FINAL
Site Inspection Report
Army Aviation Support Facility
Stockton, California

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

November 2023

Prepared for:

Army National Guard Bureau
111 S. George Mason Drive
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The seal appearing on this document was authorized by Katharine Carr, P.G. 9315 on November 3, 2023, for the information contained herein for Stockton Army Aviation Support Facility.

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Acronyms and Abbreviations

%	percent
°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film-forming foam
amsl	above mean sea level
AOI	Area of Interest
ARNG	Army National Guard
bgs	below ground surface
CAARNG	California Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CoC	chain of custody
CSM	conceptual site model
CSMS	Combined Support Maintenance Shop
DA	Department of the Army
DoD	Department of Defense
DPT	direct push technology
DQO	data quality objective
DUA	data usability assessment
ECM	Environmental Cost Management, Inc.
EA	EA Engineering, Science, and Technology, Inc.
EDR™	Environmental Data Resources, Inc.™
ELAP	Environmental Laboratory Accreditation Program
EM	Engineer Manual
FedEx	Federal Express
FEMA	Federal Emergency Management Agency
FMS	Field Maintenance Shop
FTA	Fire Training Area
GRPS	Ground Penetrating Radar Systems
HAZMAT	hazardous materials
HDPE	high-density polyethylene
HFPO-DA	hexafluoropropylene oxide dimer acid
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
LC/MS/MS	liquid chromatography with tandem mass spectrometry
MIL-SPEC	military specification
ND	non-detect
NELAP	National Environmental Laboratory Accreditation Program
ng/L	nanograms per liter
NOAA	National Oceanic and Atmospheric Administration
OSD	Office of the Secretary of Defense

PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PID	photoionization detector
PQAPP	Programmatic UFP-QAPP
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RWQCB	Regional Water Quality Control Board
SI	Site Inspection
SL	screening level
SOP	standard operating procedure
TOC	total organic carbon
TPP	Technical Project Planning
UFP	Uniform Federal Policy
US	United States
USACE	United States Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service

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Executive Summary

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

The PA identified three Areas of Interest (AOIs) where PFAS-containing materials may have been used, stored, disposed, or released historically (see **Table ES-2** for AOI locations). The objective of the SI is to identify whether there has been a release to the environment from the AOIs identified in the PA and determine whether further investigation is warranted, a removal action is required to address immediate threats, or no further action is required based on SLs for relevant compounds. This SI was completed at the Stockton Army Aviation Support Facility (AASF) in Stockton, California and determined further evaluation under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) is warranted for AOI 1and AOI 3; no further evaluation is warranted for AOI 2 at this time. The Stockton AASF will also be referred to as the "facility" throughout this document.

Stockton AASF is located at 2000 Stimson Road, Stockton, California 95206 and borders the Stockton Metropolitan Airport to the south. The Stockton Metropolitan Airport has a history of military use as a training installation and has been formerly referred to as Stockton Field and Sharpe Army Depot Field Annex. In 1973, the US Army vacated the airport; however, the California ARNG (CAARNG) presence remains. Stockton AASF is a CAARNG aviation maintenance facility for helicopters that has been leased from San Joaquin County since 1972 (AECOM Technical Services, Inc. [AECOM], 2020).

The PA identified three AOIs for investigation during the SI phase. SI sampling results from the three AOIs were compared to OSD SLs. **Table ES-2** summarizes the SI results for each AOI. Based on the results of this SI, further evaluation under CERCLA is warranted in a Remedial Investigation (RI) for AOI 1 and AOI 3; no further evaluation is warranted for AOI 2 at this time.

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

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

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

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

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

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

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Airfield	◐	●	●	Proceed to RI
2	Wash Rack	◐	◐	◐	No further action at this time
3	Butler Building Parking FTA	●	●	●	Proceed to RI

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

1. Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on the six compounds presented in the memorandum from the Office of the Secretary of Defense (OSD) dated 6 July 2022 (Assistant Secretary of Defense, 2022). The six compounds listed in the OSD memorandum will be referred to as "relevant compounds" throughout this document and include perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), perfluorohexanesulfonic acid (PFHxS), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-DA)[1], and perfluorobutanesulfonic acid (PFBS) at ARNG facilities nationwide. The ARNG performed this SI at the Stockton Army Aviation Support Facility (AASF) in Stockton, California. The Stockton 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; US Environmental Protection Agency [USEPA], 1980), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations Part 300; USEPA, 1994), and in compliance with US Department of the Army (DA) requirements and guidance for field investigations.

1.2 SI Purpose

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

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

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2. Facility Background

2.1 Facility Location and Description

Stockton AASF is located at 2000 Stimson Road, Stockton, California 95206 and borders the Stockton Metropolitan Airport to the south. The Stockton Metropolitan Airport has a history of military use as a training installation and has been formerly referred to as Stockton Field and Sharpe Army Depot Field Annex. In 1973, the US Army vacated the airport; however, the California ARNG (CAARNG) presence remains. The AASF is situated in the Sacramento-San Joaquin Valley, within the Central Valley, approximately equidistant from the Pacific Ocean and Sierra Nevada Mountains (**Figure 2-1**). The geographic coordinates and surface elevation at the main gate of the AASF are 37°53'13.0" N; 121°14'37.2" W and 21 feet above mean sea level (amsl), respectively.

Stockton AASF is a CAARNG aviation maintenance facility for helicopters. Impervious surfaces make up 82 percent (%) of the 22-acre facility and include roadways, parking lots, helipads, and taxi lanes. Physical structures include a hangar, maintenance shop, fuel tank farm, wash rack, and equipment storage areas. Stockton AASF has been leased from San Joaquin County since 1972 (AECOM, 2020).

Four state-owned divisional areas comprise the entire CAARNG facility, including the AASF, Field Maintenance Shop (FMS) #24, Armory, and Combined Support Maintenance Shop (CSMS). However, only the AASF was specifically evaluated for this SI. FMS #24 is a one-story maintenance building and the site of two former underground storage tanks. FMS #24 lies adjacent to the southwest of the AASF and has been extensively investigated as a source of petroleum hydrocarbons and related compounds in soil and groundwater (Adanta- Environmental Cost Management, Inc. [ECM] Joint Venture, 2018).

2.2 Facility Environmental Setting

The areas surrounding Stockton AASF comprise light and heavy industrial areas directly north/northwest and farmlands to the east, south, and west (**Figure 2-2**). Few residents reside in the rural farmlands within a 1-mile radius of the AASF, although the community of French Camp, California is located approximately 1.5 miles to the west. The facility sits at an average elevation of 26 feet amsl with a slight general topographic gradient to the west. There are no significant natural topographic features surrounding the facility.

2.2.1 Geology

Stockton AASF lies in the border of the Sacramento Valley and San Joaquin Valley. Deposits found within this region are composed of unconsolidated Quaternary sediments made up of alluvial and lake deposits. The Sierra Nevada Mountains to the east and the Sacramento Valley Coast Ranges to the west of the AASF are both contributing sources of deposits that originate from a variety of metamorphic and sedimentary rocks (Adanta-ECM Joint Venture, 2018). The uppermost geologic unit comprises marine and nonmarine (continental) sedimentary rocks (**Figure 2-3**). The Stockton Fault (trending northeast-southwest), forms the divide between the Sacramento and the San Joaquin Valleys, is located within Stockton city limits; the Midland Fault Zone (trending north) is located approximately 25 miles northwest of Stockton AASF (Oneida Total Integrated Enterprises [OTIE], 2010).

During the SI, low to medium plasticity fines (silts) were observed as the dominant lithology of the unconsolidated sediments below the Stockton AASF. The borings were completed at depths between 45 and 49 feet below ground surface (bgs). Varying quantities of sand were noted,

specifically, isolated layers of silty sand, sandy silt, poorly graded sand with silt, and poorly graded sand were also observed in the borings with thicknesses ranging from a few inches to 11 feet. These observations are consistent with the reported fluvial depositional environment of the region.

2.2.2 Hydrogeology

Stockton AASF is located within the San Joaquin Groundwater Basin, which contains several water-bearing zones within the upper 700 to 800 feet of unconsolidated valley fill. Shallow groundwater primarily occurs in unconfined conditions, although it may occur in semi-confined conditions due to the distribution of clay lenses in the sediments. Based on historical investigations performed in the vicinity of the AASF, coarser sediments are generally discontinuous in the lateral and vertical direction above the groundwater table and more laterally continuous below the groundwater table (Versar, Inc., 2004; URS Corporation, 2007; OTIE, 2010, 2012, 2013; ECM, 2015).

According to the California Water Board Groundwater Ambient Monitoring and Assessment Program database, multiple public water system wells are located within a 4-mile radius (**Figure 2-3**). A public water system well is defined as serving “15 or more connections or more than 25 people per day” (California Water Board, 2019). Stockton AASF receives potable water from the Stockton Municipal Utilities Water Service, which derives approximately 25% of its water supply from groundwater wells, while the remaining water supply is from treated surface water supplied by the Stockton East Water District. The locations of Stockton Municipal Utilities Water Service wells are unknown. The Stockton East Water District also supplies surface water for agricultural irrigation in the area. The Stockton East Water District sources surface water from the New Melones Reservoir and the New Hogan Reservoir, located approximately 30 and 38 miles northeast of the AASF, respectively (City of Stockton, 2019; Stockton East Water District, 2019). According to the Stockton 2020 Water Quality Report, PFOS was measured by Stockton Municipal Utilities Water Service at concentrations ranging from non-detect (ND) to 7.0 nanograms per liter (ng/L) (California Water Service, 2022).

Depths to water measured in July 2021 during the SI ranged from 37.27 to 42.23 feet bgs. Groundwater elevation contours from the SI are presented on **Figure 2-4** and indicate the groundwater flow direction at the AASF is primarily to the northeast, with local groundwater flow in the vicinity of the wash rack potentially to the southwest.

2.2.3 Hydrology

The nearest surface water feature to the facility is Rydberg Creek, which wraps around the southern and western boundary of the Stockton AASF facility, flows northwest, and connects with French Camp Slough. According to the National Wetlands Inventory, there are no wetland areas within the AASF property (Environmental Data Resources, Inc. [EDR]™, 2019). The western portion of the AASF is in the Federal Emergency Management Agency (FEMA) 100-year flood zone.

Stockton AASF lies within the Walker Slough-French Camp Slough Watershed. Storm water is diverted to storm drains inlets that are located on and around the AASF. The storm drains then discharge offsite through two discharge points into the City of Stockton storm sewer system, which eventually leads to the San Joaquin River. The western discharge point, however, has not been observed to have any flow. Surface water that is not captured in storm drains is drained south into an adjoining ditch canal (Rydberg Creek), which is a tributary to the San Joaquin River. The closest surface water intake is along the San Joaquin River, approximately 18 miles to the northwest. Based on Third Unregulated Contaminant Monitoring Rule (UCMR3) data, there were no detections of PFAS in surface water intakes for the cities of Stockton and Lathrop. The AASF has no water treatment system, and the oil water separator associated with the wash rack is

connected to the Stockton sanitary sewer system (HazCon, 2017). Surface water features are presented on **Figure 2-5**.

2.2.4 Climate

Stockton AASF is in a semi-arid, Mediterranean climate zone characterized by warm, dry summers and mild winters. The average annual rainfall is approximately 13.45 inches, with the majority of the rainfall occurring between late fall and early spring. Summer temperatures peak in July, with an average high of 93 degrees Fahrenheit (°F) and an average low of 60 °F. Winter temperatures are lowest in December to January and range from 53 °F during the day to 37 °F at night. Prevailing wind speeds are westerly or northwesterly for 9 months out of the year and southeasterly for 3 months out of the year (National Oceanic and Atmospheric Administration [NOAA], 2019.).

