FINAL
Site Inspection Report
Grand Prairie Army Aviation Support Facility
Grand Prairie, Texas

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

October 2022

Prepared for:

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

UNCLASSIFIED

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Acronyms and Abbreviations

%	percent
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonic acid
8:2 FTS	8:2 Fluorotelomer sulfonic acid
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DNAS	Dallas Naval Air Station
DoD	Department of Defense
DPT	direct push technology
DQI	data quality indicator
DQO	data quality objective
EIS	extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
FedEx	Federal Express
GPF	Grand Prairie Facility
GPRS	Ground Penetrating Radar Systems, LLC
HA	Health Advisory
HDPE	high-density polyethylene
IDW	investigation-derived waste
IIS	injection internal standards
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
LCS	laboratory control spike
LCSD	laboratory control spike duplicate
LOD	limit of detection
LOQ	limit of quantitation
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
OMS	organizational maintenance shop
OSD	Office of the Secretary of Defense

OWS	oil-water separator
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluoroheptanoic 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 QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TCEQ	Texas Commission on Environmental Quality
TCRA	Time Critical Removal Action
TOC	total organic carbon
TPP	Technical Project Planning
TXARNG	Texas Army National Guard
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
WWTP	wastewater treatment plant

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Executive Summary

The Army National Guard (ARNG) G9 is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at potential 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). A SI was completed at Grand Prairie Army Aviation Support Facility (AASF), Texas. The Grand Prairie AASF will also be referred to as the "facility" throughout this document.

Grand Prairie AASF, home to the 149th Aviation Regiment of the Texas ARNG (TXARNG), is within the southwest portion of the former Dallas Naval Air Station (DNAS), which was decommissioned in 1998. The facility is 12 miles southwest of downtown Dallas and is situated adjacent to the northwest shore of Mountain Creek Lake, on property that overlaps into the cities of Dallas and Grand Prairie, Texas. The current TXARNG facility houses a hangar, a wash rack, fuel station, ramp and flight line, a hazardous materials storage building, an organizational maintenance shop, and an armory. Current activities at the Grand Prairie AASF include helicopter maintenance and training.

During the PA for PFAS, five potential PFAS release areas were identified: the Wash Rack, Hazardous Materials Storage Building, Fuel Station, Flight Line Ramp, and Former Location of a Firetruck (AECOM, 2020). PFAS-containing aqueous film-forming foam (AFFF) may have been released during fire training activities at the Wash Rack and Flight Line Ramp. AFFF was previously stored at the Hazardous Materials Storage Building and the Fuel Station and the firetruck historically stored on site was equipped with AFFF. The potential PFAS release areas were grouped into three Areas of Interest (AOIs), AOI 1, AOI 2, and AOI 3, which were investigated during the SI. The SI field activities were conducted from 22 to 24 March 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, 2021b), 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 5.8** 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 Wash Rack, Fuel Station, and downgradient of the Hazardous Materials Storage Building exceeded the SL of 40 nanograms per liter (ng/L) at concentrations of 106 ng/L and 94.4 ng/L, at locations AOI01-01 and AOI01-02, respectively. Based on the results of the SI, further evaluation of AOI 1 is warranted in the Remedial Investigation (RI).
- At the facility boundary, PFOA in groundwater near the northeastern boundary exceeded the SL of 40 ng/L at a concentration of 369 ng/L at location Grand Prairie Facility (GPF)-01. Based on the results of the SI, further evaluation of the northeastern facility boundary is warranted in the RI.
- At AOI 1 and GPF-01, detected concentrations of PFOS and PFBS in groundwater were below SLs.
- At AOI 2, AOI 3, and the eastern facility boundary (GPF-02) detected concentrations of PFOA, PFOS, and PFBS in groundwater were below SLs.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs.

Table ES-2 summarizes the SI results for soil and groundwater. Based on the conceptual site models developed and revised in light of the SI findings, there is potential for exposure to receptors on facility 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: Wash Rack, AOI 1: Fuel Station, and Facility Boundary: GPF-01 area.

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

Analyte	Residential (Soil) (µg/kg)[a] 0-2 feet below ground surface (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 USEPA's Regional Screening Level Calculator. Hazard Quotient (HQ) = 0.1. 15 September 2021.

Table ES-2: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Wash Rack	◐	●	●
	Hazardous Materials Storage Building	N/A	N/A	●
	Fuel Station	◐	●	●
2	Flight Line Ramp	◐	◐	N/A
3	Former Firetruck Location	◐	◐	◐
Facility Boundary	GPF-01	◐	●	●
	GPF-02	◐	◐	◐

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	Wash Rack, Hazardous Materials Storage Building, and Fuel Station	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI
2	Flight Line Ramp	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action
3	Former Firetruck Location	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action
Facility Boundary	GPF-01 (northeastern boundary)	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI
	GPF-02 (eastern boundary)	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action

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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 Grand Prairie Army Aviation Support Facility (AASF), Texas. The Grand Prairie AASF is also referred to as the "facility" throughout this document.

The SI project elements were performed in compliance with Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA; 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 Grand Prairie AASF (AECOM, 2020) that identified five potential PFAS release areas at the facility, which were grouped into three Areas of Interest (AOIs). The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

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

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

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

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2. Facility Background

2.1 Facility Location and Description

Grand Prairie AASF, home to the 149th Aviation Regiment of the Texas ARNG (TXARNG), is within the southwest portion of the former Dallas Naval Air Station (DNAS), which was decommissioned in 1998. The facility is 12 miles southwest of downtown Dallas and is situated adjacent to the northwest shore of Mountain Creek Lake (**Figure 2-1**), on property that overlaps into the cities of Dallas and Grand Prairie, Texas. TXARNG began leasing approximately 40 acres of land situated in Dallas County, Texas in 1975. Historically, the DNAS has provided support to the Texas Air National Guard, US Army Reserve, TXARNG, and various Navy and Marine groups.

With the exception of TXARNG operations, the majority of military operations ceased at DNAS in September 1998, and the air station was put into caretaker status (Tetra Tech NUS, Inc. [TtNUS], 2001). The current TXARNG facility houses a hangar, a wash rack, fuel station, ramp and flight line, a hazardous materials storage building, an organizational maintenance shop (OMS), and an armory. The Grand Prairie AASF Hangar does not have an aqueous film forming foam (AFFF) fire suppression system. Current activities at the Grand Prairie AASF include helicopter maintenance and training.

2.2 Facility Environmental Setting

Grand Prairie AASF is in north-central Texas, approximately 325 miles north of the Gulf of Mexico. The facility is situated near the headwaters of the Trinity River that flow in the upper margins of the Coastal Plain. The topography of the site is generally level with slopes along borders with water surface water bodies (i.e. Cottonwood Bay to the northeast and Cottonwood Creek to the southeast) (**Figure 2-2**).

2.2.1 Geology

The general stratigraphic sequence present throughout the TXARNG facility consists of Holocene and Pleistocene alluvial terrace deposits overlaying the Cretaceous Eagle Ford Shale (**Figure 2-3**). The upper soil horizons and alluvium have been disturbed locally by industrial development; therefore, shallow surface and subsurface soils are composed of fill materials in some areas. The lithology of sediments is primarily clay and silty clay. The clays are interspersed with sporadic deposits of streambed sand and gravel (Geo-Marine, Inc [GMI], 2002).

Soil borings completed during the SI found poorly-graded and well-graded sand as the dominant lithology of unconsolidated sediments below the Grand Prairie AASF. The borings were completed at 15 feet below ground surface (bgs). Layers of clay to silty sand were also observed in the boring logs at thicknesses ranging from a few inches up to 6 feet. Many of the logs also reported varying percentages of gravel included in the sand packages.

2.2.2 Hydrogeology

The surficial aquifer below the facility is within the alluvium overburden and the weathered portion of the underlying shale. This aquifer is heterogeneous and exhibits characteristics of unconfined aquifer systems and semi-confined to confined aquifer systems. These two types of aquifer systems are interconnected hydraulically to the adjacent water bodies; Mountain Creek Lake, Cottonwood Bay, and the Diversion Channel. Groundwater contour elevations are very similar to the land surface topography. In the central section of the facility, the potentiometric surface is primarily flat. Along the Cottonwood Bay and the Diversion Channel shorelines, the potentiometric surface is extremely steep, and along the east portion of the facility, across the flight line toward

Mountain Creek Lake, the potentiometric surface is moderately steep. The groundwater primarily flows to the west-northwest in the direction of Cottonwood Bay and the Diversion Channel. Seepage velocity of the groundwater underlying the facility within the overburden is estimated to range from 0.12 to 0.23 foot per day (TtNUS, 2001) (**Figure 2-3**).

Shallow groundwater in the alluvial section flows primarily through the semi-confined to confined zones and in unconfined zones of sands and clayey sands. Shallow groundwater is estimated to be approximately 4 to 9 feet bgs at the facility, as indicated in well reports stored on the Texas Water Development Board Submitted Drillers Reports Database. Clay, silty clay, sandy clay, and gravelly clay comprise the semi-confined zones that are cut by joints, microfractures, partings, and other zones of macroporosity. The confined zones may be interconnected with the weathered and jointed upper surface of the Eagle Ford Shale. The surficial aquifer underlying the facility is most likely recharged by the downward migration of rainwater through the vadose zone. Direction of groundwater flow was determined from potentiometric surface maps developed from static water level data collected during five separate water level gauging events (TtNUS, 2001).

The facility's drinking water is supplied by the City of Grand Prairie. A query of the Texas Water Development Board Submitted Drillers Reports Database identified 21 public supply wells, 17 domestic wells, 13 irrigation wells, and 19 industrial water supply wells within a 4-mile radius of the facility. The public supply wells range in depth from 432 to 1158 feet bgs. The domestic wells range in depth from 80 to 1060 feet bgs, the irrigation wells range from 142 to 1165 feet bgs, and industrial water supply wells range in depth from 142 to 2,148 feet bgs. The shallowest of the wells is the 80-foot-deep domestic well, which is located approximately 4 miles north-northwest of the facility. Based on the USEPA's Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, no PFAS were detected in a public water system above the USEPA Health Advisory (HA) level within 20 miles of the facility (USEPA, 2017a). The HA is 70 nanograms per liter (ng/L) for PFOA and PFOS, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

Depths to water measured in March 2021 during the SI ranged from 2.67 to 13.08 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-4**. Based on depths to water measured during the SI, the groundwater flow direction is northward in the direction of Cottonwood Bay and westward in the direction of the Diversion Channel.

2.2.3 Hydrology

Surface water in the vicinity of Grand Prairie AASF flows primarily across paved or grassy areas and into the storm drainage system that discharges into Cottonwood Bay, the Diversion Channel, and Mountain Creek Lake (**Figure 2-5**). Mountain Creek Lake drains to the northeast from the spillway located approximately 1.5 miles east of the facility (TtNUS, 2001).

2.2.4 Climate

The Dallas-Fort Worth climate is humid subtropical with hot summers. The climate is also continental, characterized by a wide annual temperature range. Precipitation also varies considerably, ranging from less than 20 to more than 50 inches. Average annual precipitation for the facility is 37.35 inches. Winters are mild, but northers occur about three times each month and often are accompanied by sudden drops in temperature. The highest temperatures of summer are associated with fair skies, westerly winds and low humidity. Characteristically, hot spells in summer are broken into three- to five-day periods by thunderstorm activity. There are only a few nights each summer when the low temperature exceeds 80 degrees Fahrenheit (ºF). Summer daytime temperatures frequently exceed 100°F. Average yearly minimum and maximum temperatures are 36.5°F and 96.2°F, respectively, with an average annual temperature of 66.6°F.

Throughout the year, rainfall occurs more frequently during the night. Usually, periods of rainy weather last for only a day or two and are followed by several days with fair skies. A large part of the annual precipitation results from thunderstorm activity, with occasional heavy rainfall over brief periods of time. Thunderstorms occur throughout the year but are most frequent in the spring (National Oceanic and Atmospheric Administration, 2019).

2.2.5 Current and Future Land Use

The Grand Prairie AASF currently includes a hangar, a wash rack, fuel station, ramp and flight line, a hazardous materials storage building, an OMS, and an armory. Current land use in the direct vicinity of the Grand Prairie AASF includes residential to the west, industrial to the north, as well as open areas and parks, commercial and retail buildings, and governmental institutions. A representative from the Texas Military Department noted plans to move the Grand Prairie AASF to the Naval Air Station Joint Reserve Base Fort Worth soon. Additionally, in August 2020, the City of Dallas announced plans to convert the former Dallas Naval Air Station (including the Grand Prairie AASF) into low, medium, and high density residential and business use as part of the Hensley Field Master Redevelopment Plan (City of Dallas, 2020).

