Final
Site Inspection Report
Joint Forces Training Base
Los Alamitos, CA

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

August 2021

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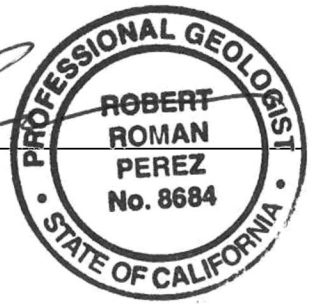

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Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
µg/kg	micrograms per kilogram
6:2 FTS	6:2 Fluorotelomer sulfonate
8:2 FTS	8:2 Fluorotelomer sulfonate
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AFRC	Armed Forces Reserve Center
amsl	above mean sea level
AOI	area of interest
ARNG	Army National Guard
AST	aboveground storage tank
bgs	below ground surface
btoc	below top of casing
CAARNG	California Army National Guard
CDFA	California Department of Food and Agriculture
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Crash Fire Rescue
CoC	chain of custody
CSM	conceptual site model
DA	Department of the Army
DO	dissolved oxygen
DoD	Department of Defense
DPT	direct-push technology
DPVE	dual-phase vacuum extraction
DQI	data quality indicator
DQO	data quality objective
DTSC	Department of Toxic Substance Control
DUA	data usability assessment
DVR	data validation report
DWR	Department of Water Resources
EIS	Extraction internal standards
ELAP	Environmental Laboratory Accreditation Program
EM	Engineers Manual
ERB	equipment rinsate blank
FD	Fire Department
FedEx	Federal Express
FFO	Fuel Farm Office
FRB	field reagent blank
FTA	Fire Training Area
gpm	gallons per minute
gpm/sqft	gallons per minute per square foot

HA	Health Advisory
HDPE	high-density polyethylene
IDW	investigation-derived waste
ITRC	Interstate Technology Regulatory Council
JFTB LA	Joint Forces Training Base Los Alamitos
JP-4	Jet Propellant-4
LAACOC	Los Alamitos Area Chamber of Commerce
LC/MS/MS	liquid chromatography tandem mass spectrometry
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LOQ	limit of quantitation
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
N	North
NAS	Naval Air Station
NELAP	National Environmental Laboratory Accreditation Program
NEtFOSAA	N-ethyl perfluorooctanesulfonamidoacetic acid
ng/L	nanograms per liter
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
OCB	Orange County Groundwater Basin
OCWD	Orange County Water District
ORP	oxidation-reduction potential
OSD	Office of the Secretary of Defense
PA	Preliminary Assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutyrate
PFBS	perfluorobutanesulfonic acid
PFCs	perfluorinated compounds
PFDA	perfluorodecanoic acid
PFDoA	perfluoroheptanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUdA	perfluoroundecanoic acid
PID	photoionization detector
PPE	Personal Protective Equipment
PQAPP	Programmatic UFP-QAPP

PVC	poly-vinyl chloride
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	relative percent differences
RSC	Rossmoor Storm Channel
RSL	Regional Screening Level
RWQCB	Regional Water Quality Control Board
SCEDC	Southern California Earthquake Data Center
SI	Site Inspection
SL	screening level
SOP	Standard Operating Procedure
sqft	square foot
SSS	SubSurface Surveys & Associates, Inc
SWRCB	California State Water Resources Control Board
TFA	Tank Farm Area
TFFT	tactical firefighting truck
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
UST	underground storage tank
W	West
WCC	Winner’s Circle Court
WDD	Western Drainage Ditch
WEF	West End of the Flightline

Executive Summary

The Army National Guard (ARNG) is performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. The objective of the SI at each facility is to identify whether there has been a release to the environment from the Areas of Interest (AOIs) identified in the PA and determine the presence or absence of perfluorooctanoic acid (PFOA), perfluorooctanesulfonic acid (PFOS), and perfluorobutanesulfonic acid (PFBS) at or above screening levels (SLs). This SI was performed by the ARNG at the Joint Forces Training Base Los Alamitos (JFTB LA) in Los Alamitos, California. JFTB LA will be referred to as the "facility" throughout this document.

The JFTB LA is located in northwestern Orange County, California, within the southeastern corner of the city of Los Alamitos, approximately 20 miles to the southeast of the city of Los Angeles. The JFTB LA is largely developed with buildings, roads, and an airfield and occupies approximately 1,319 acres of near-level terrain. The most prominent feature of the JFTB LA is its airfield, which occupies approximately 465 acres and has two runways that are served by a fully staffed Army Air Traffic Control Tower, crash rescue and fire department (FD), jet fuel farm for aviation refueling, and an Army Aviation Weather Office. The JFTB LA is operated by California ARNG (CAARNG) and serves multiple tenant entities representing military services, federal, state, municipal, public, private, and nonprofit organizations.

The PA Report (AECOM, 2019a) for JFTB LA identified eight potential PFAS release areas, including three Fire Training Areas, Hangar 1, JFTB LA Fire Station, Building 80, Emergency Response Site on Alpha Hammer-Head taxiway, and the Western Drainage Ditch. Two additional potential PFAS release areas, Ramp Area in front of Hangar 1 and 3 and Groundwater Remediation System, were discovered after completion of PA. The potential release areas were grouped into eight different Areas of Interest (AOIs), which were investigated during the SI. The SI field activities were conducted during 21 to 29 October 2019 and included the collection of soil, groundwater, and surface water samples.

To fulfill the project Data Quality Objectives (DQOs) set forth in the approved SI Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2018a), samples were collected and analyzed for a subset of 18 PFAS via liquid chromatography with tandem mass spectrometry (LC/MS/MS) Compliant with Quality Systems Manual (QSM) 5.1 Table B-15. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.9** of this Report.:

The Department of Defense (DoD) has adopted a policy to retain facilities in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). The ARNG PFAS SIs follow this DoD policy and, when the maximum site concentration for sampled media exceed the SLs, the site will proceed to a Remedial Investigation (RI), the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table ES-1**. All other results presented in this report are considered informational in nature and serve as an indication as to whether soil, groundwater, sediment, and surface water do or do not contain the 18 PFAS analyzed within the boundaries of the Site.

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

- PFOS and PFOA in soil at AOI 3: West End of the Flightline exceeded the individual SLs of 130 µg/Kg with maximum concentrations of 1570 µg/Kg (AOI3-2) and 219 µg/Kg (AOI 3-12), respectively. Based on the results of the SI, further evaluation of AOI 3 is warranted in the RI.

- PFOA and PFOS in soil at AOI 5: Building 34 exceeded the individual SLs of 130 µg/Kg with concentrations of 134 µg/Kg and 352 µg/Kg, respectively. Based on the results of the SI, further evaluation of AOI 5 is warranted in the RI.

- PFOA in groundwater at AOI 1: Old CFR Training Pits exceeded the SL of 40 nanograms per liter (ng/L), with a maximum concentration of 166,000 ng/L at location AOI 1-5. Additionally, PFOS in groundwater at AOI 1 exceeded the SL of 40 ng/L, with a maximum concentration of 11,100 J- ng/L at location AOI 1-2. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.

- PFOA and PFOS in groundwater at AOI 2: New CFR Training Pit exceeded the individual SLs of 40 ng/L, with concentrations of 62,900 ng/L and 1,620 ng/L, respectively, at location AOI 2-5. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.

- PFOA and PFOS in groundwater at AOI 3: West End of the Flightline exceeded the individual SLs of 40 ng/L, with maximum concentrations of 6,380 ng/L and 16,600 J- ng/L, respectively, at location AOI 3-11. Based on the results of the SI, further evaluation of AOI 3 is warranted in the RI.

- PFOA and PFOS in groundwater at AOI 4: Hangar 1 exceeded the individual SLs of 40 ng/L, with concentrations of 245 ng/L and 401 ng/L, respectively, at location AOI 4-1. Based on the results of the SI, further evaluation of AOI 4 is warranted in the RI.

- PFOA and PFOS in groundwater at AOI 5: Building 34 (JFTB LA Fire Station) exceeded the individual SLs of 40 ng/L, with maximum concentrations of 31,300 ng/L and 16,800 J ng/L, respectively, at location AOI 5-1. Based on the results of the SI, further evaluation of AOI 5 is warranted in the RI.

- PFOA and PFOS in groundwater at AOI 8: Western Drainage Ditch exceeded the individual SLs of 40 ng/L, with concentrations of 3,740 ng/L and 4,880 ng/L, respectively, at location AOI 8-X3. Based on the results of the SI, further evaluation of AOI 8 is warranted in the RI.

- The detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs.

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

Table ES-3 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1: Old CFR Training Pits, AOI 2: New CFR Training Pit, AOI 3: West End of Flightline, AOI 4: Hangar 1, AOI 5: Building 34, and AOI 8: Western Drainage Ditch.

Table ES- 1 Screening Levels (Soil and Groundwater)

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

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using USEPA's Regional Screening Level (RSL) Calculator. HQ=0.1. 15 October 2019.

b.) If only one PFAS is present, a Hazard Quotient (HQ) of 1 applies and the values presented would increase by a factor of x10.

Table ES- 2 Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Old CFR Training Pits	◐	●	NA
2	New CFR Training Pit	◐	●	NA
3	West End of the Flightline	●	●	NA
4	Hangar 1	◐	●	NA
5	Building 34 (JFTB LA Fire Station)	●	●	NA
6	AFFF Release in Vicinity of Building 80	◐	◐	NA
7	Emergency Response	◐	◐	NA
8	Western Drainage Ditch	NA	NA	●

Legend:

AFFF = Aqueous Film Forming Foam
CFR = Crash Fire Rescue
JFTB LA = Joint Force Training Base Los Alamitos
NA = not applicable

● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table ES- 3 Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Old CFR Training Pits	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
2	New CFR Training Pit	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
3	West End of the Flightline	Exceedances of SLs in groundwater at source area. Exceedances of SLs in soil at source area.	Proceed to RI
4	Hangar 1	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
5	Building 34 (JFTB LA Fire Station)	Exceedances of SLs in groundwater at source area. Exceedances of SLs in soil at source area.	Proceed to RI
6	AFFF Release in Vicinity of Building 80	Detections in groundwater but no exceedance of SLs. No exceedances of SLs in soil.	No further action
7	Emergency Response	Detections in groundwater but no exceedance of SLs. No exceedances of SLs in soil.	No further action
8	Western Drainage Ditch	Exceedances of SLs in groundwater at the facility boundary. No soil samples collected.	Proceed to RI

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1.0 Introduction

1.1 Project Authorization

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) at per- and polyfluoroalkyl substances (PFAS)-impacted sites at ARNG facilities nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor, AECOM Technical Services, Inc. (AECOM), under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017. The ARNG performed this SI at the Joint Forces Training Base Los Alamitos (JFTB LA) in Los Alamitos, California. JFTB LA will be referred to as the "facility" throughout this document.

The SI project elements were performed in accordance with 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 Army Requirements and Guidance for field investigations, including specific requirements for sampling for PFOA, PFOS, and perfluorobutanesulfonic acid (PFBS), and the group of related compounds known in the industry as PFAS. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOA, PFOS, and PFBS, which are the key components of the suspected releases being evaluated, and the other 15 related compounds listed in the task order.

1.2 SI Purpose

A PA was performed at JFTB LA (AECOM, 2019a) that identified eight potential PFAS release areas, which were grouped into eight Areas of Interest (AOIs). The objective of the SI is to identify whether there has been a release to the environment from the AOIs and determine the presence or absence of PFOA, PFOS, and PFBS at or above screening levels (SLs).

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

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

Collect data to determine whether the release is more than likely the result of activities associated with the Department of Defense (DoD).In addition to the USEPA-identified goals of an SI, the ARNG SI also identifies whether there are potential off-facility PFAS sources.

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2.0 Facility Background

2.1 Facility Location and Description

The JFTB LA is located in northwestern Orange County, California, within the southeastern corner of the city of Los Alamitos, approximately 20 miles to the southeast of the city of Los Angeles, and approximately 7 miles north of Seal Beach National Wildlife Refuge and the waters of the Pacific Ocean (**Figure 2-1**).

The JFTB LA is bounded to the north by Farquhar Avenue, residential developments, and commercial-business complexes; to the south by Lampson Avenue, residential developments, and the Old Ranch Golf Course; to the east by commercial properties and residential developments; and to the west by Seal Beach Boulevard, residential developments, a school, and a park. The communities of Cypress, Seal Beach, Garden Grove, and Rossmoor are situated to the north, south, east, and west of the JFTB LA, respectively.

The JFTB LA is largely developed with buildings, roads, and an airfield and occupies approximately 1,319 acres of near-level terrain. The reference point and surface elevation at the geographic center of the airfield is 33° 47' 24" North (N) latitude and 118° 03' 04" West (W) longitude at 21.16 feet above mean sea level (amsl), respectively.

According to the Los Alamitos Area Chamber of Commerce (LAACOC), the JFTB LA serves multiple tenant entities representing military services, federal, state, municipal, public, private and nonprofit organizations.

The land area currently occupied by the JFTB LA was used primarily for agricultural purposes in the 1920s and 1930s (PlaceWorks, 2015). In 1941, the Navy purchased the land, and by 1942, it had constructed a fully operating facility, the Naval Reserve Air Base Los Alamitos. The Base was complete with barracks, a sick bay, and several hangars and functioned during this time as a location for fighter pilot training during World War II. On 15 August 1943, the facility was re-designated as the Naval Air Station (NAS) Los Alamitos and was considered to be one of the Navy's most important US West Coast air defense facilities. Approximately 130 buildings, including housing for 2,200 naval personnel, were built during the early 1940s. Other structures included hangars, equipment and maintenance shops, a laundry, warehouses, mess halls, headquarter buildings, a gymnasium, chapel, and a small hospital (Marshall and Denger, 2016).

By the end of 1945, NAS Los Alamitos facilities included ordnance storage facilities, a rifle range, motor repair shops, gasoline and oil stations, aviation fuel dispensing facilities, wash racks and grease racks, a laundry, and a fire station. The air station was equipped with both storm and sanitary sewer systems and a wastewater treatment plant that performed secondary water treatment, including a sludge lagoon. The wastewater treatment plant and the sludge lagoon were closed in the late 1960s. A landfill trench area also operated at the facility from the mid-1950s through 1988. During the 1940s, the airfield had a cumulative aviation fuel capacity of 160,000 gallons that were stored in approximately 17 underground storage tanks (USTs) (Marshall and Denger, 2016).

In November 1972, NAS Los Alamitos was re-designated as an Armed Forces Reserve Center (AFRC), and in July 1977, operational control of the AFRC Los Alamitos was officially transferred from the Department of the Navy to the Department of the Army (DA) by the House Armed Services Committee. In March 1979, AFRC Los Alamitos was licensed to the state of California by the DA, and the California ARNG (CAARNG) was directed to serve as host of the facility. As a result, CAARNG was assigned operational control of the installation. In July 2000, AFRC Los Alamitos's status as a reserve center was changed to JFTB LA (Marshall and Denger, 2016).

2.2 Facility Environmental Setting

The JFTB LA is situated in Orange County, California, within the southeastern portion of the City of Los Alamitos. The JFTB LA covers about 50 percent of the city's land surface.

The most prominent feature of the JFTB LA is its airfield, which occupies approximately 465 acres and has two runways that are served by a fully staffed Army Air Traffic Control Tower, crash rescue and FD, jet fuel farm for aviation refueling, and an Air Force Weather Office. Airfield operations and support areas encompass approximately 240 acres. Approximately 220 acres of the airfield are designated as cantonment and include administrative and training facilities, assembly areas, and dining facilities. Approximately 220 acres of the airfield are recreational/open space used for training activities, athletic fields, a dog park, and the Navy Golf Course. The Navy Golf Course has operated, and continues to operate, under the Navy's purview since its inception. The lands associated with the golf course were permitted to the Navy by the Army for an indefinite period of time. Approximately 190 acres of the airfield, mostly in the south and southeastern portions of the JFTB LA, were leased to and managed by Agromin Oc, LLC.; they conducted a soil amendment process in which pre-processed green waste was integrated into the soil in leased land areas to boost nutrient levels.

The surface topography of JFTB LA is generally flat, with an average elevation of 35 feet amsl. The majority of the JFTB LA is developed with buildings, concrete, or asphalt features. There are no naturally occurring surface waterways located on JFTB LA; however, artificially-made channels and a drainage ditch, herein referred to as the Western Drainage Ditch (WDD), exist either within or adjacent to most of the properties' boundaries. There are several artificial ponds located within the Navy Golf Course in the southeastern portion of the JFTB LA.

2.2.1 Geology

The JFTB LA is situated within the Los Angeles Coastal Plain and Basin in the Peninsular Ranges, a region characterized by northwest trending hills and ranges with intervening valleys. The southern portion of the Plain is an alluvial plain that gently slopes southwest from the Santa Monica Mountains to the San Joaquin Hills (Saucedo et al., 2016) (**Figure 2-2**).

The JFTB LA is underlain by a northwest-trending syncline that is approximately 20 miles wide and contains up to 2,000 feet of a succession of unconsolidated Quaternary and Tertiary sediments and sedimentary rock. These sediments were deposited in marine, lagoonal, and fluvial environments resting unconformably on Cretaceous and Jurassic granitic and/or metavolcanic basement rocks (Yerkes, R.F., 1972).

Surface lithology at the JFTB LA comprises Holocene and Upper Pleistocene (Quaternary) alluvial flood plain deposits (Saucedo et al., 2016). These surface deposits are underlain by a succession of Upper Pleistocene, Middle Pleistocene, and Lower Pleistocene sediments, cumulatively up to 2,000 feet thick. Upper Pleistocene sediments include the Lakewood Formation, a bluish-gray silt and fine sandy silt with sand lenses. Middle and Lower Pleistocene sediments include the San Pedro Formation, which can be further sub-divided into upper, middle, and lower units. Sand and gravel units within the Upper San Pedro Formation are the major water- bearing zones of the middle aquifer system in the Orange County Groundwater Basin (OCB) (California Department of Water Resources [DWR], 2014).

The entire Southern California region is seismically active. Faults in the Orange County-Los Angeles County region that are capable of generating destructive earthquakes and surface rupture in Los Alamitos include the El Modena, Elysian Park, Newport-Inglewood-Rose Canyon, Norwalk, and Whittier-Elsinore fault zones. Located approximately 3 miles southeast of the JFTB LA, the Newport-Inglewood-Rose Canyon Fault Zone is the closest active fault (Holocene) to the facility. The 7-mile long concealed Los Alamitos Fault is located at the southwestern corner of

JFTB LA. According to the Southern California Earthquake Data Center (SCEDC), the most recent surface rupture occurred sometime in the Late Quaternary (between 700,000 years ago and present day) (SCEDC, 2013). The northwest/southeast-oriented fault is characterized as indistinct and may be part of the larger Newport-Inglewood-Rose Canyon fault zone.

2.2.2 Hydrogeology

The JFTB LA is located within the Central Basin of the Los Angeles Coastal Basin, within which is the OCB. In the vicinity of the JFTB LA, the OCB underlies the lower Santa Ana River watershed. Potable water at the JFTB LA is supplied to the facility by the Southern California Water Company.

The majority of fresh and easily recoverable water in the OCB resides at a depth of about 2,000 feet in interbedded marine and continental sand, silt, and clay deposits situated within a deep structural depression. Upper, middle, and lower aquifer systems within the OCB have yields ranging from 500 to 4,500 gallons per minute (gpm) (DWR, 2014). Recharge to the OCB is from percolation of Santa Ana River flow, infiltration of precipitation, and injection into wells. Groundwater flow within the OCB is generally to the southwest, towards the Pacific Ocean. The Orange County Water District (OCWD) manages groundwater within the OCB. There are OCWD wells downgradient from the site that are currently used to provide drinking water.

Excessive groundwater pumping in an area to the southwest of the JFTB LA has caused water levels to drop below sea level inland of the Newport-Inglewood-Rose Canyon fault zone, where a trough-shaped depression allows sea water to migrate inland, thereby contaminating the groundwater supply. To protect the OCB from seawater intrusion, a line of wells placed in the Alamitos and Talbert Gaps inject imported and reclaimed water to create a mound of water seaward of the pumping trough (OCWD, 2015b). A portion of the well string related to the Alamitos Barrier project efforts is located approximately 1.75 miles southwest of the JFTB LA. According to the OCWD, the principle aquifer groundwater elevations beneath the JFTB LA in 2015 were between -40 feet and -50 feet amsl (OCWD, 2015a).

Initial groundwater beneath the JFTB LA is in unconsolidated sediments, at depths of less than 20 feet below ground surface (bgs). The second groundwater bearing zone, referred to as Aquifer 1, resides within sediments comprised of silty clay to clayey silt, with occasional relatively thin sand lenses (Clayton, 1996a). Groundwater residing in these sediments can be found at depths between 90 and 100 feet bgs. Aquifer 1 is underlain by a silt/clay aquitard that is 20 to 30 feet thick. The aquitard is underlain by Aquifer 2, which holds groundwater in gravelly sands. Groundwater in Aquifer 2 can be found at a depth of approximately 200 feet bgs. Aquifer 2 is underlain by Lakewood Formation clays.