2.2.5 Current and Future Land Use

The Stockton AASF serves as a CAARNG aviation maintenance facility for helicopters. The AASF includes a maintenance hangar, various storage buildings, and related infrastructure including parking lots, aircraft parking areas, wash rack, and refueling pads. The AASF is entirely fenced with restricted site access. Reasonably anticipated future land use is not expected to change from the current land use described above.

2.2.6 Sensitive Habitat and Threatened/ Endangered Species

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

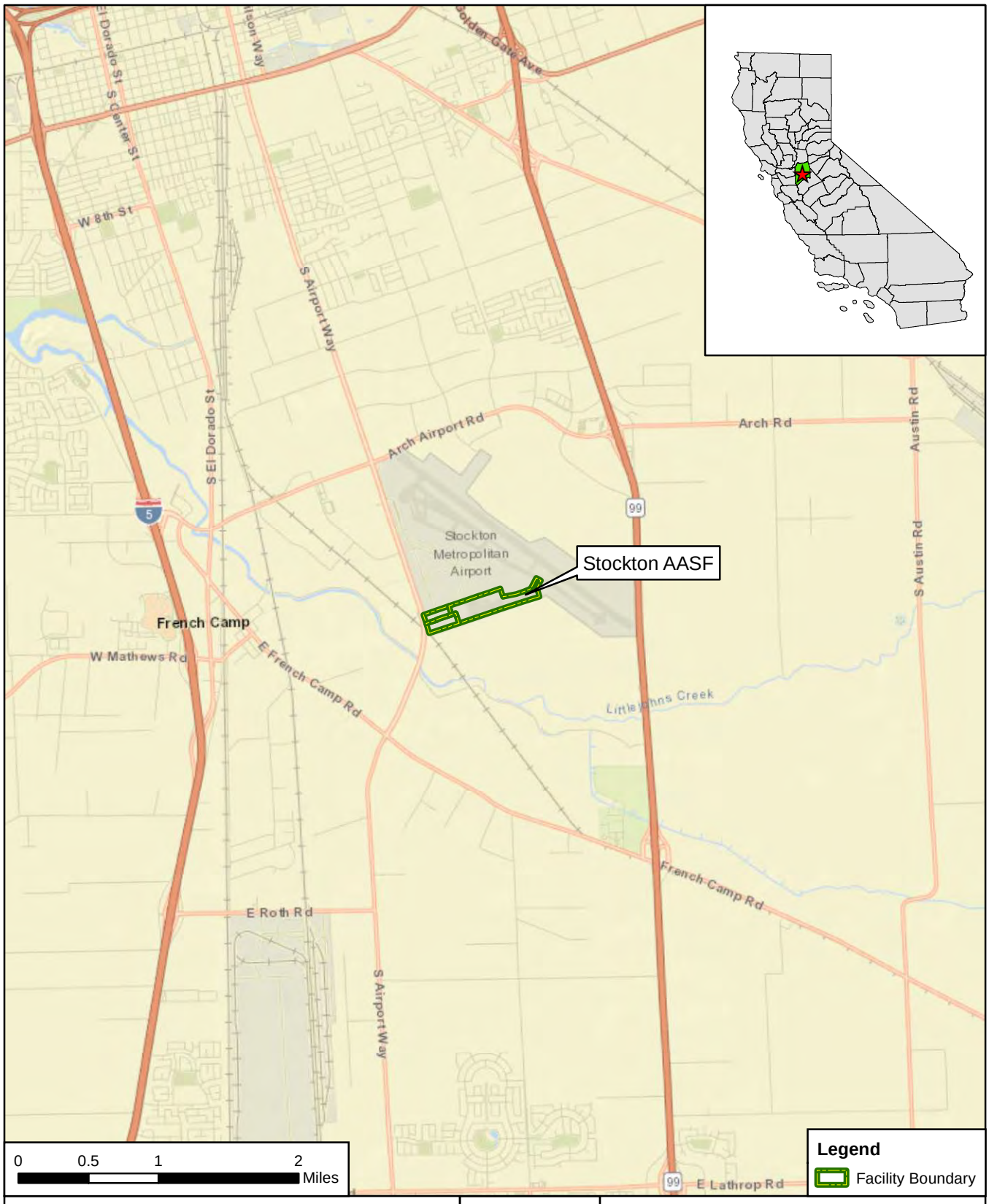
The following amphibians, birds, crustaceans, fishes, plants, insects, mammals, and reptiles are federally endangered, threatened, proposed, and/ or are listed as candidate species in San Joaquin County, California (US Fish and Wildlife Service [USFWS], 2022).

- **Amphibians:** California tiger Salamander, *Ambystoma californiense* (threatened); California red-legged frog, *Rana draytonii* (threatened)
- **Birds:** Yellow-billed Cuckoo, *Coccyzus americanus* (threatened); Least Bell's vireo, *Vireo bellii pusillus* (endangered); California clapper rail, *Rallus longirostris obsoletus* (endangered)
- **Crustaceans:** Longhorn fairy shrimp, *Branchinecta longiantenna* (endangered); Vernal pool fairy shrimp, *Branchinecta lynchi* (threatened); Conservancy fairy shrimp, *Branchinecta conservation* (endangered); Vernal pool tadpole shrimp, *Lepidurus packardi* (endangered)
- **Fishes:** Delta smelt, *Hypomesus transpacificus* (threatened); longfin smelt, *Spirinchus thaleichthys* (candidate)
- **Flowering Plants:** Greene's tuctoria, *Tuctoria greenei* (endangered); Sacramento Orcutt grass, *Orcuttia viscida* (endangered); Ione manzanita, *Arctostaphylos myrtifolia* (threatened); Large-flowered fiddleneck, *Amsinckia grandiflora* (endangered); Palmate-bracted bird's beak, *Cordylanthus palmatus* (endangered); Fleshy owl's-clover, *Castilleja campestris ssp. succulenta* (threatened)
- **Insects:** Monarch butterfly, *Danaus plexippus* (candidate); Valley elderberry longhorn beetle, *Desmocerus californicus dimorphus* (threatened)

- **Mammals**: San Joaquin kit fox, *Vulpes macrotis mutica* (endangered); Riparian brush rabbit, *Sylvilagus bachmani riparius* (endangered); Riparian woodrat (San Joaquin Valley), *Neotoma fuscipes riparia* (endangered)
- **Reptiles**: Giant garter snake, *Thamnophis gigas* (threatened); Alameda whipsnake (striped racer), *Masticophis lateralis euryxanthus* (threatened)

2.3 History of PFAS Use

Three AOIs were identified in the PA where AFFF may have been used, stored, disposed, or released historically at the Stockton AASF (AECOM, 2020). AFFF may have historically been released at the facility during familiarization training and fire training activities as early as 1992. Additional AFFF releases may also have occurred from incidental spills in the wash rack area. The potential release areas were grouped into three AOIs based on preliminary data and presumed groundwater flow directions. A description of each AOI is presented in **Section 3**.



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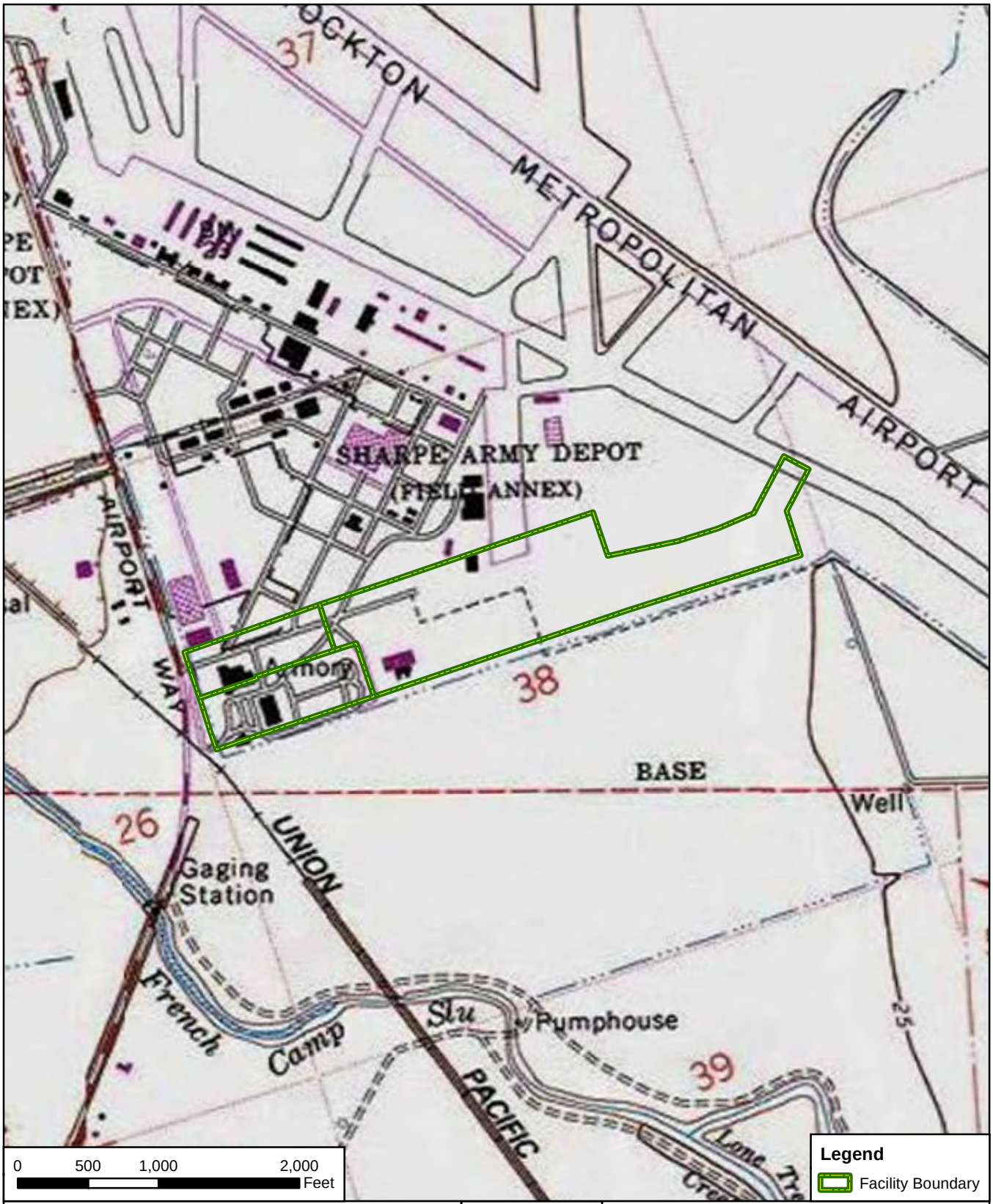
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	CM	8/15/2022

Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1



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SCALE	1:12,000	CHK BY	SL	9/23/2022
Base Map: Copyright:© 2013 National Geographic Society, i-cubed		PM	CM	9/23/2022