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

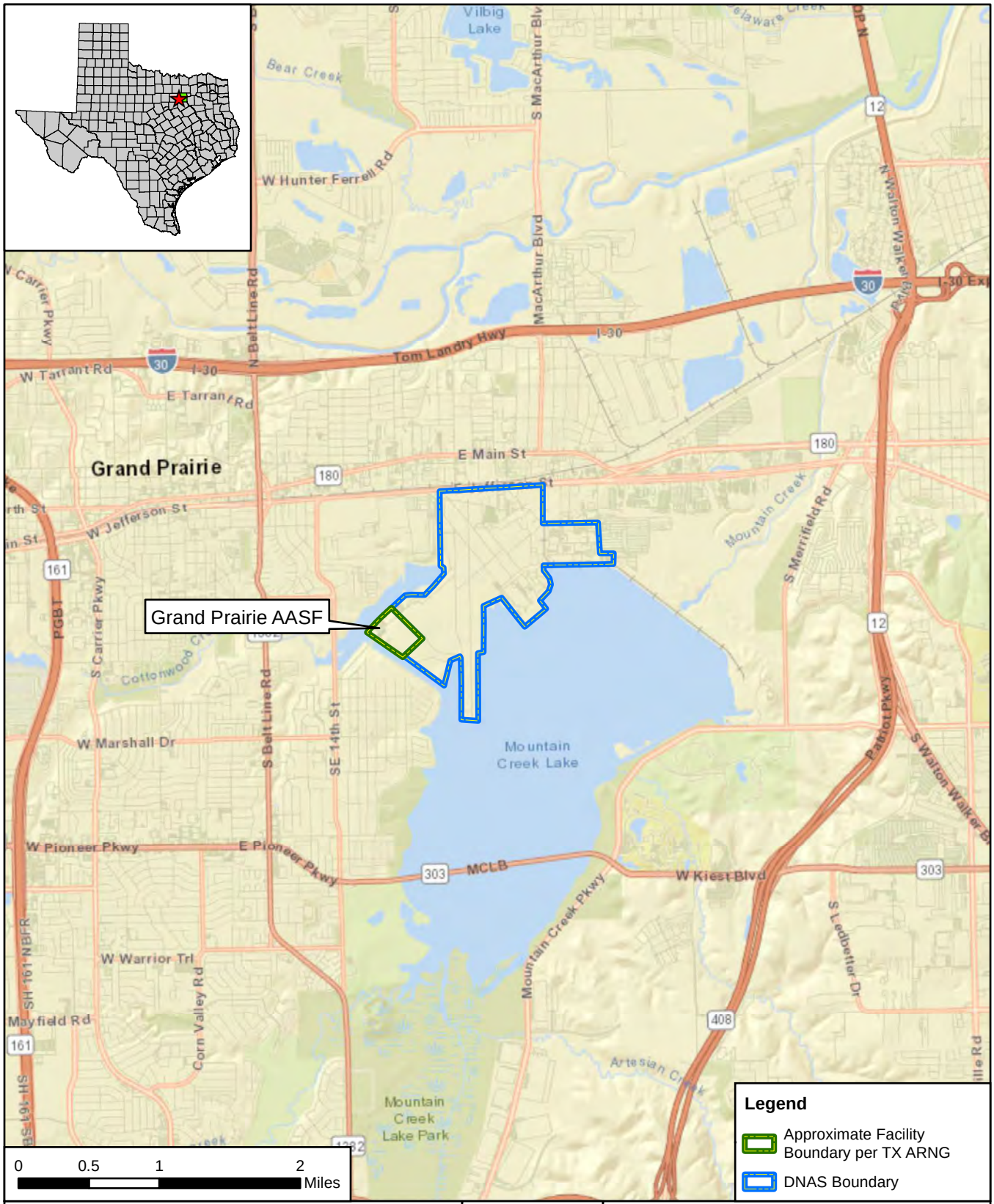
The following birds, plants, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in Dallas County, Texas (US Fish and Wildlife Service [USFWS], 2021).

- **Birds:**
    - Red knot, *Calidris canutus rufa* (threatened)
    - Bald eagle, *Haliaeetus leucocephalus* (recovery)
    - Least tern, *Sterna antillarum* (recovery)
    - Piping Plover, *Charadrius melodus* (threatened)
    - Golden-cheeked warbler, *Dendroica chrysopari* (endangered)
    - Black-capped Vireo, *Vireo atricapilla* (recovery)
    - Whooping crane, *Grus americana* (endangered)
- **Clams:** Texas heelsplitter, *Potamilus amphichaenus* (under review); Texas fawnsfoot, *Truncilla macrodon* (candidate)
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate)
- **Reptiles:** Western Chicken turtle, *Deirochelys reticularia ssp. Miaria* (under review)

2.3 History of PFAS Use

Five potential PFAS release areas were identified at the Grand Prairie AASF during the PA where AFFF may have been used or released historically (AECOM, 2020). Grand Prairie AASF includes a Wash Rack, Hazardous Materials Storage Building, Fuel Station, Flight Line Ramp, and a Former Firetruck Location. Between 2000 and 2012, AFFF was used during fire training activities at the Wash Rack and Flight Line Ramp. AFFF was previously stored at the Hazardous Materials Storage Building and the Fuel Station and the firetruck historically stored on site was equipped with AFFF. Although there were no reports of known releases from these storage locations, it is possible that spills occurred that were not reported.

Historical operations at Grand Prairie AASF have also included training at the Peace Prairie Hangar, located northeast of the current TXARNG facility boundary. The Peace Prairie Hangar has an AFFF fire suppression system which had an accidental release in 2003. The details of this release are included along with the descriptions of AOIs in **Section 3**.



CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Grand Prairie AASF, TX			
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SCALE	1:63,360	CHK BY	MB	8/10/2021
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/10/2021

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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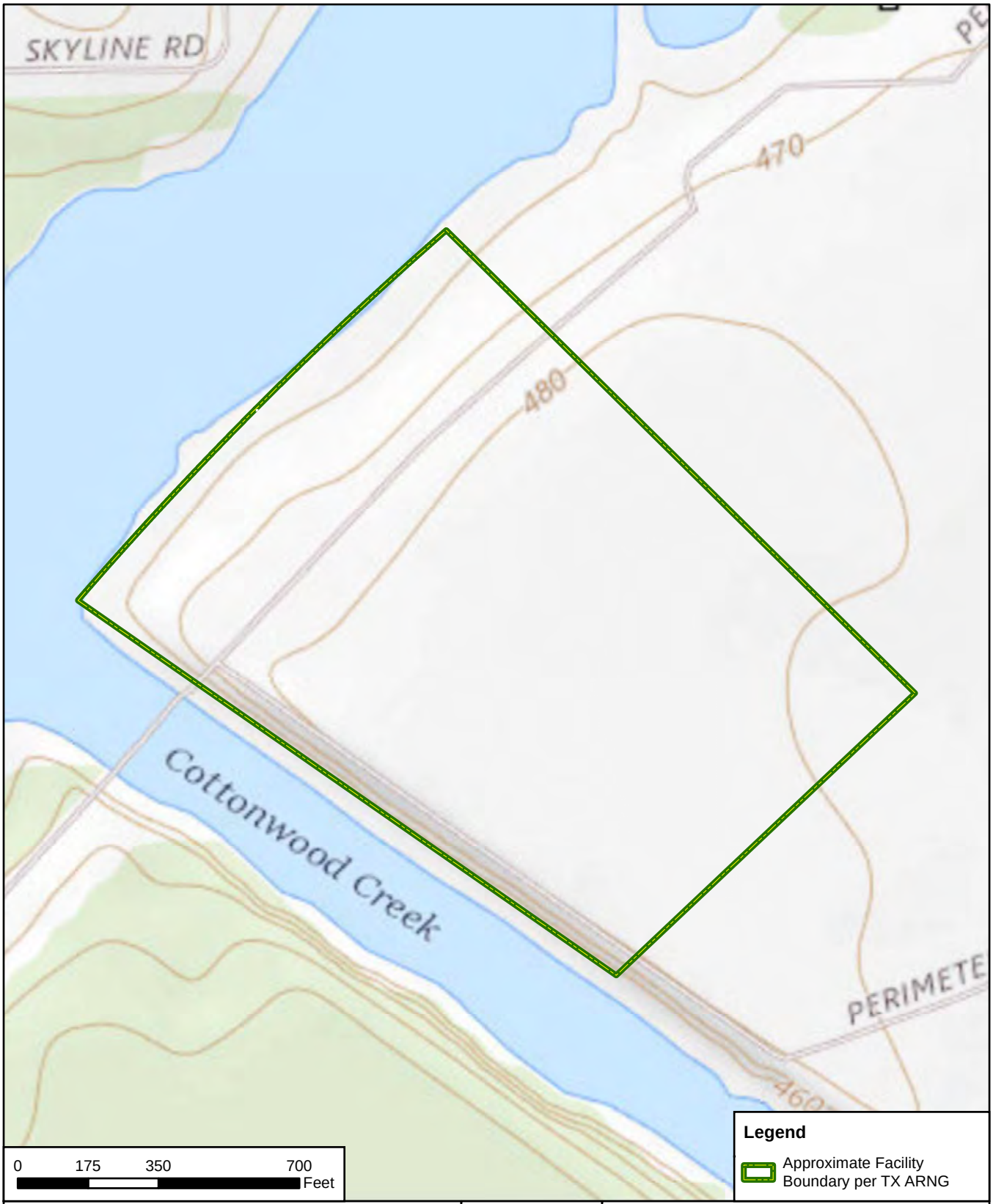

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Base Map: USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program,		PM	CM	8/10/2021

N

Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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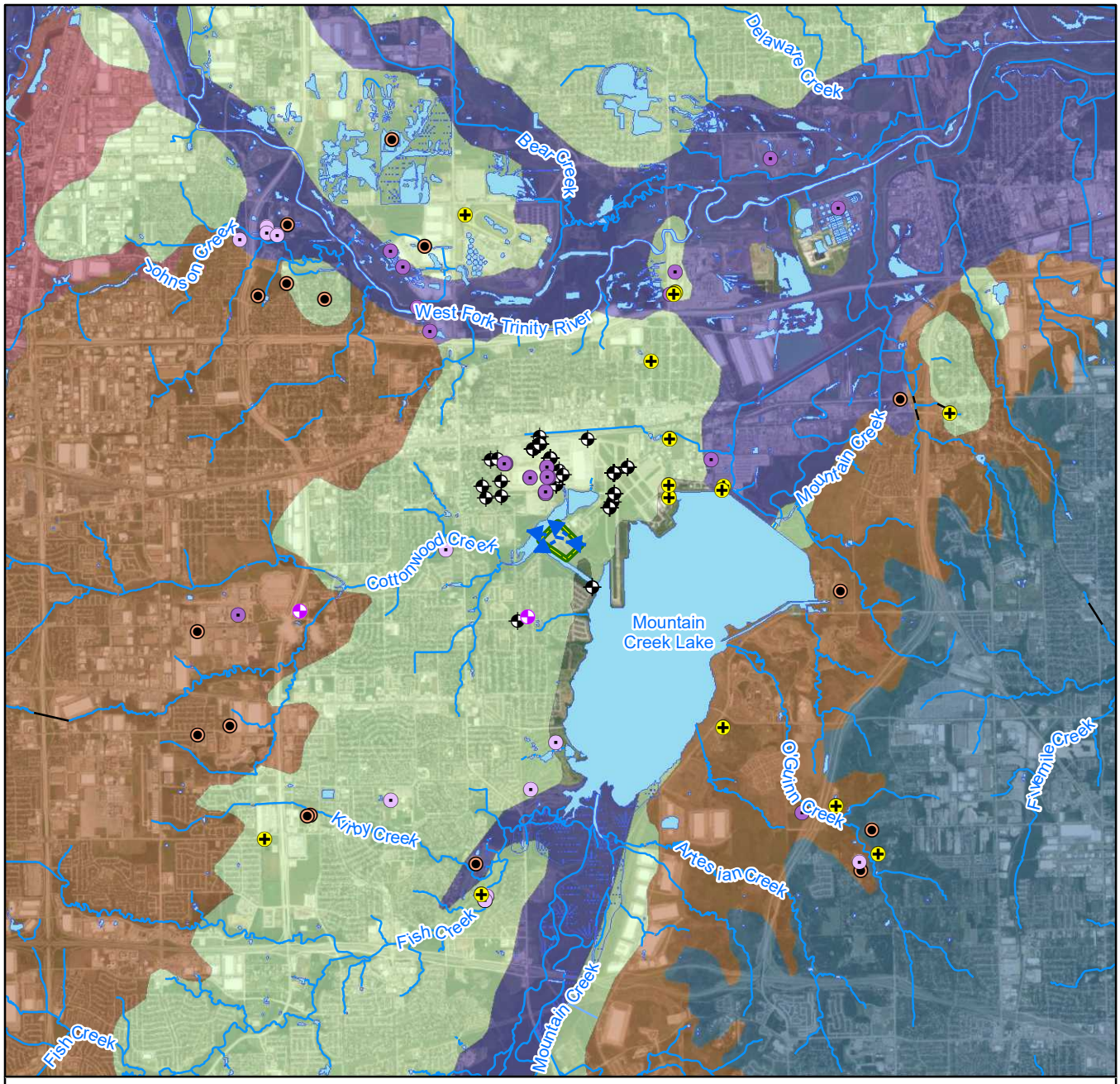

Approximate Facility Boundary per TX ARNG
Water Body
Wetland
River/Stream
Canal/Ditch
Pipeline
Groundwater Flow Direction

Geology

Alluvium
Fluvial Terrace Deposits
Austin Chalk
Eagle Ford Group
Woodine Formation

Wells

Domestic Well
Monitor Well
Irrigation Well
Industrial Well
Historic Observation Well
Public Supply Well

0 0.75 1.5 3
Miles

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Grand Prairie AASF, TX			
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SCALE	1:95,040	CHK BY	MB	8/8/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/8/2022