2.2.3 Hydrology

The JFTB LA is within the Westminster watershed, which covers approximately 74 square miles in Orange County. The watershed lies within flat coastal plain and includes a drainage area that is mostly urbanized with residential and commercial development (USACE, 2002). Regional watersheds and surface drainage features that do not originate on the JFTB LA but drain its surface water and waters from the cities of Los Alamitos, Cypress, Stanton, Garden Grove, and other Orange County cities are presented in **Figure 2-3**. Surface water features at the JFTB LA are presented in **Figure 2-4**.

Regional Surface Waters

Three surface water bodies are located in close proximity of the JFTB LA. These water bodies include the southwesterly flowing Coyote Creek Channel and the southerly flowing San Gabriel River. The two waterways converge approximately 1.25 miles west of the western JFTB LA property boundary. A third natural water body, the Carbon Creek Channel, is located

approximately 1 mile north of the northern boundary of the JFTB LA. This westerly-flowing channel converges with the Coyote Creek Channel at a point 1 mile north/northeast of the northern perimeter of the JFTB LA. The Coyote and Carbon Creek Channels flow ephemerally throughout the year. The San Gabriel River flows year-round in the lower end.

Off-facility channels in the vicinity of JFTB LA include the following:

- The Rossmoor Storm Channel

  The Rossmoor Storm Channel (RSC) is situated along the northern JFTB LA property boundary. The portion of the RSC that flows from east to west between the intersections of Farquhar Avenue and Lexington Drive and Farquhar Avenue and Bloomfield Street is trapezoidal in shape, with channel slopes and bottom concrete in construction (USACE, 2014). The remaining portion of the RSC that borders the northern JFTB LA property boundary, adjacent to Howard Avenue, is trapezoidal in shape, with channel slopes and bottom earthen in construction. Where the RSC turns south, northwest of the JFTB LA, the channel is trapezoidal with slopes and channel bottom concrete in construction. Water in the RSC eventually flows to the Los Alamitos Retention Basin, followed by the San Gabriel River and Pacific Ocean.

- The Bolsa Chica Flood Control Channel

  The Bolsa Chica Flood Control Channel is situated along most of the Navy Golf Course's western boundary. This channel, with its principal tributaries including the Anaheim-Barber City Channel and Westminster Channel, drains to Huntington Harbour. The Harbour is approximately 4.5 miles to the south of the JFTB LA. The Channel drains the urbanized commercial, residential, and industrial areas in the cities of Anaheim, Stanton, Garden Grove, Westminster, and Seal Beach. The channel and its tributaries vary in construction from earthen and riprap-trapezoidal-channels to vertical walled concrete-lined channels. The portion of the channel that is adjacent to the golf course is trapezoidal with slopes and channel bottom earthen in construction (USACE, 2014).

Regional surface water flow in the Los Alamitos area is to the southwest, towards the Alamitos Gap, which is a low-lying area between Long Beach and Seal Beach and contains the San Gabriel River channel. The Alamitos Bay, Huntington Harbour, and the Pacific Ocean are the only downstream surface-water bodies in the regional drainage pattern. Alamitos Bay is classified as coastal surface water, which are waters subject to tidal action and waters in the coastal sloughs.

Facility Surface Waters

There are no naturally occurring surface water features at the JFTB LA (**Figure 2-4**). Surface water features within JFTB LA boundaries include the following:

- The WDD, which parallels most of the JFTB LAs western property boundary;
- A storm water detention basin located in the northwest corner of the JFTB LA; and
- Several small artificial ponds associated with the Navy Golf Course, in the eastern portion of the JFTB LA. The Bolsa Chica Flood Control Channel runs through the course and drains into the Anaheim Bay-Huntington Harbor complex.

Additionally, the US Fish and Wildlife Service (USFWS), National Wetlands Inventory, identifies a small freshwater emergent wetland area located in the northeast corner of the airfield, adjacent to the Alpha Hammerhead taxiway (USFWS, 2018).

2.2.4 Climate

The JFTB LA is located in the South Coast Air Basin, within Climate Zone 8, which includes a 6,600 square-mile coastal plain area bounded by the Pacific Ocean on the southwest, and the San Gabriel, San Bernardino, and San Jacinto mountains on the north and east. The South Coast Air Basin includes all of Orange County. Climate Zone 8 is designated as a semi-arid climate with Mediterranean characteristics. Summers are cool, winters are mild, and marine-influenced breezes maintain moderate humidity with infrequent rainfall. Air temperature highs in July and lows in January average 78 degrees Fahrenheit (°F) and 47°F, respectively.

Rainfall data indicate that the area within which the JFTB LA is located averages approximately 12 inches of rain per year. The rainy season is typically from November through April. Strong, hot winds from the northeast that are referred to as the "Santa Ana" winds are common for short periods of time during the fall and winter months.

2.2.5 Current and Future Land Use

The JFTB LA is an operating flight facility, and most areas are not accessible to the general public.

The mission of the JFTB LA is to "operate a military installation and airfield that meets Army standards and provides support and training facilities for military units and other National, State, and local organizations, to include emergency operations (California Military Department, 2016)." The facility has 160 buildings and encompasses about 1,319 acres of space.

Based on the City of Los Alamitos General Plan (City of Los Alamitos, 2015), the overall future land use is anticipated to continue to facilitate the mission of JFTB LA.

2.2.6 Critical Habitat and Threatened/Endangered Species

Although ecological receptors are not specifically addressed in this SI document, the presence of critical habitat and threatened/endangered species were evaluated as part of the environmental setting. The following species in **Table 2-1** are listed as federally endangered, threatened, proposed, and/or candidate species in Orange County, California (USFWS, 2018):

Table 2-1 Federally-Listed Species in Orange County, California

Common Name	Scientific Name	Federal Status
BIRDS		
California least tern	*Sterna antillarum browni*	Endangered
Light-footed clapper rail	*Rallus longirostris levipes*	Endangered
Least Bell's vireo	*Vireo bellii pusillus*	Endangered
Western snowy plover	*Charadrius nivosus nivosus*	Threatened
Coastal California gnatcatcher	*Polioptila californica californica*	Threatened
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered
FISHES		
Tidewater goby	*Eucyclogobius newberryi*	Endangered
Santa Ana sucker	*Catostomus santaanae*	Threatened
MAMMALS		
Stephens' kangaroo rat	*Dipodomys stephensi (incl. D. cascus)*	Endangered

Common Name	Scientific Name	Federal Status
Pacific pocket mouse	*Perognathus longimembris pacificus*	Endangered
REPTILES		
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Olive ridley sea turtle	*Lepidochelys olivacea*	Threatened
CRUSTACEANS		
Riverside fairy shrimp	*Streptocephalus woottoni*	Endangered
San Diego fairy shrimp	*Branchinecta sandiegonensis*	Endangered
AMPHIBIANS		
Arroyo (arroyo southwestern) toad	*Anaxyrus californicus*	Endangered
INSECTS		
Quino checkerspot butterfly	*Euphydryas editha quino (E. e. wrighti)*	Endangered
Delhi Sands flower-loving fly	*Rhaphiomidas terminatus abdominalis*	Endangered
PLANTS		
Braunton's milk-vetch	*Astragalus brauntonii*	Endangered
Ventura Marsh Milk-vetch	*Astragalus pycnostachyus var. lanosissimus*	Endangered
Thread-leaved brodiaea	*Brodiaea filifolia*	Threatened
Laguna Beach liveforever	*Dudleya stolonifera*	Threatened
Salt marsh bird's-beak	*Cordylanthus maritimus ssp. maritimus*	Endangered
Salt marsh bird's-beak	*Cordylanthus maritimus ssp. maritimus*	Endangered
San Diego button-celery	*Eryngium aristulatum var. parishii*	Endangered
Slender-horned spineflower	*Dodecahema leptoceras*	Endangered
Munz's onion	*Allium munzii*	Endangered
Santa Monica Mountains dudleyea	*Dudleya cymosa ssp. ovatifolia*	Threatened
Big-leaved crownbeard	*Verbesina dissita*	Threatened

2.3 History of PFAS Use

As descried above, JFTB LA is mainly occupied by airfields that include two runways, crash rescue and FDs, jet fuel farm for aviation fueling, and an Army Aviation Weather Office. The Old Crash Fire Rescue (CFR) Training Pits, the New CFR Training Pit, and the West End of the Flightline (WEF) Fire Training Area (FTA), were identified as potential PFAS release areas during PA. PFAS-containing aqueous film forming foam (AFFF) was used to extinguish fires ignited with fuels during routine fire training activities conducted at above FTAs. PFAS were also released to the environment during regular AFFF equipment nozzle testing activities from at least 2000 until at least 2017 in the southwest corner of the WEF.

In addition, five non-FTAs associated with AFFF usage were identified during PA. Approximately 100 gallons of 3% AFFF were reported to have been released into the Hangar 1, located to the north of the center of the flightline, during fire suppression system testing in 2012. Based on interviews conducted with the FD staff during PA site visit, 3% AFFF is occasionally spilled, and leaks have occurred in the driveway area of the JFTB LA Fire Station, where firetrucks are filled.

AFFF was reported to be used on one occasion for insect abatement purpose, resulting in the release of approximately 70 to 80 gallons of 3% AFFF in the vicinity of Building 80. In one emergency response event, approximately 70 to 100 gallons of AFFF were used to extinguish an aircraft wheel-brake fire that occurred on the Alpha Hammer-Head taxiway, situated in the northeastern corner of the JFTB LA. The WDD, which parallels most of the JFTB LA's western property boundary, is also considered an AOI because it receives surface water and runoff from various potential AFFF release sites on the facility.

A pump and treat groundwater remediation system was previously in operation at the western boundary of the former Jet Propellant-4 (JP-4) Tank Farm site. Treated groundwater from the system was initially used to irrigate the poplar trees that make up the phytoremediation barrier along the WDD. Later, the treated effluent of this system was used for dust control on roads at various locations around the facility, making it a potential source if PFAS were found to be present in the treated effluent. However, the groundwater remediation system was not in operation during SI sampling; therefore, no groundwater sample was collected from the system.

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SCALE	1:316,800	CHK BY	HH	4/1/2020
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	4/1/2020

N

Joint Forces Training Base Los Alamitos Facility Location

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-1

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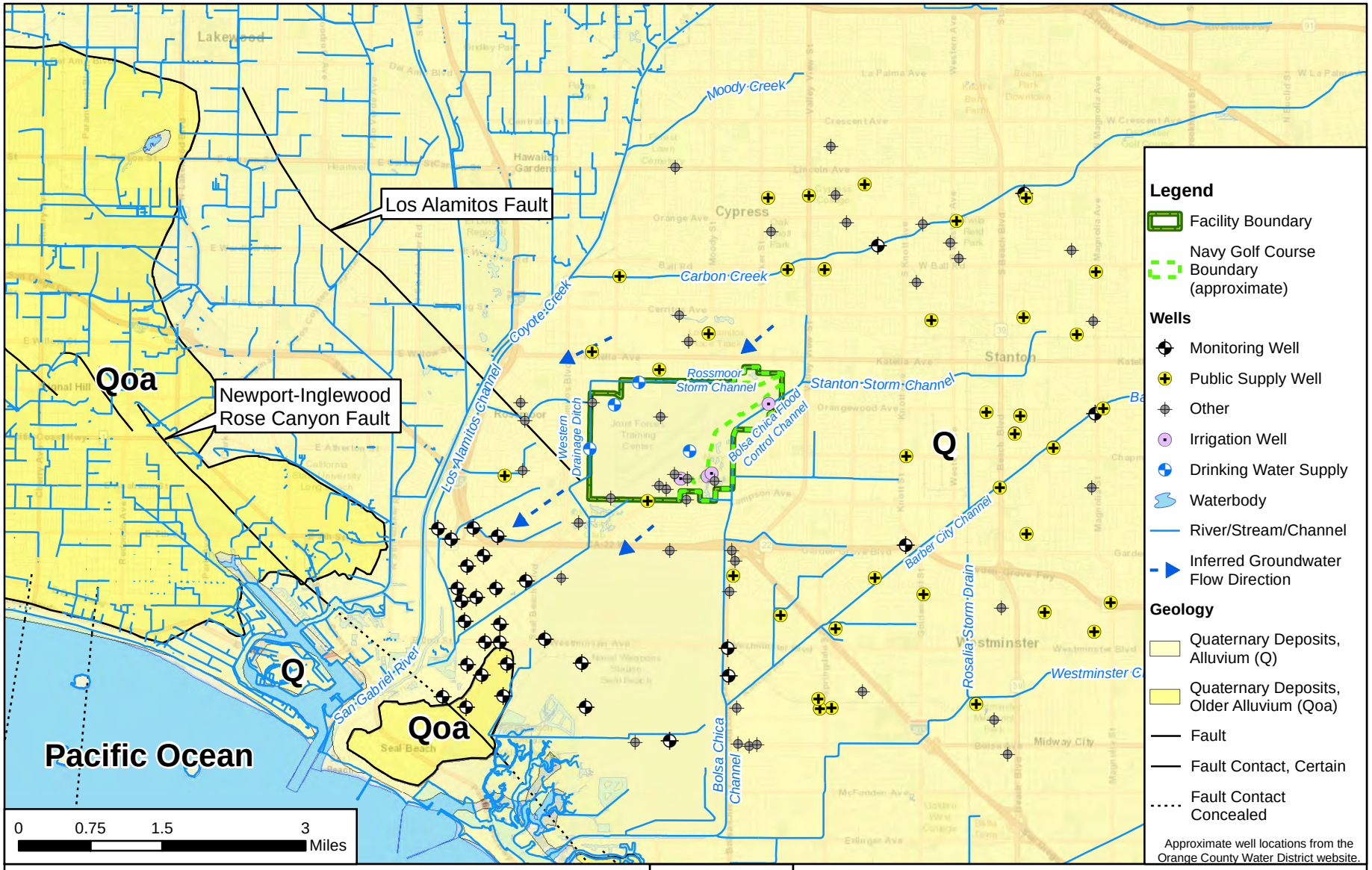

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SCALE	1:95,040	CHK BY	HH	4/1/2020
Base Map Source: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC,		PM	RG	4/1/2020

N

Regional Geology and Well Locations

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-2

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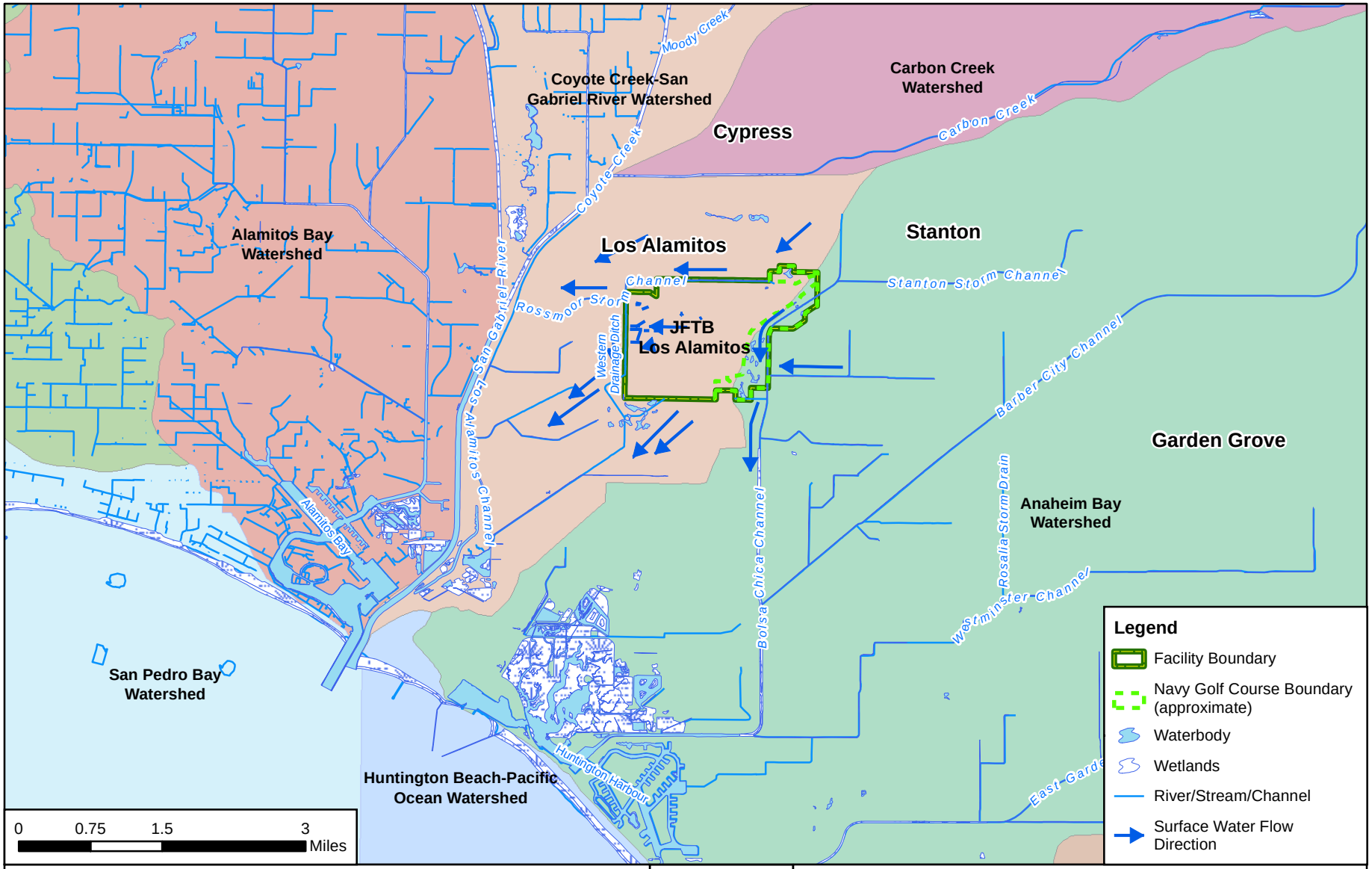

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REVISED	4/1/2020	GIS BY	MS	4/1/2020
SCALE	1:95,040	CHK BY	HH	4/1/2020
		PM	RG	4/1/2020

N

Regional Surface Water Features and Watersheds

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 2-3

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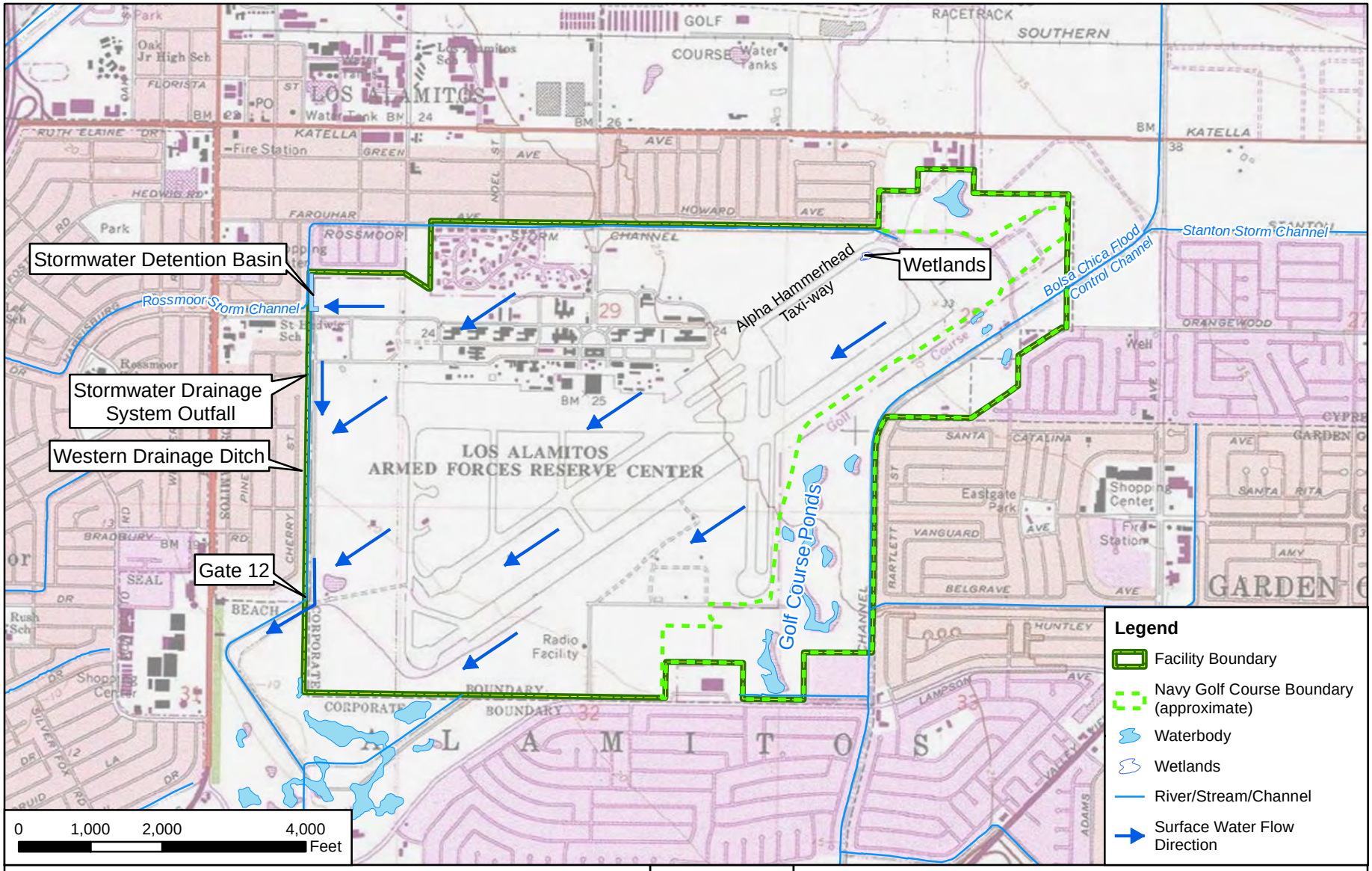

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SCALE	1:24,000	CHK BY	HH	4/1/2020
Base Map: Copyright:© 2013 National Geographic Society, i-cubed		PM	RG	4/1/2020

Joint Forces Training Base Los Alamitos
Surface Water Features

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 2-4

Q:\Projects\ENV\GEARS\GEO\MAES 2012 Unrestricted\Fort Meade\E. Data Management\GIS\MXDs\Chisholm_6th\March2017\ Fig_2-4_Los_Alamitos_Facility_Surface_Water.mxd

3.0 Summary of Areas of Interest

Based on the PA findings, eight AOIs were identified within JFTB LA (**Figure 3-1**). A summary of these AOIs is presented below.