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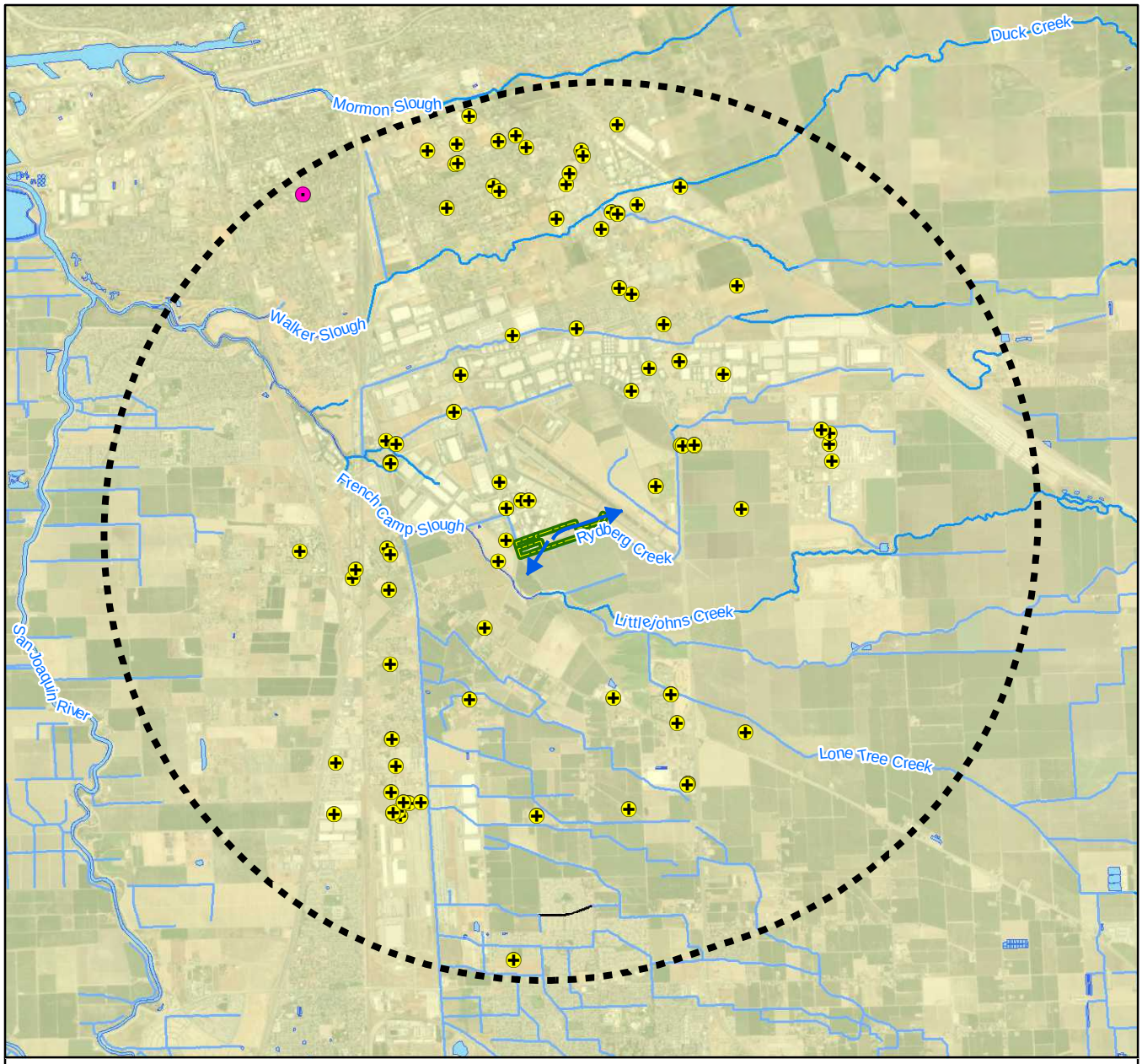
Facility Topography

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2



Legend

- Facility Boundary
- 4-mile radius
- Water Body
- Wetland
- River/Stream
- Canal/Ditch
- Pipeline
- SI Groundwater Flow Direction

Geology

- Marine and nonmarine (continental) sedimentary rocks

Wells

- Agricultural Well
- Municipal Well

0 0.75 1.5 3 Miles

CLIENT	ARNG			
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Groundwater Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-3

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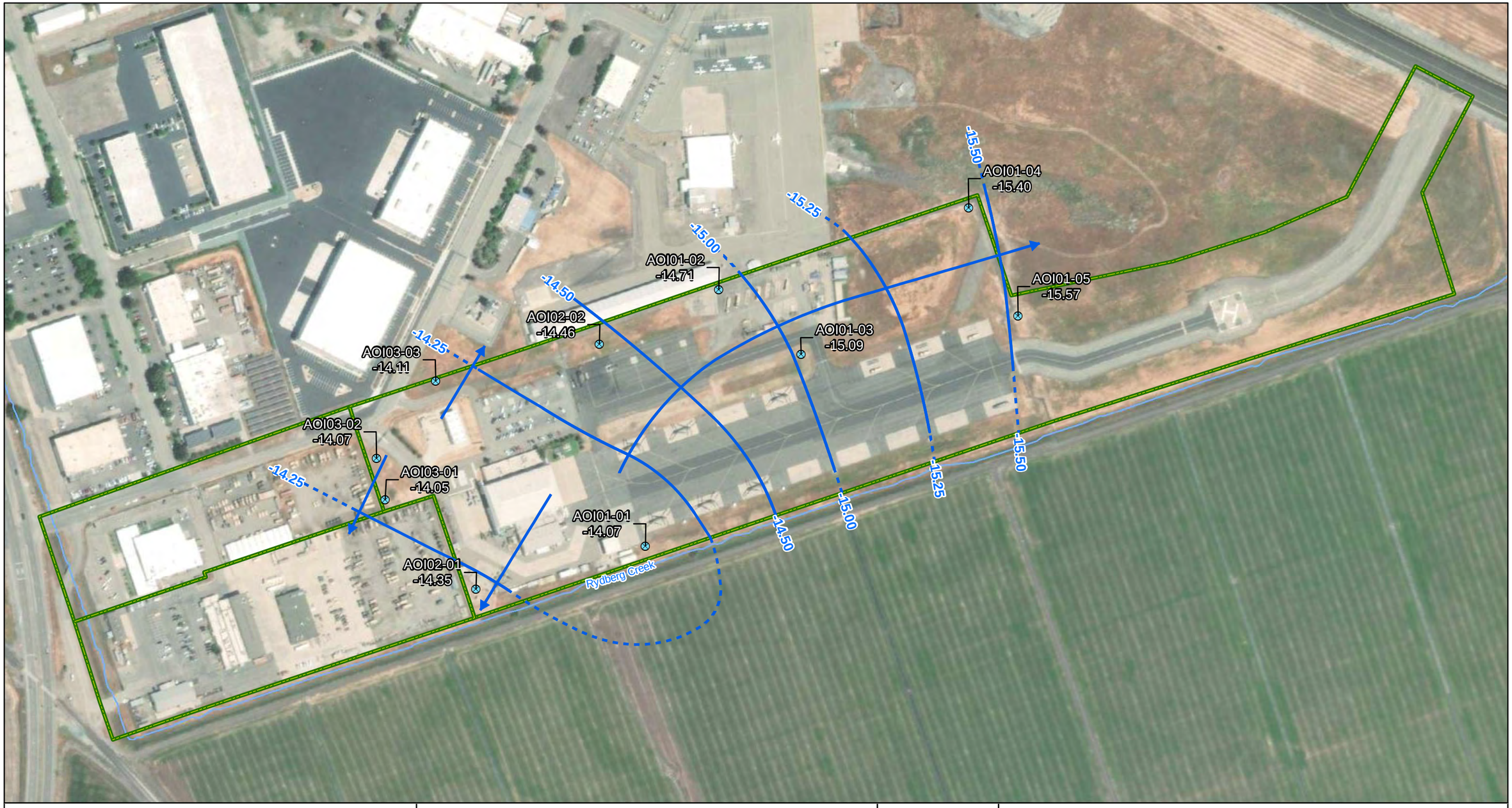

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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/20/2022

Legend

- Facility Boundary
- Canal/Ditch
- Groundwater Elevation Contour
- Inferred Groundwater Elevation Contour
- Groundwater Flow Direction

0 150 300 600 Feet

Groundwater elevations in ft NAVD88.

N

Groundwater Elevation Contours

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

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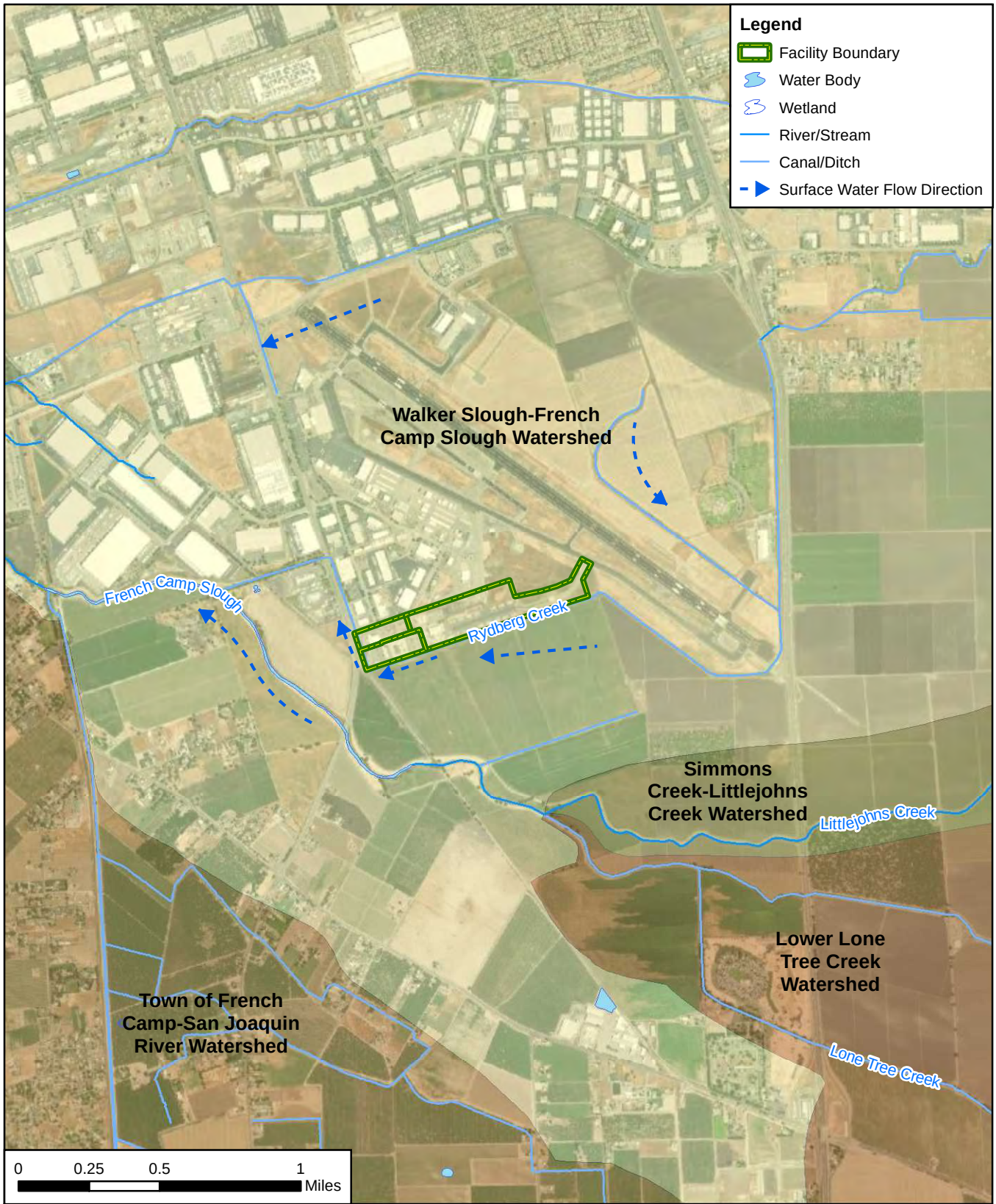

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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-5

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3. Summary of Areas of Interest

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

3.1 AOI 1 Airfield

AOI 1 is the airfield where controlled AFFF releases through familiarization training have occurred annually potentially as early as 1992 and then less frequently after 2010. The footprint of AOI 1 also includes a former wash rack shown on historical figures as previously located south of the southwest corner of the airfield. There are no known releases at this former wash rack.

3.2 AOI 2 Wash Rack

AOI 2 is the wash rack area and includes the hazardous materials (HAZMAT) locker with AFFF storage, located at the southwest corner of the wash rack. Controlled AFFF releases to the wash rack through activities related to fire training and familiarization training have occurred annually, potentially as early as 1992, and then less frequently after 2010. Potential AFFF releases from incidental spills in the wash rack area may have also occurred.