N

Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

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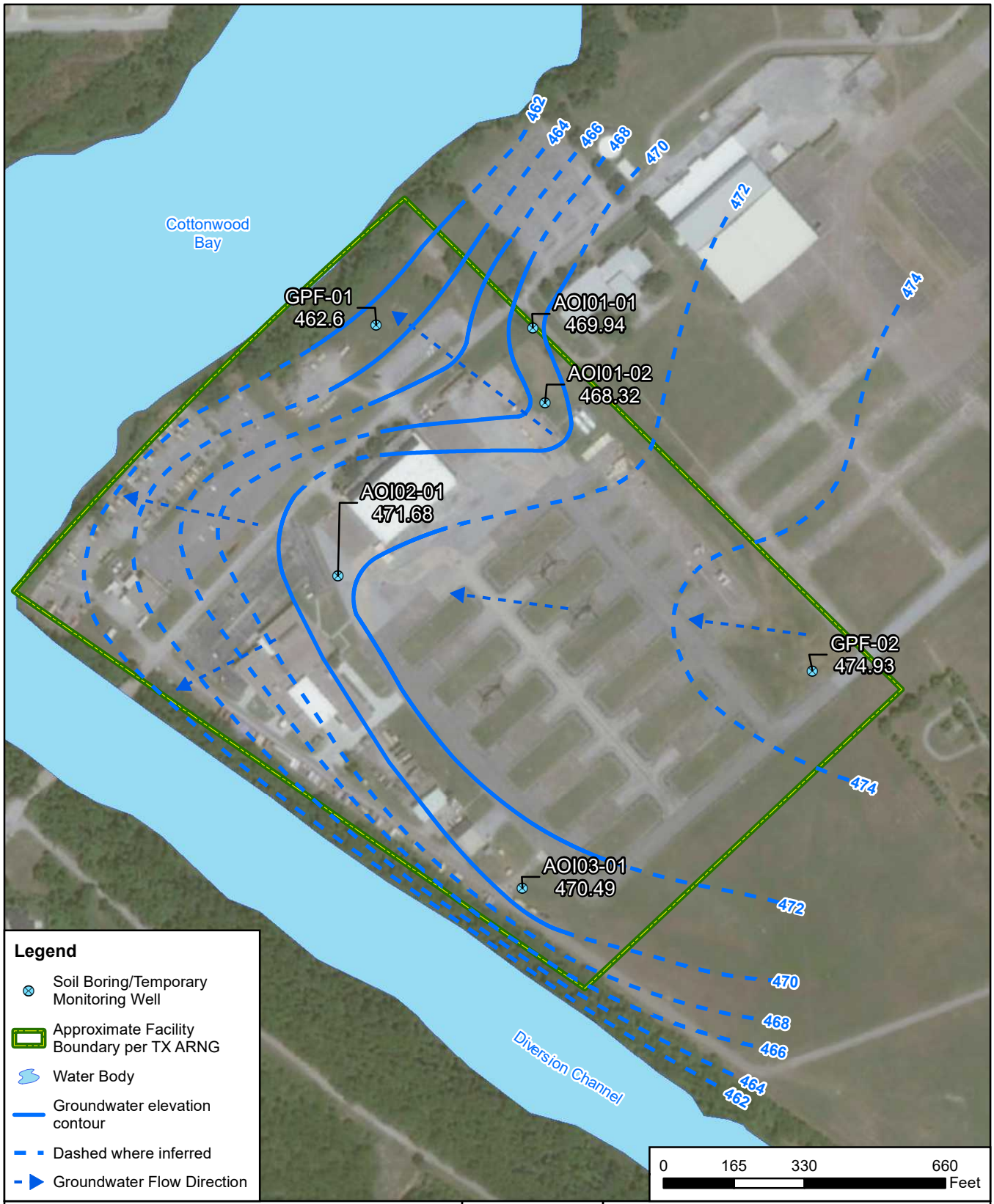

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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	10/26/2021

Groundwater Elevation Contours March 2021

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

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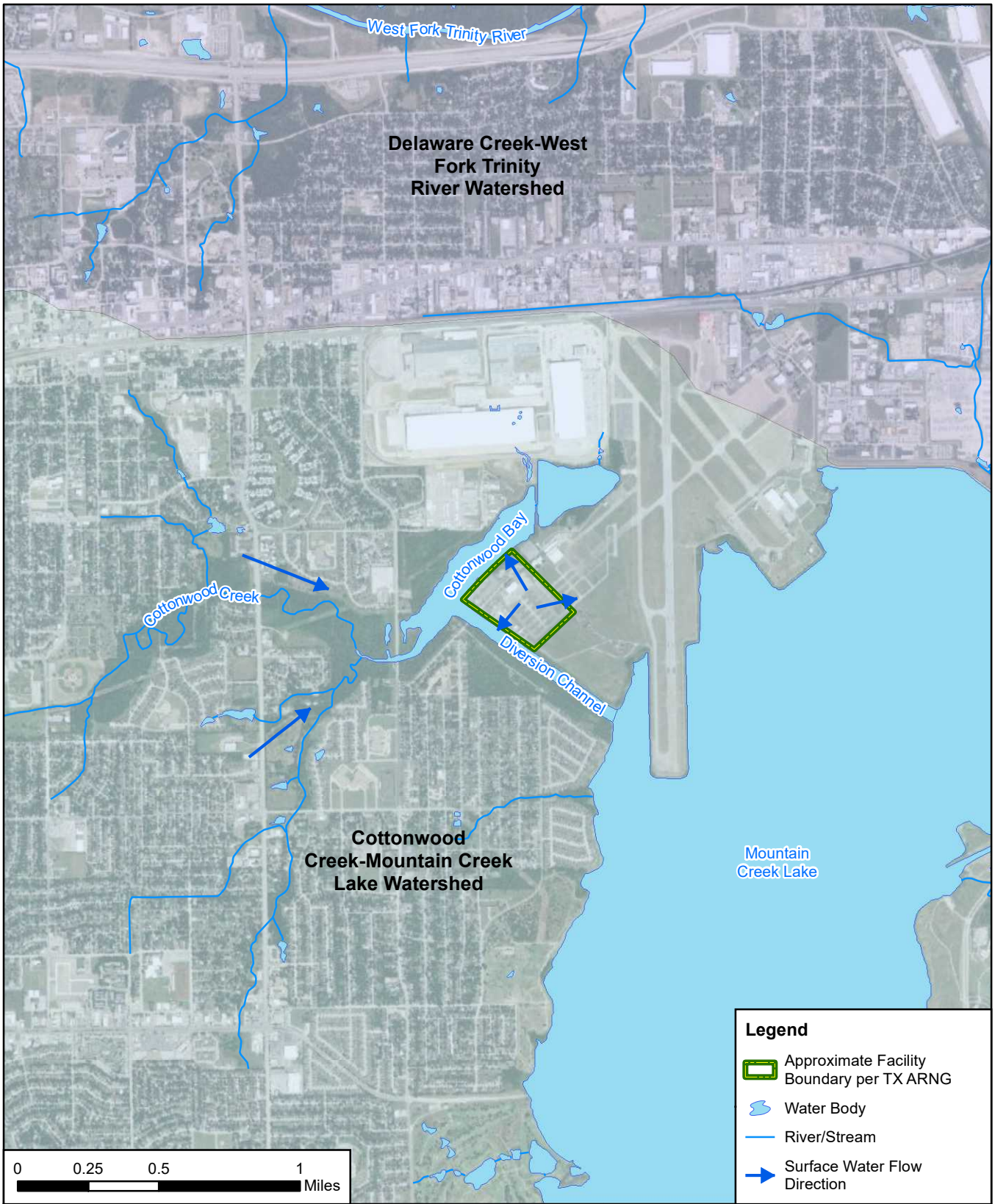

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Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

This section presents a summary of each potential PFAS release area by AOI. Based on the PA findings, five potential PFAS release areas, Wash Rack, Hazardous Materials Storage Building, Fuel Station, Flight Line Ramp, and Former Firetruck Location were identified at Grand Prairie AASF and grouped into three AOIs (AECOM, 2020). The potential PFAS release areas are shown on **Figure 3-1**.

3.1 AOI 1

AOI 1 consists of three potential PFAS release areas, as described below.

3.1.1 Wash Rack

AFFF was used during fire training from 2000 to 2012 at the Wash Rack. An unknown quantity of AFFF was released during these fire training events. Releases at the Wash Rack would have been conveyed to the drain and oil-water separator (OWS), and then depending on the positioning of a diverter valve, either flowed to the sanitary sewer system, and ultimately discharged to the municipal wastewater treatment plant (WWTP) or flowed to the street. The water discharged to the street may have infiltrated to the subsurface near the end of the discharge pipe, as well as flowed to the street and ultimately discharged to Cottonwood Bay. The position of the diverter valve during AFFF use at the Wash rack is unknown. Based on the nature of the release (during maintenance/routine testing), it appears unlikely AFFF would have been discharged to the ground surface outside of the Wash Rack, except potentially via runoff to the grassy areas surrounding the Wash Rack. PFAS contamination may have infiltrated to subsurface soil via leaks in drains, OWS or underground wastewater conveyance piping beneath the wash rack, or leaks along piping from the facility to the municipal WWTP.

3.1.2 Hazardous Materials Storage Building

The Hazardous Materials Storage Building historically housed 30 5-gallon sealed buckets of 3 percent (%) AFFF until 2012. Although there were no known releases of AFFF at the storage building, it is possible that spills occurred in the area. AFFF spills in the storage building would have most likely been washed to the nearby Wash Rack for disposal.

3.1.3 Fuel Station

Tri-Max™ units containing AFFF were stationed at the Fuel Station. Although there were no reports of Tri-Max™ use at the Fuel Station, it is possible that a spill occurred in the area without being reported. AFFF spills in the Fuel Station area would most likely infiltrate into the surrounding soil.

Additionally, potential PFAS contamination from AOI 1 may have further infiltrated to shallow groundwater, which is flows northward in the direction of Cottonwood Bay and westward in the direction of the Diversion Channel.

3.2 AOI 2

AOI 2 consists of one potential PFAS release area, as described below.

3.2.1 Flight Line Ramp

AFFF was used during fire training from 2000 to 2012 at the flight line ramp. An unknown quantity of AFFF was released during these fire training events. Based on the nature of the release it appears unlikely AFFF would have been discharged to the ground surface outside of the Flight Line Ramp, except potentially via runoff to the grassy areas to the southeast of the ramp. PFAS contamination may have further infiltrated to subsurface soil in the grassy areas in the vicinity of the Flight Line Ramp. Potential PFAS contamination may have further infiltrated to shallow groundwater, which flows northward in the direction of Cottonwood Bay and westward in the direction of the Diversion Channel.

3.3 AOI 3

AOI 3 consists of one potential PFAS release area, as described below.

3.3.1 Former Firetruck Location

The firetruck that was historically located on site was equipped with AFFF. Based on interviews no AFFF was ever deployed from the firetruck; however, it is possible that spills occurred in that location that were not recorded. AFFF spills in the Former Firetruck Location would have infiltrated into soil. Based on the nature of the possible release, PFAS contamination may have further infiltrated to subsurface soil through precipitation from rain events. Potential PFAS contamination may have further infiltrated to shallow groundwater, which flows northward in the direction of Cottonwood Bay and westward in the direction of the Diversion Channel.

3.4 Adjacent Sources

Sources located adjacent to the Grande Prairie AASF that could have contributed potential PFAS releases are described below.

The Peace Prairie Hangar was built in 1976 and was initially owned and operated by the TXARNG. Singapore Air Force troops were trained at the Peace Prairie facility by TXARNG personnel. In 1998, the Peace Prairie Hangar was expanded, and an AFFF fire suppression system was added. The Peace Prairie Hangar is located northeast of the Grand Prairie AASF. Based on interviews, the suppression system has not been triggered, and no leaks have been detected since 2013. The system is currently inspected once a month and has been inspected monthly since 2015. The Peace Prairie Hangar is no longer part of the TXARNG lease and is currently owned by the City of Dallas.

In 2003, a release was reported from the AFFF fire suppression system at the Peace Prairie Hangar. According to the TXARNG Environmental Spill Report, less than 150 gallons of Chemguard™ Standard Grade 3% AFFF was released in the Peace Prairie Hangar on 5 May 2003. The accidental release was caused by a malfunction of the pull station due to vibration, triggering the fire suppression system. Once the system was triggered, the 3% AFFF chemical mixed with water to produce approximately 5,000 gallons of liquid and 15,000 gallons of foam that filled the hangar. Facility personnel washed the liquid/foam mixture into the floor drain, which is connected to holding sumps and an OWS. Eagle Construction and Environmental was contracted to put the foam/water and any other liquid in the sumps and the OWS into holding pods in case of rain, awaiting lab results and then disposal. Some AFFF was released to the ground because of a defective diverter valve. Approximately 20,000 gallons of liquid and residue were removed by Eagle Construction who transported the wastewater to Cold Springs Processing for disposal.

The Peace Prairie Division had Tri-Max™ units, which hangar maintenance personnel inspected. Peace Prairie personnel reported training monthly with Tri-Max™ units. It is unknown where this training occurred, but it most likely occurred at the Peace Prairie Wash Rack. AFFF concentrate is stored in the Peace Prairie Hangar and in the Peace Prairie Bulk Storage Facility. Tri-Max™ units were serviced by a contractor, and it is not clear what happened to the old solution.