3.1 AOI 1 – Old Crash Fire Rescue Training Pits

AOI 1 includes one potential source areas, the Old CFR Training Pits. Fire training activities involving AFFF usage occurred at these locations.

3.1.1 Old Crash Fire Rescue Training Pits

Two Old CFR Training Pits (IRP number: LAAFRC – 003) were located in close proximity to each other in the northwest portion of the JFTB LA. One training pit is located south of Building 272, Buildings 275 D through G, and Saratoga Avenue; east of the JFTB LA JP-4 Tank Farm Area (TFC); and north/northeast of the Fuel Farm Office (FFO) and former “Seabee Compound” areas and Building 74. The other training pit is located west of Building 279 and a parking area.

The older of the two pits was initially used by the Navy and then by the JFTB LA until approximately 1983. The year in which the Navy constructed and initially began to use this pit is unknown.

The second pit was constructed approximately 400 feet to the southwest of the older pit. The pit was in use from 1977 to 1979.The two Old CFR Training Pits were each reported to be 60 feet in diameter. To allow for liquids to be introduced into the pits without escaping, berms were constructed around the pits to a height of approximately 1 foot. During fire training exercises, the pits were flooded with water, and JP-4 fuel or other combustibles were introduced to the ponded water’s surface. The fuels were ignited and then extinguished using AFFF. After the fire was extinguished, the fuel residue was burned off, and the remaining liquids were allowed to percolate into the ground, often without additional burning; the pits were unlined. Fuels introduced to the pits were stored in nearby above ground storage tanks (ASTs).

The quantity of fuel used during each fire training session is reported to be between approximately 500 to 1,000 gallons, and exercises were conducted six to eight times per week over the period that the pits were used. The amount and percentage of AFFF used are not known.

3.2 AOI 2 – New Crash Fire Rescue Training Pit

AOI 2 represents one potential source area, the New CFR Training Pit, where fire training activities occurred.

3.2.1 New Crash Fire Rescue Training Pit

The New CFR Training Pit (IRP number: LAAFRC – 003) is located in the western portion of the JFTB LA facility, among the couple of remaining JFTB LA revetments. The New CFR Training Pit area is bounded to the north by the former JP-4 TFA and Medfly Compound, to the west by the WDD and residential development, to the south by the WCC, and to the east by the WEF FTA.

The New CFR Training Pit was used by JFTB LA for training from 1983 until September 1987, at which time, outside burning was discontinued by an Air Quality Management District mandate. During these years, training exercises consisted of flooding the pit with water and then introducing JP-4 or other flammable liquids over the surface of the ponded water. The fuel was ignited, and the fire was extinguished using AFFF. The percent concentrate of AFFF used during this time is not known. At the conclusion of training sessions and after the fire was extinguished, remaining fuel residue was burned off. Residues that were not burned off were permitted to percolate into

the ground (Clayton, 1996a). Previous remediation efforts for fuels and solvents in this area include dual-phase vacuum extraction (DPVE) remediation system.

Approximately 500 to 1,000 gallons of fuel were introduced into the pit during each training session. Fire training exercises were conducted six and possibly up to eight times per week over the approximate 5-year period the pit was used (Clayton, 2007).

The New CFR Training Pit was approximately 3 to 5 feet deep, 60 feet in diameter, and surrounded by a 1- to 1.5-foot high earthen berm. The bottom of the pit was constructed with 4 feet of imported sand and gravel placed in alternating layers (Clayton, 1996a). In addition, an underground pipe out-letting at the center of the pit was installed and used to convey fuels to the pit during fire training exercises. A fuel feeder pipe was attached to a 4,000-gallon fuel tanker located approximately 100 feet south of the pit. Revetment 118, situated to the south of the New CFR training pit area, was used to store the fuel tanker that conveyed fuels to the pit (Clayton, 2007).

3.3 AOI 3 – West End of the Flightline

AOI 3 represents one potential source area, WEF FTA and AFFF Nozzle Testing area, where fire training activities and testing of AFFF equipment were performed.

3.3.1 West End of the Flightline Fire Training Area and AFFF Equipment Nozzle Testing Area

The WEF FTA (IRP number: LAAFRC – 003) is located at the northwest edge of the paved runway area, south of Enterprise Avenue near Nosedock 61 and east of the New CFR Training Pit FTA (**Figure 3-1**). The area is accessible to base personnel only.

From the mid-1960s to early 1970, the WEF FTA was used for the staging of fuel bladders. Aircraft maintenance and cleaning were also conducted in this area during the 1950s and 1960s. At the time of the PA visual site inspection, several fuel tanker trucks were observed to be parked in the area. A portion of this area is used by Medfly, a program operated jointly by California Department of Food and Agriculture (CDFA) and the US Department of Agriculture, for aircraft parking purposes.

According to JFTB LA FD staff interviewed, fire training exercises were conducted in the WEF area within the last 20 years. The training was simulated, where trainees set up a target, such as cardboard, on the concrete portion of the tarmac and sprayed 3% AFFF on the target to learn how to apply the foam. There was no actual fire involved, as the Air Quality Management District banned open fires in 1987. The AFFF applied was pushed or sprayed off the concrete with water into the grass- and soil-covered areas west of the concrete tarmac.

In addition to the fire training activities and according to JFTB FD staff interviewed, AFFF equipment nozzle testing was conducted regularly until at least 2017 on a once monthly basis in the southwest corner of the WEF. In early 2018, all AFFF nozzle testing activities ceased per the US Army Office of the Assistant Chief of Staff for Installation Management directive prohibiting non-emergency use of AFFF. During the tests, 3% AFFF was sprayed through equipment nozzles for a period of approximately 10 seconds. The stream of spray was directed to the grassy area west of the WEF's concrete surface, where it ponded in surface depressions and evaporated or percolated into the ground. Equipment nozzle tests were conducted in this area since at least 2000, the year of initial employment of the FD staff interviewed. It is not known when the practice of nozzle tests began in this area or if any other equipment testing areas were used at JFTB LA.

3.4 AOI 4 – Hangar 1

AOI 4 represents one potential source area, Hangar 1, including the nearby wash rack, where AFFF was discharged to the ground from the fire suppression system in the hangar.

3.4.1 Hangar 1

The JFTB LA Hangar 1 (IRP number: LAAFRC – 010) is located to the north of the approximate center of the flightline and west of the wash rack and Building 914. The area is accessible only to JFTB LA base personnel.

The JFTB LA Hangar 1 has been in continuous use since 1943 and is used for aircraft maintenance purposes.

On 8 October 2012, the fire suppression system discharged foam when a contractor pressurized the system for testing purposes during final project inspection. Approximately 100 gallons of 3% AFFF were reported to have been released into the hangar during the event. The approximate extent of area affected was reported to be a 50-foot by 100-foot area.

Based on interviews conducted during the PA site visit and a hazardous materials/waste incident report, the release was from only one of the six overhead agitators associated with the automatic fire suppression system. Located in the northeast corner of the hangar, the agitator released foam onto a helicopter that was being serviced. After the release, the helicopter was pushed out of the hangar and into the wash rack area, where it was hosed off with water. AFFF in the hangar was squeegeed out of the west side of the hangar, and the foam was pushed out to the concrete driveway area between the hangar and wash rack. The incident report noted that the JFTB LA FD responded and contained the spill with absorbent materials to protect the storm drain and wash rack drop inlets. Two nearby catch basins, one located in the driveway area between the hangar and the wash rack, and the other in the center (floor) of the wash rack structure, were observed during the PA site visit. The report indicated that liquids and used absorbent materials were placed into 50-gallon drums that were taken to the facility's hazardous materials storage area. All hazardous waste was sent to a licensed hazardous waste disposal facility.

During the PA site visit, an aboveground storage tank (AST) associated with the hangar fire suppression system containing 3% AFFF was observed outdoors, in the northeast corner of the hangar. The AST is supported by steel cradles that are bolted to a raised concrete pad. As such, the AST is not in contact with the ground surface and was observed to be in good condition. The AST was observed to be aluminum in construction, with an estimated 750-gallon capacity. Pipes associated with the AST pass through the hangars outside wall and connect to a hydraulically-operated automatic fire suppression system located in the main hangar area. According to a manufacturer's tag that was affixed to the system, the two-zone system was installed in November 2010 by Cosco Fire Protection. The designed density and area of discharge is 0.20 gpm per square foot (gpm/sqft) and 5,000 sqft, respectively. The design sprinkler water flow rate and foam flow rate are approximately 1,300 gpm and 1,400 gpm, respectively. A total of six bell-shaped agitators were observed hanging from the ceiling of the structure.

3.5 AOI 5 – Building 34 (JFTB LA Fire Station)

AOI 5 includes one potential source area, Building 34 (JFTB LA Fire Station), where firetrucks are loaded, and AFFF is stored.

3.5.1 Building 34 (JFTB LA Fire Station)

The JFTB LA Building 34 (Fire Station) (IRP number: LAAFRC – 008) is located south of Constitution Avenue, east of Building 35.

The FD operates and maintains four firefighting trucks, three of which are specially equipped tactical firefighting trucks (TFFTs) that are capable of carrying either Class A or Class B firefighting agents. One truck is a structure truck that does not carry foam. The TFFTs are equipped with nozzles capable of expelling AFFF. The trucks are filled with 3% AFFF in a concrete driveway area on the west side of the building. AFFF is stored in the southwestern portion of Building 34, adjacent to the driveway area where the trucks are filled. During the PA site visit, the AFFF storage area was observed to contain various brands of AFFF in approximately 48 55-gallon plastic drums and 38 5-gallon plastic containers. About half of the 55-gallon drums observed were National Foam; Aer-O-Water 3%, made by 3EM. The other half of the drums was Ansulite 3%, manufactured by Ansul. The 5-gallon plastic containers all contained AFFF manufactured by Chemguard 3%. The package dates printed on the side of the drums were between January 2002 and April 2004, and all of the containers were situated atop secondary containment devices.

Based on interviews conducted with FD staff during the PA site visit, 3% AFFF is occasionally spilled, and leaks have and do occur in the driveway area where the TFFTs are filled; these leaks were reported to be occasional and on the order of a few drops to a few gallons.

3.6 AOI 6 – AFFF Release in the Vicinity of Building 80

AOI 6 includes one potential source area, a release of AFFF in the vicinity of Building 80 (IRP number: LAAFRC – 008) through insect abatement activity.

3.6.1 AFFF Release in the Vicinity of Building 80

According to JFTB LA FD staff, 3% AFFF was used on one occasion for insect abatement purposes. Approximately 70 to 80 gallons of 3% AFFF were expelled from a TFFT into an abandoned structure that had become infested with bees and wasps. The nozzle of the TFFT was pushed through the door of the structure, and the entire structure was filled with foam. The structure was subsequently demolished and removed at an unknown time. The structure, which was approximately 10 feet by 10 feet in dimension, was located approximately 50 feet to the south of existing Building 80. No further details were recalled by individuals interviewed regarding the release, and the area was not observed during the PA site visit.

3.7 AOI 7 – Emergency Response

AOI 7 represents one potential source area, the location of an emergency response area, where AFFF was used by the JFTB LA FD to extinguish a wheel-brake fire.

3.7.1 Emergency Response

According to JFTB LA FD staff, 3% AFFF was used on one occasion, when a Lockheed Martin C-130 Hercules tanker version aircraft sustained a wheel-brake fire during landing. The aircraft taxied to the approximate mid-point of the Alpha Hammer-Head taxiway, where the fire was reported to have been extinguished using 3% AFFF. The taxiway is the northern-most airfield runway situated in the northeastern corner of the JFTB LA. It was estimated by the FD individual interviewed that approximately 70 to 100 gallons of 3% AFFF were used. No further information was available about the fire, and no other emergency response incidents were recalled during the staff's tenure at JFTB LA. The area in which AFFF was released was not observed during the PA site visit.

3.8 AOI 8 – Western Drainage Ditch

AOI 8 represents one potential source area, the WDD, into which runoff from several of the other AOIs flows.

3.8.1 Western Drainage Ditch

The mostly unlined and open WDD parallels most of the JFTB LAs western property boundary. The ditch is situated onsite to a point approximately 200 feet north of the facility's southwestern property corner, near Gate 12, where it leaves the facility in a direction to the southwest, crosses under the I-405 Freeway, and discharges into the Los Alamitos Retarding Basin, the San Gabriel River, and eventually the Pacific Ocean. The trapezoid-shaped ditch is approximately 18 feet wide south of where it passes beneath the intersection of Saratoga and Orangewood Avenues. The ditch becomes approximately 40 feet wide at its southern terminus, where an approximate 275-feet long portion of the ditch is concrete-lined in the area where it turns and leaves the facility.

Surface water entering storm drains at the flight line, main roadways, and other areas within the operational cantonment areas of the JFTB LA flows to an outfall structure located in the WDD, south of the JP-4 containment system. Surface water entering all other catch basins at the facility, with the exception of water entering catch basins associated with the various wash rack facilities, drains to the WDD. In addition, a majority of surface water runoff from the cantonment areas of the facility and from areas generally in the western third of the facility likely flows to and is captured by the WDD. Significant volumes of groundwater extracted historically by various remediation systems were passed through granular activated carbon vessels subsequent to which the effluent was ultimately discharged to the WDD in accordance with a National Pollution Discharge Elimination System permit. The facility currently does not hold this permit.

The WDD is considered an AOI, as surface water potentially impacted from various AFFF release sites, including the New CFR Training Pit, WEF FTA and AFFF equipment nozzle testing area, and the Old CFR Training Pits, may have migrated to the WDD. Furthermore, water in the WDD may be marginally influent to the shallow groundwater zone during the rainy season based on the channel's elevation with respect to groundwater gauging data obtained historically from wells in the vicinity (Clayton, 1993).

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PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
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SCALE	1:9,960	CHK BY	HH	4/1/2020
Base Map: National Agriculture Imagery Program 2016			PM	RG	4/1/2020

- Area of Interest (AOI)
- PFAS Release Area
- Facility Boundary
- Navy Golf Course Boundary (approximate)
- Water Body
- Wetlands
- River/Stream
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Irrigation Well
- Drinking Water Supply
- Active Large System Well
- Other Well

N

Joint Forces Training Base Los Alamitos Areas of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4.0 Project Data Quality Objectives

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

4.1 Problem Statement

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

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the Office of the Secretary of Defense (OSD) dated 15 October 2019 (Assistant Secretary of Defense, 2019). 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 site will proceed to the next phase under CERCLA. The SLs established in the OSD memorandum apply to three compounds: PFOS, PFOA, and PFBS. The SLs are presented in **Section 6.1** of this Report.

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

- "The Army will research and identify locations where PFOS- and/or PFOA-containing products, such as AFFF, are known or suspected to have been used. Installations shall coordinate with installation/facility fire response or training offices to identify AFFF use or storage locations. The Army will consider fire training areas, AFFF storage locations, hangars/buildings with AFFF suppression systems, fire equipment maintenance areas, and areas where emergency response operations required AFFF use as possible source areas. In addition, metal plating operations, which used certain PFOS-containing mist suppressants, shall be considered possible source areas."

- "Based on a review of site records…determine whether a CERCLA PA is appropriate for identifying PFOS/PFOA release sites. If the PA determines a PFOS/PFOA release may have occurred, a CERCLA SI shall be conducted to determine presence/absence of contamination."

- "Identify sites where perfluorinated compounds (PFCs) are known or suspected to have been released, with the priority being those sites within 20 miles of the public systems that tested above USEPA Health Advisory (HA) levels" (USEPA, 2016a; USEPA, 2016b).

4.2 Goals of the Study

The goals of SI include the following:

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

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

3. Determine the potential need for a removal action.

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

5. Identify within 4 miles of the installation other potential PFAS sources (fire stations, major manufacturers, other DoD facilities) and receptors, including both groundwater and surface water receptors, to determine whether the ARNG is the likely source of PFAS or whether there is an off-facility source of PFAS responsible for installation detections of PFAS (USEPA, 2005).

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

4.3 Information Inputs:

Primary information inputs for the SI included:

- The PA for JFTB LA (AECOM, 2019a);
- Analytical data from groundwater, soil, and surface water samples collected as part of this SI in accordance with the site-specific Uniform Federal Policy (UFP)-Quality Assurance Project Plan (QAPP) Addendum (AECOM, 2019b); and
- Field data collected during the SI, including groundwater elevation and water quality parameters measured at the time of sampling.

4.4 Study Boundaries

The scope of the SI is horizontally bounded by the property limits of JFTB LA (**Figure 2-1**). The scope of the SI is vertically bounded by the shallow groundwater zone (up to 30 feet bgs). Off-facility sampling was not included in the scope of this SI. If future off-facility sampling is required, the proper stakeholders will be notified, and necessary rights of entry will be obtained by ARNG with property owner(s).

4.5 Analytical Approach

Samples were analyzed by Pace Analytical Gulf Coast accredited under the DoD Environmental Laboratory Accreditation Program (ELAP; Accreditation Number 74960) and the National Environmental Laboratory Accreditation Program (NELAP; Certificate Number 01955). Data were compared to applicable SLs and decision rules as defined in the SI QAPP Addendum (AECOM, 2019b). Decision rules were developed for groundwater and soil, and they applied to all data collected. These rules governed response actions based on the results of the SI sampling effort.

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

Groundwater:

- Is there a human receptor within 4-miles of the facility?
- What is the concentration of PFOA, PFOS, and PFBS at the potential release areas?
- What is the concentration of PFOA, PFOS, and PFBS at the facility boundary upgradient and downgradient of the potential release areas?
- What does the conceptual site model (CSM) suggest in terms of source, pathway and receptor?

Soil:

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

Soil, groundwater, and/or surface water samples were collected from the potential PFAS release areas within AOI 1 through AOI 8. Depth to groundwater was observed to range from 6.71 feet to 21.68 feet below top of casing (btoc) in October 2019.

4.6 Data Usability Assessment

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

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

4.6.1 Precision

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

Extraction internal standards (EIS) were added by the laboratory during sample extraction to measure relative responses of target analytes and used to correct for bias associated with matrix interferences and sample preparation efficiencies, injection volume variances, mass spectrometry ionization efficiencies, and other associated preparation and analytical anomalies. Several field samples displayed EIS area counts less than the quality control (QC) limit of 50%. The positive field sample results associated with EIS area counts less than the QC limit but greater than 20%, were qualified “J+”, while non-detects were qualified “UJ”. The field sample results associated with area counts less than 20% were qualified “X”. The qualified field sample results associated with EIS area counts less than 20% but greater than 10% are recommended for use as estimated values with a positive bias. During data review, the project chemist noted that field sample AOI8-6-SW-102919-MS displayed a 0.8% recovery for one compound (M_2PFTeDA) but the sample was still able to have positive results reported. The matrix spike had a recovery for perfluorotetradecanoic acid (PFTeDA) within control limits and a perfluorotridecanoic acid (PFTrDA) recovery of 478%, showing that at near 0% recovery of the extracted internal standard, the laboratory is still able to identify the presence of native compounds. A similar anomaly of a 17% recovery of M_2PFTeDA in LCS1975551 corresponded to native compound recoveries within control limits. Conservatively, the project team still decided to exclude non-detect data associated

with EIS recoveries less than 10%.Additionally, the positive field sample results associated with EIS area counts less than 10% are recommended for use as estimated values with a positive bias and are reported with interpreted qualifiers of “J+”. The project team determined these qualified results were usable for project purposes. The non-detect field sample results associated with the remaining EIS area counts less than 10% were qualified “X”. The data points flagged “X” were non-detect results for PFTeDA and PFTrDA; no site decisions were made based on the presence or absence of these two compounds.