The wash rack drains lead to an oil water separator that connects to the Stockton sanitary sewer system. Therefore, discharges of AFFF in the wash rack would release directly into the sanitary sewer system; however, the HAZMAT locker is located near unpaved, grassy areas. Potential releases nearby the HAZMAT locker would drain via overland surface flow to the adjacent ditch canal (Rydberg Creek), which is a tributary to the San Joaquin River.

3.3 AOI 3 Butler Building Parking Fire Training Area (FTA)

AOI 3 is a former FTA at what is now the parking area located east of the Butler Building. Controlled AFFF releases through fire training activities had occurred annually, potentially as early as 1992, until approximately 2010 to 2012, when the Butler Building was constructed.

Ground-disturbing activities at AOI 3 have occurred. During the construction of the Butler Building, the soil beneath and in the vicinity of the parking lot was disturbed, and the area was regraded. The original soil was either left in place or used to fill in a depression west of the road next to the Butler Building.

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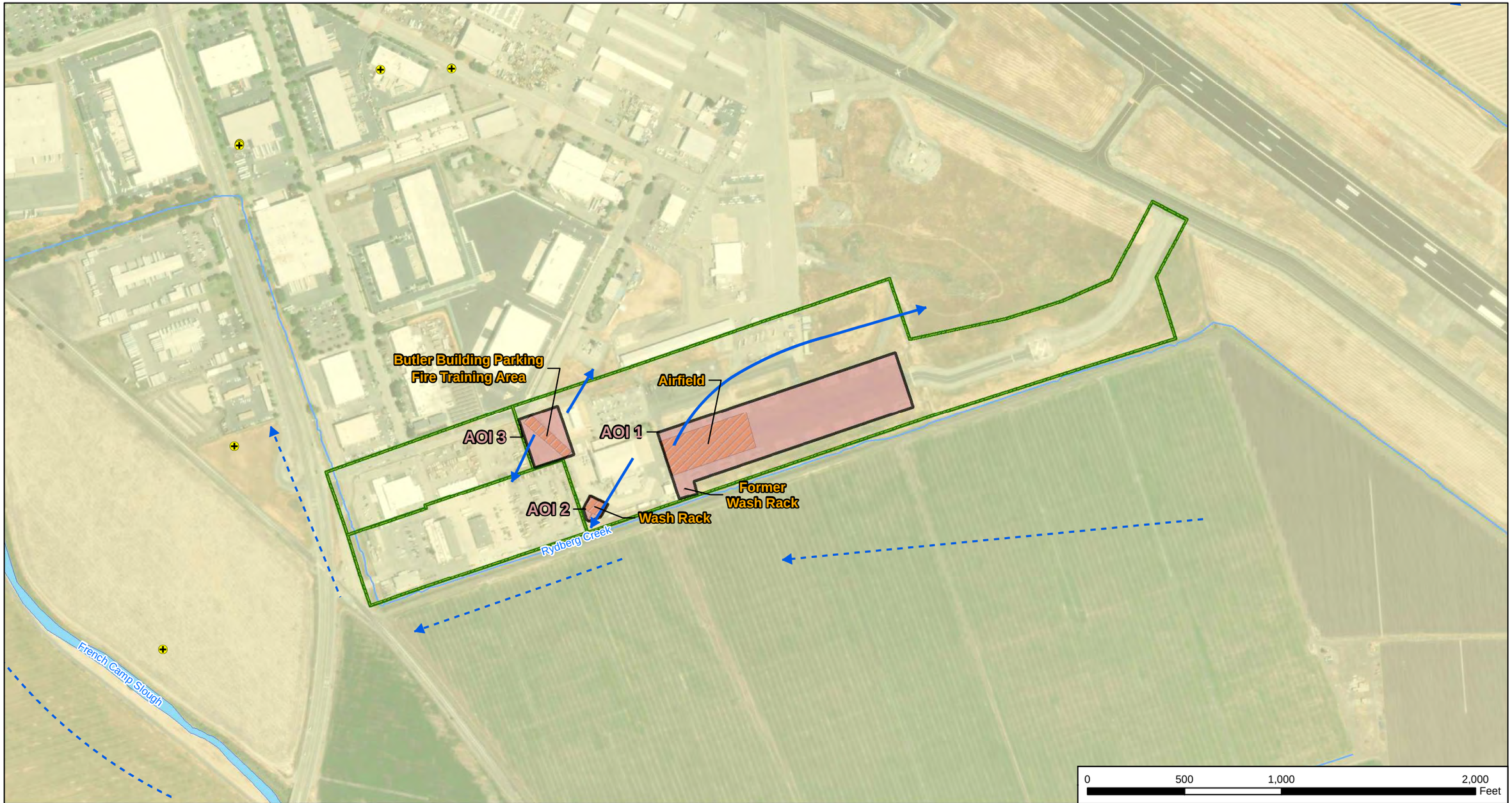

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Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/30/2022

Legend

- Area of Interest
- Potential Release Area
- Facility Boundary
- Canal/Ditch
- Groundwater Flow Direction
- Surface Water Flow Direction
- Municipal Well

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Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Project Data Quality Objectives

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

4.1 Problem Statement

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

4.2 Information Inputs

Primary information inputs included:

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

4.3 Study Boundaries

The scope of the SI was bounded by the property limits of the facility (**Figure 2-2**). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s). The SI scope was bounded vertically by the observed depths of the surficial groundwater table. Temporal boundaries were limited to the summer season, which was the earliest available time field resources were available to complete the study.

4.4 Analytical Approach

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

4.5 Data Usability Assessment

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

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

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

5. Site Inspection Activities

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

- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP)* dated March 2018 (AECOM, 2018a);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b);
- *Final Preliminary Assessment Report, Stockton Army Aviation Support Facility, Stockton* dated January 2020 (AECOM, 2020);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Army Aviation Support Facility, Stockton, California* dated June 2021 (AECOM, 2021a); and
- *Final Site Safety and Health Plan, Army Aviation Support Facility, Stockton, California* dated June 2021 (AECOM, 2021b).

The SI field activities were conducted from 12 to 23 July 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a).

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

- Thirty-six (36) soil samples from 16 boring locations;
- Ten (10) grab groundwater samples from 10 temporary well locations;
- Nineteen (19) quality assurance (QA)/quality control (QC) samples.

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

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

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

A combined TPP Meeting 1 and 2 was held on 24 February 2021, prior to SI field activities. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2. The stakeholders for this SI include the ARNG, CAARNG, USACE, and California Regional Water Quality Control Board (RWQCB). Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2021a).

A TPP Meeting 3 was held on 27 June 2023 to discuss the results of the SI. Meeting minutes for TPP 3 are included in **Appendix D** of this report. Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM's drilling subcontractor, Cascade Technical Services, LLC. placed a ticket with the USA North 811 "Call Before You Dig" California utility clearance provider to notify them of intrusive work on 6 July 2021. Additionally, AECOM contracted Ground Penetrating Radar Systems (GPRS), a private utility location service, to perform utility clearance. GPRS performed utility clearance of the proposed boring locations on 12 July 2021 with input from the AECOM field team and Stockton 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 Sampling Equipment Acceptability

Two potable water sources at Stockton AASF were sampled on 25 May 2021 to assess usability for decontamination of drilling equipment. Results of the sample collected at the wash rack spigot (S-DECON) confirmed this source to be acceptable for use in this investigation; therefore, it was used throughout the field activities. Specifically, the samples were analyzed for PFAS by LC/MS/MS compliant with QSM 5.3 Table B-15. The results of the decontamination water sample associated with the wash rack spigot source used during the SI are provided in **Appendix F**. A discussion of the results is presented in the DUA (**Appendix A**).

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

5.2 Soil Borings and Soil Sampling

Borings were installed in grass areas, where applicable, to avoid disturbing concrete or asphalt surfaces. Soil samples were collected via direct push technology (DPT), in accordance with the SI QAPP Addendum (AECOM, 2021a). A GeoProbe® 3126GT 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 5 feet of the boring, in accordance with AECOM utility clearance procedures. Surface soil samples collected with a hand auger between 0 and 2 feet bgs were backfilled with the parent soil that was removed from the hand auger. The soil boring locations are shown on **Figure 5-1**, and depths are provided **Table 5-1**. Several boring locations were adjusted within a 50-feet offset for reasons including drill rig access, utility avoidance, and bias toward sampling within observed drainage features.

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

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

Soil borings completed during the SI found low to medium plasticity fines with varying levels of sand as the dominant lithology of the unconsolidated sediments below the Stockton AASF. The borings were completed at depths between 45 and 49 feet bgs. Isolated layers of silty sand, sandy silt, poorly graded sand with silt, and poorly graded sand were also observed in the boring logs at thicknesses ranging from a few inches to 11 feet. These observations are consistent with the understood fluvial depositional environment of the region.

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

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

5.3 Temporary Well Installation and Groundwater Grab Sampling

DPT borings were converted to temporary wells. Temporary wells were installed using a GeoProbe® 3126GT dual-tube sampling system. Once the borehole was advanced to the desired depth, a temporary well was constructed of a 5-foot section of 1-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. New PVC pipe and screen were used to avoid cross contamination between locations. The screen intervals for the temporary wells are provided in **Table 5-2**.

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

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

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

Following well surveying (described below in **Section 5.5**), temporary wells were abandoned in accordance with the SI QAPP Addendum (AECOM, 2021a) by removing the PVC and backfilling the hole with neat cement grout. Upon completion of well abandonment, the ground surface at each location was patched to match existing surrounding conditions. A San Joaquin County Grout Inspector was onsite to inspect the grout and observe the decommissioning of the temporary monitoring wells.

5.4 Synoptic Water Level Measurements

Groundwater elevation measurements were collected from the ten new temporary monitoring wells prior to groundwater purging and sampling. Water level measurements were taken from the northern side of the well casing. A groundwater flow contour map is provided in **Figure 2-4**. Groundwater elevation data are provided in **Table 5-2**.

5.5 Surveying

The northern side of each well casing was surveyed by California-licensed land surveyors following guidelines provided in the SOPs provided in the SI QAPP Addendum (AECOM, 2021a). Survey data from the newly installed wells on the facility were collected on 22 July 2021 in the applicable Universal Transverse Mercator zone projection with California Coordinate System of 1983 (CCS83) datum (horizontal) and North American Vertical Datum 1988 (vertical). Top of casing elevation and ground surface elevation were surveyed at each well. The surveyed well data are provided in **Appendix B3**.

5.6 Investigation-Derived Waste

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

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

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

Management and disposal of containerized IDW is being handled by Engineering, Science, and Technology, Inc, PCB (EA) under a separate contract with USACE in accordance with SOP No. 042A (EA, 2021).

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

5.7 Laboratory Analytical Methods

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

5.8 Deviations from SI QAPP Addendum

Three deviations from the SI QAPP Addendum were identified during review of the field documentation.

- During DPT drilling activities, subsurface soil samples were collected from the mid-points of borings below 15 feet bgs, based on the total boring depths. The approved SI QAPP Addendum states that mid-point subsurface soil samples would be collected from 13 to 15 feet bgs if total boring depth exceeded 30 feet bgs. The total boring depths at all boring locations exceeded 30 feet bgs, and the mid-point samples were inadvertently collected at depths greater than 15 feet bgs. Shallow subsurface soil samples collected at depths ranging from 18 to 22 feet bgs were therefore not compared to the industrial/commercial worker scenario SLs to provide a conservative assessment of that potential exposure route. These actions were documented in a nonconformance report dated July 2022 and are provided in **Appendix B4**.
- AOI03-02 was offset by 110 feet southwest of the proposed boring location for utility avoidance and drill rig access purposes.
- As noted in the field log, grab groundwater samples were initially collected on 16 July 2022 without field readings. These samples were not sent to the laboratory for analysis. Groundwater samples and field parameters were collected on 21 and 22 July 2022 and samples were sent to the laboratory for analysis.

