3 inches (National Oceanic and Atmospheric Administration, 2021).

2.2.5 Current and Future Land Use

MIARNG operations in Lansing Hangar currently include aircraft maintenance and aircraft support for the National Guard. The facility is staffed by both full- and part-time employees and shares tarmac space with the surrounding Capital Region International Airport.

The eastern and southern borders of the Capital Region International Airport are abutted primarily by residential and business districts. Undeveloped land and agricultural farmlands are located to the north of the airport, and a public golf course and cemetery are located to the west. Future land development and expansion projects for the Capital Regional International Airport are expected to occur in surrounding property areas (CRAA, 2006). Reasonably anticipated future land use is not expected to change from the current land use described above for the Lansing Hangar.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

The following insects, plants, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Clinton County, Michigan (US Fish and Wildlife Service [USFWS], 2021).

- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)
- **Mammals:** Indiana bat, *Myotis sodalis* (endangered); Northern long-eared bat, *Myotis septentrionalis* (threatened)
- **Reptiles:** Eastern massasauga rattlesnake, *Sistrurus catenatus* (threatened)

- **Clams:** Snuffbox mussel, *Epioblasma triquetra* (endangered)
- **Flowering plants:** Eastern prairie fringed orchid, *Platanthera leucophaea* (threatened)

2.3 History of PFAS Use

During the PA for PFAS, one potential PFAS release area, the C-12 Hangar, was identified due to an existing data gap regarding historical activities at the hangar (AECOM, 2020). Following the PA, additional information was learned about a potential release of aqueous film forming foam (AFFF) in the grassy area between the apron east of the hangar door and the adjacent police building to the north. In the late 1990s or early 2000s, at least one familiarization training exercise event occurred that resulted in discharge of an unknown type of foam from a single fire extinguisher. The potential PFAS release areas were grouped into one AOI based on proximity to one another and presumed groundwater flow. A description of AOI 1 is presented in **Section 3**.

2.4 Other PFAS Investigations

The CRAA has been collecting drinking water samples for PFAS from two potable wells located at the Capital Region International Airport's ARFF since October 2018. The two potable wells continue to be sampled on an approximately semi-annual basis (CRAA and Triterra, 2020). All potable well sampling results have been non-detect for PFAS as to date of this report (Michigan PFAS Action Response Team [MPART], 2021a-b).

In March 2021, the CRAA conducted a PFAS Phase I Investigation that involved soil, groundwater, drinking water, surface water, and sediment sampling at the Capital Region International Airport. Three areas (Area A, Area B, and Area C) where AFFF had been historically used through ARFF activities were investigated (CRAA and Triterra, 2020). All three areas of investigation, as shown on **Figure 3-1**, had exceedances of the Michigan Part 201 Generic Cleanup Criteria in groundwater. Additionally, surface water samples collected from the Reynolds Drain within the airport's drainage system exceeded the Michigan Part 31 Water Quality Standards (MPART, 2021a). The PFAS Phase II Investigation was conducted in November 2021 and the results of the investigation are pending as to date of this report (MPART, 2021b).

On 27 May 2021, EGLE conducted a precautionary PFAS investigation for drinking water from 11 potable wells surrounding the Capital Region International Airport to the southwest and east. Three municipal water sources were also sampled for PFAS. All results were measured to be non-detect for PFAS (MPART, 2021a-b).

On 24 August 2021, a small commuter plane crashed at the east end of Runway 28 at the Capital Region International Airport. The resulting fire was extinguished with 105-gallons of AFFF and 105,000-gallons of water. Clean up and response actions included the removal of 800 cubic yards of soil from the impacted area and approximately 7,000 gallons of water from Reynolds Drain (MPART, 2021a-b).

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Lansing Hangar, MI			
REVISED	11/4/2021	GIS BY	MS	11/4/2021
SCALE	1:63,360	CHK BY	ST	11/4/2021
Base Map: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN,		PM	CM	11/4/2021

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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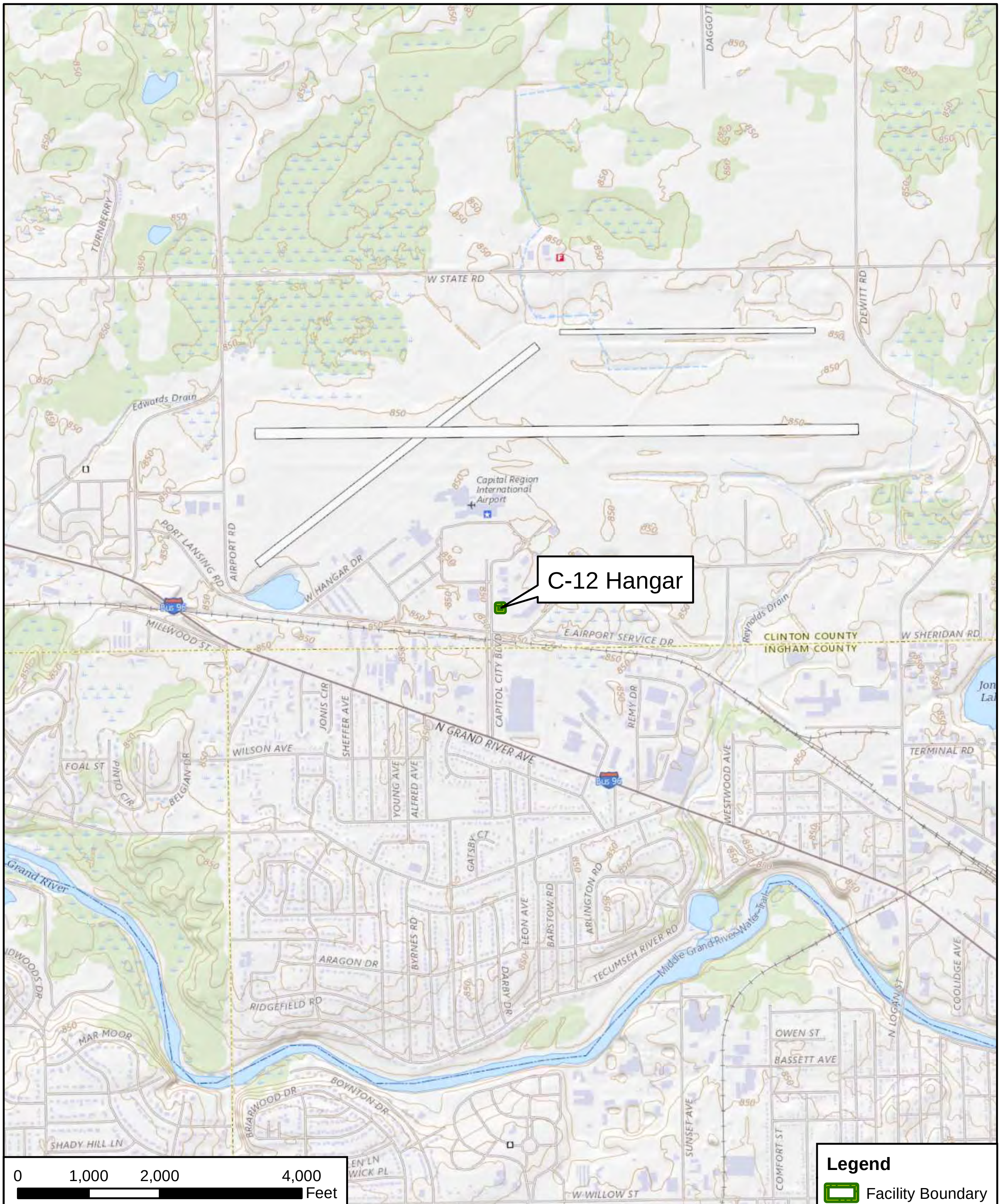

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Lansing Hangar, MI			
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SCALE	1:24,000	CHK BY	ST	12/1/2021
Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	12/1/2021

Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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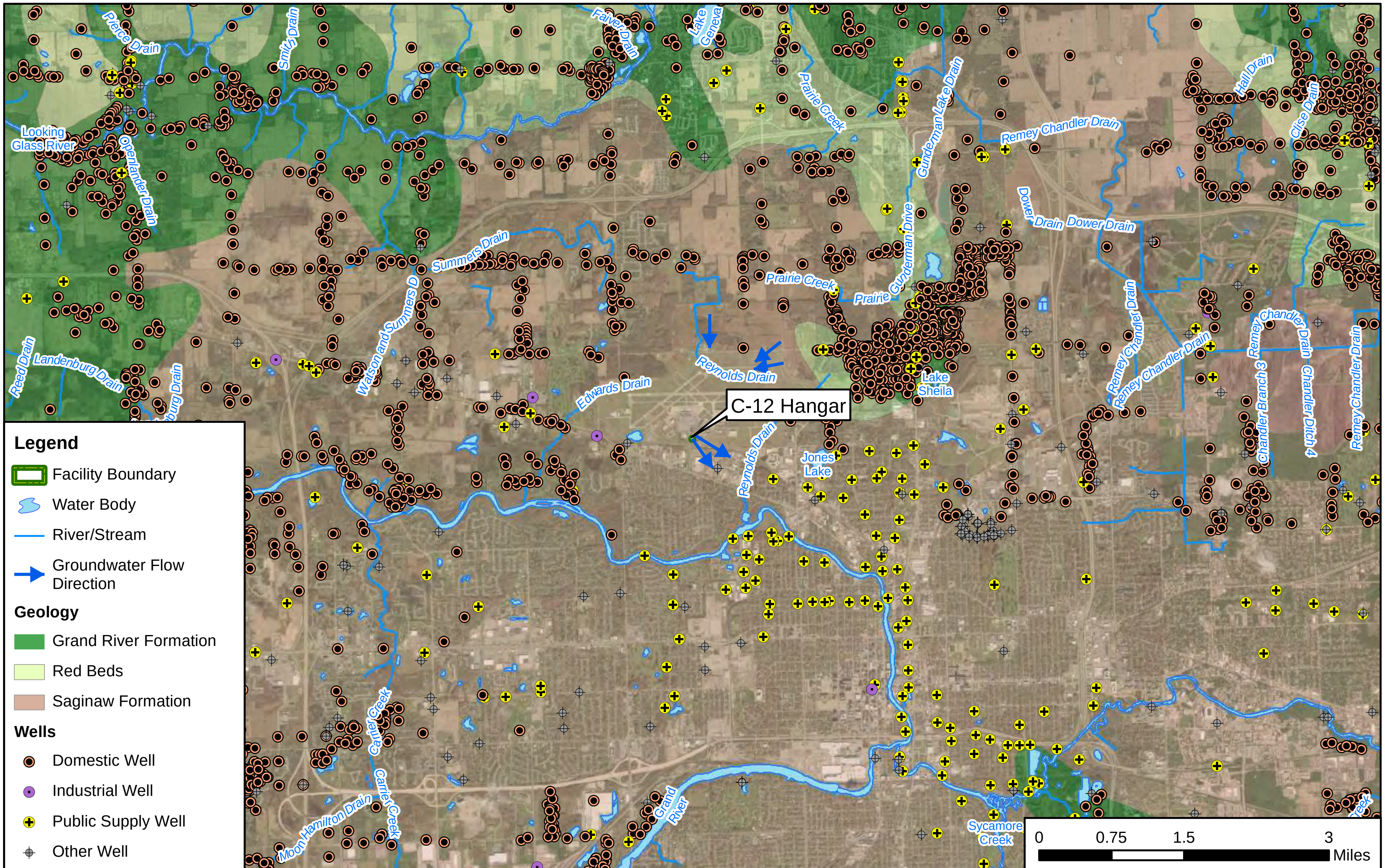

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Lansing Hangar, MI			
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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	3/9/2022

TITLE

Groundwater Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

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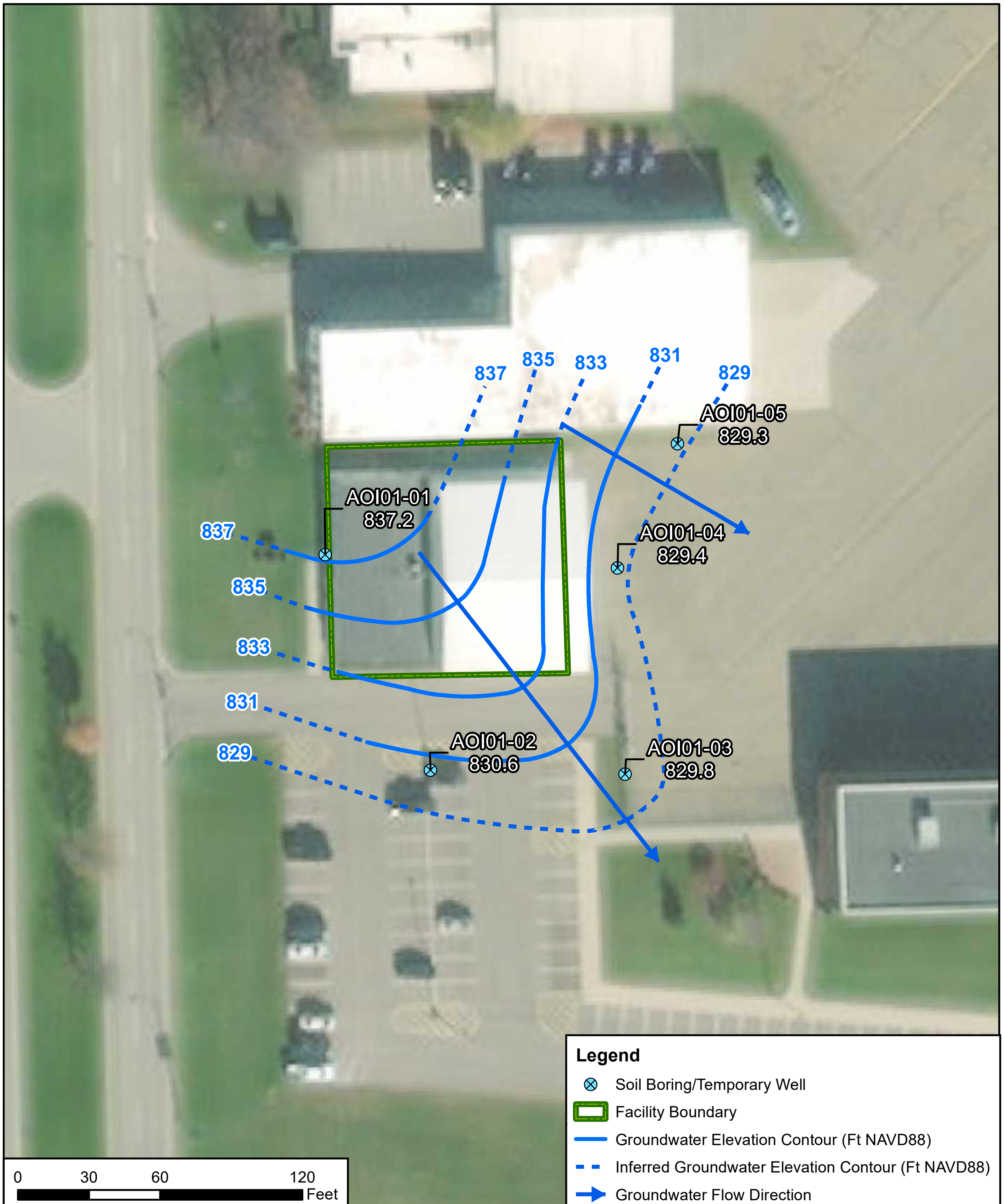

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Lansing Hangar, MI			
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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	12/2/2021

Groundwater Elevations, July 2021

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

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CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Lansing Hangar, MI			
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Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	3/9/2022

TITLE

Surface Water Features

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

This section presents a summary of each potential PFAS release area by AOI. During the PA for PFAS, one potential PFAS release area, the C-12 Hangar, was identified (AECOM, 2020). An additional potential PFAS release area, the Extinguisher Training Area, was identified after completion of the PA. The potential PFAS release areas were grouped into one AOI and are shown on **Figure 3-1**. Three additional potential PFAS release areas (Area A, Area B, and Area C), which are being investigated for PFAS at the CRAA, are also shown on **Figure 3-1** for informational purposes but are not evaluated as part of this SI.

3.1 AOI 1

AOI 1 consists of two potential PFAS release areas. The release areas are described below.

3.1.1 C-12 Hangar

The C-12 Hangar was identified during the PA as an area where PFAS may have been incidentally spilled or discharged to the ground surface. Although there was no documented use, release, or storage of AFFF from the hangar at the time of the PA, there was a data gap in knowledge between the years 1992 (the beginning of MIARNG's property lease) and 2003; therefore, the site was recommended for an SI. The C-12 hangar has never been equipped with a fire suppression system. During the visual site inspection, floor drains within the hangar were observed leading into an oil water separator, but it is unknown whether the oil water separator discharges to stormwater or sanitary sewer. The C-12 Hangar was considered a potential PFAS release area due to the existing data gap regarding historical activities at the hangar.

3.1.2 Extinguisher Training Area

After the PA, additional information was learned about a potential release of AFFF in the grassy area between the apron east of the hangar door and the adjacent police building to the north. One facility personnel was interviewed during a site visit on 4 February 2021, and it was reported that there was a single instance of an unknown type of foam being released from one fire extinguisher during a familiarization training exercise that took place in either the late 1990s or early 2000s. The foam was sprayed at the outdoor wall of the adjacent police building before flowing onto the grass. The foam came from a green, mobile fire extinguisher cart that originated from the Grand Ledge Army Aviation Support Facility (AASF) and Armory in Grand Ledge, Michigan. The fire extinguisher was stationed at the C-12 Hangar for a few years before returning to the Grand Ledge AASF and Armory.