Calibration verifications were performed routinely to ensure that instrument responses for all calibrated analytes were within established QC criteria. All calibration verifications were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019b).

Laboratory control spike/laboratory control spike duplicate (LCS/LCSD) pairs were prepared by addition of known concentrations of each analyte in a matrix-free media known to be free of target analytes. LCS/LCSD pairs were analyzed for every analytical batch to demonstrate the ability of the laboratory to detect similar concentrations of a known quantity in matrix-free media. All LCS/LCSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019b).

Matrix spike/matrix spike duplicate (MS/MSD) samples were prepared, analyzed, and reported for all preparation batches. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested. MS/MSD samples were submitted to the laboratory for analysis at a rate of 5%. All MS/MSD samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019b).

Field duplicate samples were collected at a rate of 10% to assess the overall sampling and measurement precision for this sampling effort. The field duplicate samples were analyzed for PFAS and general chemistry parameters. The field duplicate pairs performed on parent samples AOI1-5-SB-4.5-5-102319 and AOI2-2-SB-4.5-5-102319 displayed RPDs greater than the upper QC limit of 50% for perfluoropentanoic acid (PFPeA) at 61.4% and perfluorohexanesulfonic acid (PFHxS) at 65.5%, respectively. The positive associated field sample and field duplicate results were qualified J. All other field duplicate samples were within the project established precision limits presented in the QAPP Addendum (AECOM, 2019b).

4.6.2 Accuracy

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

LCS/LCSD samples were prepared by addition of known concentrations of each analyte in a matrix free media known to be free of target analytes. LCS/LCSD samples were analyzed for every analytical batch and demonstrated that the analytical system was in control during sample preparation and analysis, with one exception. Several preparation batches displayed percent recoveries greater than the upper QC limit of 130%. The LCS/LCSD prepared in batch 669969 displayed a detection for N-methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA) greater than the upper QC limit at 135% in the LCS. The LCS/LCSD prepared in batch 669972 displayed several LCSD percent recoveries greater than the upper QC limit: 8:2 fluorotelomer sulfonate (8:2 FTS) (134%), NMeFOSAA (134%), PFOS (146%), and PFTrDA (150%). The LCS/LCSD prepared in batch 670959 displayed a detection for N-ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA) at 135% in the LCSD. Preparation batch 670389 displayed percent recoveries for PFTrFA at 134% in the LCS and 167% in the LCSD. The LCS/LCSD prepared in batch 671184 displayed a percent recovery for PFTrDA at 178% in the LCSD. All associated field sample results were non-detect; no data-qualifying action was required.

MS/MSD samples were prepared, analyzed, and reported at a rate of 5%. MS/MSD samples demonstrated that the analytical system was in control for the matrix being tested, with a limited number of exceptions. Several MS/MSD displayed percent recoveries outside the QC limits of 70-130%. The MS/MSD performed on parent sample AOI-8-5-SW-102919 displayed a percent recovery for 6:2 fluorotelomer sulfonate (6:2 FTS) less than the lower QC limit at 20% in the MSD and displayed a percent recovery for PFOS greater than the upper QC limit at 142% in the MS. The MS/MSD performed on parent sample AOI-7-6-SW-102919 displayed a MSD percent recovery for 6:2 FTS less than the lower QC limit at 56% and displayed MS percent recoveries for PFOS and PFTrDA greater than the upper QC limit at 131% and 478%, respectively. The MS/MSD performed on parent sample AOI6-2-SB-1.5-2-102219 displayed a percent recovery for perfluoroheptanoic acid PFHpA at 155% in the MSD and displayed percent recoveries for PFOA greater than the upper QC limit at 145% in the MS and 146% in the MSD. The MS/MSD performed on parent sample AOI6-3-SB-1.5-2-102219 displayed a percent recovery for PFTrDA greater than the upper QC limit at 204% in the MSD. The positive parent sample results associated with the positive biases were qualified J+. The parent sample results associated with the negative biases were positive and were qualified J-, while non-detects were qualified UJ. The initial results were recommended for data use.

4.6.3 Representativeness

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

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

Field QC samples were collected to assess the representativeness of the data collected. Field duplicates were collected at a rate of 10% for all field samples, while MS/MSD samples were collected at a rate of 5%. All preservation techniques were followed by the field staff, and all technical and analytical holding times were met by the laboratory. The laboratory used approved standard methods in accordance with the QAPP Addendum (AECOM, 2019b) for all analyses.

Instrument blanks and method blanks were prepared by the laboratory in each batch as a negative control. Three PFAS method blanks displayed detections greater than the detection limit for multiple target analyte. All associated field sample results were greater than five times the associated blank detections; no data qualifying action was required.

One field reagent blank (FRB) was collected during the event. Equipment rinsate blanks (ERBs) were also collected for groundwater and soil samples. Several ERBs and the FRB displayed detections for multiple target analytes. The positive associated field sample results less than five times the concentration found in the blanks were qualified as U, and where appropriate, lab limits were elevated to detected concentrations. The results are usable as qualified but should be considered a false positive and treated as non-detect.

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

4.6.4 Comparability

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

4.6.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount of data expected under normal conditions. The laboratory provided data that met system QC acceptance criteria for all samples tested. Project completeness was determined by evaluating the planned versus actual quantities of data. Percent completeness per parameter is as follows:

- PFAS in groundwater by LC/MS/MS Compliant with QSM 5.1 Table B-15 at 100%;
- PFAS in soil by LC/MS/MS Compliant with QSM 5.1 Table B-15 at 100%;
- PFAS in surface water by LC/MS/MS Compliant with QSM 5.1 Table B-15 at 100%;
- pH in soil by USEPA Method 9045D at 100%; and
- Total organic carbon (TOC) by USEPA Method 9060 at 100%.

4.6.6 Sensitivity

Sensitivity is the capability of a test method or instrument to discriminate between measurement responses representing different levels (e.g., concentrations) of a variable of interest. Examples of QC measures for determining sensitivity include laboratory fortified blanks, a method detection limit (MDL) study, and calibration standards at the limit of quantitation (LOQ). In order to meet the needs of the data users, project data must meet the measurement performance criteria for sensitivity and project LOQs specified in the QAPP Addendum (AECOM, 2019b). The laboratory provided the requested MDL studies and provided applicable calibration standards at the LOQ. In order to achieve the DQOs for sensitivity outlined in the QAPP Addendum (AECOM, 2019b), the laboratory reported all field sample results at the lowest possible dilution. Additionally, any analytes detected below the LOQ and above the MDL were reported and qualified “J” as estimated values by the laboratory.

5.0 Site Inspection Activities

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

- *Final Preliminary Assessment Report, Joint Forces Training Base Los Alamitos, California* dated September 2019 (AECOM, 2019a);
- *Final Site Inspection Programmatic Uniform Federal Policy-Quality Assurance Project Plan* dated March 2018 (AECOM, 2018a);
- *Final Site Inspection Uniform Federal Policy-Quality Assurance Project Plan Addendum, Joint Forces Training Base Los Alamitos, California* dated October 2019 (AECOM, 2019b);
- *Final Programmatic Accident Prevention Plan* dated July 2018 (AECOM, 2018b); and
- *Final Site Safety and Health Plan, Joint Forces Training Base Los Alamitos, California* dated July 2019 (AECOM, 2019c).

The SI field activities were conducted from 21 to 29 October 2019 and consisted of direct push boring and soil sample collection, temporary monitoring well installation, grab groundwater sample collection, low-flow groundwater sampling, and surface water collection. Field activities were conducted in accordance with the QAPP Addendum (AECOM, 2019b), except as noted in **Section 5.9**.

The following samples were collected during the SI and analyzed for a subset of 18 PFAS via LC/MS/MS compliant with QSM 5.1 Table B-15 to fulfill the project DQOs:

- 76 soil samples from 40 locations (soil borings or hand auger locations);
- 19 grab groundwater samples from temporary well locations;
- Two (2) low-flow groundwater samples from existing monitoring wells; and
- Five (5) surface water samples.

Sample locations for all media across the facility are presented in **Figure 5-1** through **Figure 5-4**. **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**. A Nonconformance and Corrective Action Report is provided in **Appendix B2**, and sampling forms are provided in **Appendix B3**. Additionally, a photographic log of field activities is provided in **Appendix C**.

5.1 Pre-Investigation Activities

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

5.1.1 Technical Project Planning

The USACE TPP Process, Engineers Manual (EM) 200-1-2 (DA, 2016a) defines four phases to project planning: 1) defining the project phase; 2) determining data needs; 3) developing data collection strategies; and 4) finalizing the data collection plan. The process encourages stakeholder involvement in the SI, beginning with defining overall project objectives, including

quantitative and qualitative DQOs, and formulating a sampling approach to address the AOIs identified in the PA.

A combined TPP Meeting 1 and 2 was held on 28 February 2019, prior to SI field activities. Meeting minutes are provided in **Appendix D**. The combined TPP Meeting 1 and 2 was conducted in general accordance with EM 200-1-2.

The stakeholders for this SI include ARNG, CAARNG, USACE, Santa Ana Regional Water Quality Control Board (RWQCB), and California Department of Toxic Substance Control (DTSC) representatives familiar with the facility, the regulations, and the community. Stakeholders were provided the opportunity to make comments on the technical sampling approach and methods at the combined TPP Meeting 1 and 2. The outcome of the combined TPP Meeting 1 and 2 was memorialized in the SI QAPP Addendum (AECOM, 2019b). Future TPP meetings will provide an opportunity to discuss the results and findings, and future actions, where warranted.

5.1.2 Utility Clearance

AECOM contacted the "DigAlert®" one-call utility clearance contractor to notify them of intrusive work at JFTB LA. However, because JFTB LA is a government facility, DigAlert® contractors do not always enter the facility. Therefore, AECOM contracted SubSurface Surveys & Associates, Inc (SSS), a private utility location service, to perform utility clearance at the facility. SSS performed utility clearance of the proposed boring locations on 16 October 2019 with input from the AECOM field team and JFTB LA staff. General locating services and ground-penetrating radar were used to complete the clearance. Additionally, the first 5 feet of each boring were pre-cleared using a hand auger to verify utility clearance in shallow subsurface where utilities would typically be encountered.

5.1.3 Source Water and PFAS Sampling Equipment Acceptability

The potable water source used for decontamination of drilling equipment was confirmed to be usable prior to the start of field activities. A sample from the potable water source identified onsite was collected on 17 September 2019, prior to mobilization, and analyzed for PFAS by LC/MS/MS Compliant with QSM 5.1 Table B-15. The results of the potable well sample are provided in **Appendix F**. A discussion of the results is presented in **Section 4.6.3**.

Materials that were used within the sampling zone were confirmed as acceptable for use in the PFAS sampling environment. The checklist of acceptable materials for use in the PFAS sampling environment was provided in the Standard Operating Procedures (SOPs) appendix to the Programmatic UFP-QAPP (PQAPP) (AECOM, 2018a). Prior to the start of field work each day, a PFAS Sampling Checklist was completed as an additional layer of control. The checklist served as a daily reminder to each field team member regarding the allowable materials within the sampling environment.

5.2 Soil Borings and Soil Sampling

Soil samples were collected via direct-push technology (DPT), in accordance with the QAPP Addendum (AECOM, 2019b). A GeoProbe® 7822DT dual-tube sampling system was used to collect continuous soil cores to the target depth. A hand auger was used to collect soil from the top five feet of the boring to be compliant with utility clearance procedures.

Three discrete soil samples were collected for chemical analysis from each soil boring, with the exception of locations AOI1-4 and AOI3-10, which had only two soil samples collected due to multiple shallow saturated zones observed. Refer to **Section 5.7** for additional details on deviations from the QAPP Addendum. Based on conversations with JFTB LA staff, the number of borings at AOI 4 were reduced from three points to one before mobilization due to access

concerns. AOI4-2 and AOI4-3 were not attempted, and the change was approved via the Nonconformance and Corrective Action Report process (**Section 5.7**).

Additionally, two surface soil locations at the WDD (AOI8-1 and AOI8-2) were completed to 0.5 feet bgs using a hand trowel, as no surface water was observed in these locations. The soil boring and sample depths are provided in **Table 5-1**. The soil boring locations were selected based on the AOI information as agreed on through TPP and QAPP Addendum review.

The soil cores were continuously logged for lithological descriptions by a field geologist using the Unified Soil Classification System (USCS). A photoionization detector (PID) was used to screen the breathing zone during boring activities as part of personal safety requirements. Observations and measurements were recorded on sampling forms (**Appendix B3**) 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**.

Three distinct saturated zones were observed in soil borings AOI5-1 and AOI1-5. The saturated intervals occurred where silt and clay interbeds form low permeability strata that act as a barrier to the downward movement of water. The shallower, low permeability layers are described as dark yellowish brown to brown to dark grayish brown silts and sandy silts with low to medium plasticity, containing 10 to 40% of fine- to medium-grained sand disseminated throughout the fine-grained interval. The deeper low permeability layer is described as brown to gray clay, with medium to high plasticity and containing trace fine grained sand. Beds of poorly-graded sand and silty sands are observed between the low permeability intervals and provide the matrix for the saturated zones observed.

Each sample was collected into laboratory-supplied PFAS-free high-density polyethylene (HDPE) bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via Federal Express (FedEx) under standard chain of custody (CoC) procedures to the laboratory and analyzed for PFAS by LC/MS/MS Compliant with QSM 5.1 Table B-15, TOC (USEPA Method 9060A), and pH (USEPA Method 9045D) in accordance with the QAPP Addendum (AECOM, 2019b).

Field duplicate samples were collected at a rate of 10% and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, such as a hand auger for the shallow soil samples, ERBs were collected at a rate of 5% and analyzed for the same parameters as the soil samples. A temperature blank was placed in each cooler to ensure that samples were preserved at or below 4 degrees Celsius (°C) during shipment.

DPT borings were converted to temporary wells, which were subsequently abandoned in accordance with the QAPP Addendum (AECOM, 2019b) using bentonite chips at completion of sampling activities. Borings were advanced in dirt areas to avoid disturbing concrete or asphalt surfaces, except at AOI4-1 and AOI5-1, where concrete coring or cutting through asphalt was required.

5.3 Temporary Well Installation and Groundwater Grab Sampling

Temporary wells were installed using a GeoProbe® 7822DT dual-tube sampling system. Temporary wells were installed at nineteen of the twenty proposed boring locations, excluding AOI4-2 and AOI4-3, which were removed from the program and documented in NCR-01. An additional temporary well (AOI1-5A) was installed at location AOI1-5, as multiple shallow saturated zones were observed. During advancement of the first soil boring (AOI7-10), a low permeability lithology was observed in the prescribed screen zone from 25 to 30 feet bgs. After installation of a temporary well at this depth and difficulty collecting a groundwater sample, all

borings were advanced to 15 to 25 feet bgs. (Refer to **Section 5.7** for additional details on deviations from the QAPP Addendum). Once each borehole was advanced to the desired depth, a temporary well was constructed of a 5-foot section of 0.75-inch Schedule 40 poly-vinyl chloride (PVC) screen with sufficient casing to reach ground surface. The screen intervals for the temporary wells are provided on **Table 5-2**. New PVC pipe and screen were used at each location to avoid cross contamination. The temporary wells were sampled immediately after installation.

Groundwater samples were collected from temporary wells using a peristaltic pump with PFAS-free HDPE tubing. Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. The temporary wells were purged at a rate determined in the field to reduce turbidity and draw down prior to sampling. Water quality parameters (e.g., temperature, specific conductance, pH, dissolved oxygen [DO], and oxidation-reduction potential [ORP]) were measured using a water quality meter and recorded on the field sampling form (**Appendix B3**) after each grab sample was collected.

Additional groundwater samples were collected from two existing monitoring wells (N19-3 and X3-1) at JFTB LA via low-flow sampling methods using a QED™ Sample Pro® bladder pump (or equivalent) with disposable tubing. The pump tubing was PFAS-free and placed at the center of the well screen or at the mid-point of the water column. Water quality readings collected during low-flow sampling were recorded on the field sampling form (**Appendix B3**).

Additionally, a subsample of each groundwater sample was collected in a separate container and a shaker test was completed to identify if there was any foaming. No foaming was noted in any of the groundwater samples.

Each sample was collected into laboratory-supplied PFAS-free HDPE bottles and labeled using a PFAS-free marker or pen. Samples were packaged on ice and transported via FedEx under standard CoC procedures to the laboratory and analyzed for PFAS by LC/MS/MS Compliant with QSM 5.1 Table B-15 in accordance with the QAPP Addendum (AECOM, 2019b).

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 FRB 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 4°C during shipment.

Temporary wells were abandoned in accordance with the QAPP Addendum (AECOM, 2019b) by removing the PVC and backfilling the hole with bentonite chips. Temporary wells were installed in dirt areas to avoid disturbing concrete or asphalt surfaces, except at AOI4-1 and AOI5-1 in which the concrete was resurfaced after all samples were collected.

5.4 Surface Water and Surface Soil Sampling

Surface water and surface soil samples were collected from the WDD, located approximately 200 feet north of the facility's southwestern property corner. The WDD is considered an AOI (AOI 8), as surface water and surface soil were potentially impacted from various AFFF release sites including the New CFR Training Pit, WEF, FTA, and AFFF equipment nozzle testing area; and the Old CFR Training Pits may have migrated to the WDD. Surface soil samples were collected from AOI8-1 and AOI8-2, as no surface water was present in these locations. Surface water samples were collected from locations AOI8-3 through AOI8-7.

Surface water samples were collected from a single point in the waterbody at each sample location using a disposable HDPE dipper and decanting the sample into the laboratory-supplied bottle. Additionally, a subsample of each surface water sample was collected in a separate container and a shaker test was completed to identify if there was any foaming. No foaming was noted on any of the surface water 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 for analysis of PFAS (USEPA Method 537 Compliant with QSM 5.1 Table B-15). Surface soil samples were also analyzed for TOC (USEPA Method 9060A) and pH (USEPA Method 9045D), in accordance with the QAPP Addendum (AECOM, 2019b).

Field duplicate samples were collected at a rate of 10 percent (%) and analyzed for the same parameters as the accompanying samples. MS/MSDs were collected at a rate of 5% and analyzed for the same parameters as the accompanying samples. In instances when non-dedicated sampling equipment was used, ERB samples 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 4 degrees °C during shipment.

5.5 Investigation-Derived Waste

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

Soil IDW (i.e., soil cuttings) generated during the SI activities were containerized in labeled 55-gallon drums. Liquid IDW generated during SI activities (i.e. purge water, development water, and decontamination fluids) was also containerized in labeled 55-gallon drums. IDW was staged near AOI 1 on secondary containment, as agreed upon by JFTB LA.

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

5.6 Laboratory Analytical Methods

Samples were analyzed for a subset of 18 PFAS by LC/MS/MS compliant with QSM 5.1 Table B-15 at Pace Analytical Gulf Coast (formerly Gulf Coast Analytical Laboratory) in Baton Rouge, Louisiana, a DoD ELAP and NELAP-certified laboratory. The 18 PFAS compounds analyzed as part of the ARNG SI program include the following:

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

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

5.7 Deviations from QAPP Addendum

Deviations from the QAPP Addendum occurred based on field conditions and discussion between AECOM, ARNG, JFTB LA, and USACE. Three deviations from the QAPP Addendum are noted below and are documented in the Nonconformance and Corrective Action Report (**Appendix B2**):

- Based on conversations with the Base and access issues, the number of borings at AOI 4 (Hangar 1) was reduced from three to one point located closest to the hangar and the wash rack; the suspected location of the western Old CFR Training Pit in AOI 1 was shifted due to recent information from the CAARNG; and a sample was not collected from the JP-4 treatment system because the system was taken offline before the start of field work.
- The QAPP Addendum specifies that groundwater samples will be collected from temporary wells screened between 25 and 30 feet bgs; however, the first boring (AOI7-10) encountered lithology with low permeability in this interval, resulting in difficulty collecting groundwater samples. After discussion with the ARNG Project Manager and based on similar lithology observed in two other sampling points, borings were terminated at 25 feet bgs and temporary wells screened from 20 to 25 feet bgs.
- At boring location AOI1-5, three saturated zones were observed when advanced to 25 feet bgs. After discussion with the ARNG Project Manager and the JFTB LA contact, a step-out location (AOI1-5A) was drilled, and a well screen was set from 10 to 15 feet bgs to see if this layer would produce enough groundwater to collect a sample. Water samples were successfully collected from both AOI1-5 and AOI1-5A and, based on observed lithology, temporary well screens at boring locations AOI1-6, AOI1-4, and AOI1-2 were also set from 10 to 15 feet bgs.