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Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Stockton AASF, California

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
Soil Samples						
AOI01-01-SB-0-2	7/16/2021 9:15	0-2	x			
AOI01-01-SB-20-21	7/16/2021 10:50	20-21	x			
AOI01-01-SB-40-41	7/16/2021 10:45	40-41	x			
AOI01-02-SB-0-2	7/16/2021 12:55	0-2	x			
AOI01-02-SB-0-2-D	7/16/2021 12:55	0-2	x			FD
AOI01-02-SB-20-21	7/16/2021 14:40	20-21	x			
AOI01-02-SB-42-43	7/16/2021 14:35	42-43	x			
AOI01-03-SB-0-2	7/19/2021 8:45	0-2	x			
AOI01-03-SB-0-2-MS	7/19/2021 8:45	0-2	x			MS
AOI01-03-SB-0-2-MSD	7/19/2021 8:45	0-2	x			MSD
AOI01-03-SB-20-21	7/19/2021 10:55	20-21	x			
AOI01-03-SB-41-42	7/19/2021 11:00	41-42	x			
AOI01-04-SB-0-2	7/19/2021 11:20	0-2	x			
AOI01-04-SB-21-22	7/19/2021 13:50	21-22	x			
AOI01-04-SB-43-44	7/19/2021 13:55	43-44	x			
AOI01-05-SB-0-2	7/19/2021 14:45	0-2	x			
AOI01-05-SB-19-20	7/20/2021 8:05	19-20	x			
AOI01-05-SB-39-40	7/20/2021 8:08	39-40	x			
AOI01-06-SB-0-2	7/22/2021 7:25	0-2	x	x	x	
AOI01-06-SB-0-2-MS	7/22/2021 7:25	0-2		x	x	MS
AOI01-06-SB-0-2-MSD	7/22/2021 7:25	0-2		x	x	MSD
AOI01-07-SB-0-2	7/22/2021 7:45	0-2	x			
AOI01-07-SB-0-2-D	7/22/2021 7:45	0-2	x			FD
AOI01-08-SB-0-2	7/22/2021 7:55	0-2	x			
AOI01-09-SB-0-2	7/22/2021 8:10	0-2	x			
AOI01-09-SB-0-2-MS	7/22/2021 8:10	0-2	x			MS
AOI01-09-SB-0-2-MSD	7/22/2021 8:10	0-2	x			MSD
AOI02-01-SB-0-2	7/20/2021 9:15	0-2	x	x	x	
AOI02-01-SB-0-2-D	7/20/2021 9:15	0-2		x	x	FD
AOI02-01-SB-20-21	7/20/2021 10:30	20-21	x			
AOI02-01-SB-42-43	7/20/2021 10:25	42-43	x			
AOI02-02-SB-0-2	7/20/2021 12:20	0-2	x			
AOI02-02-SB-20-21	7/20/2021 13:55	20-21	x			
AOI02-02-SB-42-43	7/20/2021 14:00	42-43	x			
AOI03-01-SB-0-2	7/21/2021 7:05	0-2	x	x	x	
AOI03-01-SB-0-2-D	7/21/2021 7:05	0-2	x			FD
AOI03-01-SB-18-19	7/21/2021 8:10	18-19	x			
AOI03-01-SB-38-39	7/21/2021 8:15	38-39	x			
AOI03-02-SB-0-2	7/21/2021 9:05	0-2	x			
AOI03-02-SB-0-2-MS	7/21/2021 9:05	0-2	x			MS
AOI03-02-SB-0-2-MSD	7/21/2021 9:05	0-2	x			MSD
AOI03-02-SB-20-21	7/21/2021 10:03	20-21	x			
AOI03-02-SB-42-43	7/21/2021 10:08	42-43	x			
AOI03-03-SB-0-2	7/21/2021 11:45	0-2	x			
AOI03-03-SB-20-21	7/21/2021 13:48	20-21	x			

Table 5-1
Site Inspection Samples by Medium
Site Inspection Report, Stockton AASF, California

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs)	LC/MS/MS compliant with QSM 5.3 Table B-15	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
AOI03-03-SB-41-42	7/21/2021 13:50	41-42	x			
AOI03-04-SB-0-2	7/22/2021 8:30	0-2	x			
AOI03-04-SB-0-2-D	7/22/2021 8:30	0-2	x			FD
AOI03-05-SB-0-2	7/22/2021 8:45	0-2	x	x	x	
Groundwater Samples						
AOI01-01-GW	7/21/2021 13:15	NA	x			
AOI01-02-GW	7/22/2021 8:30	NA	x			
AOI01-03-GW	7/22/2021 10:30	NA	x			
AOI01-03-GW-D	7/22/2021 10:30	NA	x			FD
AOI01-03-GW-MS	7/22/2021 10:30	NA	x			MS
AOI01-03-GW-MSD	7/22/2021 10:30	NA	x			MSD
AOI01-04-GW	7/22/2021 12:45	NA	x			
AOI01-05-GW	7/22/2021 14:25	NA	x			
AOI02-01-GW	7/22/2021 16:15	NA	x			
AOI02-02-GW	7/23/2021 7:50	NA	x			
AOI03-01-GW	7/23/2021 9:30	NA	x			
AOI03-02-GW	7/23/2021 10:55	NA	x			
AOI03-03-GW	7/23/2021 12:30	NA	x			
Quality Control Samples						
S-DECON	5/25/2021 13:25	NA	x			
S-DECON (RE)	5/25/2021 13:25	NA	x			re-extracted
S-DECON-2	5/25/2021 14:30	NA	x			
STOCK-ERB-01	7/20/2021 7:30	NA	x			LDPE Tubing
STOCK-ERB-02	7/23/2021 12:50	NA	x			Hand Auger
STOCK-ERB-03	7/23/2021 12:55	NA	x			Stainless-steel Bowl
STOCK-ERB-04	7/23/2021 13:00	NA	x			Water Level Meter
STOCK-FRB-01	7/23/2021 10:40	NA	x			

Notes:
AASF = Army Aviation Support Facility
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
LC/MS/MS = Liquid Chromatography Mass Spectrometry
LDPE = low-density polyethylene
MS/MSD = matrix spike/ matrix spike duplicate
QSM = Quality Systems Manual
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

Table 5-2
Soil Boring Depths, Temporary Well Screen Intervals, and Groundwater Elevations
Site Inspection Report, Stockton AASF, California

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	45	40 - 45	23.41	23.29	37.48	37.36	-14.07
	AOI01-02	48	43 - 48	25.58	24.23	40.29	38.94	-14.71
	AOI01-03	47	42 - 47	26.89	23.69	41.98	38.78	-15.09
	AOI01-04	49	44 - 49	28.03	26.83	43.43	42.23	-15.4
	AOI01-05	45	40 - 45	26.94	26.31	42.51	41.88	-15.57
	AOI01-06	2	NA	NA	NA	NA	NA	NA
	AOI01-07	2	NA	NA	NA	NA	NA	NA
	AOI01-08	2	NA	NA	NA	NA	NA	NA
	AOI01-09	2	NA	NA	NA	NA	NA	NA
2	AOI02-01	48	43 - 48	27.09	25.05	41.44	39.40	-14.35
	AOI02-02	48	43 - 48	26.76	25.04	41.22	39.50	-14.46
3	AOI03-01	45	39 - 44[1]	23.13	23.22	37.18	37.27	-14.05
	AOI03-02	48	40.5 - 45.5[1]	26.34	25.03	40.41	39.10	-14.07
	AOI03-03	48	42 - 47[1]	26.64	24.33	40.73	38.42	-14.09
	AOI03-04	2	NA	NA	NA	NA	NA	NA
	AOI03-05	2	NA	NA	NA	NA	NA	NA

Notes:

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

AASF = Army Aviation Support Facility
bgs = below ground surface
btoc = below top of casing
NA = not applicable
NAVD88 = North American Vertical Datum 1988

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CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	9/30/2022	GIS BY	MS	9/30/2022
SCALE	1:3,600	CHK BY	SS	9/30/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/30/2022

Legend

- Soil Boring/Temporary Monitoring Well
- Surface Soil Sampling
- Area of Interest
- Facility Boundary
- Canal/Ditch
- Surface Water Flow Direction
- Groundwater Flow Direction

N

Site Inspection Sample Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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6. Site Inspection Results

This section presents the analytical results of the SI. The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results for each AOI is provided in **Section 6.3** through **Section 6.5**. **Table 6-2** through **Table 6-4** present results in soil or groundwater for the relevant compounds. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

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

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

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

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

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

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

The data in the subsequent sections are compared against the SLs presented in **Table 6-1**. The SLs for groundwater are based on direct ingestion. The SLs for soil are based on incidental ingestion and are applied to the depth intervals reasonably anticipated to be encountered by the receptors identified at the facility: the residential scenario is applied to surface soil results (0 to 2 feet bgs) and the industrial/commercial worker scenario is applied to shallow subsurface soil results (2 to 15 feet bgs). The SLs are not applied to deep subsurface soil results (>15 feet bgs) because 15 feet is the anticipated limit of construction activities. However, as discussed in the SI QAPP Addendum deviation in **Section 5.8**, the industrial/commercial worker scenario was not applied to subsurface soil samples collected from the mid-point at the soil borings below 15 feet bgs (18 to 22 feet bgs) in each AOI.

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

6.3 AOI 1

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

6.3.1 AOI 1 Soil Analytical Results

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI01-01 through AOI01-09. Soil was also sampled from two deep subsurface soil intervals (18 to 22 feet bgs and 39 to 44 feet bgs) from boring locations AOI01-01 through AOI01-05. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** and **Table 6-3** summarize the soil results.

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in soil at concentrations below their respective SLs in surface soil. PFOA, PFOS, PFHxS, PFNA, and PFBS were detected at concentrations less than 6.61 micrograms per kilogram (µg/kg); all detected concentrations were below the SLs in surface soil.

PFOS, PFHxS, and PFBS were detected in the deep subsurface soil intervals. PFOS was detected at two of the five locations, with concentrations of 0.081 J µg/kg at 20 to 21 feet bgs at AOI01-01 and 0.090 J µg/kg at 20 to 21 feet bgs at AOI01-03. PFHxS was detected in the mid-point sample (18 to 22 feet bgs) in four of the five locations and in the deepest sample (38 to 42 feet bgs) in three of five locations, with concentrations ranging from 0.036 J µg/kg to 0.365 J µg/kg. PFBS was detected at 40 to 41 feet at location AOI01-01, with a concentration of 0.037 J µg/kg. PFOA and PFNA were not detected in either deep subsurface soil interval.

6.3.2 AOI 1 Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-4** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring wells AOI01-01 through AOI01-05. The following exceedances of the SLs were measured:

- PFOA was detected above the SL of 6 nanograms per liter (ng/L) in two of the five wells, with concentrations of 34.8 ng/L at AOI01-04 and 21.3 ng/L at AOI01-05.

- PFOS was detected above the SL of 4 ng/L at four of the five wells, with concentrations ranging from of 5.39 ng/L to 30.9 ng/L.
- PFHxS was detected above the SL of 39 ng/L at all five wells, with concentrations ranging from of 45.2 ng/L to 536 ng/L.

PFNA and PFBS were detected below their respective SLs.

6.3.3 AOI 1 Conclusions

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

6.4 AOI 2

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

6.4.1 AOI 2 Soil Analytical Results

Soil was sampled from surface soil (0 to 2 feet bgs) and two deep subsurface soil intervals (20 to 21 feet bgs and 42 to 43 feet bgs) from boring locations AOI02-01 and AOI02-02. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** and **Table 6-3** summarize the soil results.

PFOA, PFOS, PFHxS, and PFNA were detected in surface soil at concentrations less than 0.683 J µg/kg and below the SLs. PFBS was not detected in surface soil. PFOA, PFOS, PFHxS, PFNA, and PFBS were not detected in either deep subsurface soil interval.