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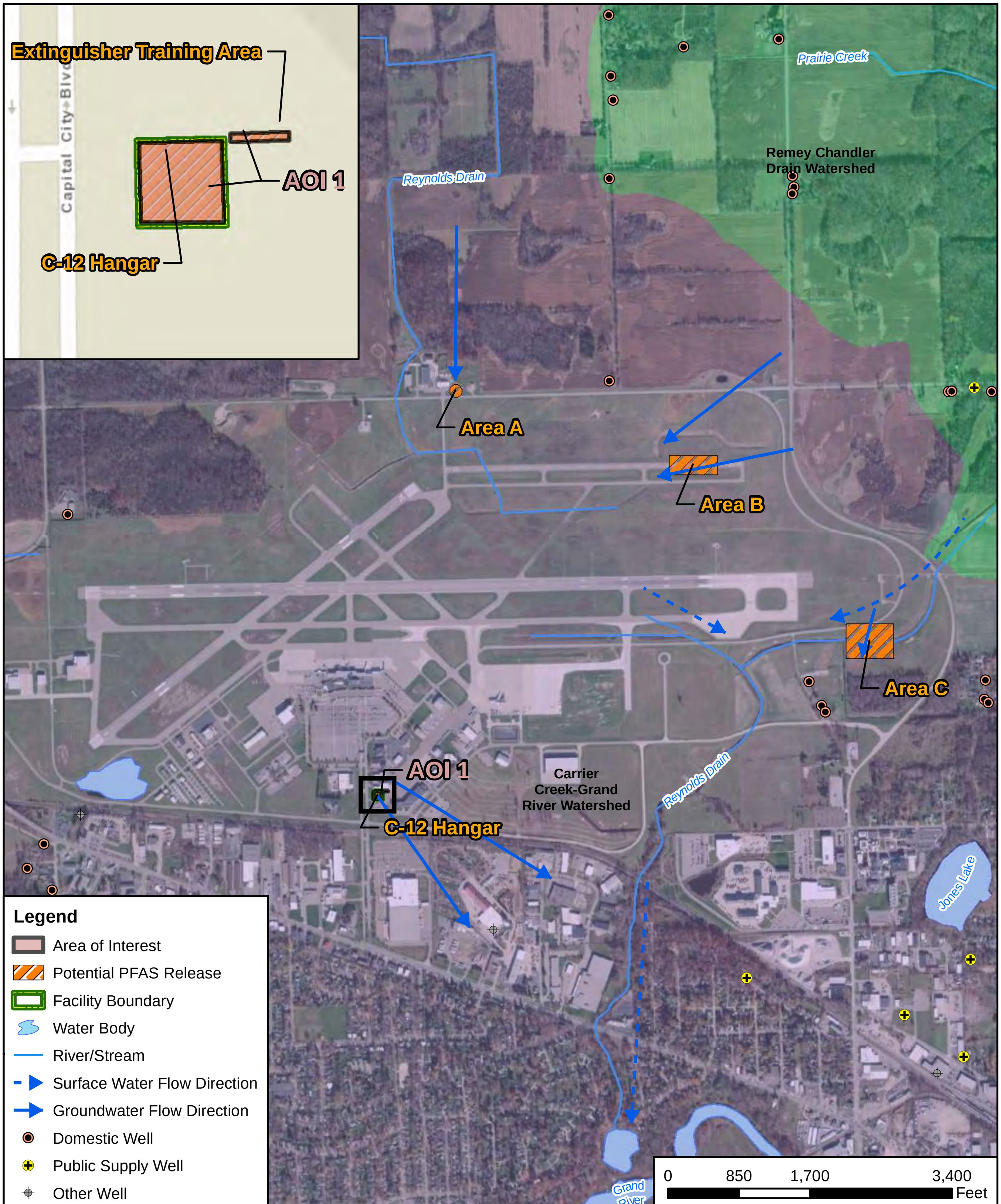

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Lansing Hangar, MI			
REVISED	3/9/2022	GIS BY	MS	3/9/2022
SCALE	1:1,920	CHK BY	ST	3/9/2022
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	3/9/2022

N

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

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

4.1 Problem Statement

The following problem statement was developed during project planning:

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

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs are presented in **Section 6.1** of this Report.

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

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

4.2 Goals of the Study

The following goals were established for this SI:

1. Determine the presence or absence of PFOA, PFOS, and PFBS at or above SLs.
2. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.

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

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

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

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

4.3 Information Inputs

Primary information inputs included:

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

4.4 Study Boundaries

The scope of the SI was horizontally bounded by the property limits of Lansing Hangar (limited to the hangar building itself). However, off-facility sampling was also included in the scope of this SI to extend the sampling footprint beyond Lansing Hangar. Therefore, the proper stakeholders were notified, and necessary rights of entry were obtained by ARNG with the property owner(s).

4.5 Analytical Approach

Samples were analyzed for PFAS by liquid chromatography with tandem mass spectrometry (LC/MS/MS) compliant with Quality Systems Manual (QSM) 5.3 Table B-15 by Pace Analytical Gulf Coast, accredited under the DoD Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs and decision rules as defined in the SI QAPP Addendum (AECOM, 2021a). These rules governed response actions based on the results of the SI sampling effort.

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

Groundwater:

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

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

Soil:

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

Soil and groundwater samples were collected from each of the potential release areas. Groundwater was encountered at approximately 15.2 to 23.5 feet bgs.

4.6 Data Usability Assessment

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

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

4.6.1 Precision

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

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

LCS/LCS duplicate (LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. The LCS/LCSD samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021a) with limited exceptions. One LCS/LCSD displayed RPD exceedances for several target analytes. The positive field sample results were qualified as estimate with an indeterminate bias, while the non-detect results should be considered usable as reported.

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

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021a).

4.6.2 Accuracy

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

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis. The LCS/LCSD samples were within the project established accuracy limits presented in the SI QAPP Addendum (AECOM, 2021a).

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. The MS/MSD samples were within the project established control limits presented in the SI QAPP Addendum (AECOM, 2021a) with one exception. The MSD performed on parent sample AOI01-04-SB-20-22 displayed a percent recovery for PFOA less than the lower QC limit. The associated field sample result was qualified as estimate with a negative bias.

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. All field samples displayed EIS recoveries within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021a).

Injection internal standards (IIS) were added by the laboratory after sample extraction and prior to analysis as a legacy requirement of DoD QSM 5.1 to measure relative responses of target analytes. Even though not required under the current DoD QSM 5.3 analysis, the IIS are still added to the sample after extraction as an additional QC measure. The IIS percent recoveries were within the established precision limits presented in the SI QAPP Addendum (AECOM, 2021a).

4.6.3 Representativeness

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

Relating to the use of standard analytical methods, the laboratory followed the method as established in PFAS by LC/MS/MS Compliant with QSM 5.1 Table B-15, including the specific preparation requirements (i.e. ENVI-Carb or equivalent used), mass calibration, spectra, all the ion transitions identified in Table B-15 were monitored, standards that contained both branched and linear isomers, when available, were used, and isotopically labeled standards were used for quantitation.

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

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. All laboratory blanks displayed non-detect results.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The decontamination sample, LH-DECON-280721, displayed a positive result for perfluoropentanoic acid (PFPeA) greater than the detection limit (DL). All associated positive field sample results displayed results greater than five times the blank detection and should be considered usable as reported.

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

4.6.4 Comparability

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

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data meeting system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows and reflects the exclusion of “X/UX” flagged data, if applicable:

- PFAS in aqueous media by DoD QSM 5.3 Table B-15 at 100%
- PFAS in solid media by DoD QSM 5.3 Table B-15 at 100%
- pH in soil by USEPA Method 9045D at 100%
- Total organic carbon (TOC) by USEPA Method 9060 at 100%

4.6.6 Sensitivity

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

5. Site Inspection Activities

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

- *Final Preliminary Assessment Report, Lansing Hangar, Michigan* dated September 2020 (AECOM, 2020);
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Lansing Hangar, Michigan* dated June 2021 (AECOM, 2021a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b); and
- *Final Site Safety and Health Plan, Lansing Hangar, Michigan* dated July 2021 (AECOM, 2021b).

The SI field activities were conducted from 22 to 30 July 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

- Nineteen (19) soil samples from five boring locations and four hand auger locations;
- Five grab groundwater samples from five temporary well locations; and
- Thirteen (13) quality assurance (QA) 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**, land survey data are provided in **Appendix B3**, and investigation-derived waste (IDW) polygons are provided in **Appendix B4**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 17 May 2021, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, MIARNG, USACE, EGLE, MDOT, and representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021a).

A TPP Meeting 3 was held on 12 April 2022 after the field event to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the "Miss Dig" Michigan utility clearance provider to notify them of intrusive work on 13 July 2021. AECOM also contracted The Underground Detective, a private utility location service, to perform utility clearance. The Underground Detective performed utility clearance of the proposed boring locations on 22 July 2021 with input from the AECOM field team and Lansing Hangar facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be acceptable for use in a PFAS investigation prior to the start of field activities. A sample from a potable water source[1] at Lansing Hangar was collected on 4 February 2021, prior to mobilization, and analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample are provided in **Appendix F**. A discussion of the results is presented in **Section 4.6.3**.

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

5.2 Soil Borings and Soil Sampling

Soil samples were collected via hand auger and direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021a). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A concrete core drill was also used to penetrate the asphalt pavement at boring locations AOI01-02 and AOI01-04. A hand auger was used to collect surface soil samples (0 to 2 feet bgs) and clear the top five feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1** and depths are provided **Table 5-1**.

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

[1] The potable water source at Lansing Hangar is the municipal water supply, provided by the Lansing Board of Water and Light.

2 feet above the groundwater table, and one subsurface soil sample at the mid-point between the surface and the groundwater table, in accordance with the QAPP Addendum (AECOM, 2021a).

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

Soil borings completed during the SI found a lithology of predominately unconsolidated clays and silts overlying and underlying 1 to 9.8-foot lenses of fine- to medium-grained sands with varying amounts of fines. The borings were completed at depths between 20 and 27 feet bgs within lean clay. These observations are consistent with a geology comprising glacial till and glacial outwash.

AOI01-01-SB-8-9 was submitted for a grain-size analysis via American Society for Testing and Materials (ASTM) D422. The analysis indicated 40.72% silt, 28.52% fine-grained sand, 18.11% clay, 7.23% medium-grained sand, and 5.42% coarse-grained sand. This result is indicative of unsorted glacial till.