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	4/1/2020	GIS BY	MS	4/1/2020
SCALE	1:1,800	CHK BY	SL	4/1/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	4/1/2020

Legend

Area of Interest (AOI)

Facility Boundary

Borehole/Groundwater Sample

N

Site Inspection Sample Locations, AOI 1

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 5-1

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Area of Interest (AOI)
Facility Boundary
Borehole/Groundwater Sample
Existing Monitoring Well
Soil Sample
Surface Soil Sample
Surface Water/Sediment Sample

0 125 250 500 Feet

Site Inspection Sample Locations, AOI 2. AOI 3. AOI 8

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	4/1/2020	GIS BY	MS	4/1/2020
SCALE	1:3,000	CHK BY	SL	4/1/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	4/1/2020

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Figure 5-2

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CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	4/1/2020	GIS BY	MS	4/1/2020
SCALE	1:2,400	CHK BY	SL	4/1/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	4/1/2020

Legend

- Area of Interest (AOI)
- Facility Boundary
- Borehole/Groundwater Sample
- Existing Monitoring Well

N

Site Inspection Sample Locations, AOI 4, AOI 5, AOI 6

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Figure 5-3

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CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	4/1/2020	GIS BY	MS	4/1/2020
SCALE	1:2,400	CHK BY	SL	4/1/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	4/1/2020

Legend

- Area of Interest (AOI)
- Facility Boundary
- Borehole/Groundwater Sample
- Surface Soil Sample

Site Inspection Sample Locations, AOI 7

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Figure 5-4

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Table 5-1
Samples by Medium
Site Inspection Report
Joint Force Training Base, Los Alamitos, California

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs) [1]	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
Soil Samples						
AOI1-1-SB-10-10.5-102219	10/22/2019	10 - 10.5	x	x	x	
AOI1-1-SB-17-17.5-102219	10/22/2019	17 - 17.5	x	x	x	
AOI1-1-SB-4.5-5-102219	10/22/2019	4.5 - 5	x	x	x	
AOI1-2-SB-12.5-13-102319	10/23/2019	12.5 - 13	x	x	x	
AOI1-2-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI1-2-SB-9.5-10-102319	10/23/2019	9.5 - 10	x	x	x	
AOI1-3-SB-16-16.5-102219	10/22/2019	16 - 16.5	x	x	x	
AOI1-3-SB-4.5-5-102219	10/22/2019	4.5 - 5	x	x	x	
AOI1-3-SB-9.5-10-102219	10/22/2019	9.5 - 10	x	x	x	
AOI1-4-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI1-4-SB-4.5-5-102319-D	10/23/2019	4.5 - 5	x	x	x	FD
AOI1-4-SB-9.5-10-102319	10/23/2019	9.5 - 10	x	x	x	
AOI1-5-SB-17.5-18-102319	10/23/2019	17.5 - 18	x	x	x	
AOI1-5-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI1-5-SB-4.5-5-102319-D	10/23/2019	4.5 - 5	x	x	x	FD
AOI1-5-SB-7-7.5-102319	10/23/2019	7 - 7.5	x	x	x	
AOI1-6-SB-12.5-13-102319	10/23/2019	12.5 - 13	x	x	x	
AOI1-6-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI1-6-SB-9-9.5-102319	10/23/2019	9 - 9.5	x	x	x	
AOI2-1-SB-4.5-5-102519	10/25/2019	4.5 - 5	x	x	x	
AOI2-2-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI2-2-SB-4.5-5-102319-D	10/23/2019	4.5 - 5	x	x	x	FD
AOI2-3-SB-4.5-5-102319	10/23/2019	4.5 - 5	x	x	x	
AOI2-3-SB-4.5-5-102319-D	10/23/2019	4.5 - 5	x	x	x	FD
AOI2-4-SB-4.5-5-102519	10/25/2019	4.5 - 5	x	x	x	
AOI2-5-SB-13-13.5-102519	10/25/2019	13 - 13.5	x	x	x	
AOI2-5-SB-4.5-5-102519	10/25/2019	4.5 - 5	x	x	x	
AOI2-5-SB-9.5-10-102519	10/25/2019	9.5 - 10	x	x	x	
AOI3-1-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-2-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-2-SB-1.5-2-102519-D	10/25/2019	1.5 - 2	x	x	x	FD
AOI3-3-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-4-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-4-SB-1.5-2-102519-D	10/25/2019	1.5 - 2	x	x	x	FD
AOI3-5-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-6-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-7-SB-1.5-2-102519	10/25/2019	1.5 - 2	x	x	x	
AOI3-7-SB-1.5-2-102519-D	10/25/2019	1.5 - 2	x	x	x	FD
AOI3-8-SB-1.5-2-102419	10/24/2019	1.5 - 2	x	x	x	
AOI3-8-SB-1.5-2-102419-D	10/25/2019	1.5 - 2	x	x	x	FD
AOI3-8-SB-13-13.5-102419	10/24/2019	13 - 13.5	x	x	x	
AOI3-8-SB-9-9.5-102419	10/24/2019	9 - 9.5	x	x	x	
AOI3-9-SB-1.5-2-102419	10/24/2019	1.5 - 2	x	x	x	
AOI3-9-SB-14-14.5-102419	10/24/2019	14 - 14.5	x	x	x	
AOI3-9-SB-8.5-9-102419	10/24/2019	8.5 - 9	x	x	x	
AOI3-10-SB-1.5-2-102419	10/24/2019	1.5 - 2	x	x	x	
AOI3-10-SB-10.5-11-102419	10/24/2019	10.5 - 11	x	x	x	
AOI3-11-SB-1.5-2-102419	10/24/2019	1.5 - 2	x	x	x	
AOI3-11-SB-11-11.5-102419	10/24/2019	11 - 11.5	x	x	x	
AOI3-11-SB-8.5-9-102419	10/24/2019	8.5 - 9	x	x	x	
AOI3-12-SB-1.5-2-102419	10/24/2019	1.5 - 2	x	x	x	
AOI3-12-SB-19-19.5-102419	10/24/2019	19 - 19.5	x	x	x	
AOI3-12-SB-7-7.5-102419	10/24/2019	7 - 7.5	x	x	x	
AOI4-1-SB-0-0.5-102519	10/25/2019	0 - 0.5	x	x	x	
AOI4-1-SB-5.5-6-102519	10/25/2019	5.5 - 6	x	x	x	
AOI4-1-SB-9.5-10-102519	10/25/2019	9.5 - 10	x	x	x	
AOI5-1-SB-1.5-2-102219	10/22/2019	1.5 - 2	x	x	x	

Table 5-1
Samples by Medium
Site Inspection Report
Joint Force Training Base, Los Alamitos, California

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs) [1]	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
AOI5-1-SB-1.5-2-102219-D	10/22/2019	1.5 - 2	x	x	x	FD
AOI5-1-SB-19-19.5-102219	10/22/2019	19 - 19.5	x	x	x	
AOI5-1-SB-8-8.5-102219	10/22/2019	8 - 8.5	x	x	x	
AOI6-1-SB-1.5-2-102219	10/22/2019	1.5 - 2	x	x	x	
AOI6-1-SB-1.5-2-102219-MS	10/22/2019	1.5 - 2	x	x	x	MS
AOI6-1-SB-1.5-2-102219-MSD	10/22/2019	1.5 - 2	x	x	x	MSD
AOI6-1-SB-18.5-19-102219	10/22/2019	18.5 - 19	x	x	x	
AOI6-1-SB-7-7.5-102219	10/22/2019	7 - 7.5	x	x	x	
AOI6-2-SB-1.5-2-102219	10/22/2019	1.5 - 2	x	x	x	
AOI6-2-SB-1.5-2-102219-MS	10/22/2019	1.5 - 2	x	x	x	MS
AOI6-2-SB-1.5-2-102219-MSD	10/22/2019	1.5 - 2	x	x	x	MSD
AOI6-3-SB-1.5-2-102219	10/22/2019	1.5 - 2	x	x	x	
AOI6-3-SB-1.5-2-102219-MS	10/22/2019	1.5 - 2	x	x	x	MS
AOI6-3-SB-1.5-2-102219-MSD	10/22/2019	1.5 - 2	x	x	x	MSD
AOI6-4-SB-1.5-2-102219	10/22/2019	1.5 - 2	x	x	x	
AOI6-4-SB-1.5-2-102219-MS	10/22/2019	1.5 - 2	x	x	x	MS
AOI6-4-SB-1.5-2-102219-MSD	10/22/2019	1.5 - 2	x	x	x	MSD
AOI7-1-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-2-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-3-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-4-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-5-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-6-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-7-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-8-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-9-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-9-SB-17-17.5-102119	10/21/2019	17 - 17.5	x	x	x	
AOI7-9-SB-7.5-8-102119	10/21/2019	7.5 - 8	x	x	x	
AOI7-10-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-10-SB-17-17.5-102119	10/21/2019	17 - 17.5	x	x	x	
AOI7-10-SB-7.5-8-102119	10/21/2019	7.5 - 8	x	x	x	
AOI7-11-SB-1.5-2-102119	10/21/2019	1.5 - 2	x	x	x	
AOI7-11-SB-18-18.5-102119	10/21/2019	18 - 18.5	x	x	x	
AOI7-11-SB-7.5-8-102119	10/21/2019	7.5 - 8	x	x	x	
AOI8-1-SB-0-0.5-102919	10/29/2019	0 - 0.5	x	x	x	
AOI8-2-SB-0-0.5-102919	10/29/2019	0 - 0.5	x	x	x	
Groundwater Samples						
AOI1-1-GW-102219	10/22/2019	20 - 25	x			
AOI1-2-GW-102319	10/23/2019	10 - 15	x			
AOI1-3-GW-102219	10/22/2019	20 - 25	x			
AOI1-4-GW-102319	10/23/2019	10 - 15	x			
AOI1-5A-GW-102319	10/23/2019	10 - 15	x			
AOI1-5-GW-102319	10/23/2019	20 - 25	x			
AOI1-6-GW-102319	10/23/2019	10 - 15	x			
AOI2-5-GW-102519	10/25/2019	15 - 20	x			
AOI3-8-GW-102419	10/24/2019	10 - 15	x			
AOI3-9-GW-102419	10/24/2019	15 - 20	x			
AOI3-10-GW-102419	10/24/2019	15 - 20	x			
AOI3-11-GW-102419	10/24/2019	10 - 15	x			
AOI3-12-GW-102419	10/24/2019	20 - 25	x			
AOI4-1-GW-102519	10/25/2019	10 - 15	x			
AOI5-1-GW-102219	10/22/2019	20 - 25	x			
AOI5-N19-3-102919	10/29/2019	9 - 10	x			
AOI5-N19-3-102919-D	10/29/2019	9 - 10	x			FD
AOI6-1-GW-102219	10/22/2019	20 - 25	x			
AOI7-9-GW-102119	10/21/2019	20 - 25	x			
AOI7-10-GW-102119	10/21/2019	25 - 30	x			
AOI7-11-GW-102119	10/21/2019	20 - 25	x			

Table 5-1
Samples by Medium
Site Inspection Report
Joint Force Training Base, Los Alamitos, California

Sample Identification	Sample Collection Date/Time	Sample Depth (feet bgs) [1]	PFAS (USEPA Method 537 Modified)	TOC (USEPA Method 9060A)	pH (USEPA Method 9045D)	Comments
AOI8-X3-1-102919	10/29/2019	11 - 13	x			
AOI8-X3-1-102919-D	10/29/2019	11 - 13	x			FD
Surface Water Samples						
AOI 8-3-SW-102919	10/29/2019	NA	x			
AOI 8-4-SW-102919	10/29/2019	NA	x			
AOI 8-5-SW-102919	10/29/2019	NA	x			
AOI 8-5-SW-102919-MS	10/29/2019	NA	x			MS
AOI 8-5-SW-102919-MSD	10/29/2019	NA	x			MSD
AOI 8-6-SW-102919	10/29/2019	NA	x			
AOI 8-6-SW-102919-MS	10/29/2019	NA	x			MS
AOI 8-6-SW-102919-MSD	10/29/2019	NA	x			MSD
AOI 8-7-SW-102919	10/29/2019	NA	x			
AOI 8-7-SW-102919-D	10/29/2019	NA	x			FD
Quality Control Samples						
JFTBLA-DECON-091719	9/17/2019	NA	x			ERB on decontamination water
JFTBLA-DW-FIELDBLANK-091719	9/17/2019	NA	x			FRB on decontamination water
JFTBLA-EB-102919	10/29/2019	NA	x			ERB on the pump
JFTBLA-EB-B-102319	10/23/2019	NA	x			ERB on stainless steel bowl
JFTBLA-EB-HA-102319	10/23/2019	NA	x			ERB on hand auger
JFTBLA-EB-HA-102119	10/21/2019	NA	x			ERB on hand auger
JFTBLA-EB-HA-102519	10/25/2019	NA	x			ERB on hand auger
JFTBLA-EB-PW-102219	10/22/2019	NA	x			ERB on pressure washer
JFTBLA-EB-WM-102319	10/23/2019	NA	x			ERB on water meter
JFTBLA-FRB-102119	10/21/2019	NA	x			FRB

Notes:
[1] Sample depths for surface water samples are inches (in) below water surface

Acronyms and Abbreviations:
bgs = below ground surface
ERB = equipment rinsate blank
FD = field duplicate
FRB = field reagent blank
ft = feet
in = inches
MS/MSD = matrix spike/ matrix spike duplicate
NA = not applicable
PFAS = per- and polyfluoroalkyl substances
TOC = total organic carbon
USEPA = United States Environmental Protection Agency

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Table 5-2
Soil Boring Depths and Temporary Well Screen Intervals
Site Inspection Report
Joint Force Training Base, Los Alamitos, California

Area of Interest	Location ID	Soil Boring Depth (feet bgs)	Temporary Well Screen Interval (feet bgs)
1	AOI1-1	25	20 - 25
	AOI1-2	15	10 - 15
	AOI1-3	25	20 - 25
	AOI1-4	15	10 - 15
	AOI1-5	25	20 - 25
	AOI1-5A	15	10 - 15
	AOI1-6	15	10 - 15
2	AOI2-5	20	15 - 20
3	AOI3-8	15	10 - 15
	AOI3-9	20	15 - 20
	AOI3-10	20	15 - 20
	AOI3-11	15	10 - 15
	AOI3-12	25	20 - 25
4	AOI4-1	15	10 - 15
5	AOI5-1	25	20 - 25
6	AOI6-1	25	20 - 25
7	AOI7-9	25	20 - 25
	AOI7-10	30	25 - 30
	AOI7-11	25	20 - 25

Acronyms and Abbreviations:
bgs = below ground surface

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6.0 Site Inspection Results

This section presents the analytical results of the SI for each AOI. The analytical results are reported and evaluated in the subsequent sections.

The SLs used in this evaluation are presented in **Section 6.1**. A discussion of the results is provided in **Section 6.3** through **Section 6.10**. **Tables 6-2** through **6-6** present PFAS results for samples with detections in soil, groundwater, and surface water; only constituents detected in one or more samples are included. Tables that contain all results are provided in **Appendix F**, and the laboratory reports are provided in **Appendix G**.

6.1 Screening Levels

The DoD has adopted a policy to retain facilities in the CERCLA process based on risk-based SLs for soil and groundwater, as described in a memorandum from the OSD dated 15 October 2019 (Assistant Secretary of Defense, 2019). 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 site will proceed to an RI, the next phase under CERCLA. The SLs apply to three compounds, PFOA, PFOS, and PFBS, for both soil and groundwater, as presented in **Table 6-1**.

All other results presented in this report are considered informational in nature and serve as an indication as to whether soil, groundwater, sediment, and surface water contain or do not contain PFAS within the boundaries of the Site.

Table 6-1 Screening Levels (Soil and Groundwater)

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

Notes:

a.) Assistant Secretary of Defense, 2019. Risk Based Screening Levels Calculated for PFOS, PFOA, PFBS in Groundwater and Soil using United States Environmental Protection Agency's (USEPA's) Regional Screening Level Calculator. HQ=0.1. 15 October 2019.

b.) If only one PFAS is present, a Hazard Quotient (HQ) of 1 applies and the values presented would increase by a factor of x10.

6.2 Soil Physicochemical Analyses

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

The data collected in this investigation will be used in subsequent investigations, where appropriate, to assess fate and transport of PFAS contaminants. According to the Interstate Technology Regulatory Council (ITRC), several important PFAS partitioning mechanisms include hydrophobic and lipophobic effects, electrostatic interactions, and interfacial behaviors (ITRC, 2018). 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 – Old Crash Fire Rescue Training Pits

This section presents the analytical results for soil and groundwater for AOI 1, which includes two potential PFAS release areas: The Old CFR Training Pit (West) and the Old CFT Training Pit (East). PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-1**, **Figure 6-5**, and **Figure 6-9**.

6.3.1 AOI 1 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the potential PFAS release area: the Old CFR Training Pits. **Figure 6-1** and **Figure 6-5** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At the Old CFR Training Pits, surface interval (0 to 2 feet bgs) samples were not collected due to the known presence of fill from 0 to 5 feet bgs. Soil was sampled from the shallow interval (4.5 to 13 feet bgs) from boring locations AOI1-1 through AOI1-6. Soil was also sampled at the deep interval (16 to 18 feet bgs) from boring locations AOI1-1, AOI1 through3, and AOI1-5. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of each boring. In the shallow interval, PFOA was detected in all samples with concentrations ranging from 3.25 micrograms per kilogram (µg/Kg) to 1,040 µg/Kg. PFOS was detected in all shallow samples except AOI1-1 (4.5 to 5 feet bgs) and AOI 1-6 (9 to 9.5 feet bgs) with concentrations ranging from 0.262 J µg/Kg to 31.8 µg/Kg. PFBS was detected in all shallow samples except AOI1-2 (12.5 to 13 feet bgs), AOI1-3 (4.5 to 5 feet bgs), AOI1-4 (9.5 to 10 feet bgs), and AOI1-6 (4.5 to 13 feet bgs) with concentrations ranging from 0.169 J µg/Kg to 1.66 µg/Kg.

In the deep interval, PFOA was detected at all locations sampled, at concentrations ranging from 1.49 µg/Kg to 21.5 µg/Kg. PFOS was detected at all locations sampled, at concentrations ranging from 0.293 J µg/Kg to 4.34 µg/Kg. PFBS was detected only at location AOI1-3, at a concentration of 0.258 J µg/Kg.

6.3.2 AOI 1 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: the Old CFR Training Pits. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-9** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 1, groundwater was sampled from temporary monitoring well locations AOI1-1 through AOI1-6. Based on the lithology/hydrogeology observed in the field, a step-out location (AOI1-5A) was advanced at AOI1-5, and an additional groundwater sample was collected from a shallower zone. The SLs of 40 ng/L for PFOA and PFOS were exceeded at all locations at maximum concentrations of 166,000 ng/L and 11,100 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L at all well locations with concentrations ranging from 22.7 ng/L to 759 ng/L, with the maximum concentration occurring at AOI1-3.

6.3.3 AOI 1 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 1; however, the detected concentrations did not exceed the soil SLs. At all locations sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater at concentrations below the SL. Based on the exceedances of the SLs for PFOA and PFOS in groundwater, further evaluation at AOI 1 is warranted.

6.4 AOI 2 – New Crash Fire Rescue Training Pit

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 2, which includes one potential PFAS release area: the New CFR Training Pit. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-2**, **Figure 6-6**, and **Figure 6-10**.

6.4.1 AOI 2 Soil Analytical Results

PFOA, PFOS, and PFBS did not exceed the SLs in soil at the potential PFAS release area: the New CFR Training Pit. **Figure 6-2**, and **Figure 6-6** present detections in soil for PFOS and PFOA. The detected compounds in soil are summarized on **Table 6-2** through **Table 6-4**.

At the New CFR Training Pit, surface interval (0 to 2 feet bgs) samples were not collected due to the known presence of fill from 0 to 5 feet bgs. Soil was sampled from the shallow interval (4.5 to 13.5 feet bgs) from boring locations AOI2-1 through AOI2-5. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of each boring. In the shallow interval, PFOA was detected in all samples, with concentrations ranging from 2.02 µg/Kg to 25.9 µg/Kg. PFOS was detected in all samples, with concentrations ranging from 0.650 J µg/Kg to 1120 µg/Kg. PFBS was detected in all samples except AOI2-5 (13 to 13.5 feet bgs), with concentrations ranging from 3.47 µg/Kg to 50 µg/Kg.

6.4.2 AOI 2 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: the New CFR Training Pit. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-10** presents the ranges of detections for PFOS and PFOA. The detected compounds from the investigation are summarized in **Table 6-5**.

Within AOI 2, groundwater was sampled from temporary monitoring well location AOI2-5. The SLs of 40 ng/L for PFOA and PFOS were exceeded at AOI2-5, at concentrations of 62,900 ng/L and 1,620 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L, at a concentration of 1,600 ng/L.

6.4.3 AOI 2 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 2; however, the detected concentrations did not exceed the soil SLs. At the location sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater at concentrations below the SL. Based on the exceedances of the SLs for PFOA and PFOS in groundwater, further evaluation at AOI 2 is warranted.

6.5 AOI 3 – West End of the Flightline

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 3, which includes one potential PFAS release area: the WEF FTA and AFFF Equipment Nozzle Testing Area. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-2**, **Figure 6-6**, and **Figure 6-10**.