6.4.2 AOI 2 Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-4** summarizes the groundwater results.

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

- PFOA was detected below the SL of 6 ng/L at concentrations of 5.32 ng/L and 1.47 J ng/L.
- PFOS was detected below the SL of 4 ng/L at concentrations of 3.33 J ng/L and 3.15 J ng/L.
- PFHxS was detected below the SL of 39 ng/L at concentrations of 2.72 J ng/L and 5.13 ng/L.
- PFNA was detected below the SL of 6 ng/L at AOI02-01, with a concentration of 1.01 J ng/L.
- PFBS was detected below the SL of 601 ng/L at AOI02-02, with a concentration of 1.56 J ng/L.

6.4.3 AOI 2 Conclusions

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

Due to the uncertainty regarding groundwater flow, this report resulted in only one location (AOI02-01) with data associated with the wash rack at AOI 2. This single sample location yielded groundwater results below but very close to the groundwater SLs for PFOS and PFOA. Based on groundwater flow, the other sample location (AOI02-02) does not appear to be representative of AOI 2.

6.5 AOI 3

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3: Butler Building Parking FTA. The results in soil and groundwater are presented in **Table 6-2** through **Table 6-4**. Soil and groundwater results are presented on **Figure 6-1** through **Figure 6-7**.

6.5.1 AOI 3 Soil Analytical Results

Soil was sampled from surface soil (0 to 2 feet bgs) from boring locations AOI03-01 through AOI03-05. Soil was also sampled from two deep subsurface soil intervals (18 to 21 feet bgs and 38 to 43 feet bgs) from boring locations AOI03-01 through AOI03-03. **Figure 6-1** through **Figure 6-5** present the ranges of detections in soil. **Table 6-2** and **Table 6-3** summarize the soil results.

PFOS was detected above the SL of 13 µg/kg in surface soil at AOI03-02, with a concentration of 26.2 J µg/kg. PFOA, PFHxS, PFNA, and PFBS were detected at concentrations less than 1.46 µg/kg and below their respective SLs in surface soil.

PFOS, PFHxS, and PFBS were detected in the deep subsurface soil intervals. PFOS was detected at a concentration of 4.12 µg/kg at 38 to 39 feet bgs at AOI03-01. PFHxS was detected in the mid-point samples (18 to 21 feet bgs) in two of three locations, AOI03-01 and AOI03-02 and in the deepest sample (38 to 39 feet bgs) in one location, AOI03-01 at concentrations ranging from 0.00622 J µg/kg to 0.822 J µg/kg. PFBS was detected at a concentration of 0.189 J µg/kg at 38 to 39 feet bgs at AOI03-01. PFOA and PFNA were not detected in either deep subsurface soil interval.

6.5.2 AOI 3 Groundwater Analytical Results

Figure 6-6 and **Figure 6-7** present the ranges of detections in groundwater. **Table 6-4** summarizes the groundwater results.

Groundwater was sampled from temporary monitoring wells AOI03-01, AOI03-02, and AOI03-03. The following exceedances of the SLs were measured:

- PFOA was detected above the SL of 6 ng/L in all three wells, with concentrations ranging from of 7.85 ng/L to 139 ng/L.
- PFOS was detected above the SL of 4 ng/L at all three wells, with concentrations ranging from of 50.2 ng/L to 82.3 ng/L.
- PFHxS was detected above the SL of 39 ng/L at all three wells, with concentrations ranging from of 56.8 ng/L to 112 ng/L.

- PFNA was detected above the SL of 6 ng/L at AOI03-01 with a concentration of 71.3 ng/L

PFBS was detected below the SL of 601 ng/L at all three wells, with a maximum concentration of 16.0 ng/L.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOS was detected in soil above the SL. PFOA, PFOS, PFHxS, and PFNA were detected in groundwater, at concentrations above their respective SLs. Based on the exceedances of the SLs in soil and groundwater, further evaluation at AOI 3 is warranted.

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

Area of Interest		AOI01																			
Sample ID		AOI01-01-SB-0-2		AOI01-02-SB-0-2		AOI01-02-SB-0-2-D		AOI01-03-SB-0-2		AOI01-04-SB-0-2		AOI01-05-SB-0-2		AOI01-06-SB-0-2		AOI01-07-SB-0-2		AOI01-07-SB-0-2-D		AOI01-08-SB-0-2	
Sample Date		07/16/2021		07/16/2021		07/16/2021		07/19/2021		07/19/2021		07/19/2021		07/22/2021		07/22/2021		07/22/2021		07/22/2021	
Depth		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
PFBS	1900	ND	U	ND	U	ND	U	ND	U	0.037	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.114	J	0.078	J	0.076	J	0.139	J	0.636	J	0.148	J	0.068	J	ND	U	ND	U	0.065	J
PFNA	19	0.052	J	ND	U	ND	U	ND	U	ND	U	0.056	J	ND	U	0.105	J	0.098	J	6.61	
PFOA	19	0.213	J	ND	U	ND	U	0.251	J	ND	U	0.188	J	ND	U	0.136	J	0.130	J	1.42	
PFOS	13	2.45		0.157	J	0.173	J	1.87		0.176	J	0.459	J	0.323	J	0.999	J	0.885	J	4.35	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

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

	Area of Interest	AOI01		AOI02				AOI03													
	Sample ID	AOI01-09-SB-0-2		AOI02-01-SB-0-2		AOI02-02-SB-0-2		AOI03-01-SB-0-2		AOI03-01-SB-0-2-D		AOI03-02-SB-0-2		AOI03-03-SB-0-2		AOI03-04-SB-0-2		AOI03-04-SB-0-2-D		AOI03-05-SB-0-2	
	Sample Date	07/22/2021		07/20/2021		07/20/2021		07/21/2021		07/21/2021		07/21/2021		07/21/2021		07/22/2021		07/22/2021		07/22/2021	
	Depth	0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft		0-2 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)																					
PFBS	1900	ND	U	ND	U	ND	U	ND	U	ND	U	0.045	J	ND	U	ND	U	ND	U	ND	U
PFHxS	130	0.035	J	0.161	J	ND	U	0.042	J	0.038	J	1.46		ND	U	0.065	J	0.073	J	0.047	J
PFNA	19	0.025	J	0.059	J	ND	U	0.168	J	0.189	J	ND	U	ND	U	0.046	J	0.024	J	0.054	J
PFOA	19	0.145	J	0.355	J	0.200	J	0.365	J	0.339	J	ND	U	0.302	J	0.384	J	0.389	J	0.167	J
PFOS	13	0.243	J	0.683	J	0.065	J	0.247	J	0.263	J	26.2	J	0.946	J	1.26		0.675	J	1.25	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Stockton AASF

Area of Interest	AOI01													
Sample ID	AOI01-01-SB-20-21		AOI01-01-SB-40-41		AOI01-02-SB-20-21		AOI01-02-SB-42-43		AOI01-03-SB-20-21		AOI01-03-SB-41-42		AOI01-04-SB-21-22	
Sample Date	07/16/2021		07/16/2021		07/16/2021		07/16/2021		07/19/2021		07/19/2021		07/19/2021	
Depth	20-21 ft		40-42 ft		20-21 ft		42-43 ft		20-21 ft		41-42 ft		21-22 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)														
PFBS	ND	U	0.037	J	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	0.365	J	0.106	J	0.122	J	ND	U	0.075	J	0.036	J	0.058	J
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	0.081	J	ND	U	ND	U	ND	U	0.090	J	ND	U	ND	U

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Stockton AASF

Area of Interest	AOI01						AOI02							
Sample ID	AOI01-04-SB-43-44		AOI01-05-SB-19-20		AOI01-05-SB-39-40		AOI02-01-SB-20-21		AOI02-01-SB-42-43		AOI02-02-SB-20-21		AOI02-02-SB-42-43	
Sample Date	07/19/2021		07/20/2021		07/20/2021		07/20/2021		07/20/2021		07/20/2021		07/20/2021	
Depth	43-44 ft		19-20 ft		39-40 ft		20-21 ft		42-43 ft		20-21 ft		42-43 ft	
Analyte	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)														
PFBS	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFHxS	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-3
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Deep Subsurface Soil
Site Inspection Report, Stockton AASF

Area of Interest	AOI03											
Sample ID	AOI03-01-SB-18-19		AOI03-01-SB-38-39		AOI03-02-SB-20-21		AOI03-02-SB-42-43		AOI03-03-SB-20-21		AOI03-03-SB-41-42	
Sample Date	07/21/2021		07/21/2021		07/21/2021		07/21/2021		07/21/2021		07/21/2021	
Depth	18-19 ft		38-39 ft		20-21 ft		42-43 ft		20-21 ft		41-42 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, LCMSMS compliant with QSM 5.3 Table B-15 (µg/kg)												
PFBS	ND	U	0.189	J	ND	U	ND	U	ND	U	ND	U
PFHxS	0.062	J	0.822	J	0.00622	J	ND	U	ND	U	ND	U
PFNA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOA	ND	U	ND	U	ND	U	ND	U	ND	U	ND	U
PFOS	ND	U	4.12		ND	U	ND	U	ND	U	ND	U

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Stockton AASF

Area of Interest		AOI01												AOI02				AOI03	
Sample ID		AOI01-01-GW		AOI01-02-GW		AOI01-03-GW		AOI01-03-GW-D		AOI01-04-GW		AOI01-05-GW		AOI02-01-GW		AOI02-02-GW		AOI03-01-GW	
Sample Date		07/21/2021		07/22/2021		07/22/2021		07/22/2021		07/22/2021		07/22/2021		07/22/2021		07/23/2021		07/23/2021	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)																			
PFBS	601	107		15.4		17.8		17.8		9.73		6.39		ND	U	1.56	J	16.0	
PFHxS	39	536		45.2		168		166		130		132		2.72	J	5.13		81.3	
PFNA	6	ND	U	ND	U	ND	U	ND	U	4.85		ND	U	1.01	J	ND	U	71.3	
PFOA	6	5.80		ND	U	5.69		5.48		34.8		21.3		5.32		1.47	J	139	
PFOS	4	12.3		ND	U	5.52		5.39		15.7		30.9		3.33	J	3.15	J	50.2	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

Table 6-4
PFOA, PFOS, PFBS, PFNA, and PFHxS Results in Groundwater
Site Inspection Report, Stockton AASF

Area of Interest		AOI03			
Sample ID		AOI03-02-GW		AOI03-03-GW	
Sample Date		07/23/2021		07/23/2021	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual
Water, LCMSMS compliant with QSM 5.3 Table B-15 (ng/l)					
PFBS	601	7.71		9.40	
PFHxS	39	112		56.8	
PFNA	6	ND	U	ND	U
PFOA	6	7.85		33.8	
PFOS	4	60.2		82.3	

Grey Fill Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

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

Chemical Abbreviations

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

Acronyms and Abbreviations

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

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Facility Boundary

Canal/Ditch

Depth Intervals*

Shallow = 0-2 ft bgs

Intermediate = 18-22 ft bgs

Deep = 38-44 ft bgs

PFOA Results (µg/Kg)

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

N

0 150 300 600 Feet

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

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

PFOA Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	8/15/2022	GIS BY	MS	8/15/2022
SCALE	1:3,600	CHK BY	MB	8/15/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 6-1

Facility Boundary

Canal/Ditch

Depth Intervals*

Shallow = 0-2 ft bgs

Intermediate = 18-22 ft bgs

Deep = 38-44 ft bgs

PFOS Results (µg/Kg)

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

N

0 150 300 600 Feet

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

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

PFOS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	8/15/2022	GIS BY	MS	8/15/2022
SCALE	1:3,600	CHK BY	MB	8/15/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

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Figure 6-2

Facility Boundary

Canal/Ditch

Depth Intervals*
Shallow = 0-2 ft bgs
Intermediate = 18-22 ft bgs
Deep = 38-44 ft bgs