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

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

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) using bentonite chips at completion of sampling activities. Temporary wells installed in concrete and asphalt were additionally repaired with a concrete cold patch.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Once the borehole was advanced to the desired depth, wherever conditions allowed, 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**.

The temporary wells were allowed to recharge after installation before collection of groundwater samples. After the recharge period, groundwater samples were collected using a peristaltic pump with PFAS-free HDPE tubing. Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B2**) after each grab sample was collected. Additionally, a subsample of each groundwater sample was collected in a separate container, and a shaker test was completed to identify if there 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 for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

Temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with bentonite chips. Temporary wells installed in concrete and asphalt were additionally repaired with a concrete cold patch.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed on 29 July 2021, except for location AOI01-04, which was gauged on 27 July 2021 before groundwater sampling and abandoned immediately afterwards, as the location was in an active tarmac area. Groundwater elevation measurements were collected from the five new temporary monitoring wells. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by Michigan-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed wells on the facility were collected on 29 July 2021 in the applicable Universal Transverse Mercator zone projection with World Geodetic System 84 datum (horizontal) and North American Vertical Datum 1988 (vertical). The surveyed well data are provided in **Appendix B3**.

5.6 Investigation-Derived Waste

As of the date of this report, the disposal of PFAS IDW is not regulated federally. PFAS IDW generated during the SI is considered non-hazardous waste and was managed in accordance with the SI QAPP Addendum (AECOM, 2019a) and with the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Solid IDW (e.g. soil and asphalt cuttings) generated near high traffic areas or highly visible landscaped areas were containerized in one properly labeled 55-gallon drum. The 55-gallon drum was stored at a location designated by the ARNG Environmental Manager and MIARNG. ARNG will coordinate waste profiling, transportation, and disposal of the solid IDW. At all other locations, the soil cuttings were distributed on the ground surface on the downgradient side of the boring.

The solid IDW was not sampled and assumes the PFAS 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 PFAS 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 (i.e., an IDW polygon). The IDW polygons are displayed on the figure in **Appendix B4**. Other solids such as spent personal protective equipment, plastic sheeting, tubing, rope, unused monitoring well construction materials, and other environmental media generated during the field activities were disposed of at a licensed solid waste landfill.

5.7 Laboratory Analytical Methods

Samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15 at Pace Analytical Gulf Coast in Baton Rouge, Louisiana, a DoD ELAP and NELAP certified laboratory. The 18 PFAS analyzed as part of the ARNG SI program include the following:

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

Soil samples were also analyzed for TOC using USEPA Method 9060A and pH by USEPA Method 9045D.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Lansing Hangar, Michigan

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments
Soil Samples							
AOI01-01-SB-0-2	7/28/2021 14:00	0 - 2	x	x	x		
AOI01-01-SB-0-2-D	7/28/2021 14:00	0 - 2		x	x		FD
AOI01-01-SB-0-2-MS	7/28/2021 14:00	0 - 2		x			MS
AOI01-01-SB-0-2-MSD	7/28/2021 14:00	0 - 2		x			MSD
AOI01-01-SB-8-9	7/28/2021 14:29	8 - 9				x	
AOI01-01-SB-15-16	7/28/2021 14:31	15 - 16	x				
AOI01-02-SB-0-2	7/28/2021 10:01	0 - 2	x				
AOI01-02-SB-9-10	7/28/2021 12:11	9 - 10	x				
AOI01-02-SB-9-10-D	7/28/2021 12:11	9 - 10	x				
AOI01-02-SB-18-19	7/27/2021 13:36	18 - 19	x				
AOI01-03-SB-0-2	7/27/2021 13:36	0 - 2	x				
AOI01-03-SB-11-12	7/27/2021 15:30	11 - 12	x				
AOI01-03-SB-21-22	7/27/2021 15:33	21 - 22	x				
AOI01-04-SB-0-2	7/26/2021 13:46	0 - 2	x				
AOI01-04-SB-12-13	7/27/2021 10:30	12 - 13	x				
AOI01-04-SB-20-22	7/27/2021 10:55	20 - 22	x				
AOI01-04-SB-20-22-MS	7/27/2021 10:55	20 - 22	x				MS
AOI01-04-SB-20-22-MSD	7/27/2021 10:55	20 - 22	x				MSD
AOI01-05-SB-0-2	7/26/2021 11:09	0 - 2	x				
AOI01-05-SB-14-15	7/26/2021 15:20	14 - 15	x				
AOI01-05-SB-20-22	7/26/2021 15:26	20 - 22	x				
AOI01-06-SB-0-2	7/26/2021 14:55	0 - 2	x				
AOI01-07-SB-0-2	7/26/2021 12:09	0 - 2	x				
AOI01-07-SB-0-2-D	7/26/2021 12:09	0 - 2	x				FD
AOI01-08-SB-0-2	7/26/2021 15:35	0 - 2	x				
AOI01-09-SB-0-2	7/26/2021 10:35	0 - 2	x				
Groundwater Samples							
AOI01-01-GW	7/28/2021 17:27	NA	x				
AOI01-02-GW	7/30/2021 10:45	NA	x				
AOI01-03-GW	7/28/2021 10:10	NA	x				
AOI01-04-GW	7/27/2021 13:55	NA	x				
AOI01-04-GW-MS	7/27/2021 13:55	NA	x				MS
AOI01-04-GW-MSD	7/27/2021 13:55	NA	x				MSD
AOI01-05-GW	7/27/2021 12:13	NA	x				
Quality Control Samples							
LH-FRB-01	7/28/2021 14:44	NA	x				
LH-ERB-01	7/26/2021 16:00	NA	x				from hand auger
LH-ERB-02	7/28/2021 14:52	NA	x				from drilling shoe
LH-DECON-280721	7/28/2021 15:00	NA	x				from hose of water tanker

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

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Lansing Hangar, Michigan

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Grain Size (ASTM D-422)	Comments

QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Lansing Hangar, Michigan

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 [2] (feet btoc)	Depth to Water [2] (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	20	13 - 18 [1]	855.24	852.38	18.05	15.19	837.19
	AOI01-02	23	16 - 21 [1]	855.19	851.51	24.55	20.87	830.64
	AOI01-03	25	19 - 24 [1]	853.84	852.50	24.02	22.68	829.82
	AOI01-04	24.5	19.5 - 24.5	852.87	852.31	23.5	22.94	829.37
	AOI01-05	27	20.5 - 25.5 [1]	856.97	852.79	27.68	23.50	829.29

Notes:

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

[2] Depth to water was gauged on 29 July 2021 for all wells except for AOI01-04, which was gauged on 27 July 2021 before groundwater sampling and abandoned immediately afterwards

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

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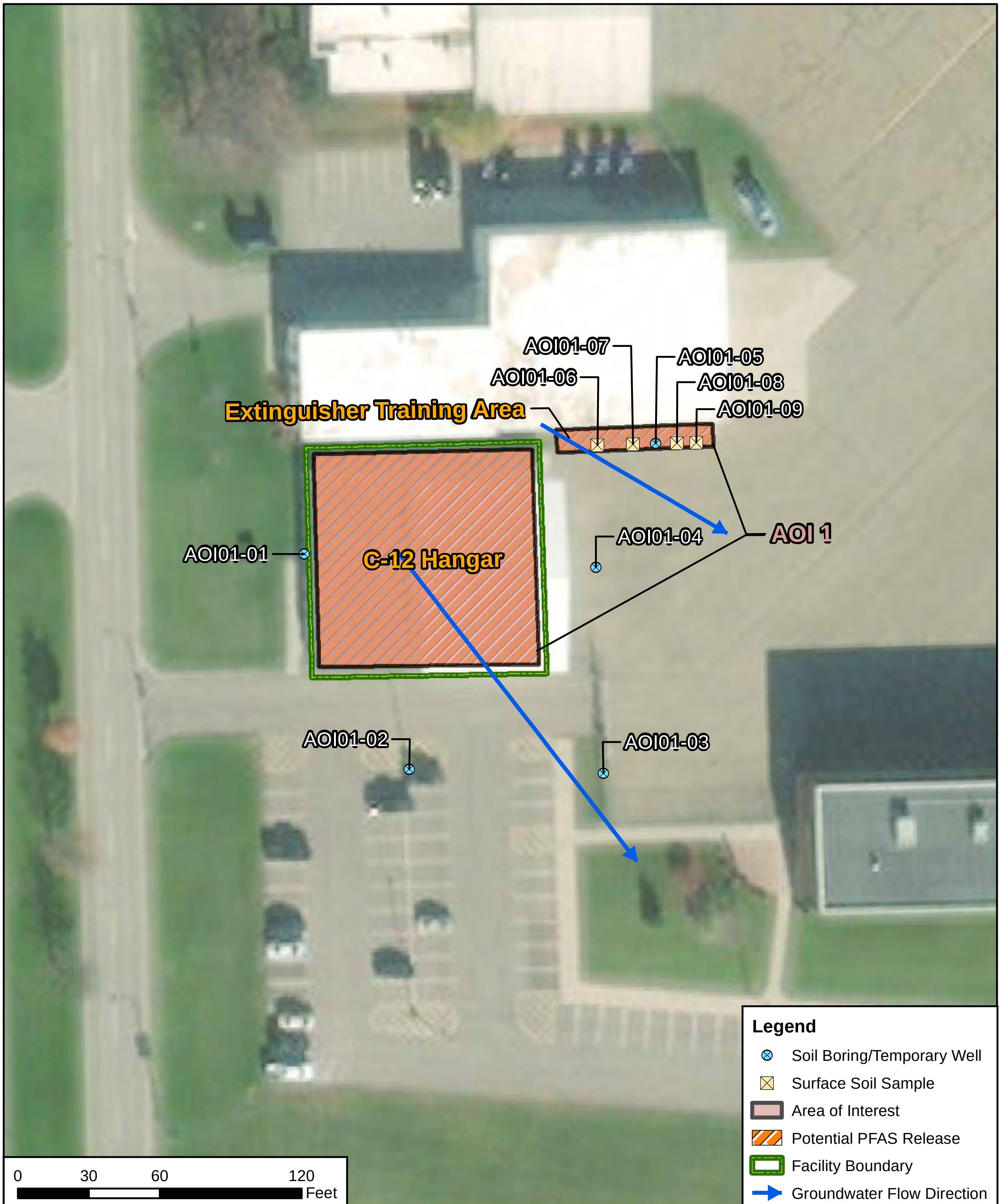