6.5.1 AOI 3 Soil Analytical Results

PFOA, and PFOS exceeded the SLs in soil at the potential PFAS release area: the WEF FTA and AFFF Equipment Nozzle Testing Area. PFBS did not exceed the SLs at the potential PFAS release area. **Figure 6-2** and **Figure 6-6** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At the WEF FTA and AFFF Equipment Nozzle Testing Area, soil was sampled from the surface interval (1.5 to 2 feet bgs) from boring locations AOI3-1 through AOI3-12. Soil was also sampled at the shallow interval (7 to 14.5 feet bgs) from boring locations AOI3-8 through AOI3-12, and at the deep interval (19 to 19.5 feet bgs) from boring location AOI3-12. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of each boring. In the surface interval, PFOA was detected in all samples except AOI3-8 and AOI3-10, with concentrations ranging from 0.922 J µg/Kg to 219 µg/Kg, with exceedances in AOI3-3 (145 µg/Kg) and AOI3-12 (219 µg/Kg). PFOS was detected at all samples in the surface interval, with exceedances in AOI3-1, AOI3-2, AOI3-4, AOI3-5, AOI3-6, AOI3-7, AOI3-11, and AOI3-12 with concentrations of 381 µg/Kg, 1570 µg/Kg, 508 µg/Kg, 396 µg/Kg, 1120 µg/Kg, 198 µg/Kg, 643 µg/Kg, and 739 µg/Kg, respectively. In the surface interval, PFBS was detected at all locations except AOI3-8 and AOI3-10, with concentrations ranging from 0.203 J µg/Kg to 65.4 µg/Kg.

At the shallow interval, PFOA was detected in all samples, with concentrations ranging from 0.456 J µg/Kg to 50.2 µg/Kg. PFOS was detected in all samples except AOI3-8 (13 to 13.5 feet bgs), with concentrations ranging from 0.245 J µg/Kg to 599 µg/Kg. PFBS was detected in all samples except AOI3-9 (14 to 14.5 feet bgs), with concentrations ranging from 0.778 J µg/Kg to 19 µg/Kg.

In the deep interval, PFOA and PFOS were detected at AOI3-12, at concentrations of 0.176 J µg/Kg and 2.88 µg/Kg, respectively. PFBS was not detected in the deep interval.

6.5.2 AOI 3 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: WEF FTA and AFFF Equipment Nozzle Testing Area. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-10** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 3, groundwater was sampled from temporary monitoring well locations AOI3-8 through AOI3-12. The SLs of 40 ng/L for PFOA and PFOS were exceeded at all locations except AOI3-9 in which PFOS was not detected. Maximum concentrations of PFOA and PFOS were 5,800 ng/L and 16,600 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L at all well locations, with concentrations ranging from 150 ng/L to 6,310 ng/L, with the maximum concentration occurring at AOI3-11.

6.5.3 AOI 3 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 3; however, only detected concentrations of PFOA and PFOS exceeded the soil SLs. At the locations sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater, at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater, at

concentrations below the SL. Based on the exceedances of the SLs for PFOA and PFOS in soil and groundwater, further evaluation at AOI 3 is warranted.

6.6 AOI 4 – Hangar 1

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 4, which includes one potential PFAS release area: Hangar 1, including the nearby wash rack. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-3**, **Figure 6-7**, and **Figure 6-11**.

6.6.1 AOI 4 Soil Analytical Results

PFOA and PFOS did not exceed the SLs in soil at the potential PFAS release area: Hangar 1, including the nearby wash rack. PFBS was not detected in soil in AOI 4. **Figure 6-3** and **Figure 6-7** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At Hangar 1, soil was sampled from the surface (0.5 to 1 feet bgs) and shallow (5.5 to 10 feet bgs) intervals from boring location AOI4-1. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of the boring. Where present, PFOA and PFOS were detected in soil, at concentrations several orders of magnitude lower than SLs. In the surface interval, PFOA and PFBS were not detected, and PFOS was detected at a concentration of 0.440 J µg/Kg. At the shallow interval, PFOA was detected in samples at a maximum concentration of 1.59 µg/Kg. PFOS was detected in one sample in the shallow interval at a maximum concentration of 0.967 J µg/Kg. PFBS was not detected at the shallow interval.

6.6.2 AOI 4 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: Hangar 1, including the nearby wash rack. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-11** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 4, groundwater was sampled from one temporary monitoring well location AOI4-1. The SLs of 40 ng/L for PFOA and PFOS were exceeded. Maximum concentrations of PFOA and PFOS were 245 ng/L and 401 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L with a concentration of 55.9 ng/L.

6.6.3 AOI 4 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in soil at AOI 4; however, the detected concentrations did not exceed the soil SLs. At the location sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater at concentrations below the SL. Based on the exceedances of the SLs for PFOA and PFOS in groundwater, further evaluation at AOI 4 is warranted.

6.7 AOI 5 – Building 34 (JFTB LA Fire Station)

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 5, which includes one potential PFAS release area: Building 34, the JFTB LA Fire Station. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-3**, **Figure 6-7**, and **Figure 6-11**.

6.7.1 AOI 5 Soil Analytical Results

PFOA and PFOS exceeded the SLs in soil at the potential PFAS release area: Building 34, the JFTB LA Fire Station. PFBS did not exceed the SLs in soil at the potential release area. **Figure 6-3** and **Figure 6-7** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At Building 34, soil was sampled from the surface (1.5 to 2 feet bgs), shallow (8 to 8.5 feet bgs), and deep (19 to 19.5 feet bgs) intervals from boring location AOI5-1. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of the boring. In the surface interval, PFOA and PFOS exceeded SLs at concentrations of 134 µg/Kg and 352 µg/Kg, respectively. In the surface interval, PFBS was detected at a concentration of 0.550 J µg/Kg. At the shallow interval, PFOA, PFOS and PFBS were detected at concentrations of 23.4 µg/Kg, 1.67 µg/Kg, and 38.3 µg/Kg, respectively.

In the deep interval, PFOA, PFOS and PFBS were detected at concentrations of 15.7 µg/Kg, 29.4 µg/Kg, and 2.61 µg/Kg, respectively.

6.7.2 AOI 5 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: Building 34, the JFTB LA Fire Station. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-11** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 5, groundwater was sampled from one temporary monitoring well location, AOI5-1, and one existing monitoring well, N19-3, located at the east corner of Building 34. The SLs of 40 ng/L for PFOA and PFOS were exceeded at both locations. Maximum concentrations of PFOA and PFOS were observed in AOI5-1, at 31,300 ng/L and 16,800 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L, with a maximum concentration of 7,870 ng/L.

6.7.3 AOI 5 Conclusions

Based on the results of the SI, PFOA, PFOS, and PFBS were detected in soil at AOI 5; however, only detected concentrations of PFOA and PFOS exceeded the soil SLs. At the location sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater at concentrations below the SL. Based on the exceedances of the SLs for PFOA and PFOS in soil and groundwater, further evaluation at AOI 5 is warranted.

6.8 AOI 6 – AFFF Release in the vicinity of Building 80

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 6, which includes one potential PFAS release area: a release of AFFF in the vicinity of Building 80. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-3**, **Figure 6-7**, and **Figure 6-11**.

6.8.1 AOI 6 Soil Analytical Results

PFOA and PFOS did not exceed the SLs in soil at the potential PFAS release area: a release of AFFF in the vicinity of Building 80. PFBS was not detected in soil in AOI 6. **Figure 6-3** and **Figure 6-7** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At Building 80, soil was sampled from the surface (1.5 to 2 feet bgs), shallow (7 to 7.5 feet bgs), and deep (18.5 to 19 feet bgs) intervals from boring location AOI6-1. Soil was also sampled at the surface (1.5 to 2 feet bgs) interval for locations AOI6-2 through AOI6-4. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of the boring. Where present, PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than SLs. In the surface interval, PFOA was detected at all four locations, with concentrations ranging from 0.213 J µg/Kg to 6.24 µg/Kg. PFOS was detected at locations AOI6-2 and AOI6-3, at concentrations ranging from 1.06 J µg/Kg to 1.37 µg/Kg. PFBS was not detected in the surface soil.

In the shallow and deep intervals, PFOA, PFOS and PFBS were not detected.

6.8.2 AOI 6 Groundwater Analytical Results

PFOA and PFOS were not detected in groundwater at the potential PFAS release area: a release of AFFF in the vicinity of Building 80. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-11** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 6, groundwater was sampled from one temporary monitoring well location AOI6-1. PFBS was detected below the SL of 40,000 ng/L, with a maximum concentration of 21.7 ng/L. PFOA and PFOS were not detected in groundwater at AOI 6.

6.8.3 AOI 6 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in soil at AOI 6; however, the detected concentrations did not exceed the soil SLs. At the location sampled in the potential PFAS release area, PFBS was detected in groundwater at a concentration below the individual SL of 40,000 ng/L. PFOA and PFOS were not detected in groundwater. Therefore, further evaluation at AOI 6 is not warranted. However, to confirm the non-detects, additional groundwater sampling and analysis (using methods with lowered detection limits) will be conducted at AOI 6 during the RI, as part of the site-wide OU 1 groundwater investigation.

6.9 AOI 7 – Emergency Response

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 7, which includes one potential PFAS release area: the location of an emergency response by the JFTB LA FD. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-4**, **Figure 6-8**, and **Figure 6-12**.

6.9.1 AOI 7 Soil Analytical Results

PFOA and PFOS did not exceed the SLs in soil at the potential PFAS release area: the location of an emergency response by the JFTB LA Fire Department. PFBS was not detected in soil in AOI 7. **Figure 6-4** and **Figure 6-8** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At AOI 7, soil was sampled from the surface (1.5 to 2 feet bgs), shallow (7.5 to 8 feet bgs), and deep (17 to 18.5 feet bgs) intervals from boring locations AOI7-9 through AOI7-11. Soil was also sampled at the surface (1.5 to 2 feet bgs) interval for locations AOI7-1 through AOI7-11. Sampling depths presented on **Table 5-1** were determined based on lithology observed during the advancement of the boring. Where present, PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than SLs. In the surface interval, PFOA was detected at all eleven locations except AOI7-3, AOI7-9, AOI7-10, and AOI7-11, with concentrations ranging from 0.183 J µg/Kg to 0.649 µg/Kg. PFOS was detected at locations AOI7-

2, AOI7-3, AOI7-4, and AOI7-8 at concentrations ranging from 0.207 J µg/Kg to 0.455 µg/Kg. PFBS was not detected in the surface soil.

In the shallow and deep intervals, PFOA, PFOS and PFBS were not detected.

6.9.2 AOI 7 Groundwater Analytical Results

PFOA and PFOS in groundwater did not exceed the SLs at the potential PFAS release area: the location of an emergency response by the JFTB LA FD. PFBS was not detected in groundwater at this potential PFAS release area. **Figure 6-12** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 7, groundwater was sampled from temporary monitoring well locations AOI7-9 through AOI7-11. The SLs of 40 ng/L for PFOA and PFOS were not exceeded at any locations. PFOA was detected in groundwater only at AOI7-10 at a concentration of 4.53 J ng/L. PFOS was detected in groundwater only at the duplicate sample taken at AOI7-11 at a concentration of 1.56 J ng/L.

6.9.3 AOI 7 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in soil at AOI 7; however, the detected concentrations did not exceed the soil SLs. At the locations sampled in the potential PFAS release area, PFOA and PFOS were detected in groundwater at a concentration below the individual SLs of 40 ng/L. PFBS was not detected in groundwater; therefore, further evaluation at AOI 7 is not warranted.

6.10 AOI 8 – Western Drainage Ditch

This section presents the analytical results for soil and groundwater in comparison to SLs for AOI 8, which includes one potential PFAS release area: the WDD. This section also presents the analytical results for surface water for AOI 8. PFAS detections are summarized in **Table 6-2** through **Table 6-6** and on **Figure 6-2**, **Figure 6-6**, **Figure 6-10** and **Figure 6-13**.

6.10.1 AOI 8 Soil Analytical Results

PFOA and PFOS did not exceed the SLs in soil at the potential PFAS release area: the WDD. PFBS was not detected in soil in AOI 8. **Figure 6-2** and **Figure 6-6** present detections in soil for PFOS and PFOA. PFAS detections in soil are summarized on **Table 6-2** through **Table 6-4**.

At AOI 8, surface soil was sampled from 0 to 0.5 feet bgs from locations AOI8-1 and AOI8-2. Where present, PFOA and PFOS were detected in soil at concentrations several orders of magnitude lower than SLs. In surface soil, PFOA was detected at AOI8-1 and AOI8-2, with concentrations of 0.255 J µg/Kg and 0.211 J µg/Kg, respectively. PFOS was detected at locations AOI8-1 and AOI8-2 at concentrations of 3.02 µg/Kg and 2.42 µg/Kg, respectively. PFBS was not detected in surface soil.

6.10.2 AOI 8 Groundwater Analytical Results

PFOA and PFOS in groundwater exceeded the SLs at the potential PFAS release area: the WDD. PFBS did not exceed the SL at this potential PFAS release area. **Figure 6-10** presents the ranges of detections for PFOS and PFOA. PFAS detections from the investigation are summarized in **Table 6-5**.

Within AOI 8, groundwater was sampled from one existing monitoring well, X3-1, located along the WDD. The SLs of 40 ng/L for PFOA and PFOS were exceeded. Maximum concentrations of

PFOA and PFOS were observed in X3-1 at 3,040 ng/L and 4,670 ng/L, respectively. PFBS was detected below the SL of 40,000 ng/L, with a maximum concentration of 118 ng/L.

6.10.3 AOI 8 Surface Water Analytical Results

Surface water was sampled from five locations (AOI8-3, AOI8-4, AOI8-5, AOI8-6, and AOI8-7) along the Western Drainage Ditch. PFOA, PFOS, and PFBA were detected in the samples. PFOA was detected in all five locations, at concentrations ranging from 14.5 ng/L to 29.2 ng/L, with the maximum concentration detected at location AOI8-6. PFOS was detected in all five locations, at concentrations ranging from 34.5 ng/L to 104 J+ ng/L, with the maximum concentration detected at location AOI8-5. PFBS was detected in all five locations at concentrations ranging from 3.89 J ng/L to 6.43 J ng/L, with the maximum concentration detected at location AOI8-6. **Figure 6-13** presents the concentration ranges of detections in surface water for PFOA and PFOS. PFAS detections are presented in **Table 6-6**.

6.10.4 AOI 8 Conclusions

Based on the results of the SI, PFOA and PFOS were detected in surface soil at AOI 8. At the existing monitoring well sampled in the potential PFAS release area, PFOS and PFOA were detected in groundwater at concentrations exceeding the individual SLs of 40 ng/L. PFBS was detected in groundwater, at concentrations below the SL. There are no established SLs for sediment and surface water; therefore, these results are presented for informational purposes only. Based on the exceedances of the SLs for PFOA and PFOS in groundwater, further evaluation at AOI 8 is warranted.

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Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI03															
Sample ID		AOI3-1-SB-1.5-2-102519		AOI3-2-SB-1.5-2-102519		AOI3-2-SB-1.5-2-102519-D		AOI3-3-SB-1.5-2-102519		AOI3-4-SB-1.5-2-102519		AOI3-4-SB-1.5-2-102519-D		AOI3-5-SB-1.5-2-102519		AOI3-6-SB-1.5-2-102519	
Sample Date		10/25/2019		10/25/2019		10/25/2019		10/25/2019		10/25/2019		10/25/2019		10/25/2019		10/25/2019	
Depth		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	0.270	J	229	J-	230		283	J-	86.1	J-	70.5		13.6		118	J-
8:2 FTS	-	ND		1.56		1.13	J	2.59		84.9	J-	100		ND		38.1	
PFBA	-	2.78		41.8		39.4		42.0		1.24		0.948	J	9.45		9.05	
PFBS	130000	1.10	J	65.4		57.7		16.1		0.225	J	0.146	J	50.9	J	4.60	
PFDA	-	ND		ND		ND		ND		4.31		2.66		ND		1.23	J
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	0.707	J	20.2		15.5		50.5		1.16		0.806	J	12.7		3.39	
PFHxA	-	3.33		305		287		293		6.04		4.15		155		20.2	
PFHxS	-	14.4		239		199		154		5.93		4.44		645		26.5	
PFNA	-	0.968	J	1.32	J	2.85	J+	0.677	J	1.44		0.983	J	0.298	J	11.4	
PFOA	130	4.31		33.1		26.5		145		4.44		2.87		63.7		14.0	
PFOS	130	381	J-	1440	J-	1570		44.6		508	J-	372		396		1120	
PFPeA	-	3.57		156		139		308		4.58		3.06		33.7		33.7	
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		0.164	J	ND		ND		1.03	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography 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
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI03															
Sample ID		AOI3-7-SB-1.5-2-102519		AOI3-7-SB-1.5-2-102519-D		AOI3-8-SB-1.5-2-102419		AOI3-8-SB-1.5-2-102419-D		AOI3-9-SB-1.5-2-102419		AOI3-10-SB-1.5-2-102419		AOI3-11-SB-1.5-2-102419		AOI3-12-SB-1.5-2-102419	
Sample Date		10/25/2019		10/25/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019	
Depth		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	5.89		6.83		ND		ND		14.3		0.209	J	0.356	J	202	J-
8:2 FTS	-	0.874	J	1.24		ND		ND		0.482	J	ND		0.440	J	13.4	
PFBA	-	3.83		3.03		ND		ND		4.52		ND		0.372	J	31.3	
PFBS	130000	0.281	J	0.226	J	ND		ND		0.325	J	ND		0.203	J	12.4	
PFDA	-	0.363	J	0.480	J	ND		ND		ND		ND		0.308	J	0.581	J
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	4.74		4.17		ND		ND		8.19		ND		0.254	J	25.2	
PFHxA	-	5.93		5.29		ND		ND		9.85		ND		1.41		163	
PFHxS	-	9.92		8.57		ND		ND		26.2		ND		7.02		110	
PFNA	-	8.15		8.73		ND		ND		0.596	J	ND		1.02	J	2.91	
PFOA	130	8.48		8.05		ND		ND		7.23		ND		0.922	J	219	
PFOS	130	198		223		0.251	J	0.224	J	21.6		0.304	J	643		739	
PFPeA	-	7.72		6.25		ND		ND		9.45		ND		0.505	J	128	
PFTrDA	-	ND		ND		ND		ND		ND		ND		0.386	J	ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		3.45		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography 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
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI04		AOI05				AOI06								AOI07	
Sample ID		AOI4-1-SB-0-0.5-102519		AOI5-1-SB-1.5-2-102219		AOI5-1-SB-1.5-2-102219-D		AOI6-1-SB-1.5-2-102219		AOI6-2-SB-1.5-2-102219		AOI6-3-SB-1.5-2-102219		AOI6-4-SB-1.5-2-102219		AOI7-1-SB-1.5-2-102119	
Sample Date		10/25/2019		10/22/2019		10/22/2019		10/22/2019		10/22/2019		10/22/2019		10/22/2019		10/21/2019	
Depth		0 - 0.5 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	ND		1.08	J	1.41		104	J-	194	J-	229	J+	0.310	J	ND	
8:2 FTS	-	ND		1.05	J	1.41		ND		0.386	J	1.04	J	ND		ND	
PFBA	-	ND		1.66		2.22		2.49		13.5		15.1		0.611	J	ND	
PFBS	130000	ND		0.550	J	0.772	J	ND		ND		ND		ND		ND	
PFDA	-	0.313	J	0.967	J	1.47		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		4.57		5.40		4.63		5.27	J+	34.8		1.11	J	ND	
PFHxA	-	ND		4.22		5.45		5.63		33.2		71.7	J-	1.42		ND	
PFHxS	-	ND		23.6		32.0		0.324	J	0.319	J	10.5		ND		ND	
PFNA	-	ND		2.20		2.73		ND		0.172	J	ND		ND		ND	
PFOA	130	ND		112		134		2.31		5.36	J+	6.24		0.213	J	0.649	J
PFOS	130	0.440	J	252		352		ND		1.06	J	1.37		ND		ND	
PFPeA	-	ND		4.05		5.49		7.45		57.7	J-	57.7	J-	2.06		0.156	J
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography 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
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI07															
Sample ID		AOI7-10-SB-1.5-2-102119		AOI7-11-SB-1.5-2-102119		AOI7-2-SB-1.5-2-102119		AOI7-3-SB-1.5-2-102119		AOI7-4-1.5-2-102119		AOI7-5-SB-1.5-2-102119		AOI7-6-SB-1.5-2-102119		AOI7-7-SB-1.5-2-102119	
Sample Date		10/21/2019		10/21/2019		10/21/2019		10/21/2019		10/21/2019		10/21/2019		10/21/2019		10/21/2019	
Depth		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft		1.5 - 2 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBS	130000	ND		ND		ND		ND		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHxA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHxS	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	130	ND		ND		0.245	J	ND		0.183	J	0.395	J	0.496	J	0.600	J
PFOS	130	ND		ND		0.286	J	0.207	J	0.259	J	ND		ND		ND	
PFPeA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFTrDA	-	ND	UJ	ND		ND		ND		ND		ND	UJ	ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography 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
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-2
PFAS Detections in Surface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI07				AOI08			
Sample ID		AOI7-8-SB-1.5-2-102119		AOI7-9-SB-1.5-2-102119		AOI 8-1-SB-0-0.5-102919		AOI 8-2-SB-0-0.5-102919	
Sample Date		10/21/2019		10/21/2019		10/29/2019		10/29/2019	
Depth		1.5 - 2 ft		1.5 - 2 ft		0 - 0.5 ft		0 - 0.5 ft	
Analyte	**OSD Screening Level [a]**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)									
6:2 FTS	-	ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND	
PFBA	-	ND		ND		ND		ND	
PFBS	130000	ND		ND		ND		ND	
PFDA	-	ND		ND		0.426	J	0.369	J
PFDoA	-	ND		ND		0.213	J	0.261	J
PFHpA	-	ND		ND		ND		ND	
PFHxA	-	ND		ND		ND		ND	
PFHxS	-	ND		ND		0.169	J	ND	
PFNA	-	ND		ND		0.156	J	0.147	J
PFOA	130	0.563	J	ND		0.255	J	0.211	J
PFOS	130	0.455	J	ND		3.02		2.42	
PFPeA	-	ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND	
PFUnDA	-	ND		ND		0.168	J	ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography 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
ug/Kg	micrograms per Kilogram
-	Not applicable