PFBS Results (µg/Kg)

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

N

0 150 300 600 Feet

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

PFBS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	8/15/2022	GIS BY	MS	8/15/2022
SCALE	1:3,600	CHK BY	MB	8/15/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

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Figure 6-3

Facility Boundary

Canal/Ditch

Depth Intervals*
Shallow = 0-2 ft bgs
Intermediate = 18-22 ft bgs
Deep = 38-44 ft bgs

PFHxS Results (µg/Kg)

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

N

0 150 300 600 Feet

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

PFHxS Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	8/15/2022	GIS BY	MS	8/15/2022
SCALE	1:3,600	CHK BY	MB	8/15/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

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12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-4

Facility Boundary

Canal/Ditch

Depth Intervals*

Shallow = 0-2 ft bgs

Intermediate = 18-22 ft bgs

Deep = 38-44 ft bgs

PFNA Results (µg/Kg)

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

N

0 150 300 600 Feet

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

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

PFNA Detections in Soil

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	8/15/2022	GIS BY	MS	8/15/2022
SCALE	1:3,600	CHK BY	MB	8/15/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	8/15/2022

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Figure 6-5

PFOA

PFOS

PFBS

Legend

- Facility Boundary
- Canal/Ditch
- Groundwater Flow Direction

N

0 150 300 600 Feet

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

PFOA, PFOS, and PFBS Detections in Groundwater

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	10/5/2022	GIS BY	MS	10/5/2022
SCALE	1:3,600	CHK BY	MB	10/5/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	10/5/2022

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Figure 6-6

PFHxS

AOI01-04
AOI01-02
AOI01-05
AOI02-02
AOI01-03
AOI03-03
AOI03-02
AOI03-01
AOI01-01
AOI02-01
Rydberg Creek

PFHxS Results (ng/L)
- ND
- >ND - 39
- >39 - 100
- >100 - 1,000
- >1,000

PFNA

AOI01-04
AOI01-02
AOI01-05
AOI02-02
AOI01-03
AOI03-03
AOI03-02
AOI03-01
AOI01-01
AOI02-01
Rydberg Creek

PFNA Results (ng/L)
- ND
- >ND - 6
- >6 - 100
- >100 - 1,000
- >1,000

Legend
- Facility Boundary
- Canal/Ditch
- Groundwater Flow Direction

N

0 150 300 600 Feet

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

PFHxS and PFNA Detections in Groundwater

CLIENT	ARNG			
PROJECT	Site Inspection at Stockton AASF, CA			
REVISED	9/29/2022	GIS BY	MS	9/29/2022
SCALE	1:3,600	CHK BY	MB	9/29/2022
Base Map: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community		PM	CM	9/29/2022

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Figure 6-7

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7. Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-3**. Please note that while the CSM discussion assists in determining if a receptor may be impacted, the decision to move from SI to Remedial Investigation (RI) or interim action is determined based upon exceedances of the SLs for the relevant compounds and whether the release is more than likely attributable to the DoD. A CSM presents the current understanding of the site conditions with respect to known and suspected sources, potential transport mechanisms and migration pathways, and potentially exposed human receptors. A human exposure pathway is considered potentially complete when the following conditions are present:

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

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

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

7.1 Soil Exposure Pathway

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

7.1.1 AOI 1

AOI 1 is the Airfield, where controlled AFFF releases through familiarization training have occurred annually potentially as early as 1992 and then less frequently after 2010.

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected below the SLs in surface soil at AOI 1. Site workers, future construction workers, and trespassers could contact constituents in surface

soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers, future construction workers, and trespassers are potentially complete. Although shallow subsurface soil (between 2 and 15 feet bgs) samples were not collected, it is possible that construction workers could contact constituents in subsurface soil via incidental ingestion, as PFHxS, PFOS, and PFBS were detected in deep subsurface soil at AOI 1. Therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

AOI 2 is the wash rack area and includes the HAZMAT locker with AFFF storage, located at the southwest corner of the wash rack. Controlled AFFF releases to the wash rack through activities related to fire training and familiarization training have occurred annually at AOI 2, potentially as early as 1992, and then less frequently after 2010. Potential AFFF releases from incidental spills in the wash rack area may have also occurred.

The wash rack drains lead to an oil water separator that connects to the Stockton sanitary sewer system. Therefore, discharges of AFFF in the wash rack would release directly into the sanitary sewer system; however, the HAZMAT locker is located near unpaved, grassy areas.

PFOA, PFOS, PFHxS, and PFNA were detected below the SLs in surface soil at AOI 2. Site workers and construction workers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers and future construction workers are potentially complete. Although shallow subsurface soil (between 2 and 15 feet bgs) samples were not collected, it is possible that construction workers could contact constituents in subsurface soil via incidental ingestion; therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 2 is presented on **Figure 7-2**.

7.1.3 AOI 3

AOI 3 is a former FTA at what is now the parking area located east of the Butler Building. Controlled AFFF releases through fire training activities have occurred annually at AOI 3, potentially as early as 1992, until approximately 2010 to 2012, when the Butler Building was constructed.

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in surface soil at AOI 3, and PFOS exceeded the residential SL. Site workers, construction workers, and trespassers could contact constituents in surface soil via incidental ingestion and inhalation of dust. Therefore, the surface soil exposure pathway for site workers, future construction workers, and trespassersare potentially complete. Although shallow subsurface soil (between 2 and 15 feet bgs) samples were not collected, it is possible that construction workers could contact constituents in subsurface soil via incidental ingestion, as PFOS, PFHxS, and PFBS were detected in deep subsurface soil at AOI 3. Therefore, the subsurface soil exposure pathway for future construction workers is potentially complete. The CSM for AOI 3 is presented on **Figure 7-3**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

PFOA, PFOS, and PFHxS were detected above their respective SLs in groundwater samples collected at AOI 1. Due to the presence of public water system wells within a 4-mile radius of the facility, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Because the location of Stockton Municipal Utilities Water Service groundwater wells that may serve the AASF are unknown, the pathway for exposure to site workers via ingestion of groundwater is also considered potentially complete. Depths to water measured during the SI at AOI 1 in July 2021 ranged from 37.36 to 42.23 feet bgs. Therefore, the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, PFHxS, PFNA, and PFBS were detected in groundwater samples collected at AOI 2, at concentrations below SLs. Due to the presence of public water system wells within a 4-mile radius of the facility, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Because the locations of Stockton Municipal Utilities Water Service groundwater wells that may serve the AASF are unknown, the pathway for exposure to site workers via ingestion of groundwater is also considered potentially complete. Depths to water measured in July 2021 during the SI ranged from 39.4 to 39.5 feet bgs; therefore, the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 2 is presented on **Figure 7-2**.

7.2.3 AOI 3

PFOA, PFOS, PFHxS, and PFNA were detected above their respective SLs in groundwater samples collected at AOI 3. Due to the presence of public water system wells within a 4-mile radius of the facility, the pathway for exposure to off-facility residents via ingestion of groundwater is considered potentially complete. Because the locations of Stockton Municipal Utilities Water Service groundwater wells that may serve the AASF are unknown, the pathway for exposure to site workers via ingestion of groundwater is also considered potentially complete. Depths to water measured in July 2021 during the SI ranged from 37.27 to 39.10 feet bgs; therefore, the ingestion exposure pathway for future construction workers is considered incomplete. The CSM for AOI 3 is presented on **Figure 7-3**.

7.3 Surface Water and Sediment Exposure Pathway

The SI results in soil and groundwater, in combination with knowledge of the fate and transport properties of PFAS, were used to determine whether a potentially complete pathway exists between the source and potential receptors.

Rydberg Creek wraps around the southern and western boundary of the facility and connects to French Camp Slough, located approximately 2,000 feet away from AOI 2 and AOI 3. PFAS are water soluble and can migrate readily from soil to surface water via leaching and run-off. PFAS in runoff is also likely to flow into catchments that drain into these surface water features. The ingestion exposure pathways for surface water and sediment are potentially complete for trespassers and recreational users, based on the detections in groundwater and soil from AOI 1 through AOI 3. The ingestion exposure pathway for trespassers and recreational users is relevant to incidental ingestion during recreational use of Rydberg Creek and French Camp Slough, only, as surface water is not used as a drinking water source from these surface water features. The CSMs for AOI 1 through AOI 3 are presented in **Figures 7-1** through **7-3**, respectively.

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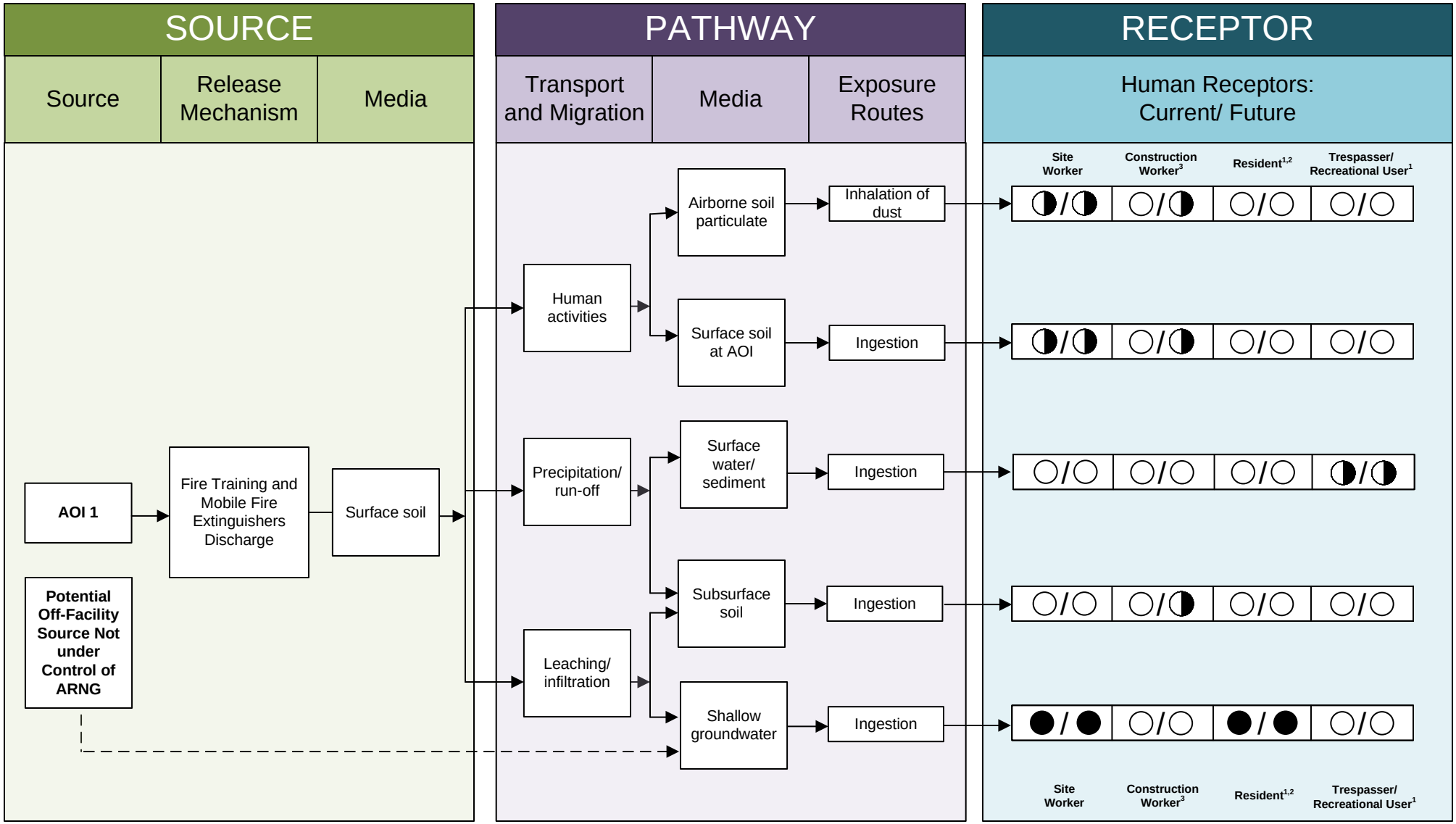