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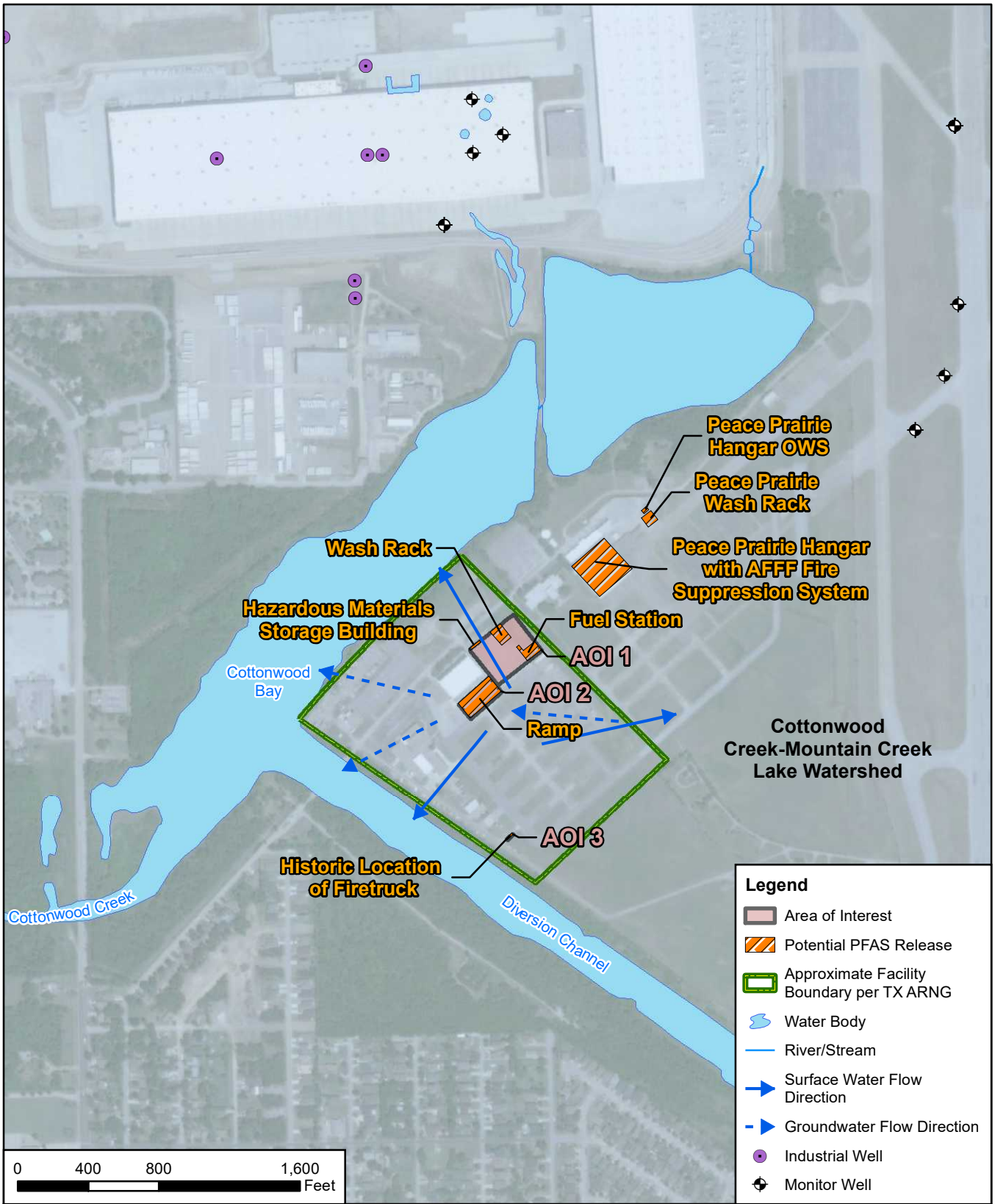

CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	10/26/2021	GIS BY	MS	10/26/2021
SCALE	1:9,600	CHK BY	MB	10/26/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	10/26/2021

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

4.2 Goals of the Study

The following goals were established for this SI:

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

2. Develop information to potentially eliminate a release from further consideration because it is determined that it poses no significant threat to human health or the environment.
3. Determine the potential need for a Time Critical Removal Action (TCRA) (applies to drinking water only). The primary actions that will be considered include provision of alternative water supplies or wellhead treatment.
4. Collect data to better characterize the release areas for more effective and rapid initiation of a 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 Grand Prairie AASF (AECOM, 2020);
- Analytical data from groundwater and soil samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2021b); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-1**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s).

4.5 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast, accredited under the DoD Environmental Laboratory Accreditation Program (DoD 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, 2021b). 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 2.67 to 13.08 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 (**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.

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. The field sample EIS recoveries were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021b).

Injection internal standards (IIS) were added by the laboratory after sample extraction and prior to analysis as a requirement of DoD Quality Systems Manual (QSM) 5.3 to measure relative responses of target analytes. Several field and laboratory samples displayed IIS area counts outside of quality control (QC) limits. PFAS analytes are not quantitated based on IIS recoveries

in non-drinking water matrices. No data quality impact is anticipated, and the associated field sample results are usable as reported.

LCS/laboratory control spike 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, 2021b).

MS/matrix spike 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 with limited exceptions. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. The MS/MSD samples were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021b) with the exception of the PFOA result for AOI01-01-GW and four PFAS compounds for AOI01-01-SB-00-02 which displayed percent recoveries greater than the upper QC limit. The positive associated parent sample results were qualified “J+” with a likely high bias so these results are likely conservative high estimates.

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 duplicates AOI01-01-GW and AOI01-01-SB-03-05 displayed precision anomalies for PFNA and PFUnDA, respectively: the field duplicate pairs displayed positive results in the parent sample and non-detect results in the associated duplicate sample. The positive field duplicate results were qualified “J”, while the non-detect results were qualified “UJ”. The qualified results should be considered usable as estimated values.

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. One LCS/LCSD performed displayed a percent recovery greater than the upper QC limits for PFNA and PFTrDA. The associated field sample results were non-detect; therefore, no data qualifying action was required, and the associated parent sample results should be considered usable as reported.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with one exception. Several MSDs displayed percent recoveries greater than the upper QC limit of 70% for multiple target analytes. The positive field sample result associated with the positive biases was qualified “J+” and should be considered usable as an estimated value with a positive bias.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. The calibration verifications performed during the laboratory analyses were within the project established precision limits presented in the SI QAPP Addendum (AECOM, 2021b), with one exception. One instrument calibration

sensitivity standard associated recovered above the QC limits for several target analytes. The associated field sample results were non-detect and no impact on the data is anticipated.

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 liquid chromatography with tandem mass spectrometry (LC/MS/MS) Compliant with QSM 5.3 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 branch 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%. All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory. The laboratory used approved standard methods in accordance with the SI QAPP Addendum (AECOM, 2021b) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Multiple instrument and method blanks displayed concentrations for target analytes greater than the detection limit. The positive field sample results less than five times the detections found in the method and laboratory blanks were qualified “U”, and the associated numerical value reported was elevated to the limit of detection (LOD). These results are usable as qualified and should be considered false positives.

Equipment blanks and field blanks were also collected for groundwater and soil samples. Several field and equipment blanks displayed concentrations of target analytes greater than the LOD. The associated field sample results were either non-detect or displayed results greater than five times the concentration displayed in the blanks. No data qualifying action was necessary, and the field sample results should be considered usable as reported.

A sample of the water used for decontamination of the drill rig was collected in advance of the field effort. The drill rig decontamination sample displayed a concentration above the detection limit for several target analytes. The associated field sample results were treated as true positives by the project team.

Field samples were extracted and analyzed within the appropriate holding time in order to qualitatively express the degree to which data accurately reflect site conditions with limited exceptions. The holding time for pH analysis is “immediate”, all field samples analyzed for pH were qualified “J” and should be considered usable as estimated values.

Overall, the data are usable for evaluating the presence or absence of PFAS at the Site. Sufficient usable data were obtained to meet the objectives of the SI and to complete the risk assessment.

4.6.4 Comparability

Comparability is the extent to which data from one study can be compared directly to either past data from the current project or data from another study. Using standardized sampling and analytical methods, units of reporting, and site selection procedures help ensure comparability.

Standard field sampling and typical laboratory protocols were used during the SI and are considered comparable to ongoing investigations.

4.6.5 Completeness

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

- PFAS in groundwater by LC/MS/MS compliant with QSM 5.3 Table B-15 Modified at 100%
- PFAS in soil by LC/MS/MS compliant with QSM 5.3 Table B-15 Modified 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, a method detection limit (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, 2021b). 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, 2021b), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the MDL 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 Site Inspection Programmatic UFP-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Grand Prairie Army Aviation Support Facility, Grand Prairie, Texas* dated July 2020 (AECOM, 2020);
- *Final Site Safety and Health Plan, Grand Prairie Army Aviation Support Facility, Grand Prairie, Texas* March 2021 (AECOM, 2021a); and
- *Final Site Inspection UFP-Quality Assurance Project Plan Addendum, Grand Prairie Army Aviation Support Facility, Grand Prairie, Texas* dated April 2021 (AECOM, 2021b).

The SI field activities were conducted from 22 to 24 March 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, 2021b), except as noted in **Section 5.8**.

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:

- 18 soil samples from 6 boring locations;
- 6 grab groundwater samples from 6 temporary well locations; and
- 10 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**, a Field Change Request Form is provided in **Appendix B3**, and land survey data is 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, 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 19 November 2020, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, Texas Army National Guard (TXARNG), USACE, Texas Commission on Environmental Quality (TCEQ), 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, 2021b).

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

5.1.2 Utility Clearance

AECOM's drilling subcontractor, WEST Drilling placed a ticket with the Texas811 utility clearance provider to notify them of intrusive work on 16 April 2021. However, because the AASF is a private facility, the participating Texas811 locators did not clear utilities at the entire facility. Therefore, AECOM contracted Ground Penetrating Radar Systems, LLC (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 23 March 2021 with input from the AECOM field team and Grand Prairie AASF facility staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be acceptable for use in a PFAS investigation prior to the start of field activities. A sample from a potable water source at Grand Prairie AASF was collected on 20 January 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, 2021b). 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 direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021b). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top five feet of the boring, in accordance with AECOM utility clearance procedures. The soil boring locations are shown on **Figure 5-1** and depths are provided **Table 5-1**.

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

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

Soil borings completed during the SI found poorly-graded and well-graded sand as the dominant lithology of unconsolidated sediments below the Grand Prairie AASF. The borings were completed at 15 feet bgs. Layers of clay to silty sand were also observed in the boring logs at thicknesses ranging from a few inches up to 6 feet. Many of the logs also reported varying percentages of gravel included in the sand packages.

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, 2021b).

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 blank 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, 2021b) using bentonite chips at completion of sampling activities. With the exception of AOI02-01, borings were installed in grass areas to avoid disturbing concrete or asphalt surfaces.

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 or 10-foot section (depending on depth to water) 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, 2021b).

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

Temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021b) by removing the PVC and backfilling the hole with bentonite chips. Where possible, temporary wells were installed in grass areas to avoid disturbing concrete or asphalt. AOI02-01 was the only boring installed in an asphalt area. After the boring was abandoned, the asphalt was repaired with cold patch asphalt.

5.4 Synoptic Water Level Measurements

A synoptic groundwater gauging event was performed between 22 March and 24 March 2021. Groundwater elevation measurements were collected from the 6 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 is provided in **Table 5-2**.

5.5 Surveying

The eastern side of each well casing was surveyed by Texas-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021b). Survey data from the newly installed wells on the facility were collected on 24 March 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 B4**.

5.6 Investigation-Derived Waste

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

Soil IDW (i.e., soil cuttings) generated during the SI were containerized in a properly labeled 55-gallon drum and stored in front of the Hazardous Waste Storage Building at Grand Prairie AASF. ARNG will manage disposal of the solid IDW and will coordinate with TXARNG to ensure proper disposal in accordance with the DA Guidance for Addressing releases of PFAS, Q18 (DA, 2018).

Liquid IDW (i.e., purge water and decontamination fluids) generated during the SI were containerized in properly labeled 55-gallon drums and stored in front of the Hazardous Waste Storage Building at Grand Prairie AASF. The liquid IDW will not be sampled and will assume PFAS characteristics of the associated groundwater samples collected from the source locations. ARNG will manage and dispose of the liquid IDW under a separate contract in accordance with SOP No. 042A for treating Liquid Investigation-Derived Material (purge water, drilling water, and decontamination fluids) (EA Engineering, Science, and Technology, Inc., 2021). ARNG will further coordinate with TCEQ to ensure proper disposal and the DA Guidance for Addressing Releases of PFAS, Q18 (DA, 2018).

Other solids such as spent PPE, 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.