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Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI01															
Sample ID		AOI1-1-SB-4.5-5-102219		AOI1-1-SB-10-10.5-102219		AOI1-2-SB-4.5-5-102319		AOI1-2-SB-9.5-10-102319		AOI1-2-SB-12.5-13-102319		AOI1-3-SB-4.5-5-102219		AOI1-3-SB-9.5-10-102219		AOI1-4-SB-4.5-5-102319	
Sample Date		10/22/2019		10/22/2019		10/23/2019		10/23/2019		10/23/2019		10/22/2019		10/22/2019		10/23/2019	
Depth		4.5 - 5 ft		10 - 10.5 ft		4.5 - 5 ft		9.5 - 10 ft		12.5 - 13 ft		4.5 - 5 ft		9.5 - 10 ft		4.5 - 5 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	0.261	J	ND		0.298	J	1.12	J	ND		ND		0.340	J	0.200	J
PFBS	1600000	0.284	J	0.239	J	0.431	J	0.815	J	ND		ND		0.290	J	0.169	J
PFDA	-	ND		ND		ND		ND		ND		ND		ND		0.224	J
PFDoA	-	ND		ND		ND		ND		ND	UJ	ND		ND		ND	
PFHpA	-	0.668	J	ND		5.07		1.11	J	ND		0.207	J	0.395	J	2.62	
PFHxA	-	1.78		0.924	J	7.82		7.35		0.620	J	0.826	J	2.01		3.78	
PFHxS	-	6.15		1.36		22.7		4.96		2.36		0.672	J	3.87		4.25	
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	1600	24.0		3.25		332		31.9		8.83		3.38		23.0		109	
PFOS	1600	ND		0.262	J	9.85		13.0		31.8		0.304	J	2.63		12.0	
PFPeA	-	0.487	J	0.293	J	1.02	J	3.68		0.231	J	0.198	J	0.831	J	0.809	J
PFTeDA	-	ND		ND		ND		ND		ND	UJ	ND		ND		ND	UJ
PFTrDA	-	ND		ND		ND		ND		ND	UJ	ND		ND		ND	UJ
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
D	perfluoro-n-undecanoic acid
AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI01															
Sample ID		AOI1-4-SB-4.5-5-102319-D		AOI1-4-SB-9.5-10-102319		AOI1-5-SB-4.5-5-102319		AOI1-5-SB-4.5-5-102319-D		AOI1-5-SB-7-7.5-102319		AOI1-6-SB-4.5-5-102319		AOI1-6-SB-9-9.5-102319		AOI1-6-SB-12.5-13-102319	
Sample Date		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019	
Depth		4.5 - 5 ft		9.5 - 10 ft		4.5 - 5 ft		4.5 - 5 ft		7 - 7.5 ft		4.5 - 5 ft		9 - 9.5 ft		12.5 - 13 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	0.199	J	0.334	J	1.96		3.93		8.17		ND		ND		ND	
PFBS	1600000	0.173	J	ND		0.601	J	0.956	J	1.66		ND		ND		ND	
PFDA	-	0.231	J	ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	2.87		0.723	J	16.8		18.4		24.7		1.35		0.891	J	ND	
PFHxA	-	3.99		2.15		27.8		39.4		56.4	J-	0.750	J	1.01	J	ND	
PFHxS	-	4.44		0.804	J	18.6		19.5		14.7		0.803	J	0.406	J	ND	
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	1600	123		28.4		1010		1040		481		191		69.3		5.71	
PFOS	1600	13.7		2.19		1.69		1.88		0.841	J	0.615	J	ND		1.84	
PFPeA	-	0.787	J	1.01	J	7.74	J	14.6	J	32.1		0.159	J	0.308	J	ND	
PFTeDA	-	ND		ND		ND		ND		ND		ND	UJ	ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		ND	UJ	ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
D	perfluoro-n-undecanoic acid
AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI02															
Sample ID		AOI2-1-SB-4.5-5-102519		AOI2-2-SB-4.5-5-102319		AOI2-2-SB-4.5-5-102319-D		AOI2-3-SB-4.5-5-102319		AOI2-3-SB-4.5-5-102319-D		AOI2-4-SB-4.5-5-102519		AOI2-5-SB-4.5-5-102519		AOI2-5-SB-9.5-10-102519	
Sample Date		10/25/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/25/2019		10/25/2019		10/25/2019	
Depth		4.5 - 5 ft		4.5 - 5 ft		4.5 - 5 ft		4.5 - 5 ft		4.5 - 5 ft		4.5 - 5 ft		4.5 - 5 ft		9.5 - 10 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	60.9		12.2		17.4		0.495	J	0.487	J	1.06	J	72.7		2.86	
8:2 FTS	-	ND		21.8		32.7		ND		ND		6.87		2.18		0.365	J
NEtFOSAA	-	ND		ND		0.247	J	ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	12.9		5.71		8.26		9.99		9.89		1.64		13.9		9.25	
PFBS	1600000	3.50		7.24		10.7		32.4		32.9		3.47		50.0		26.0	
PFDA	-	ND		0.869	J	1.32		ND		ND		0.256	J	ND		ND	
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	13.3		8.73		12.3		6.88		7.59		2.11		22.0		4.59	
PFHxA	-	58.0		23.7		34.4		73.9		69.9		5.85		133		66.9	
PFHxS	-	20.4		54.7	J	108	J	132		147		27.3		350		54.8	
PFNA	-	ND		2.06		3.24		ND		ND		2.28		0.197	J	ND	
PFOA	1600	4.21		15.6		25.5		2.45		2.86		6.88		25.9		3.06	
PFOS	1600	0.650	J	904	J-	1120		25.6		26.1		456		118		20.2	
PFPeA	-	67.3		19.1		27.2		27.7		28.2		4.78		41.4		29.8	
PFTeDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFUnDA	-	ND		ND		0.182	J	ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
NMeFOSAA	N-methyl perfluorooctanesulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFTeDA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
D	perfluoro-n-undecanoic acid
AOI	Area of Interest
DUP	Duplicate
ft	feet
HA	Hand auger
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
SS	Surface Soil
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI02		AOI03													
Sample ID		AOI2-5-SB-13-13.5-102519		AOI3-10-SB-10.5-11-102419		AOI3-11-SB-8.5-9-102419		AOI3-11-SB-11-11.5-102419		AOI3-12-SB-7-7.5-102419		AOI3-8-SB-9-9.5-102419		AOI3-8-SB-13-13.5-102419		AOI3-9-SB-8.5-9-102419	
Sample Date		10/25/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019		10/24/2019	
Depth		13 - 13.5 ft		10.5 - 11 ft		8.5 - 9 ft		11 - 11.5 ft		7 - 7.5 ft		9 - 9.5 ft		13 - 13.5 ft		8.5 - 9 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	ND		0.201	J	1.29		1.48		115		0.197	J	0.289	J	0.229	J
8:2 FTS	-	ND		ND		ND		ND		0.858	J	ND		ND		ND	
NEtFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	0.163	J	0.332	J	2.37		0.612	J	16.6		0.736	J	0.200	J	5.33	
PFBS	1600000	ND		0.801	J	9.73		1.79		19.0		1.17		0.778	J	4.41	
PFDA	-	ND		ND		ND		ND		ND		ND		ND		0.420	J
PFDoA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		0.719	J	1.80		0.735	J	33.1		0.513	J	0.225	J	7.75	
PFHxA	-	0.817	J	2.10		23.0		5.82		152		3.51		1.65		29.1	
PFHxS	-	0.511	J	6.56		67.6		22.3		191		5.25		4.89		18.2	
PFNA	-	ND		ND		0.256	J	ND		0.296	J	0.219	J	ND		3.01	
PFOA	1600	2.02		0.456	J	6.61		2.94		50.2		0.780	J	0.459	J	5.44	
PFOS	1600	0.884	J	2.59		599		25.6		32.4		16.7		ND		77.7	
PFPeA	-	0.433	J	1.34		6.94		1.88		81.2		2.20		0.529	J	21.7	
PFTeDA	-	ND		ND		ND		ND	UJ	ND		ND		ND		ND	
PFTrDA	-	ND		ND		ND		ND	UJ	ND		ND		ND		ND	
PFUnDA	-	ND		ND		0.478	J	ND		ND		ND		ND		0.303	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable

Table 6-3
PFAS Detections in Shallow Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI03		AOI04				AOI05		AOI06		AOI07	AOI07	AOI07	AOI07	AOI07	AOI07
Sample ID		AOI3-9-SB-14-14.5-102419		AOI4-1-SB-5.5-6-102519		AOI4-1-SB-9.5-10-102519		AOI5-1-SB-8-8.5-102219		AOI6-1-SB-7-7.5-102219		AOI7-10-SB-7.5-8-102119		AOI7-11-SB-7.5-8-102119		AOI7-9-SB-7.5-8-102119	
Sample Date		10/24/2019		10/25/2019		10/25/2019		10/22/2019		10/22/2019		10/21/2019		10/21/2019		10/21/2019	
Depth		14 - 14.5 ft		5.5 - 6 ft		9.5 - 10 ft		8 - 8.5 ft		7 - 7.5 ft		7.5 - 8 ft		7.5 - 8 ft		7.5 - 8 ft	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																	
6:2 FTS	-	0.299	J	ND		ND		1.61		0.833	J	ND		ND		ND	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		ND	
NEtFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
NMeFOSAA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFBA	-	ND		0.195	J	ND		24.4		3.37		ND		ND		ND	
PFBS	1600000	ND		ND		ND		38.3		ND		ND		ND		ND	
PFDA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFDoA	-	ND		ND	UJ	ND		ND		ND		ND		ND		ND	
PFHpA	-	ND		ND		ND		17.2		0.753	J	ND		ND		ND	
PFHxA	-	0.344	J	0.419	J	ND		115		7.48		ND		ND		ND	
PFHxS	-	0.417	J	ND		ND		12.1		ND		ND		ND		ND	
PFNA	-	ND		ND		ND		ND		ND		ND		ND		ND	
PFOA	1600	1.52		1.59		0.398	J	23.4		ND		ND		ND		ND	
PFOS	1600	0.245	J	0.967	J	ND		1.67		ND		ND		ND		ND	
PFPeA	-	ND		0.514	J	ND		56.3		11.8		ND		ND		ND	
PFTeDA	-	ND		ND	UJ	ND		ND		ND		ND	UJ	ND		ND	
PFTrDA	-	ND		ND	UJ	ND		ND		ND		ND	UJ	ND		ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

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

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
8:2 FTS	8:2 fluorotelomer sulfonate
NEtFOSAA	N-ethyl perfluorooctane- sulfonamidoacetic acid
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PFPeA	perfluoropentanoic acid
PFUnDA	perfluoro-n-undecanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
ft	feet
HQ	Hazard quotient
LCMSMS	Liquid Chromatography Mass Spectrometry
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
QSM	Quality Systems Manual
Qual	Interpreted Qualifier
SB	Soil boring
USEPA	United States Environmental Protection Agency
ug/Kg	micrograms per Kilogram
-	Not applicable

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Table 6-4
PFAS Detections in Deep Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest	AOI01						AOI03		AOI05		AOI06		AOI07			
Sample ID	AOI1-1-SB-17-17.5-102219		AOI1-3-SB-16-16.5-102219		AOI1-5-SB-17.5-18-102319		AOI3-12-SB-19-19.5-102419		AOI5-1-SB-19-19.5-102219		AOI6-1-SB-18.5-19-102219		AOI7-9-SB-17-17.5-102119		AOI7-10-SB-17-17.5-102119	
Sample Date	10/22/2019		10/22/2019		10/23/2019		10/24/2019		10/22/2019		10/22/2019		10/21/2019		10/21/2019	
Depth	17 - 17.5 ft		16 - 16.5 ft		17.5 - 18 ft		19 - 19.5 ft		19 - 19.5 ft		18.5 - 19 ft		17 - 17.5 ft		17 - 17.5 ft	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)																
6:2 FTS	ND		ND		ND		1.27		8.22		ND		ND		ND	
PFBA	ND		0.261	J	ND		ND		2.09		ND		ND		ND	
PFBS	ND		0.258	J	ND		ND		2.61		ND		ND		ND	
PFHpA	ND		0.337	J	ND		ND		1.52		ND		ND		ND	
PFHxA	0.357	J	1.54		0.546	J	0.371	J	8.08		ND		ND		ND	
PFHxS	0.665	J	3.52		ND		0.982	J	22.4		ND		ND		ND	
PFOA	1.49		21.5		3.25		0.176	J	15.7		ND		ND		ND	
PFOS	0.466	J	4.34		0.293	J	2.88		29.4		ND		ND		ND	
PFPeA	ND		0.621	J	0.230	J	ND		4.13		0.205	J	ND		ND	

Interpreted Qualifiers
J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutyrate
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
ft	feet
LOD	Limit of Detection
ND	Analyte not detected above the LOD
Qual	Interpreted Qualifier
SB	Soil boring
µg/Kg	micrograms per Kilogram

Table 6-4
PFAS Detections in Deep Subsurface Soil
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		
Sample ID	AOI7-11-SB-18-18.5-102119	
Sample Date	10/21/2019	
Depth	18 - 18.5 ft	
Analyte	**Result**	**Qual**
Soil, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ug/Kg)		
6:2 FTS	ND	
PFBA	ND	
PFBS	ND	
PFHpA	ND	
PFHxA	ND	
PFHxS	ND	
PFOA	ND	
PFOS	ND	
PFPeA	ND	

Interpreted Qualifiers

J = Estimated concentration

Chemical Abbreviations

6:2 FTS	6:2 fluorotelomer sulfonate
PFBA	perfluorobutyrate
PFBS	perfluorobutane sulfonate
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid

Acronyms and Abbreviations

AOI	Area of Interest
ft	feet
LOD	Limit of Detection
ND	Analyte not detected above the LOD
Qual	Interpreted Qualifier
SB	Soil boring
µg/Kg	micrograms per Kilogram

Table 6-5
PFAS Detections in Groundwater
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI01														AOI02		AOI03			
Sample ID		AOI1-1-GW-102219		AOI1-2-GW-102319		AOI1-3-GW-102219		AOI1-4-GW-102319		AOI1-5A-GW-102319		AOI1-5-GW-102319		AOI1-6-GW-102319		AOI2-5-GW-102519		AOI3-8-GW-102419		AOI3-9-GW-102419	
Sample Date		10/22/2019		10/23/2019		10/22/2019		10/23/2019		10/23/2019		10/23/2019		10/23/2019		10/25/2019		10/24/2019		10/24/2019	
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
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																					
6:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		861		36.5		187	
8:2 FTS	-	ND		ND		ND		ND		ND		ND		ND		9.22		ND		ND	
PFBA	-	596		648		892		170		571		1740		51.7		2090		1060		83.3	
PFBS	40000	675		538		759		36.4		70.7		134		22.7		1600		3060		150	
PFDA	-	ND		2.44	J	8.06	J	1.62	J	4.95	J	ND		1.59	J	ND		ND		ND	
PFHpA	-	1060		759		1330		268		1180		4730		114		2560		995		145	
PFHxA	-	4330		3260		5930		1140		4180		14100	J+	222		12700		7120		565	
PFHxS	-	7010		10500		8590		310		635		1330		341		7810		10900		727	
PFNA	-	9.75		28.5		26.8		5.02	J	11.2		8.10	J	4.53	J	14.5		3.18	J	ND	
PFOA	40	47800		34000		50700		9690		34900		166000		43600		62900		817		1820	
PFOS	40	3660		11100	J-	8810	J-	583		585		273		539		1620		110		ND	
PFPeA	-	1470		1100		2050		509		1770		7190		105		7340		2900		256	
PFTrDA	-	ND		ND	UJ	ND		ND		ND	UJ	3.37	J+	ND		ND		ND	UJ	ND	
PFUnDA	-	ND		ND		ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
GW	Groundwater
HQ	Hazard quotient
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

Table 6-5
PFAS Detections in Groundwater
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI03						AOI04		AOI05						AOI06		AOI07			
Sample ID		AOI3-10-GW-102419		AOI3-11-GW-102419		AOI3-12-GW-102419		AOI4-1-GW-102519		AOI5-1-GW-102219		AOI 5-N19-3-102919		AOI 5-N19-3-102919-D		AOI6-1-GW-102219		AOI7-9-GW-102119		AOI7-10-GW-102119	
Sample Date		10/24/2019		10/24/2019		10/24/2019		10/25/2019		10/22/2019		10/29/2019		10/29/2019		10/22/2019		10/21/2019		10/21/2019	
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
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)																					
6:2 FTS	-	866		1690		2660		481		6140	J-	5040	J-	5270	J-	165		ND		119	
8:2 FTS	-	ND		8.19	J	3.31	J	ND		20.3	J+	375		465		ND		ND		ND	
PFBA	-	507		2480		230		188		3930		1280		1160		65.9		ND		ND	
PFBS	40000	454		6310	J-	330		55.9		7870		795		924		21.7		ND		ND	
PFDA	-	1.55	J	5.37	J	ND		ND		ND		4.30	J	5.78	J	ND		ND		2.11	J
PFHpA	-	625		2130		202		265		2710		988		1150		17.3		ND		ND	
PFHxA	-	2700		16100	J-	1280		513		22900		6200		7020		122		ND		7.45	J
PFHxS	-	3580		46100	J-	2430		360		50900		3020		3490		79.4		ND		4.40	J
PFNA	-	ND		29.0		5.72	J	5.02	J	11.6		10.1		12.4		ND		ND		ND	
PFOA	40	5800		6380		340		245		31300		3450		3450		ND		ND		4.53	J
PFOS	40	486		16600	J-	1830		401		16800	J	2520		2770		ND		ND		ND	
PFPeA	-	1520		7560		785		637		14900		5770		6890		212		ND		ND	
PFTrDA	-	ND		ND	UJ	ND	UJ	ND		ND		ND	UJ	ND	UJ	ND		ND		ND	
PFUnDA	-	ND		6.83	J	ND		ND		ND		ND		ND		ND		ND		ND	

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
GW	Groundwater
HQ	Hazard quotient
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

Table 6-5
PFAS Detections in Groundwater
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest		AOI07		AOI08			
Sample ID		AOI7-7-11-GW-102119		AOI 8-X3-1-102919		AOI 8-X3-1-102919-D	
Sample Date		10/21/2019		10/29/2019		10/29/2019	
Analyte	OSD Screening Level [a]	Result	Qual	Result	Qual	Result	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)							
6:2 FTS	-	94.1		1540		1530	
8:2 FTS	-	ND		155		181	
PFBA	-	ND		426		479	
PFBS	40000	ND		118		132	
PFDA	-	ND		26.2		28.7	
PFHpA	-	ND		559		602	
PFHxA	-	3.77	J	1470		1910	
PFHxS	-	1.63	J	1130		1280	
PFNA	-	ND		229		247	
PFOA	40	ND		3040		3740	
PFOS	40	1.56	J	4670		4880	
PFPeA	-	ND		1590		1940	
PFTrDA	-	ND		ND		ND	
PFUnDA	-	ND		3.31	J	3.50	J

Grey Fill — Detected concentration exceeded OSD Screening Levels

References

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

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
GW	Groundwater
HQ	Hazard quotient
LOD	Limit of Detection
ND	Analyte not detected above the LOD
OSD	Office of the Secretary of Defense
Qual	Interpreted Qualifier
USEPA	United States Environmental Protection Agency
ng/L	nanogram per liter
-	Not applicable

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Table 6-6
PFAS Detections in Surface Water
Site Inspection Report, Joint Force Training Base, Los Alamitos