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Lansing Hangar, MI			
REVISED	12/1/2021	GIS BY	MS	12/1/2021
SCALE	1:720	CHK BY	ST	12/1/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	12/1/2021

N

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the SI results is provided in **Section 6.3**. **Table 6-2** through **Table 6-5** present PFAS results for samples with detections in soil and groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

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

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

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

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

Notes:

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

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

6.2 Soil Physicochemical Analyses

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

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate

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

6.3 AOI 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 1, which includes two potential PFAS release areas: C-12 Hangar and Extinguisher Training Area. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-5**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the two potential PFAS release areas: C-12 Hangar and Extinguisher Training Area. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** through **Table 6-4** summarize the detected compounds in soil.

At the C-12 Hangar potential PFAS release area, soil was sampled from surface soil (0 to 2 feet bgs), shallow subsurface soil (between 8 and 13 feet bgs), and deep subsurface soil (between 15 and 22 feet bgs) at boring locations AOI01-01 through AOI01-04. PFOA, PFOS, and PFBS were detected in soil, at concentrations below the SLs. In the surface and shallow subsurface soil, PFOS was detected at all four locations, with concentrations ranging from 0.063 J (estimated) micrograms per kilogram (µg/kg) to 41.5 µg/kg; the maximum PFOS concentration occurred at location AOI01-04 in the surface soil. PFOA was detected at locations AOI01-01, AOI01-03, and AOI01-04, at concentrations ranging from 0.138 J µg/kg to 0.327 J µg/kg. PFBS was detected at locations AOI01-01 and AOI01-04, at concentrations 0.051 J µg/kg and 0.036 J µg/kg, respectively.

In the deep subsurface soil at the C-12 Hangar, PFOA was detected at locations AOI01-03 and AOI01-04, at concentrations 36.3 µg/kg and 0.479 J- (estimated biased low) µg/kg, respectively. PFOS was detected only at location AOI01-03, at a concentration of 0.396 J µg/kg, and PFBS was detected only location AOI01-04, at a concentration of 0.217 J µg/kg. At all locations except for AOI01-03, a greater number of compounds at higher concentrations were observed in surface soil in comparison to shallow and deep subsurface soil. At AOI01-03, the highest concentration (PFOA at 36.3 µg/kg) was in the deep subsurface soil (21 to 22 feet bgs), which may represent the capillary fringe within the vadose zone.

At the Extinguisher Training Area potential PFAS release area, soil was sampled from the surface soil (0 to 2 feet bgs), shallow subsurface soil (14 to 15 feet bgs), and deep subsurface soil (20 to 22 feet bgs) at boring location AOI01-05. Surface soil samples were also collected at four hand auger locations, AOI01-06 through AOI01-09. PFOA, PFOS, and PFBS were detected in soil at concentrations lower than the SLs. In the surface and shallow subsurface soil, PFOA was detected at all six locations, at concentrations ranging from 0.872 J µg/kg to 7.69 µg/kg. PFOS was detected at all six locations, at concentrations ranging from 8.40 µg/kg to 18.4 µg/kg. PFBS was detected at all six locations, at concentrations ranging from 0.051 J µg/kg to 0.415 J µg/kg.

In the deep subsurface soil, PFBS was detected at location AOI01-05, at a concentration of 0.042 J µg/kg; PFOA and PFOS were not detected.

6.3.2 AOI 1 Groundwater Analytical Results

PFOA in groundwater exceeded the SL at one potential PFAS release area, AOI 1: C-12 Hangar. PFOS and PFBS did not exceed the SLs at this potential PFAS release area. PFOA, PFOS, and PFBS did not exceed the SLs in groundwater at the other potential PFAS release area, AOI 1: Extinguisher Training Area. **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-5** summarizes the detected compounds in groundwater.

At the C-12 Hangar potential PFAS release area, groundwater was sampled from temporary monitoring well locations AOI01-01 through AOI01-04. The SL of 40 nanograms per liter (ng/L) for PFOA was exceeded at AOI01-03, at a concentration of 80.1 ng/L. PFOS was detected below the SL of 40 ng/L at locations AOI01-01 and AOI01-02, with concentrations ranging from 2.62 J ng/L to 10.5 ng/L. PFBS was detected below the SL of 600 ng/L at all four locations, with concentrations ranging from 1.16 J ng/L to 18.5 ng/L. AOI01-03 is situated at the most downgradient location from C-12 Hangar, and the concentration in groundwater is consistent with the soil detections observed within this area.

At the Extinguisher Training Area potential PFAS release area, groundwater was sampled from one temporary monitoring well location, AOI01-05. PFOA and PFBS were detected below their SLs, at concentrations 10.9 ng/L and 20.5 ng/L, respectively; PFOS was not detected.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations were lower than the soil SLs. At location AOI01-03 associated with the AOI 1: C-12 Hangar potential PFAS release area, PFOA was detected in groundwater at concentrations exceeding the SL of 40 ng/L. PFOS and PFBS were detected in groundwater at concentrations below the SL. Based on the exceedances of the SL for PFOA in groundwater, further evaluation at AOI 1 is warranted.

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Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Lansing Hangar

	Area of Interest	AOI01																			
	Sample ID	AOI01-01-SB-0-2		AOI01-02-SB-0-2		AOI01-03-SB-0-2		AOI01-04-SB-0-2		AOI01-05-SB-0-2		AOI01-06-SB-0-2		AOI01-07-SB-0-2		AOI01-07-SB-0-2-D		AOI01-08-SB-0-2		AOI01-09-SB-0-2	
	Sample Date	07/28/2021		07/28/2021		07/27/2021		07/26/2021		07/26/2021		07/26/2021		07/26/2021		07/26/2021		07/26/2021		07/26/2021	
	Depth	0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
6:2 FTS	-	ND		ND		ND		1.22		2.66		8.86		16.4		10.8		0.069	J	ND	
8:2 FTS	-	ND		ND		ND		0.072	J	1.47		31.9		17.7		15.1		0.075	J	ND	
PFBA	-	0.204	J	ND		0.045	J	0.118	J	1.02	J	0.537	J	1.60		1.58		0.497	J	0.305	J
PFBS	1900	0.051	J	ND		ND		0.036	J	0.172	J	0.051	J	0.206	J	0.119	J	0.222	J	0.415	J
PFDA	-	0.198	J	0.209	J	0.083	J	0.046	J	4.88		12.4		11.8		14.4		0.801	J	0.230	J
PFDoA	-	0.118	J	0.066	J	0.034	J	ND		0.142	J	0.965	J	0.641	J	0.674	J	ND		ND	
PFHpA	-	0.148	J	ND		0.053	J	0.170	J	3.80		2.23		5.44		4.92		1.14		0.396	J
PFHxA	-	0.223	J	0.024	J	0.040	J	0.297	J	1.99		1.13		3.36		2.98		0.688	J	0.320	J
PFHxS	-	0.038	J	ND		0.039	J	0.513	J	0.783	J	0.450	J	1.71		0.546	J	1.60		0.990	J
PFNA	-	0.092	J	0.034	J	0.084	J	0.356	J	8.55		4.92		8.81		8.52		5.06		1.33	
PFOA	130	0.327	J	ND		0.138	J	0.238	J	5.41		3.75		7.69		6.52		2.43		0.872	J
PFOS	130	0.265	J	0.534	J	0.310	J	41.5		15.9		10.7		8.40		8.60		18.4		11.8	
PFPeA	-	0.287	J	ND		0.065	J	0.496	J	4.04		1.92		6.24		5.93		1.22		0.584	J
PFTeDA	-	0.044	J	ND		0.046	J	ND		0.033	J	0.213	J	0.136	J	0.135	J	ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		0.132	J	0.098	J	0.099	J	ND		ND	
PFUnDA	-	0.046	J	0.113	J	0.027	J	ND		1.50		3.18		2.91		3.50		0.185	J	0.121	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