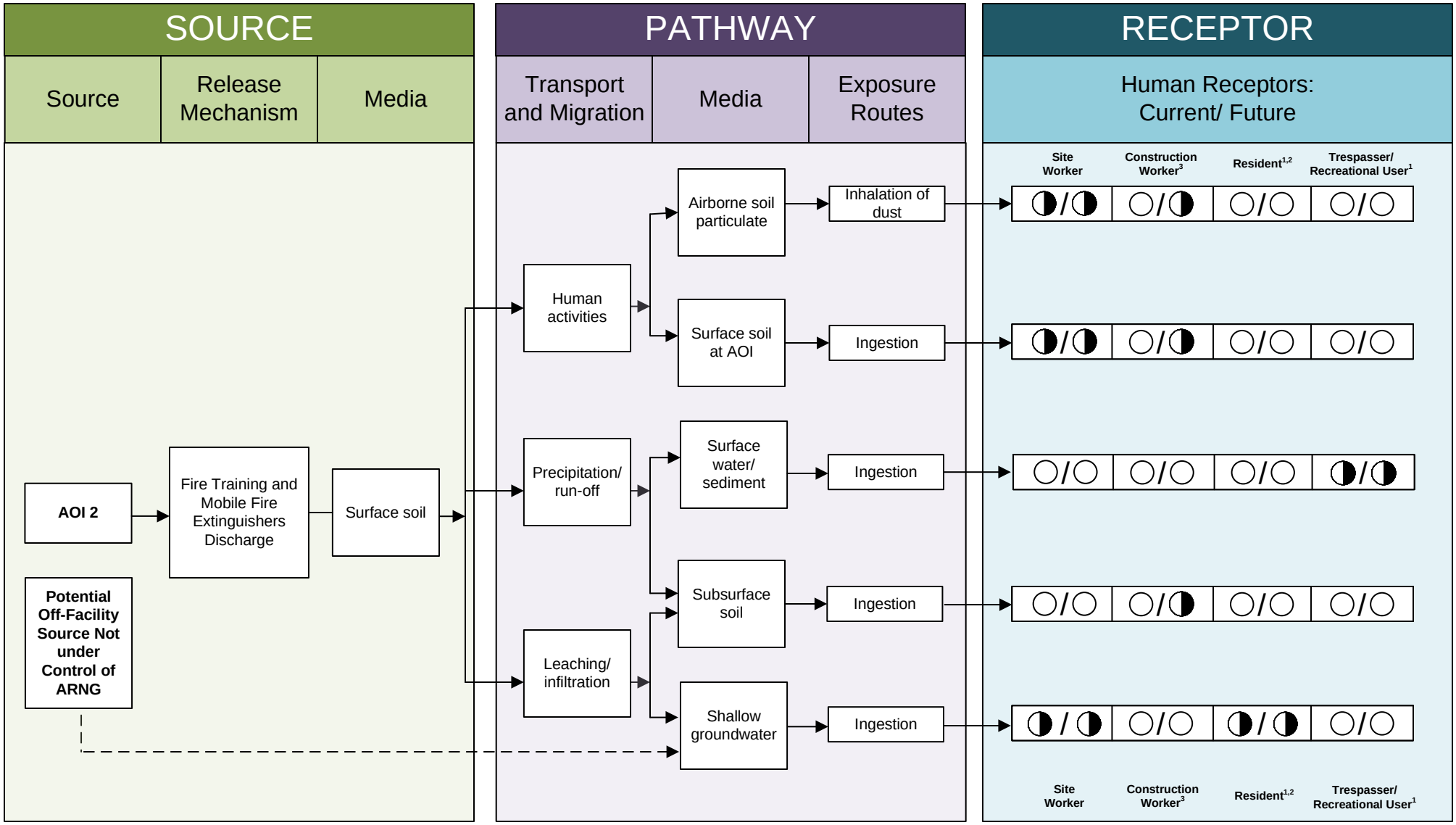
LEGEND

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

Notes:

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

Figure 7-1
Conceptual Site Model, AOI 1
Stockton AASF



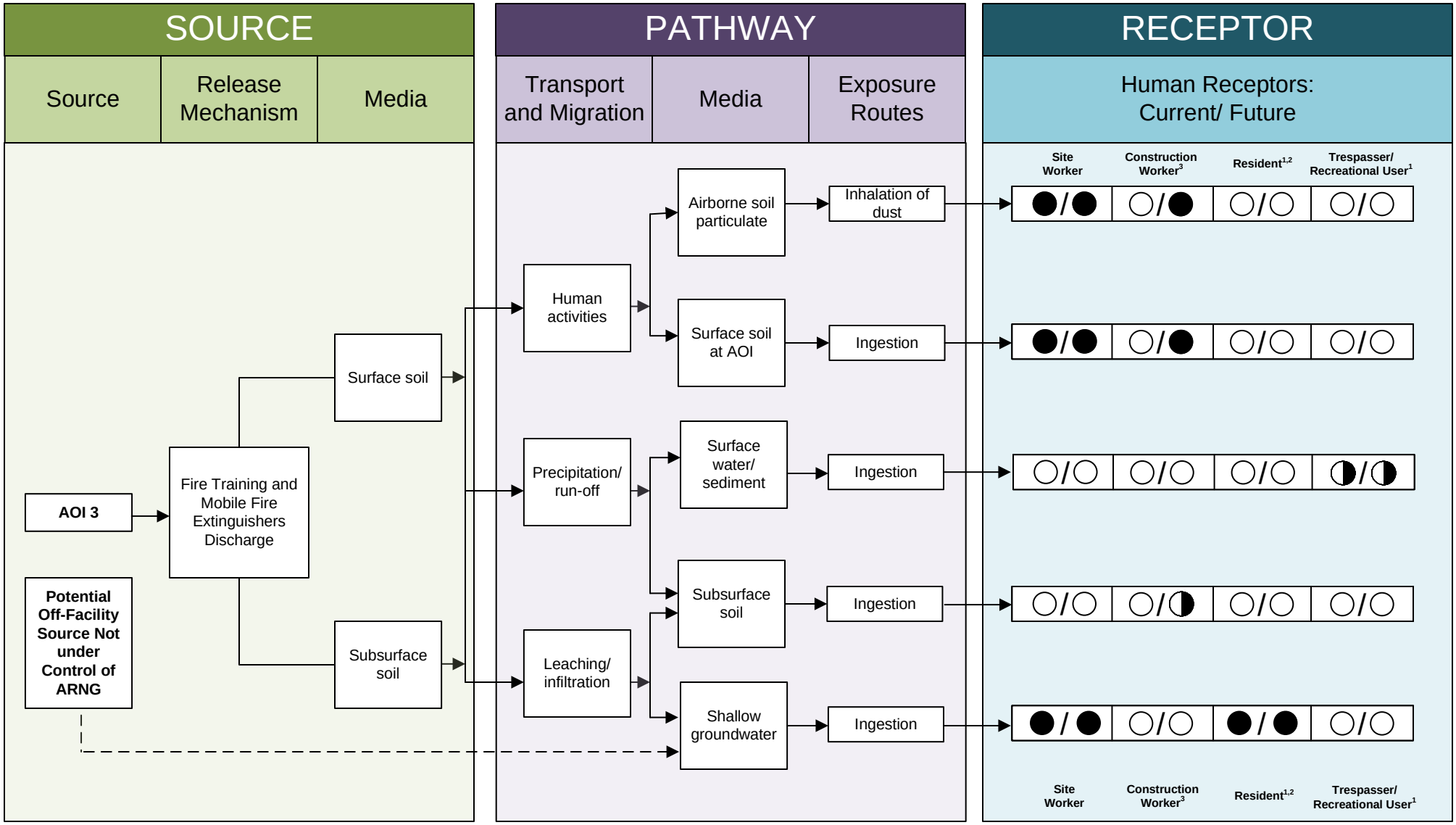
LEGEND

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

Notes:

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

Figure 7-2
Conceptual Site Model, AOI 2
Stockton AASF



LEGEND

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

Notes:

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

Figure 7-3
Conceptual Site Model, AOI 3
Stockton AASF

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8. Summary and Outcome

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

8.1 SI Activities

The SI field activities were conducted from 12 to 23 July 2021 and consisted of utility clearance, direct push boring, soil sample collection, temporary monitoring well installation, grab groundwater sample collection, and land surveying. Field activities were conducted in accordance with the SI QAPP Addendum (AECOM, 2021a).

- To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2021a), samples were collected and analyzed for a subset of 18 compounds by LC/MS/MS compliant with QSM 5.3 Table B-15 as follows.
- Thirty-six (36) soil samples from 16 boring locations;
- Ten (10) grab groundwater samples from 10 temporary well locations;
- Twenty-one (21) QA/QC samples.

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

8.2 Outcome

Based on the results of this SI, further evaluation under CERCLA is warranted in an RI for AOI 1 and AOI 3; no further evaluation is warranted for AOI 2 at this time (see **Table 8-1**). Based on the CSMs developed and revised in light of the SI findings, there is potential for exposure to drinking water receptors from AOI 1 and AOI 3 from sources on the facility resulting from historical DoD activities. Sample analytical concentrations collected during the SI were compared against the project SLs in soil and groundwater, as described in **Table 6-1**. A summary of the results of the SI data relative to the SLs is as follows:

- At AOI 1:
    - PFOA, PFOS, and PFHxS in groundwater exceeded their respective SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 34.8 ng/L at location AOI01-04. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 30.9 ng/L at location AOI01-05. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 536 ng/L at location AOI01-01.
    - The detected concentrations of PFOA, PFOS, PFHxS, PFNA and PFBS in soil at AOI 1 were below their respective SLs.
    - Based on the exceedances of the SLs in groundwater, further evaluation of AOI 1 is warranted in an RI.

- At AOI 2:
    - The detected concentrations PFOA, PFOS, PFHxS, PFNA, and PFBS in groundwater were below their respective SLs.
    - The detected concentrations of PFOA, PFOS, PFHxS, and PFNA in soil at AOI 2 were below their respective SLs.
    - Based on the results of the SI, no further evaluation of AOI 2 is warranted at this time.
- At AOI 3:
    - PFOA, PFOS, PFHxS, and PFNA in groundwater exceeded their respective SLs. PFOA exceeded the SL of 6 ng/L, with a maximum concentration of 139 ng/L at location AOI03-01. PFOS exceeded the SL of 4 ng/L, with a maximum concentration of 82.3 ng/L at AOI03-03. PFHxS exceeded the SL of 39 ng/L, with a maximum concentration of 112 ng/L at location AOI03-02. PFNA exceeded the SL of 6 ng/L, with a maximum concentration of 71.3 ng/L at location AOI03-01.
    - PFOS in surface soil exceeded the SL of 13 µg/kg at AOI03-02, with a concentration of 26.2 J µg/kg.
    - Based on the exceedances of the SLs in soil and groundwater, further evaluation of AOI 3 is warranted in the RI.

Due to the uncertainty regarding groundwater flow, this report resulted in only one location (AOI02-01) with data associated with the wash rack at AOI 2. This single sample location yielded groundwater results below but very close to the groundwater SLs for PFOS and PFOA. Based on groundwater flow, the other sample location (AOI02-02) does not appear to be representative of AOI 2.

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

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

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

AOI	Potential Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary	Future Action
1	Airfield	◐	●	●	Proceed to RI
2	Wash Rack	◐	◐	◐	No further action at this time
3	Butler Building Parking FTA	●	●	●	Proceed to RI

Legend:

● = detected; exceedance of the screening levels

◐ = detected; no exceedance of the screening levels

○ = not detected

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