5.8 Deviations from SI QAPP Addendum

One deviation from the SI QAPP Addendum was identified during review of the field documentation. The deviation is noted below and is documented in a Field Change Request Form (**Appendix B3**):

- During the installation of temporary monitoring wells, a temporary well location at Grand Prairie Facility (GPF)-01 was attempted, but a 5-foot clay layer was encountered. The temporary well did not produce water overnight. Based on the terrain near the original well location, an off-set location would likely result in the same geological situation. The well location was moved 100 feet north, east of the original location. This action was documented in a Field Change Request Form provided in **Appendix B3**.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Grand Prairie AASF, Texas

Sample Identification	Sample Collection Date	Sample Depth (feet bgs)	PFAS (LC/MS/MS QSM 5.3 Table B-15)	TOC + pH (USEPA 9060A/9045D)	Comments
Soil Samples					
AOI01-01-SB-00-02	3/23/2021	0-2	x		
AOI01-01-SB-00-02-MS	3/23/2021	0-2	x	x	MS/MSD
AOI01-01-SB-00-02-MSD	3/23/2021	0-2	x	x	MS/MSD
AOI01-01-SB-03-05	3/23/2021	3-5	x		
AOI01-01-SB-03-05-D	3/23/2021	3-5	x		Field Duplicate
AOI01-01-SB-06-08	3/23/2021	6-8	x	x	
AOI01-01-SB-06-08-D	3/23/2021	6-8	x	x	Field Duplicate
AOI01-02-SB-00-02	3/23/2021	0-2	x		
AOI01-02-SB-03-05	3/23/2021	3-5	x		
AOI01-02-SB-08-10	3/23/2021	8-10	x		
AOI02-01-SB-00-02	3/22/2021	0-2	x		
AOI02-01-SB-02-04	3/22/2021	2-4	x		
AOI02-01-SB-06-08	3/22/2021	6-8	x	x	
AOI03-01-SB-00-02	3/22/2021	0-2	x		
AOI03-01-SB-04-06	3/22/2021	4-6	x		
AOI03-01-SB-08-10	3/22/2021	8-10	x	x	
GPF-01-SB-00-02	3/23/2021	0-2	x		
GPF-01-SB-03-05	3/23/2021	3-5	x		
GPF-01-SB-06-08	3/23/2021	6-8	x		
GPF-02-SB-00-02	3/22/2021	0-2	x		
GPF-02-SB-03-05	3/22/2021	3-5	x		
GPF-02-SB-05-06	3/22/2021	5-6	x		
Groundwater Samples					
AOI01-01-GW	3/23/2021	14	x		
AOI01-01-GW-D	3/23/2021	14	x		Field Duplicate
AOI01-01-GW-MS	3/23/2021	14	x		MS/MSD
AOI01-01-GW-MSD	3/23/2021	14	x		MS/MSD
AOI01-02-GW	3/23/2021	14.5	x		
AOI02-01-GW	3/23/2021	11.35	x		
AOI03-01-GW	3/22/2021	14	x		
GPF-01-GW	3/24/2021	14	x		
GPF-02-GW	3/22/2021	14	x		
Quality Control Samples					
GPF-FRB-01	3/22/2021	--	x		Field Blank
GPF-ERB-01	3/23/2021	--	x		from DPT drill tip
GPF-ERB-02	3/23/2021	--	x		from hand auger

Notes:
AOI = Area of Interest
AASF = Army Aviation Support Facility
bgs = below ground surface
D = duplicate
DPT = direct push technology
ERB = equipment rinsate blank
FRB = field reagent blank
GPF = Grand Prairie Facility
GW = groundwater
LC/MS/MS = Liquid Chromatography Mass Spectrometry
MS/MSD = matrix spike/ matrix spike duplicate
PFAS = per- and polyfluoroalkyl substances
pH = potential for hydrogen
QSM = Quality Systems Manual
SB = soil boring
TOC =total organic carbon
USEPA = United States Environmental Protection Agency

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Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Grand Prairie AASF, Texas

Area of Interest	Boring Location	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)	Top of Casing Elevation (feet NAVD88)	Ground Surface Elevation (feet NAVD88)	Depth to Water (feet btoc)	Depth to Water (feet bgs)	Groundwater Elevation (feet NAVD88)
1	AOI01-01	15	5-15	477.65	476.30	7.71	6.36	469.94
	AOI01-02	15	5-15	481.67	481.40	13.35	13.08	468.32
2	AOI02-01	15	2-12	480.97	479.59	9.29	7.91	471.68
3	AOI03-01	15	10-15	482.52	481.40	12.03	10.91	470.49
GPF-01	GPF-01	15	5-15	470.52	470.30	7.92	7.70	462.60
GPF-02	GPF-02	15	5-15	477.93	477.60	3.00	2.67	474.93

Notes:
AOI = Area of Interest
AASF = Army Aviation Support Facility
bgs = below ground surface
btoc = below top of casing
GPF = Grand Prairie Facility
NAVD88 = North American Vertical Datum 1988

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CLIENT	ARNG			
NOTES	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	8/10/2021	GIS BY	MS	8/10/2021
SCALE	1:3,960	CHK BY	MB	8/10/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	CM	8/10/2021

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 results for each AOI is provided in **Section 6.3** through **Section 6.6**. **Table 6-2** through **Table 6-4** present PFAS results for samples with detections in soil or groundwater; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 September 2021 (Assistant Secretary of Defense, 2021). The ARNG program under which this SI was performed follows this DoD policy. Should the maximum site concentration for sampled media exceed the SLs established in the OSD memorandum, the AOI will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs were calculated using the USEPA Office of Superfund Sites On-Line Calculator, which was updated on 8 April 2021 based on the release of the final Human Health Toxicity Values for PFBS (USEPA, 2021).

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 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 site: 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 three potential PFAS release areas: Wash Rack, Hazardous Storage Building, and Fuel Station. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the three potential PFAS release areas: Wash Rack, Hazardous Storage Building, and Fuel Station. **Figure 6-1** through **Figure 6-3** present the ranges of detections of PFOA, PFOS, and PFBS in soil. **Table 6-2** and **Table 6-3** summarize the detected compounds in soil.

At the location where wastewater from the Wash Rack and OWS would have discharged to the surface, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (3 to 5 feet bgs), and deep subsurface soil (6 to 8 feet bgs) from boring location AOI01-01. PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than the SLs. PFOA was detected at all three depths with concentrations ranging from 0.110 J micrograms per kilogram (µg/kg) to 0.358 J µg/kg. PFOS was only detected in the surface soil sample (0 to 2 feet bgs) at a concentration of 0.367 J µg/kg. PFBS was not detected at AOI01-01.

At the Fuel Station, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (3 to 5 feet bgs), and deep subsurface soil (8 to 10 feet bgs) from boring location AOI01-02. PFOA was detected in soil at concentrations several orders of magnitude lower than the SLs. PFOA was detected in subsurface soil (3 to 5 feet bgs and 8 to 10 feet bgs) at concentrations of 0.161 J µg/kg and 0.107 J µg/kg, respectively. PFOA was not detected in surface soil (0 to 2 feet bgs) at AOI01-02. PFOS and PFBS were not detected at AOI01-02.

6.3.2 AOI 1 Groundwater Analytical Results

PFOA exceeded the SLs in groundwater at the potential PFAS release areas at AOI 1. **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

At the location where wastewater from the Wash Rack and OWS or where any releases from the Hazardous Material Storage Building would have discharged to the surface, groundwater was sampled from temporary monitoring well location AOI01-01. The SL of 40 ng/L for PFOA was exceeded at AOI01-01 at a concentration of 106 J+ ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 23.5 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 3.24 J ng/L.

At the Fuel Station, groundwater was sampled from temporary monitoring well location AOI01-02. The SL of 40 ng/L for PFOA was exceeded at AOI01-02 at a concentration of 94.4 ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 6.37 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 1.75 J ng/L.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations were several orders of magnitude lower than the soil SLs. At locations AOI01-01 and AOI01-02, PFOA was detected in groundwater at concentrations exceeding the SL of 40 ng/L. PFOS and PFBS were detected in groundwater at concentrations below their respective SLs. Based on the exceedances of the SL for PFOA in groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2

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

6.4.1 AOI 2 Soil Analytical Results

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

At the Flight Line Ramp, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (2 to 4 feet bgs), and deep subsurface soil (6 to 8 feet bgs) from boring location AOI02-01. PFOA, PFOS, and PFBS were detected in soil at concentrations several orders of magnitude lower than the SLs. PFOA and PFOS were detected in surface soil (0 to 2 feet bgs) at concentrations of 0.069 J µg/kg and 0.472 J µg/kg, respectively. PFBS was not detected in surface soil. PFOA, PFOS, and PFBS were not detected in subsurface soil.

6.4.2 AOI 2 Groundwater Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in groundwater at the potential PFAS release area: Flight Line Ramp. **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

At the Flight Line Ramp, groundwater was sampled from temporary monitoring well location AOI02-01. PFOA was detected below the SL of 40 ng/L at a concentration of 33.3 ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 39.0 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 37.5 ng/L.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in surface soil at AOI 2; however, the detected concentrations were several orders of magnitude lower than the soil SLs. PFOA, PFOS, and PFBS were detected in groundwater at concentrations below their respective SLs. Therefore, further evaluation at AOI 2 is not warranted.

6.5 AOI 3

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

6.5.1 AOI 3 Soil Analytical Results

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

At the Former Firetruck Location, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (4 to 6 feet bgs), and deep subsurface soil (8 to 10 feet bgs) from boring location AOI03-01. PFOA, PFOS, and PFBS were detected in soil at concentrations several orders of magnitude lower than the SLs. PFOA, PFOS and PFBS were detected in surface soil (0 to 2 feet bgs) at concentrations of 0.518 J µg/kg, 0.523 J µg/kg and 0.061 J µg/kg, respectively. PFOA, PFOS, and PFBS were not detected in subsurface soil.

6.5.2 AOI 3 Groundwater Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in groundwater at the potential PFAS release area: Former Firetruck Location. **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

At the Former Firetruck Location, groundwater was sampled from temporary monitoring well location AOI03-01. PFOA was detected below the SL of 40 ng/L at a concentration of 9.71 ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 2.97 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 14.8 ng/L.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in surface soil at AOI 3; however, the detected concentrations were several orders of magnitude lower than the soil SLs. PFOA, PFOS, and PFBS were detected in groundwater at concentrations below their respective SLs. Therefore, further evaluation at AOI 3 is not warranted.

6.6 Facility Boundary

This section presents the analytical results for soil and groundwater in comparison to SLs for the facility boundary, which includes one downgradient location near the northern boundary (GPF-01) to determine if potential PFAS impacts are migrating offsite, and one upgradient location on the eastern side (GPF-02) to determine if potential PFAS impacts are migrating from offsite to onsite. The detected compounds in soil and groundwater are summarized on **Table 6-2** through **Table 6-4**. The detections of PFOA, PFOS, and PFBS in soil and groundwater are presented on **Figure 6-1** through **Figure 6-4**.

6.6.1 Facility Boundary Soil Analytical Results

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

At the downgradient location GPF-01, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (3 to 5 feet bgs), and deep subsurface soil (6 to 8 feet bgs) from the boring location. PFOA, PFOS, and PFBS were detected in soil at concentrations several orders of magnitude lower than the SLs. PFOA was detected at all three depths with concentrations ranging from 0.075 J µg/kg to 3.5 µg/kg. PFOS was detected in subsurface soil (3 to 5 feet bgs and 6 to 8 feet bgs) at concentrations of 1.42 µg/kg and 1.03 J µg/kg, respectively. PFBS was detected subsurface soil (3 to 5 feet bgs and 6 to 8 feet bgs) at concentrations of 0.171 J µg/kg and 0.066 J µg/kg, respectively. PFOS and PFBS were not detected in surface soil (0 to 2 feet bgs) at GPF-01.

At the upgradient location GPF-02, soil was sampled from surface soil (0 to 2 feet bgs), intermediate subsurface soil (3 to 5 feet bgs), and deep subsurface soil (5 to 6 feet bgs) from the boring location. PFOA, PFOS, and PFBS were not detected in soil at GPF-02.

6.6.2 Facility Boundary Groundwater Analytical Results

PFOA exceeded the SLs for PFOA of 40 ng/L in groundwater at the facility boundary location (GPF-01). **Figure 6-4** presents the ranges of detections of PFOA, PFOS, and PFBS in groundwater. **Table 6-4** summarizes the detected compounds in groundwater.

At the downgradient location GPF-01, groundwater was sampled from the temporary monitoring well location. The SL of 40 ng/L for PFOA was exceeded at a concentration of 369 ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 13.0 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 32.9 ng/L.

At the upgradient location GPF-02, groundwater was sampled from the temporary monitoring well location. PFOA was detected below the SL of 40 ng/L at a concentration of 15.1 ng/L. PFOS was detected below the SL of 40 ng/L at a concentration of 8.08 ng/L. PFBS was detected below the SL of 600 ng/L at a concentration of 2.79 J ng/L.

6.6.3 Facility Boundary Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at the facility boundary; however, the detected concentrations were several orders of magnitude lower than the soil SLs. At location GPF-01, PFOA was detected in groundwater at a concentration exceeding the SL of 40 ng/L. PFOS and PFBS were detected in groundwater at concentrations below their respective SLs. Based on the exceedances of the SL for PFOA in groundwater, further evaluation at the facility boundary is warranted.