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

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Lansing Hangar

	Area of Interest	AOI01											
	Sample ID	AOI01-01-SB-8-9		AOI01-02-SB-9-10		AOI01-02-SB-9-10-D		AOI01-03-SB-11-12		AOI01-04-SB-12-13		AOI01-05-SB-14-15	
	Sample Date	07/28/2021		07/28/2021		07/28/2021		07/27/2021		07/27/2021		07/26/2021	
	Depth	8 - 9 ft		9 - 10 ft		9 - 10 ft		11 - 12 ft		12 - 13 ft		14 - 15 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)													
6:2 FTS	-	ND		ND		ND		ND		ND		7.28	
PFBA	-	ND		ND		ND		ND		ND		0.228	J
PFBS	25000	ND		ND		ND		ND		ND		0.172	J
PFHpA	-	ND		0.035	J	0.031	J	ND		ND		1.74	
PFHxA	-	ND		0.035	J	0.041	J	ND		ND		1.09	
PFHxS	-	ND		ND		ND		ND		ND		1.29	
PFNA	-	ND		0.026	J	0.032	J	ND		ND		ND	
PFOA	1600	ND		ND		ND		ND		ND		1.01	J
PFOS	1600	0.063	J	0.746	J	0.146	J	ND		ND		ND	
PFPeA	-	ND		0.053	J	0.056	J	ND		ND		1.40	

Grey Fill — Detected concentration exceeded OSD Screening Levels

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

Interpreted Qualifiers
J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

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

Table 6-4
PFAS Detections in Deep Subsurface Soil
Site Inspection Report, Lansing Hangar

Area of Interest	AOI01									
Sample ID	AOI01-01-SB-15-16		AOI01-02-SB-18-19		AOI01-03-SB-21-22		AOI01-04-SB-20-22		AOI01-05-SB-20-22	
Sample Date	07/28/2021		07/28/2021		07/27/2021		07/27/2021		07/26/2021	
Depth	15 - 16 ft		18 - 19 ft		21 - 22 ft		20 - 22 ft		20 - 22 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)										
6:2 FTS	ND		ND		ND		0.106	J	ND	
PFBA	ND		ND		ND		0.043	J	ND	
PFBS	ND		ND		ND		0.217	J	0.042	J
PFHpA	ND		ND		0.112	J	0.157	J	ND	
PFHxA	0.027	J	ND		0.119	J	0.287	J	0.033	J
PFHxS	ND		ND		1.26		0.401	J	0.550	J
PFNA	ND		ND		0.058	J	ND		ND	
PFOA	ND		ND		36.3		0.479	J-	ND	
PFOS	ND		ND		0.396	J	ND		ND	
PFPeA	0.025	J	ND		0.052	J	0.205	J	ND	

Interpreted Qualifiers
J = Estimated concentration
J- = Estimated concentration, biased low

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
ft	feet
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
µg/kg	micrograms per Kilogram

Table 6-5
PFAS Detections in Groundwater
Site Inspection Report, Lansing Hangar

	Area of Interest	AOI01											
	Sample ID	AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		AOI01-03-GW		AOI01-04-GW		AOI01-05-GW	
	Sample Date	07/28/2021		07/28/2021		07/30/2021		07/28/2021		07/27/2021		07/27/2021	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS by LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)													
6:2 FTS	-	ND		ND		2.62	J	ND		ND		ND	
PFBA	-	5.53		7.35		4.39		7.22		11.4		8.31	
PFBS	600	2.77	J	3.75	J	1.16	J	6.65		18.5		20.5	
PFDA	-	ND		1.62	J	2.33	J	ND		ND		ND	
PFHpA	-	8.77		11.5		4.90		3.49	J	6.05		7.87	
PFHxA	-	14.6		19.7		6.02		17.1		28.0		27.4	
PFHxS	-	5.63		7.49		ND		24.4		97.2		288	
PFNA	-	3.37	J	4.00	J	1.53	J	ND		ND		ND	
PFOA	40	22.4		27.7		4.58		80.1		30.0		10.9	
PFOS	40	8.06		10.5		2.62	J	ND		ND		ND	
PFPeA	-	14.0		18.1		9.00		9.77		12.0		8.89	

Grey Fill — Detected concentration exceeded OSD Screening Levels

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Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

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

CLIENT	ARNG
PROJECT	Site Inspection for PFAS at Lansing Hangar, MI

REVISED	12/2/2021	GIS BY	MS	12/2/2021
SCALE	1:720	CHK BY	ST	12/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/2/2021

Legend

Facility Boundary

0 30 60 120 Feet

N

Depth intervals shown represent respective sampling position within a given soil boring location