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Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Grand Prairie AASF

Area of Interest		AOI1				AOI2		AOI3		GPF-01		GPF-02	
Sample ID		AOI01-01-SB-00-02		AOI01-02-SB-00-02		AOI02-01-SB-00-02		AOI03-01-SB-00-02		GPF-01-SB-00-02		GPF-02-SB-00-02	
Sample Date		03/23/2021		03/23/2021		03/22/2021		03/22/2021		03/23/2021		03/22/2021	
Depth		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft		0 - 2 ft	
Analyte	OSD Screening Level [a,b]	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)													
PFBS	1900	ND		ND		ND		0.061	J	ND		ND	
PFDA	-	ND		ND		0.067	J	ND		ND		ND	
PFHxA	-	0.106	J	ND		ND		0.163	J	ND		ND	
PFHxS	-	ND		ND		0.241	J	ND		ND		ND	
PFOA	130	0.358	J	ND		0.069	J	0.518	J	0.075	J	ND	
PFOS	130	0.367	J	ND		0.472	J	0.523	J	ND		ND	
PFPeA	-	0.134	J	ND		ND		0.082	J	ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on residential scenario for incidental ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
ft	feet
GPF	Grand Prairie Facility
HQ	Hazard quotient
ID	Identification
LCMSMS	Liquid Chromatography 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

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Table 6-3
PFAS Detections in Subsurface Soil
Site Inspection Report, Grand Prairie AASF

Area of Interest		AOI1												AOI2				AOI3			
Sample ID		AOI01-01-SB-03-05		AOI01-01-SB-03-05-D		AOI01-01-SB-06-08		AOI01-01-SB-06-08-D		AOI01-02-SB-03-05		AOI01-02-SB-08-10		AOI02-01-SB-02-04		AOI02-01-SB-06-08		AOI03-01-SB-04-06		AOI03-01-SB-08-10	
Sample Date		03/23/2021		03/23/2021		03/23/2021		03/23/2021		03/23/2021		03/23/2021		03/22/2021		03/22/2021		03/22/2021		03/22/2021	
Depth		3 - 5 ft		3 - 5 ft		6 - 8 ft		6 - 8 ft		3 - 5 ft		8 - 10 ft		2 - 4 ft		6 - 8 ft		4 - 6 ft		8 - 10 ft	
Analyte	OSD Screening Level [a,b]	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		ND		ND		ND		ND		ND		0.093	J	ND	
PFBS	25000	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHxA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFHxS	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	1600	0.262	J	0.151	J	0.248	J	0.110	J	0.161	J	0.107	J	ND		ND		ND		ND	
PFOS	1600	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	Duplicate
ft	feet
GPF	Grand Prairie Facility
HQ	Hazard quotient
ID	Identification
LCMSMS	Liquid Chromatography 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, Grand Prairie AASF

Area of Interest		GPF-01				GPF-02			
Sample ID		GPF-01-SB-03-05		GPF-01-SB-06-08		GPF-02-SB-03-05		GPF-02-SB-05-06	
Sample Date		03/23/2021		03/23/2021		03/22/2021		03/22/2021	
Depth		3 - 5 ft		6 - 8 ft		3 - 5 ft		5 - 6 ft	
Analyte	OSD Screening Level [a,b]	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	
PFBS	25000	0.171	J	0.066	J	ND		ND	
PFHpA	-	0.099	J	ND		ND		ND	
PFHxA	-	0.678	J	0.069	J	ND		ND	
PFHxS	-	7.48		0.621	J	ND		ND	
PFOA	1600	3.50		0.596	J	ND		ND	
PFOS	1600	1.42		1.03	J	ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Soil screening levels based on industrial/commercial composite worker scenario for incidental ingestion of contaminated soil.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid

Acronyms and Abbreviations

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	Duplicate
ft	feet
GPF	Grand Prairie Facility
HQ	Hazard quotient
ID	Identification
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
µg/kg	micrograms per kilogram
-	Not applicable

Table 6-4
PFAS Detections in Groundwater
Site Inspection Report, Grand Prairie AASF

Area of Interest		AOI1						AOI2		AOI3		GPF-01		GPF-02	
Sample ID		AOI01-01-GW		AOI01-01-GW-D		AOI01-02-GW		AOI02-01-GW		AOI03-01-GW		GPF-01-GW		GPF-02-GW	
Sample Date		03/23/2021		03/23/2021		03/23/2021		03/23/2021		03/22/2021		03/24/2021		03/22/2021	
Analyte	OSD Screening Level [a,b]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS by LCMSMS Compliant with QSM 5.3 Table B-15 (ng/L)															
PFBA	-	10.3		9.38		10.6		23.7		12.4		56.5		11.7	
PFBS	600	3.24	J	2.97	J	1.75	J	37.5		14.8		32.9		2.79	J
PFHpA	-	7.25		7.12		8.03		13.3		2.92	J	11.1		7.07	
PFHxA	-	13.3		12.2		11.0		66.1		17.6		100		12.9	
PFHxS	-	23.9		24.6		25.9		88.6		68.6		946		8.92	
PFNA	-	LOD	UJ	1.39	J	1.99	J	LOD		LOD		LOD		LOD	
PFOA	40	**106**	**J+**	**106**	**J+**	**94.4**		33.3		9.71		**369**		15.1	
PFOS	40	19.6		23.5		6.37		39.0		2.97	J	13.0		8.08	
PFPeA	-	9.82		9.35		10.8		29.2		6.54		18.2		15.7	

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

References

a. Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS and PFOA in Groundwater or Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 15 October 2019. Groundwater screening levels based on residential scenario for direct ingestion of groundwater.

b. USEPA, 2021. Risk Based Screening Levels Calculated for PFBS in Groundwater and Soil using USEPA's Regional Screening Level Calculator. HQ=0.1. 8 April 2021.

Interpreted Qualifiers

J = Estimated concentration

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

PFAS	per- and polyfluoroalkyl substances
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

AASF	Army Aviation Support Facility
AOI	Area of Interest
D	Duplicate
DL	detection limit
GPF	Grand Prairie Facility
GW	Groundwater
HA	Health Advisory
HQ	Hazard quotient
ID	Identification
LCMSMS	Liquid Chromatography 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

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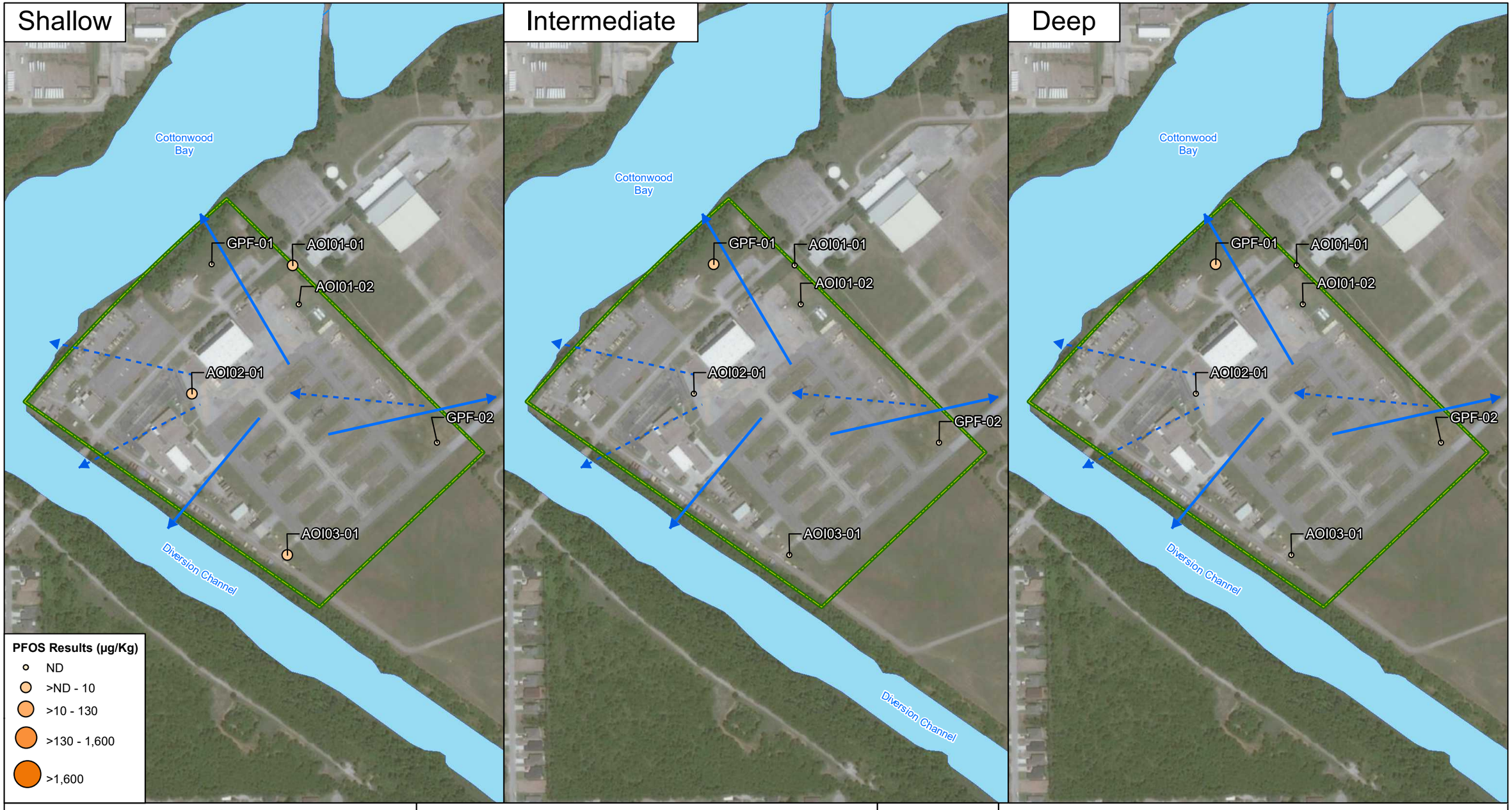

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	11/2/2021	GIS BY	MS	11/2/2021
SCALE	1:5,263	CHK BY	MB	11/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	11/2/2021

Approximate Facility Boundary per TX ARNG
Water Body
Surface Water Flow Direction
Groundwater Flow Direction

0 220 440 880 Feet

N

PFOS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

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Shallow

Intermediate

Deep

Cottonwood Bay

GPF-01

AOI01-01

AOI01-02

AOI02-01

GPF-02

AOI03-01

Diversion Channel

PFOA Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	11/2/2021	GIS BY	MS	11/2/2021
SCALE	1:5,263	CHK BY	MB	11/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	11/2/2021

Approximate Facility Boundary per TX ARNG

Water Body

Surface Water Flow Direction

Groundwater Flow Direction

0 220 440 880 Feet

N

PFOA Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-2

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Shallow

Intermediate

Deep

Cottonwood Bay

GPF-01

AOI01-01

AOI01-02

AOI02-01

GPF-02

AOI03-01

Diversion Channel

PFBS Results (µg/Kg)

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

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	11/2/2021	GIS BY	MS	11/2/2021
SCALE	1:5,263	CHK BY	JZ	11/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	11/2/2021

- Approximate Facility Boundary per TX ARNG
- Water Body
- Surface Water Flow Direction
- Groundwater Flow Direction

0 220 440 880 Feet

N

PFBS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-3

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PFOS

PFOA

PFBS

Cottonwood Bay

GPF-01

AOI01-01

AOI01-02

AOI02-01

GPF-02

AOI03-01

PFOS Results (ng/L)

- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOA Results (ng/L)

- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFBS Results (ng/L)

- ND
- >ND - 100
- >100 - 600
- >600 - 1,000
- >1,000 - 6,000
- >6,000

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Grand Prairie AASF, TX			
REVISED	11/2/2021	GIS BY	MS	11/2/2021
SCALE	1:5,280	CHK BY	MB	11/2/2021
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	CM	11/2/2021

- Approximate Facility Boundary per TX ARNG
- Water Body
- Surface Water Flow Direction
- Groundwater Flow Direction

0 220 440 880 Feet

N

PFOS, PFOA, PFBS Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-4

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7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-7**. 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. This SI programmatically focuses on potential human exposures and does not address potential ecological receptors.

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 the AOIs based on the aforementioned criteria.

7.1.1 AOI 1

Between 2000 and 2012, AFFF was used during fire training activities at the Wash Rack and AFFF was stored at the hazardous materials storage building and the fuel station. PFOA and PFOS 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, future construction worker, trespasser, recreational user, and future resident exposure to PFOA and PFOS via inhalation of dust and ingestion of surface soil. Ground-disturbing activities could also potentially result in construction worker exposure to PFOA in subsurface soil via ingestion. The CSM is presented on **Figure 7-1**.

7.1.2 AOI 2

From 2000 to 2012, AFFF was used during fire training activities at the Flight Line Ramp. PFOA and PFOS were detected in soil at AOI 2 and confirm the release of PFAS to soil in AOI 2. Based on the results of the SI in AOI 2, ground-disturbing activities could potentially result in site worker, future construction worker, trespasser, recreational user, and future resident exposure to PFOA and PFOS via inhalation of dust and ingestion of surface soil. The CSM is presented on **Figure 7-2**.

7.1.3 AOI 3

A firetruck equipped with AFFF was historically stored in the southern corner of the facility. PFOA, PFOS, and PFBS were detected in surface soil at AOI 3 and confirm the release of PFAS to soil in AOI 3. Based on the results of the SI in AOI 3, ground-disturbing activities could potentially result in site worker, future construction worker, trespasser, recreational user, and future resident exposure to PFOA, PFOS, and PFBS via inhalation of dust and ingestion of surface soil. The CSM is presented on **Figure 7-3**.

7.1.4 Facility Boundary

PFOA, PFOS, and PFBS were detected in soil near the facility boundary. Based on the results of the SI near the facility boundary, ground-disturbing activities could potentially result in site worker, future construction worker, trespasser, recreational user, and future resident exposure to PFOA via inhalation of dust and ingestion of surface soil. Ground-disturbing activities could also potentially result in construction worker exposure to PFOA, PFOS, and PFBS in subsurface soil via ingestion. The CSM is presented on **Figure 7-4**.

7.2 Groundwater Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in groundwater were used to determine whether a potentially complete pathway exists between the source and potential receptors at the AOIs based on the aforementioned criteria. Grand Prairie AASF receives its potable water from the City of Grand Prairie; therefore, the ingestion exposure pathway for site workers and trespassers is considered incomplete. A query of the Texas Water Development Board Submitted Drillers Reports Database identified the presence of public supply wells and domestic wells downgradient from Grand Prairie AASF. However, these wells range in depth from 80 ft bgs to 1158 ft bgs. Of these wells, the shallowest well is an 80-foot-deep domestic well 4 miles away and the closest well is a 2,084-foot-deep public supply well located within a mile of the facility. Groundwater within the facility boundary is shallow ranging from 2.67 feet bgs to 13.08 feet bgs during the SI. Therefore, based on the depth of the downgradient wells and distance from the facility, the ingestion exposure pathway for residential receptors is considered incomplete.

7.2.1 AOI 1

PFOA exceeded the SL in two temporary monitoring wells in AOI 1. PFOS and PFBS were detected in groundwater from the two temporary monitoring wells at concentrations below SLs. Depths to water measured in March 2021 during the SI ranged from 6.36 to 13.08 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The CSM is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, and PFBS were detected in groundwater from one temporary monitoring well at AOI 2 at concentrations below SLs. Depth to water measured at this well in March 2021 during the SI was 7.91 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The CSM is presented on **Figure 7-2**.

7.2.3 AOI 3

PFOA, PFOS, and PFBS were detected in groundwater from one temporary monitoring well at AOI 3 at concentrations below SLs. Depth to water measured at this well in March 2021 during the SI was 10.91 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The CSM is presented on **Figure 7-3**.

7.2.4 Facility Boundary

PFOA exceeded the SL in one temporary monitoring well near the northern facility boundary. PFOA was detected in groundwater from one temporary monitoring well near the eastern boundary at a concentration below the SL. PFOS and PFBS were detected in groundwater from the two temporary monitoring wells at concentrations below SLs. Depths to water measured in March 2021 during the SI ranged from 2.67 to 7.70 feet bgs. Therefore, groundwater may be encountered during construction activities and the ingestion exposure pathway for construction workers is considered potentially complete. The CSM is presented on **Figure 7-4**.

7.3 Surface Water and Sediment Exposure Pathway

No surface water or sediment features exist within the facility; therefore, the exposure pathways via surface water or sediment for incidental ingestion are considered incomplete. However, the facility is bordered to the north and west by Cottonwood Bay. Surface water and groundwater flow direction is towards Cottonwood Bay and may present a potentially complete pathway for contamination to surface water and sediment within the bay for the recreational user.

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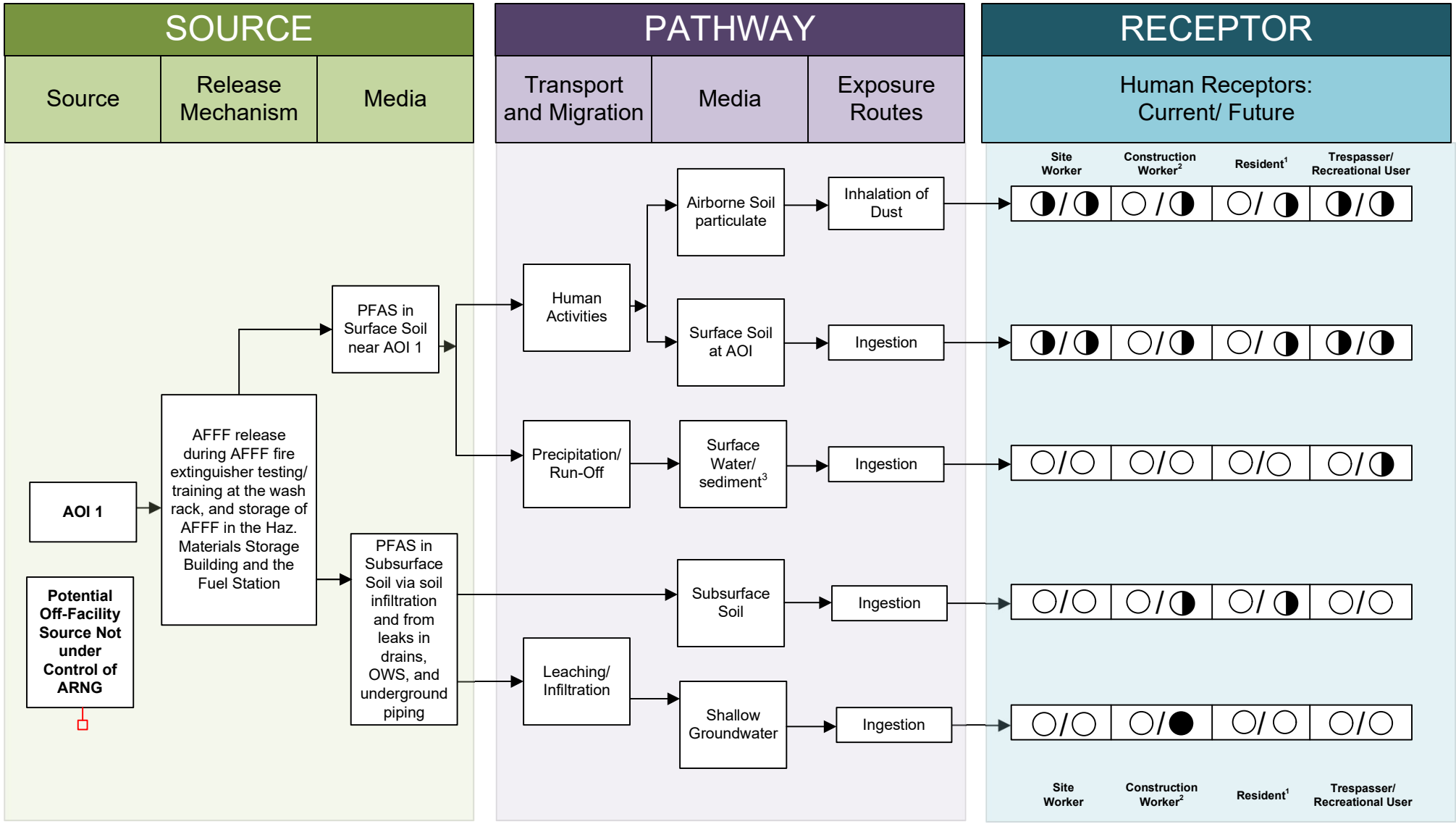


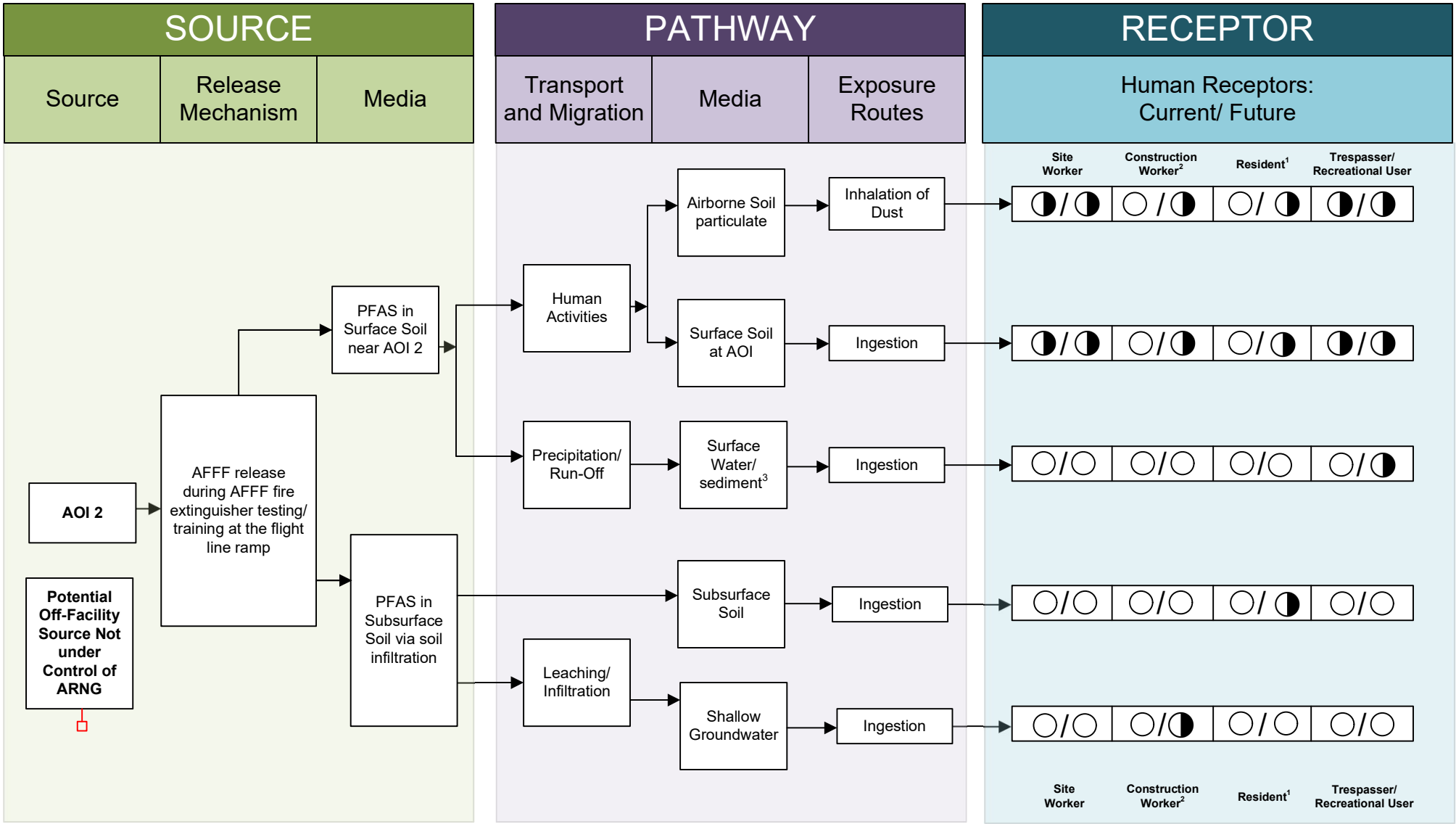
LEGEND

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

Note:

1. The residential receptor refers to future residential properties planned by the City of Dallas.
2. No current active construction at the facility.

Figure 7-1
Preliminary Conceptual Site Model, AOI 1



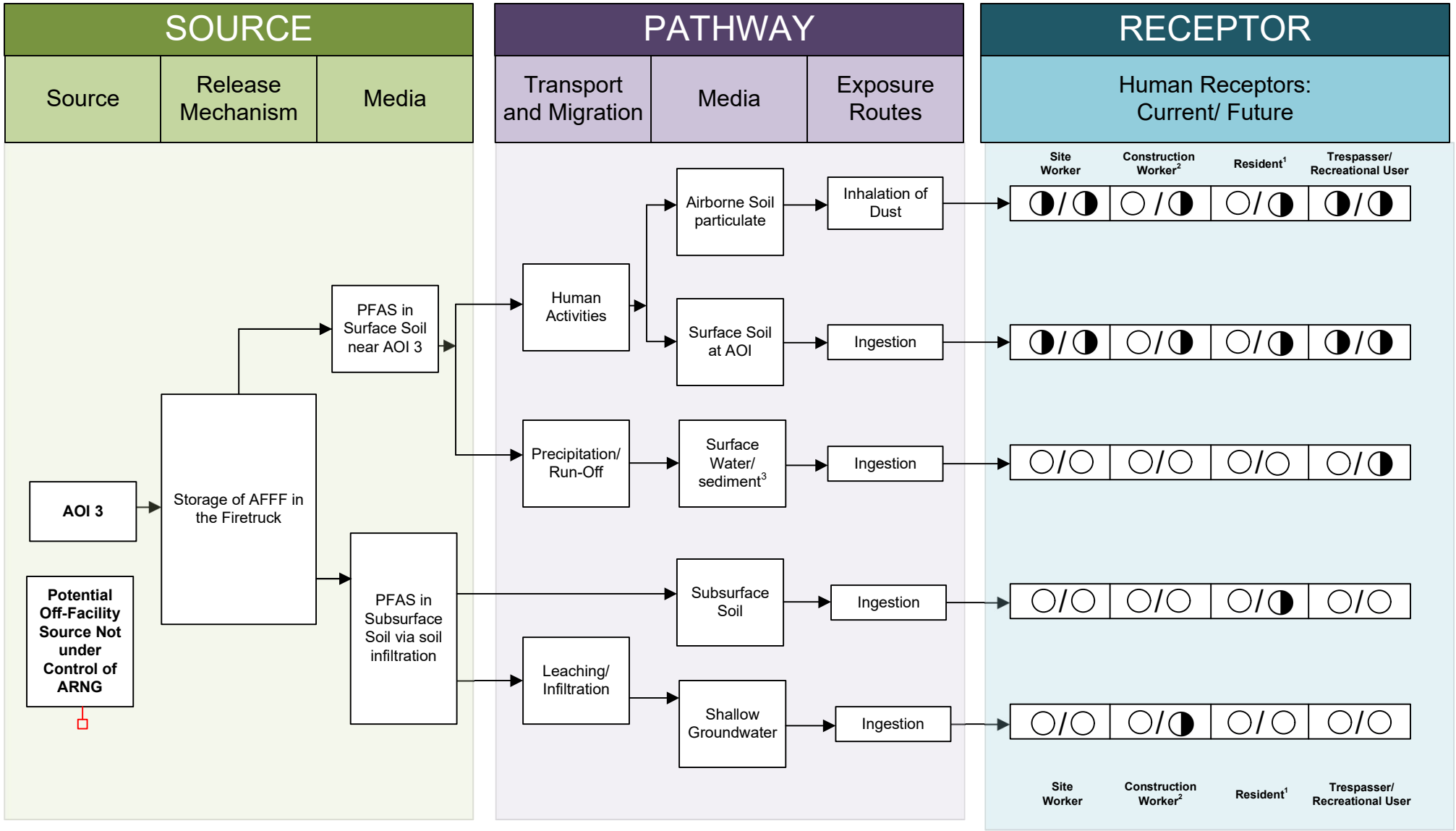
LEGEND

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

Note:

1. The residential receptor refers to future residential properties planned by the City of Dallas.
2. No current active construction at the facility.