PFOA Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

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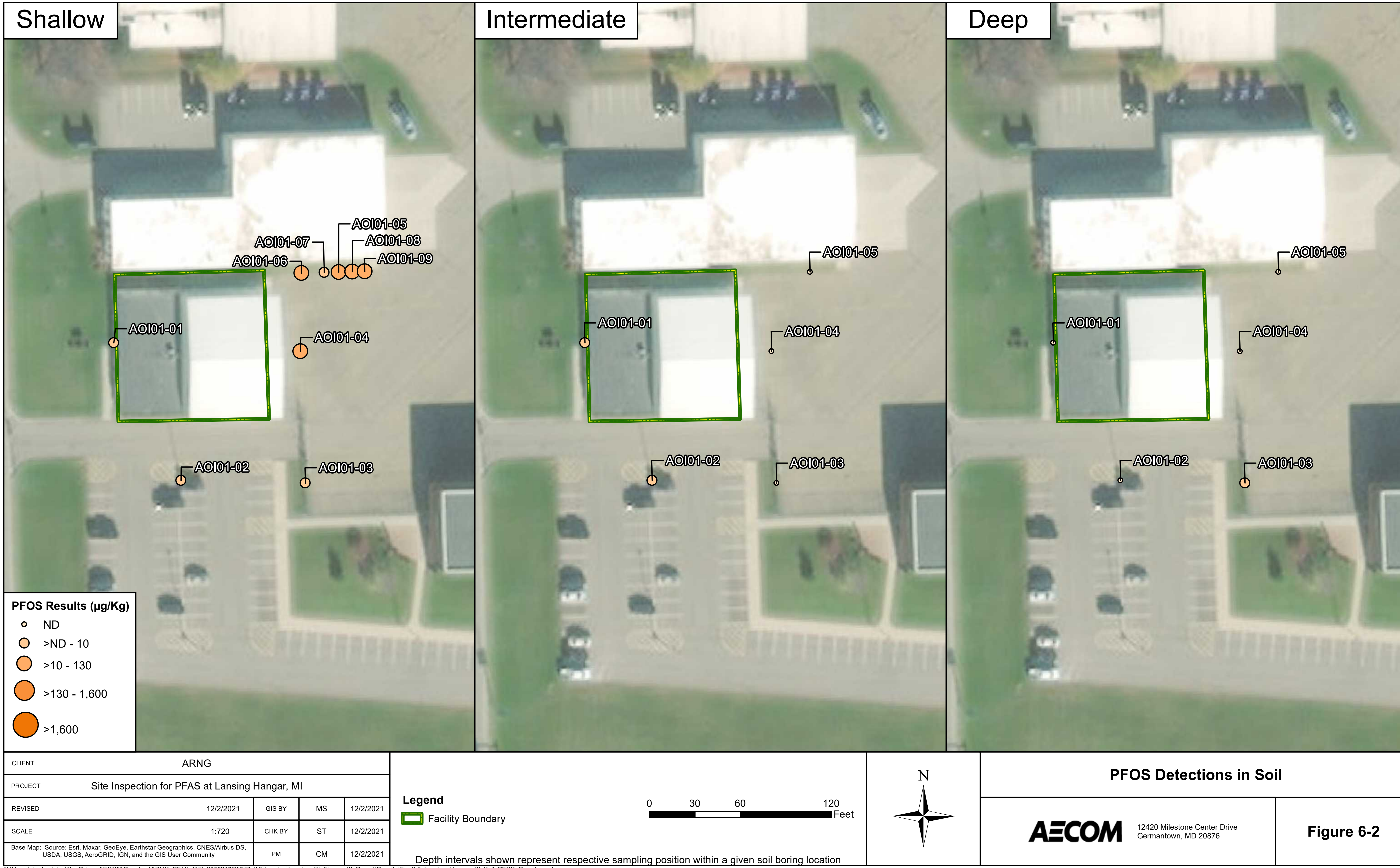
Shallow
AOI01-05
AOI01-07
AOI01-08
AOI01-06
AOI01-09
AOI01-01
AOI01-04
AOI01-02
AOI01-03
PFOS Results (µg/Kg)
ND
>ND - 10
>10 - 130
>130 - 1,600
>1,600
Intermediate
AOI01-05
AOI01-01
AOI01-04
AOI01-02
AOI01-03
Deep
AOI01-05
AOI01-01
AOI01-04
AOI01-02
AOI01-03
CLIENT ARNG
PROJECT Site Inspection for PFAS at Lansing Hangar, MI
REVISED 12/2/2021 GIS BY MS 12/2/2021
SCALE 1:720 CHK BY ST 12/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community PM CM 12/2/2021
Legend
Facility Boundary
0 30 60 120 Feet
Depth intervals shown represent respective sampling position within a given soil boring location
N
PFOS Detections in Soil
AECOM
12420 Milestone Center Drive
Germantown, MD 20876
Figure 6-2
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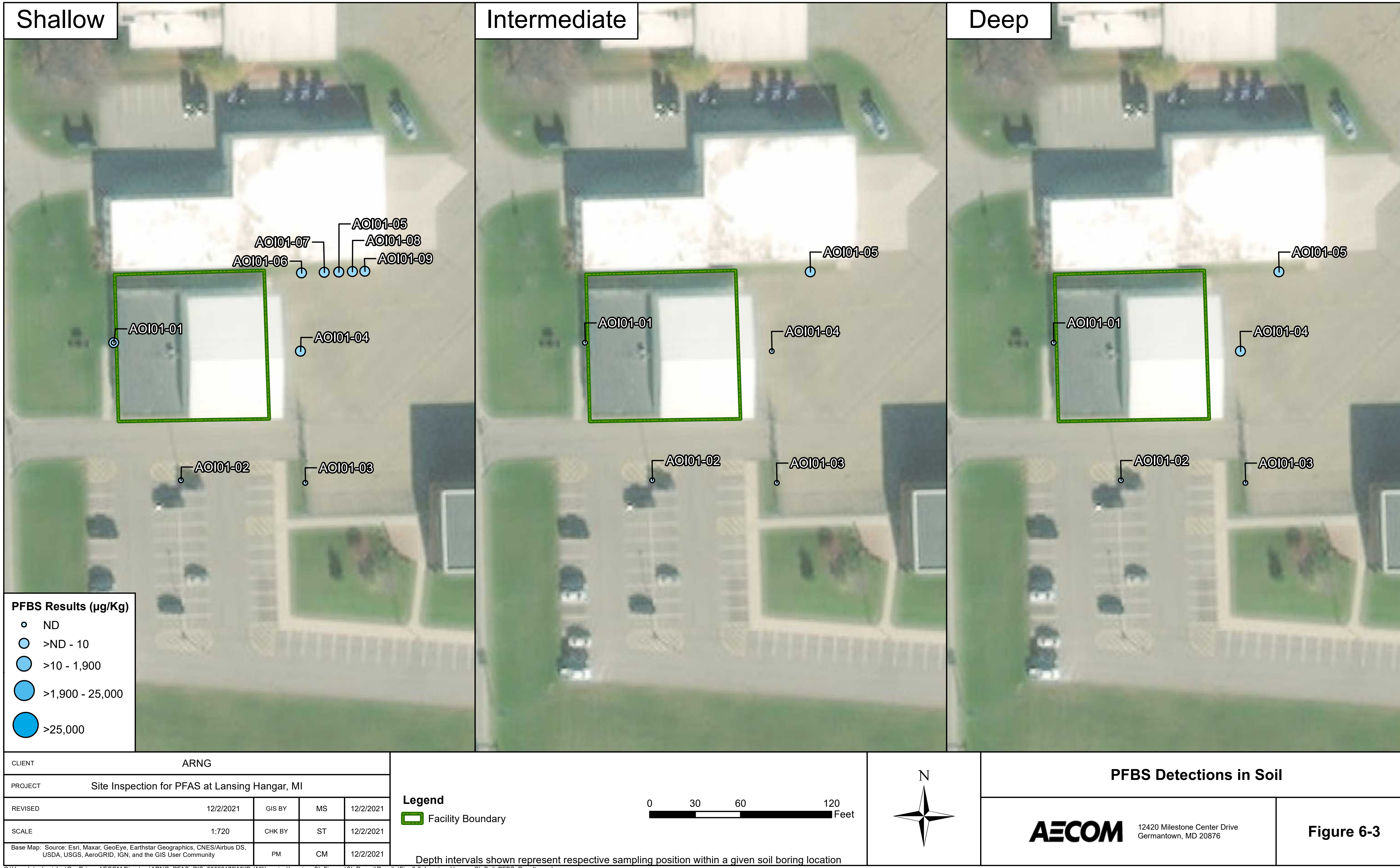
Shallow
AOI01-05
AOI01-07
AOI01-08
AOI01-06
AOI01-09
AOI01-01
AOI01-04
AOI01-02
AOI01-03
Intermediate
AOI01-05
AOI01-01
AOI01-04
AOI01-02
AOI01-03
Deep
AOI01-05
AOI01-01
AOI01-04
AOI01-02
AOI01-03
PFBS Results (µg/Kg)
ND
>ND - 10
>10 - 1,900
>1,900 - 25,000
>25,000
CLIENT ARNG
PROJECT Site Inspection for PFAS at Lansing Hangar, MI
REVISED 12/2/2021 GIS BY MS 12/2/2021
SCALE 1:720 CHK BY ST 12/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community PM CM 12/2/2021
Legend
Facility Boundary
0 30 60 120 Feet
Depth intervals shown represent respective sampling position within a given soil boring location
N
PFBS Detections in Soil
AECOM
12420 Milestone Center Drive
Germantown, MD 20876
Figure 6-3
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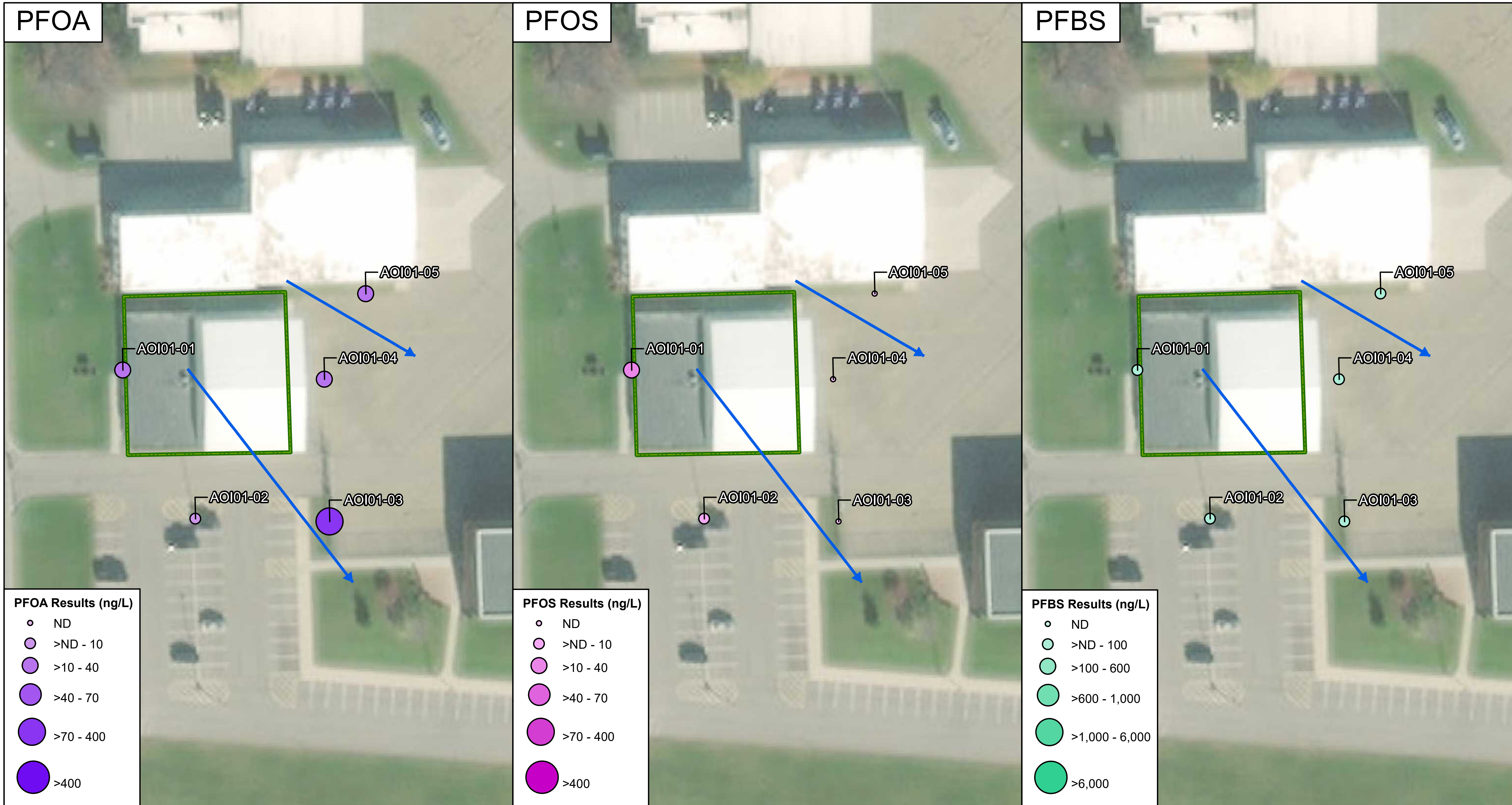

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Lansing Hangar, MI			
REVISED	12/2/2021	GIS BY	MS	12/2/2021
SCALE	1:720	CHK BY	ST	12/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	12/2/2021

Legend

Facility Boundary

Groundwater Flow Direction

0 30 60 120 Feet

N

PFOA, PFOS, PFBS Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-4

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7. Exposure Pathways

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

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

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

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

7.1 Soil Exposure Pathway

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

7.1.1 AOI 1

AFFF may have been released at AOI 1 during one familiarization training exercise with a single fire extinguisher that occurred in the late 1990s or early 2000s. The foam discharge from the fire extinguisher drained to the grassy surface between the apron east of the hangar door and the adjacent police building to the north. Other potential PFAS releases are also possible due to the lack of historical knowledge regarding activities at the facility. PFOA, PFOS, and PFBS were detected in soil at AOI 1 and confirm the release of PFAS to soil.

Based on the results of the SI in AOI 1, ground-disturbing activities could potentially result in site worker, construction worker, or trespasser exposure to PFOA, PFOS, and PFBS via inhalation of dust. Additionally, off-facility residents and recreational users may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities.

Ground-disturbing activities could also potentially result in site worker, construction worker, or trespasser exposure via ingestion of surface soil. Lasty, ground-disturbing activities could also potentially result in construction worker exposure to PFOA, PFOS, and PFBS in subsurface soil via ingestion. No construction activities were occurring at the facility at the time of the SI field work. The CSM is presented on **Figure 7-1**.