Figure 7-2
Preliminary Conceptual Site Model, AOI 2



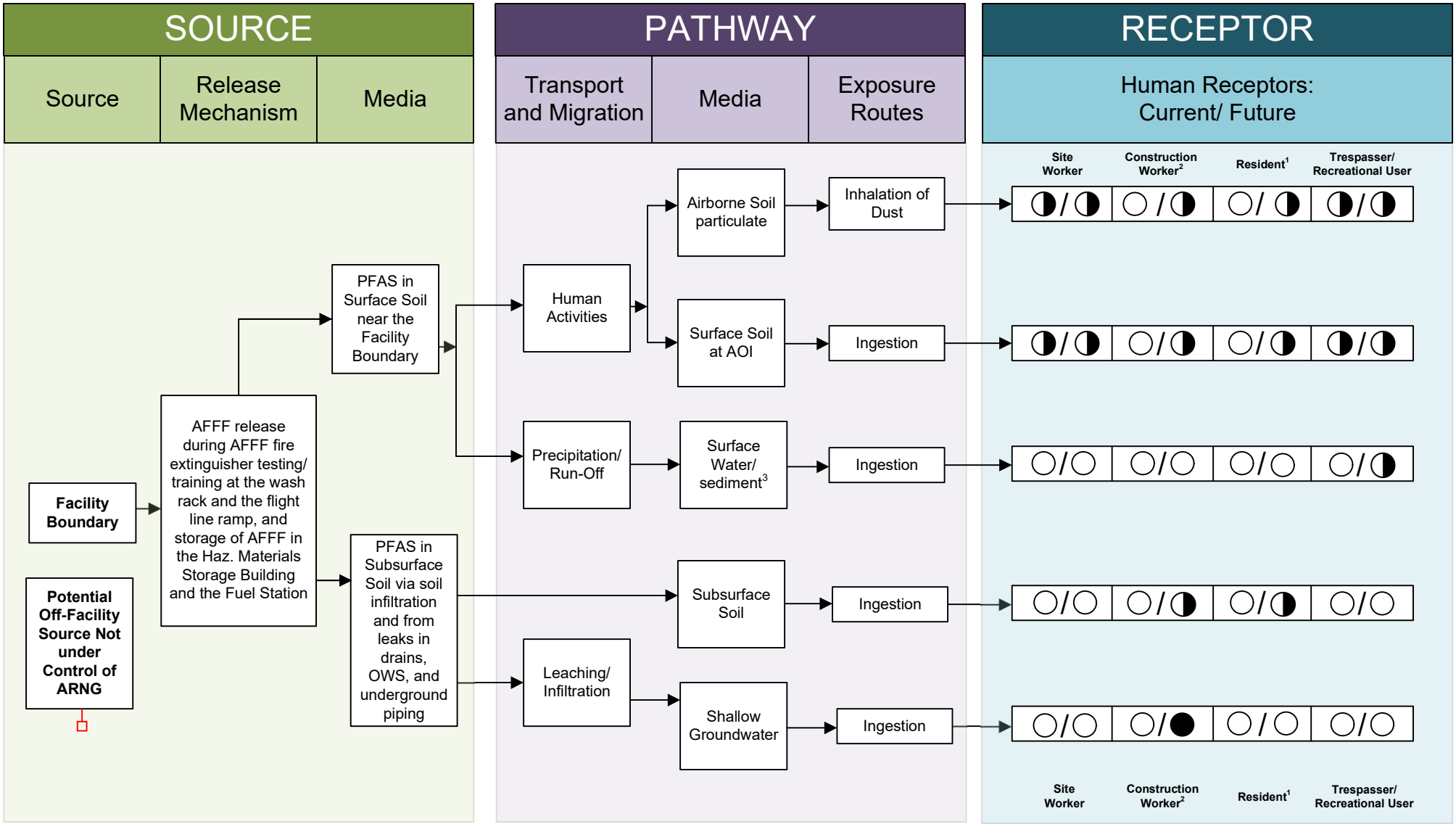
LEGEND

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

Note:

1. The residential receptor refers to future residential properties planned by the City of Dallas.
2. No current active construction at the facility.

Figure 7-3
Preliminary Conceptual Site Model, AOI 3



LEGEND

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

Note:

1. The residential receptor refers to future residential properties planned by the City of Dallas.
2. No current active construction at the facility.

Figure 7-4
Preliminary Conceptual Site Model, Facility Boundary

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 24 March 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation/plug and abandonment, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021b), except as previously noted in **Section 5.8**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021b), 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.

- 18 soil samples from 6 boring locations;
- 6 grab groundwater samples from 6 temporary well locations; and
- 10 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, PFOS, and PFBS were detected both at the source areas, as well as at the facility boundary. PFOA in groundwater at AOI 1: Wash Rack and Fuel Station and the facility boundary exceeded the SL of 40 ng/L (individually). The detected concentrations of PFOS and PFBS in groundwater from all AOIs were below the SLs. Additionally, the detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs 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.*

   Two PFAS release areas were removed from further consideration based on the groundwater and soil data collected during this SI: Flight Line Ram in AOI 2 and Former Firetruck Area in AOI 3. PFOA, PFOS, and PFBS were not detected in groundwater and/or soil above the SLs in either of these areas; therefore, these areas pose no significant threat to human health or the environment.

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

   A query of the Texas Water Development Board Submitted Drillers Reports Database identified the presence of public supply wells and domestic wells downgradient from Grand Prairie AASF. However, these wells range in depth from 80 ft bgs to 1158 ft bgs. Of these wells, the shallowest well is an 80-foot-deep domestic well 4 miles away and the closest well is a 2,084-foot-deep public supply well located within a mile of the facility. Groundwater within the facility boundary is shallow ranging from 2.67 feet bgs to 13.08 feet bgs during the SI. Based on the depth of the downgradient wells and distance from the facility, a TCRA is not recommended.

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 an overall permeable and conductive environment, with soils mostly consisting of poorly-graded fine to very fine sand and silt. Well graded sand with thin beds and lenses of gravel and mud clasts were present along with intervals of clay and clayey sand ranging from a few inches to a few feet thick.

   These site observations are consistent with the SI QAPP which reported the general stratigraphic sequence present throughout the TXARNG facility consists of Holocene and Pleistocene alluvial terrace deposits overlaying the Cretaceous Eagle Ford Shale. The upper soil horizons and alluvium have been disturbed locally by industrial development; therefore, shallow surface and subsurface soils are composed of fill materials in some areas. The lithology of sediments is primarily clay and silty clay. The clays are interspersed with sporadic deposits of streambed sand and gravel (Geo-Marine, Inc [GMI], 2002).

   During the SI, depth to water at Grand Prairie AASF ranged from approximately 2.67 to 13.08 feet bgs. Groundwater flows northward in the direction of Cottonwood Bay and westward in the direction of the Diversion Channel. 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 ARNG activities may have contributed to the detected concentrations of PFOA, PFOS, and PFBS at the facility, however, potential; releases from the adjacent property, as noted in the Grand Prairie PA (AECOM, 2020), could have contributed to the higher concentrations observed in the northeast corner of the property.

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 underlying the facility and the SL exceedance at the boundary indicate there is potentially a complete pathway between the source and receptor.

8.3 Outcome

Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to receptors 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 Wash Rack, Fuel Station, and downgradient of the Hazardous Materials Storage Building exceeded the SL of 40 ng/L at concentrations of 106 ng/L and 94.4 ng/L, at locations AOI01-01 and AOI01-02, respectively. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- At the facility boundary, PFOA in groundwater near the northeastern boundary exceeded the SL of 40 ng/L at a concentration of 369 ng/L at location GPF-01. Based on the results of the SI, further evaluation of the northeastern facility boundary is warranted in the RI.
- At AOI 1 and GPF-01, detected concentrations of PFOS and PFBS in groundwater were below SLs.
- At AOI 2, AOI 3, and the eastern facility boundary (GPF-02) detected concentrations of PFOA, PFOS, and PFBS in groundwater were below SLs.
- The detected concentrations of PFOA, PFOS, and PFBS in soil at all AOIs were below the SLs.

Table 8-1 summarizes the SI results for soil and groundwater. Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to receptors on facility 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: Wash Rack, AOI 1: Fuel Station, and Facility Boundary: GPF-01 area.

Table 8-1: Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Wash Rack	◐	●	●
	Hazardous Materials Storage Building	N/A	N/A	●
	Fuel Station	◐	●	●
2	Flight Line Ramp	◐	◐	N/A
3	Former Firetruck Location	◐	◐	◐
Facility Boundary	GPF-01	◐	●	●
	GPF-02	◐	◐	◐

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	Wash Rack, Hazardous Materials Storage Building, and Fuel Station	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI
2	Flight Line Ramp	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action
3	Former Firetruck Location	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action
Facility Boundary	GPF-01 (northeastern boundary)	Exceedances of SLs in groundwater at source areas. No exceedances of SLs in soil.	Proceed to RI
	GPF-02 (eastern boundary)	Detections in groundwater but no exceedances of SLs. No exceedances of SLs in soil.	No further action

9. References

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

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

AECOM. 2020. *Final Preliminary Assessment Report, Grand Prairie Army Aviation Support Facility, Texas.* July.

AECOM. 2021a. *Final Site Safety and Health Plan, Grand Prairie Army Aviation Support Facility, Grand Prairie, Texas, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide*. March.

AECOM. 2021b. *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Grand Prairie Army Aviation Support Facility, Grand Prairie, Texas, Perfluorooctane Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites ARNG Installations, Nationwide.* April.

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

City of Dallas. 2020. PowerPoint titled: *Hensley Field Master Redevelopment Plan, Economic Development Committee Briefing.* August. https://dallascityhall.com/departments/pnv/DCH%20Documents/Hensley%20Field%20Master%20Plan%20Briefing_August%202020.pdf. Accessed 8 February 2021.

EA Engineering, Science, and Technology, Inc. 2021. Standard Operating Procedure No. 042A for Treating Liquid Investigation-Derived Material (Purge water, drilling water, and decontamination fluids). Revision 1. March.

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

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

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

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

Geo-Marine, Inc (GMI). 2002. *Draft Site Assessment Survey (SAS)*. Texas Army National Guard (TXARNG) Dallas Naval Air Station (DNAS) Facilities. Grand Prairie, Texas. July.

Guelfo, J.L. and Higgins, C.P. 2013. *Subsurface transport potential of perfluoroalkyl acids ad aqueous film-forming foam (AFFF)-impacted sites*. Environmental Science and Technology 47(9): 4164-71.

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

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

National Oceanic and Atmospheric Administration. 2019. Dallas/Fort Worth Climatology. https://www.weather.gov/fwd/dfwclimo. Accessed 8 May 2019.

Tetra Tech NUS, Inc. (TtNUS). 2001. RCRA Facility Investigation (RFI) Report for Category A Naval Air Station Dallas.

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

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

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

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

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

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

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

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

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

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

USEPA. 2021. *Technical Fact Sheet: Toxicity Assessment for PFBS.* https://www.epa.gov/pfas/learn-about-human-health-toxicity-assessment-pfbs. 8 April.

USFWS. 2021. *Species by County Report, County: Dallas, Texas.* Environmental Conservation Online System. Accessed 10 August 2021 at https://ecos.fws.gov/ecp/report/species-listings-by-current-range-county?fips=48113.

Xiao, F., Simcik, M. F., Halbach, T. R., and Gulliver, J. S. 2015, *Perfluorooctane sulfonate (PFOS) and perfluorooctanoate (PFOA) in soils and groundwater of a U.S. metropolitan area: Migration and implications for human exposure.* Water Research 72: 64-74.