7.2 Groundwater Exposure Pathway

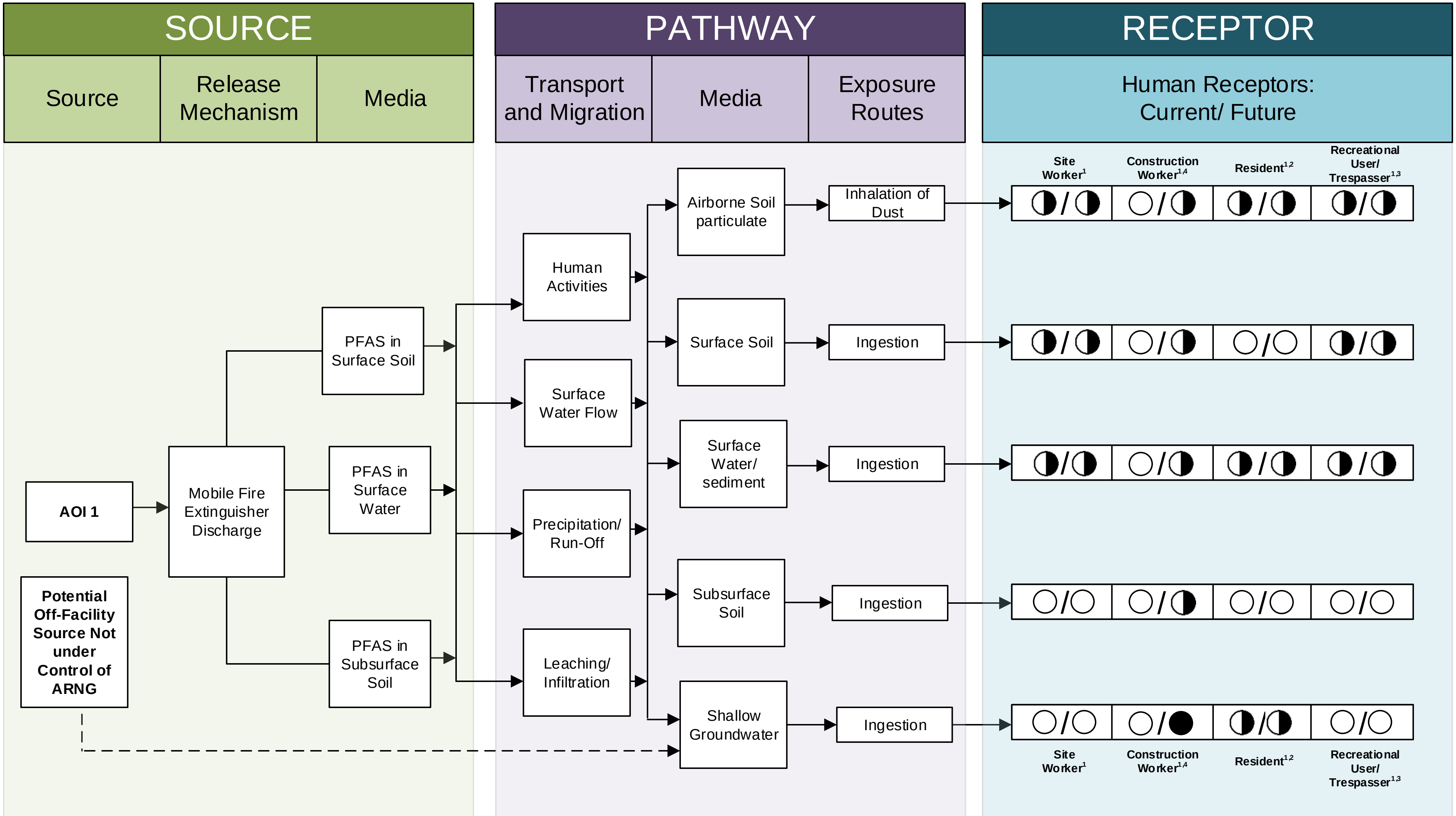
The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at AOI 1 based on the aforementioned criteria.

7.2.1 AOI 1

PFOA exceeded the SL in one temporary monitoring well in the C-12 Hangar potential PFAS release area. PFOA and PFBS were detected in groundwater from the one temporary monitoring well at the Extinguisher Training Area potential PFAS release area, at concentrations below SLs. Off-facility potable wells are located downgradient of AOI 1 within 1 mile of the facility, and as described in **Section 2.4**, EGLE sampled 10 potable wells surrounding the facility and measured non-detect results for PFAS (MPART, 2021). However, the locations of the sampled potable wells are unknown and, given the uncertainty and lack of data, the groundwater ingestion exposure pathway for off-facility residents cannot be definitively ruled out and is considered potentially complete. The facility also receives its potable water from the municipality; therefore, the ingestion exposure pathway for site workers and trespassers is considered incomplete. Depths to water measured in July 2021 during the SI ranged from 15.2 to 23.5 feet bgs. It is possible that shallow groundwater may be encountered during construction activities; therefore, the ingestion exposure pathway for construction workers is considered potentially complete. No construction activities were occurring at the facility at the time of the SI field work. The CSM is presented on **Figure 7-1**.

7.3 Surface Water and Sediment Exposure Pathway

PFAS in runoff is likely to flow into catchments that drain into Reynolds Drain and then the Grand River. The ingestion exposure pathways for surface water and sediment are potentially complete for site workers, construction workers, residents, and recreational users, based on the groundwater concentrations from the C-12 Hangar. The ingestion exposure pathway for residents and recreational users is relevant to incidental ingestion during recreational use of the Grand River, only, as surface water is not used as a drinking water source from this water body. Surface water and sediment in the Reynolds Drain and Grand River were not sampled as part of this SI, as the scope of sampling was limited to the presence or absence of PFOS, PFOA, and PFBS within the facility's potential PFAS release areas. However, surface water sampling was conducted as part of the CRAA PFAS investigation at the Capital Region International Airport, and PFOS was detected in the Reynolds Drain (MPART, 2021a). Site workers and construction workers performing maintenance work within the Reynolds Drain may be potentially exposed to PFOS via incidental ingestion of surface water and sediment.



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 site worker, construction worker, resident, and recreational user may refer to off-facility receptors.
2. Inhalation of dust for off-facility receptors is likely insignificant.
3. Human consumption of fish potentially affected by PFAS is possible.
4. No current active construction at Lansing Hangar.

Figure 7-1
Conceptual Site Model, AOI 1
Lansing Hangar

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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 22 to 30 July 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

- Nineteen (19) soil samples from five boring locations and four hand auger locations;
- Five grab groundwater samples from five temporary well locations; and
- Thirteen (13) QA samples.

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

8.2 SI Goals Evaluation

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

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

   PFOA, PFOS, and PFBS were detected at the facility in soil and groundwater. PFOA and PFBS were detected at both potential PFAS release areas. PFOA in groundwater at AOI 1: C-12 Hangar exceeded the SL of 40 ng/L. The detected concentrations of PFOA, PFOS, and PFBS in all soil samples from AOI 1 were below the SLs.

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

   AOI 1 has been retained for further consideration due to the detection of PFOA in groundwater above the SL at AOI 1: C-12 Hangar source area.

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

   As described in **Section 2.4**, in May 2021, EGLE collected off-facility drinking water samples for 10 properties surrounding the Capital Region International Airport. All results were measured to be non-detect for PFAS (MPART, 2021). Therefore, the need for a removal action due to an impacted drinking water receptor does not exist at this time.

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

   The geological data collected as part of the SI indicate a subsurface lithology dominated by fines, such as clay and silt, with a 2 to 9.8-foot lens of sand-dominated unconsolidated material. The sand-dominated lens is mostly fine-grained or fine- to medium-grained and may locally contain more than 15% silt and up to 10% gravel. The clays and silts are relatively impermeable and non-conductive, whereas the sand is more permeable and conductive. These site observations are consistent with glacial deposition. The soils with a clay and silt matrix are representative of glacial till, whereas the well sorted sands are likely indicative of glacial outwash.

   Depth to water at the Lansing Hangar ranges from 15.2 to 23.5 feet bgs. Based on the groundwater elevation contours developed during the SI, the groundwater flow direction is to the southeast. These geologic and hydrogeologic observations inform development of technical approach for the RI.

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

   Based upon the evaluation of groundwater and soil results in comparison to SLs, in combination with the groundwater flow direction analysis, the results of the SI indicate that the source of detected concentrations of PFOA, PFOS, and PFBS at the facility is likely attributable to ARNG activities.

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

   Detections of PFOA, PFOS, and PFBS in soil and groundwater at the source areas and the presence of nearby, downgradient, potable wells indicate there is a potentially complete pathway between source and receptor.

8.3 Outcome

Based on the CSMs developed and revised in light of the SI findings, there is no current exposure to drinking water receptors from AOI 1 from sources on facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs for PFOA, PFOS, and PFBS in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1, PFOA in groundwater at the C-12 Hangar exceeded the SL of 40 ng/L, at a concentration of 80.1 ng/L at the most downgradient temporary well location, AOI01-03. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at AOI 1 were below the SLs.

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

Table 8-2 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area
1	C-12 Hangar	◐	●
	Extinguisher Training Area	◐	◐

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

Table 8-2: Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	C-12 Hangar	One exceedance of an SL in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
	Extinguisher Training Area	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil. Uncertainty remains regarding exact location of release.	

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