Area of Interest	AOI08											
Sample ID	AOI 8-3-SW-102919		AOI 8-4-SW-102919		AOI 8-5-SW-102919		AOI 8-6-SW-102919		AOI 8-7-SW-102919		AOI 8-7-SW-102919-D	
Sample Date	10/29/2019		10/29/2019		10/29/2019		10/29/2019		10/29/2019		10/29/2019	
Analyte	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual	Result	Qual
Water, PFAS via PFAS by LCMSMS Compliant with QSM 5.1 Table B-15 (ng/L)												
6:2 FTS	122		233		275	J-	306	J-	271		250	
8:2 FTS	4.97	J+	7.93	J	13.5		7.69	J	8.20	J	9.13	
PFBA	8.61		15.7		18.6		19.3		19.6		18.0	
PFBS	3.89	J	5.42	J	5.90	J	6.43	J	5.68	J	5.19	J
PFDA	ND		1.89	J	3.16	J	2.35	J	2.44	J	1.97	J
PFHpA	6.63	J	11.6		14.0		15.8		15.5		13.3	
PFHxA	30.4		59.2		65.4		74.1		69.3		68.9	
PFHxS	16.5		28.8		33.5		36.6		33.4		30.3	
PFNA	2.86	J	5.01	J	6.68	J	6.02	J	4.41	J	4.22	J
PFOA	14.5		25.4		26.7		29.2		25.8		24.7	
PFOS	34.5		54.4		104	J+	71.2	J+	57.6		58.8	
PFPeA	33.7		63.8		74.1		80.2		76.2		70.8	
PFTrDA	3.12	J+	ND	UJ	ND		ND		ND	UJ	ND	UJ
PFUnDA	ND	UJ	ND		ND		ND		ND		1.73	J

Interpreted Qualifiers

J = Estimated concentration

J- = Estimated concentration, biased low

J+ = Estimated concentration, biased high

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

Chemical Abbreviations

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

Acronyms and Abbreviations

AOI	Area of Interest
D	Duplicate
LOD	Limit of Detection
ND	Analyte not detected above the LOD
Qual	Interpreted Qualifier
SW	Surface water
ng/L	nanogram per liter

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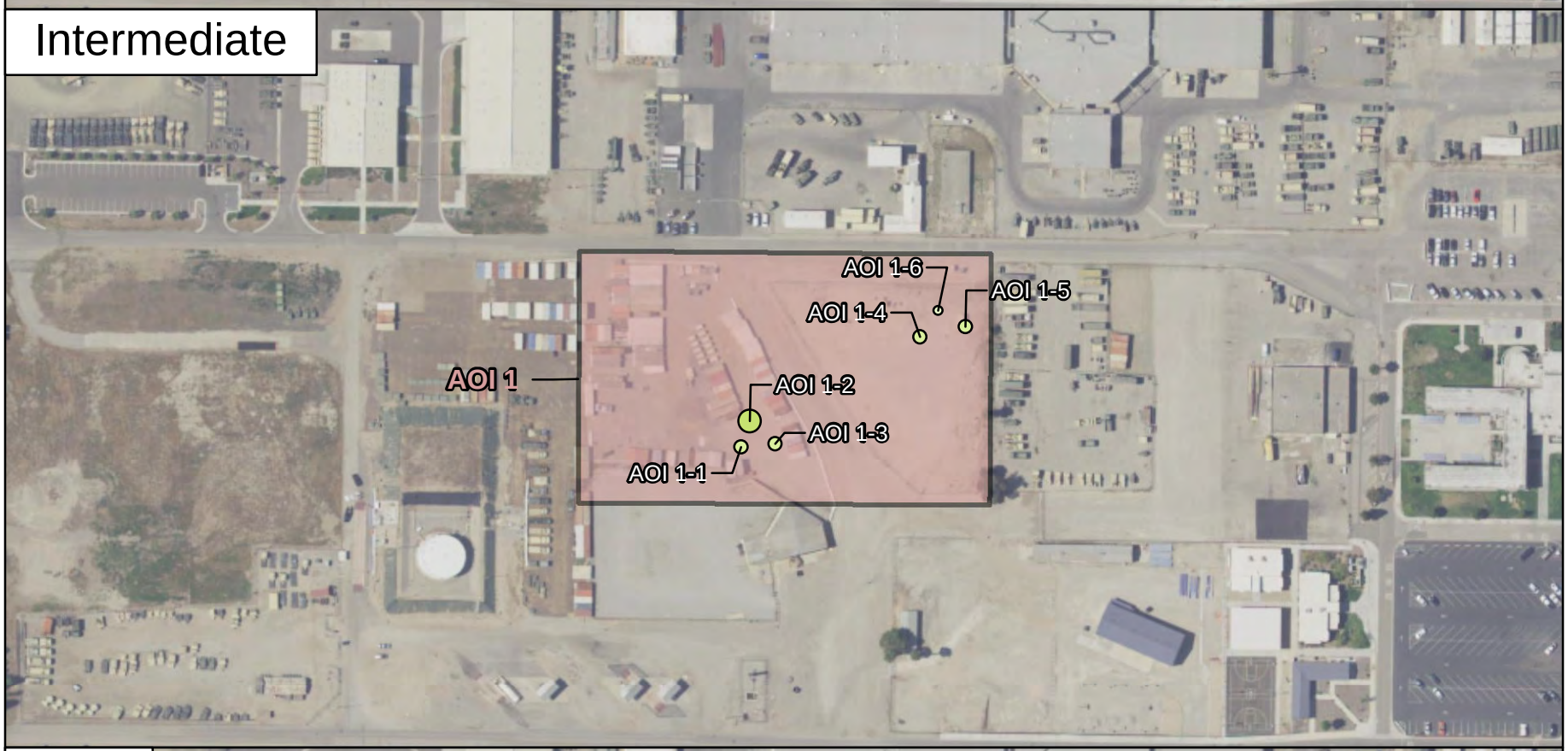
Shallow

Intermediate



Deep

Area of Interest (AOI)

Facility Boundary

PFOS (µg/kg)

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

0 100 200 400 Feet

PFOS Detections in Soil, AOI 1

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:2,400	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-1

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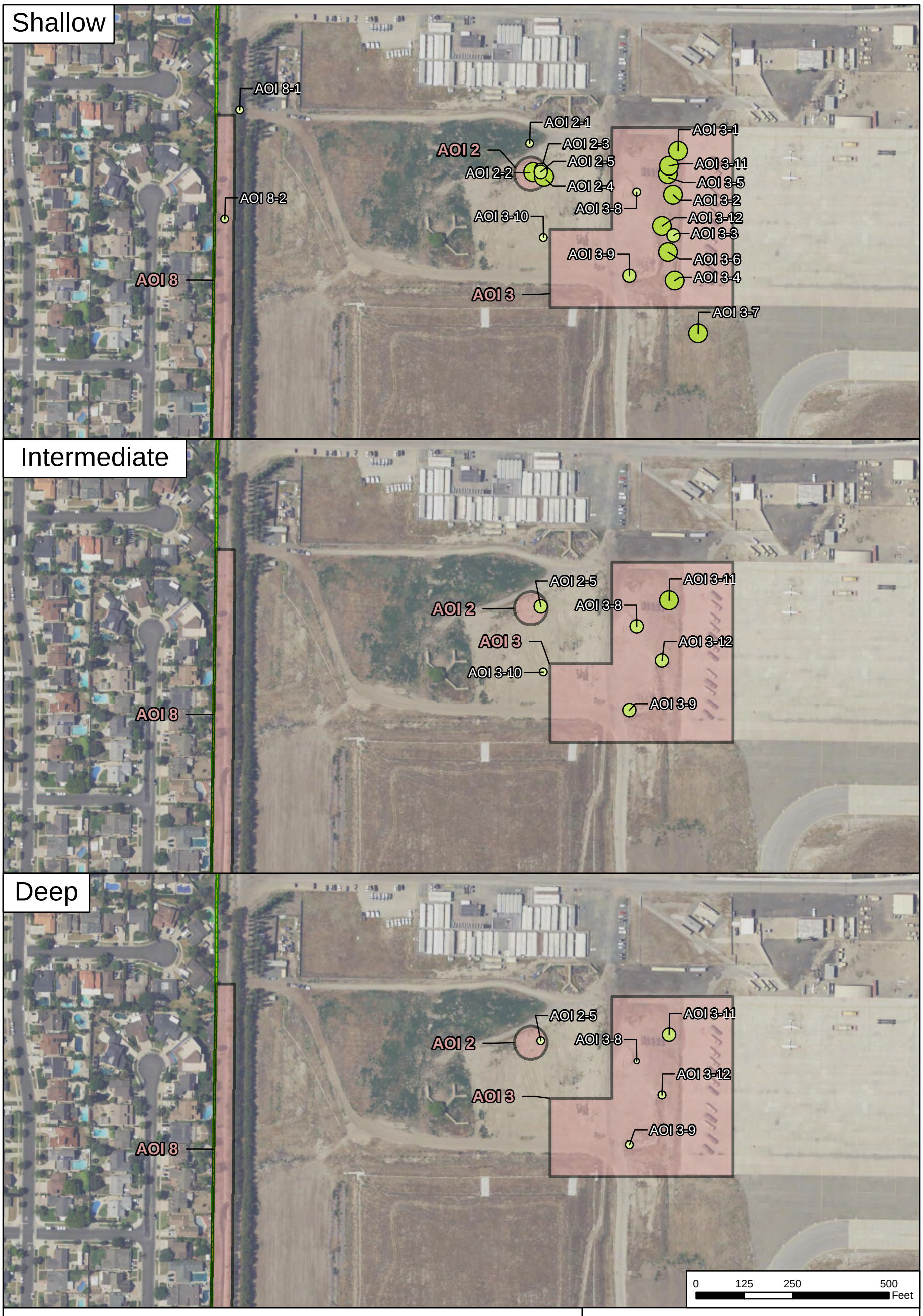

Area of Interest (AOI)

Facility Boundary

PFOS (µg/kg)

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

0 125 250 500 Feet

PFOS Detections in Soil, AOIs 2, 3, 8

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/16/2020	GIS BY	MS	3/16/2020
SCALE	1:3,000	CHK BY	SL	3/16/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/16/2020

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Figure 6-2

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Area of Interest (AOI)

Facility Boundary

PFOS (µg/kg)

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

0 125 250 500 Feet

PFOS Detections in Soil, AOIs 4, 5, 6

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:3,000	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-3

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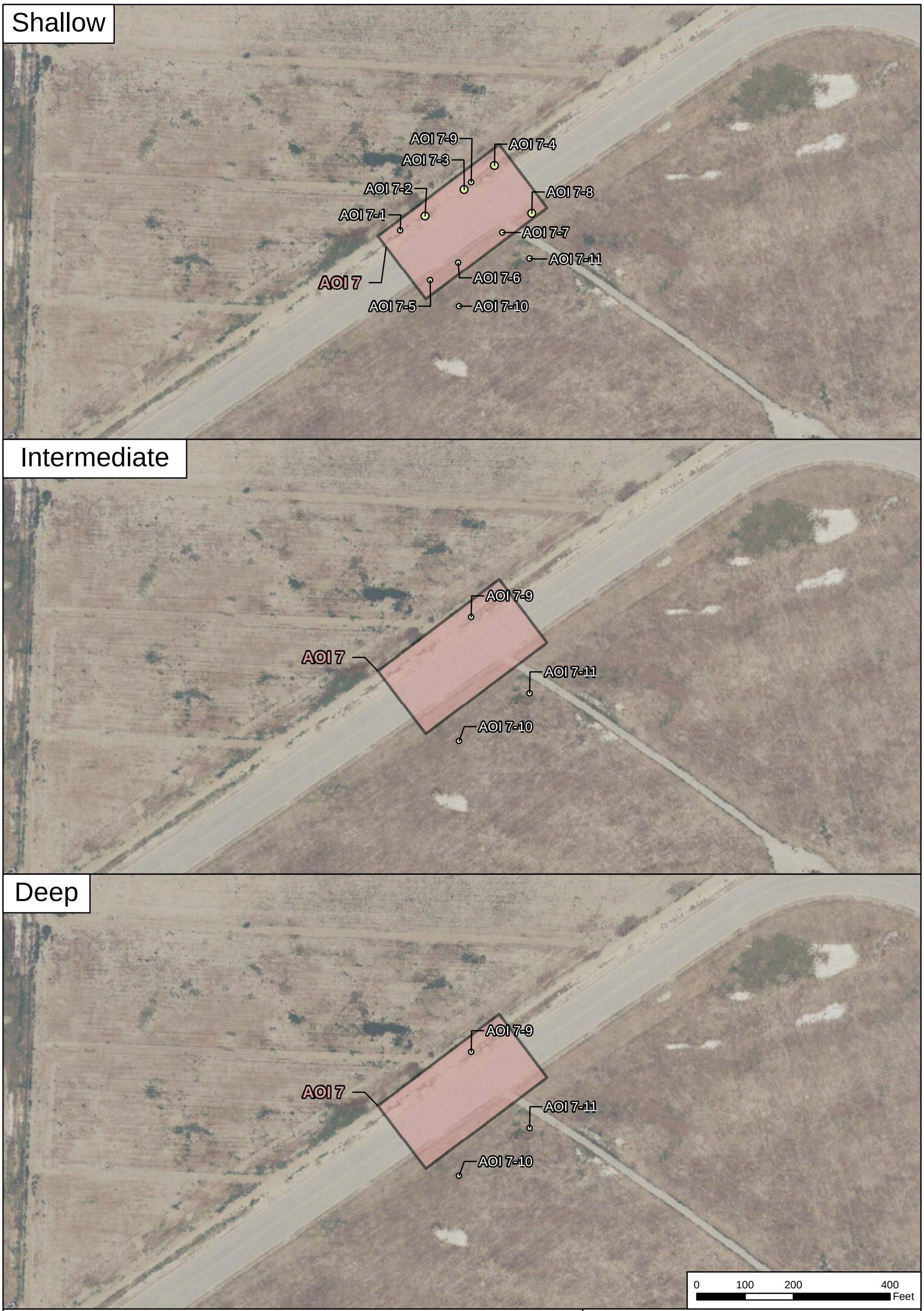

Area of Interest (AOI)

Facility Boundary

PFOS (µg/kg)

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

0 100 200 400 Feet

PFOS Detections in Soil, AOI 7

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:2,400	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-4

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Shallow

AOI 1
AOI 1-1
AOI 1-2
AOI 1-3
AOI 1-4
AOI 1-5
AOI 1-6

Intermediate

AOI 1
AOI 1-1
AOI 1-2
AOI 1-3
AOI 1-4
AOI 1-5
AOI 1-6

Deep

AOI 1
AOI 1-1
AOI 1-2
AOI 1-3
AOI 1-5
AOI 1-6

0 100 200 400 Feet

Area of Interest (AOI)
Facility Boundary

PFOA (µg/kg)

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

0 100 200 400 Feet

PFOA Detections in Soil, AOI 1

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:2,400	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-5

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Shallow

AOI 8-1
AOI 8-2
AOI 8
AOI 2
AOI 2-1
AOI 2-3
AOI 2-5
AOI 2-2
AOI 2-4
AOI 3-1
AOI 3-11
AOI 3-5
AOI 3-2
AOI 3-8
AOI 3-10
AOI 3-12
AOI 3-3
AOI 3-9
AOI 3-6
AOI 3-4
AOI 3
AOI 3-7

Intermediate

AOI 8-1
AOI 8
AOI 2
AOI 2-5
AOI 3-11
AOI 3-8
AOI 3
AOI 3-12
AOI 3-10
AOI 3-9

Deep

AOI 8-1
AOI 8
AOI 2
AOI 2-5
AOI 3-11
AOI 3-8
AOI 3
AOI 3-12
AOI 3-9

0 125 250 500 Feet

Area of Interest (AOI)
Facility Boundary

PFOA (µg/kg)

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

0 125 250 500 Feet

PFOA Detections in Soil, AOIs 2, 3, 8

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:3,000	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-6

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Area of Interest (AOI)

Facility Boundary

PFOA (µg/kg)

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

0 125 250 500 Feet

PFOA Detections in Soil, AOIs 4, 5, 6

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:3,000	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-7

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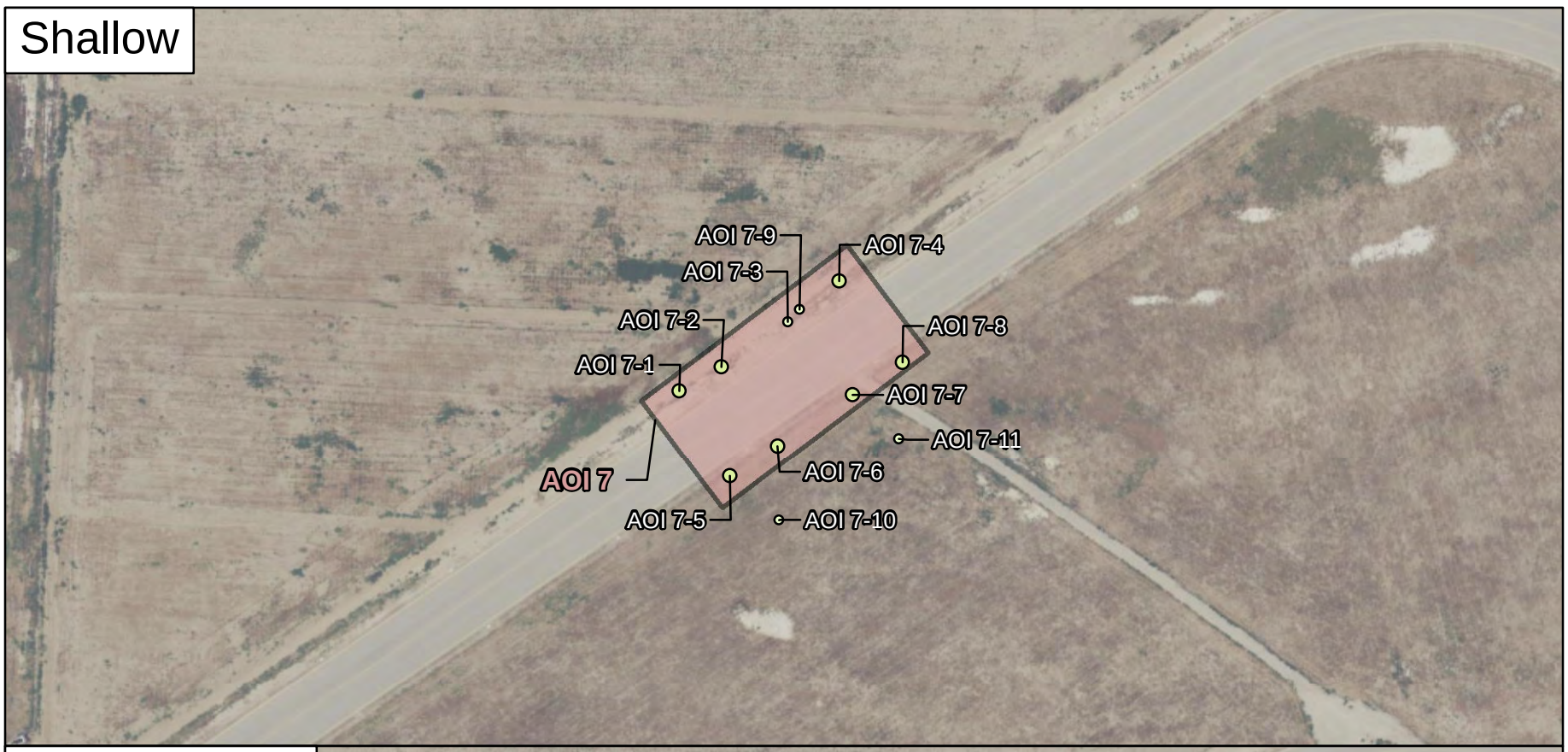
Shallow



Intermediate

Deep

0 100 200 400 Feet

Area of Interest (AOI)
Facility Boundary

PFOA (µg/kg)

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

0 100 200 400 Feet

PFOA Detections in Soil, AOI 7

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	3/17/2020	GIS BY	MS	3/17/2020
SCALE	1:2,400	CHK BY	SL	3/17/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/17/2020

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Figure 6-8

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PFOA

AOI 1
AOI 1-1
AOI 1-2
AOI 1-3
AOI 1-4
AOI 1-5
AOI 1-5A
AOI 1-6

PFOS

AOI 1
AOI 1-1
AOI 1-2
AOI 1-3
AOI 1-4
AOI 1-5
AOI 1-5A
AOI 1-6

0 100 200 400 Feet

Area of Interest (AOI)
Facility Boundary
Inferred Groundwater Flow Direction

PFOA Results (ng/L)
ND
>ND - 10
>10 - 40
>40 - 70
>70 - 400
>400

PFOS Results (ng/L)
ND
>ND - 10
>10 - 40
>40 - 70
>70 - 400
>400

PFOA & PFOS Detections in Groundwater, AOI 1

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	7/23/2020	GIS BY	MS	7/23/2020
SCALE	1:2,400	CHK BY	SL	7/23/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	7/23/2020

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Figure 6-9

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PFOA

PFOS

AOI 2-5
AOI 3-11
AOI 3-8
AOI 2
AOI 3-12
AOI 3-10
AOI 3-9
AOI 3
AOI 8
X3-1

PFOA Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOS Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	7/23/2020	GIS BY	MS	7/23/2020
SCALE	1:3,600	CHK BY	SL	7/23/2020
Base Map:		PM	RG	7/23/2020

Area of Interest (AOI)
Facility Boundary
Inferred Groundwater Flow Direction

0 150 300 600 Feet

N

PFOA & PFOS Detections in Groundwater, AOI 2, 3, 8

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Figure 6-10

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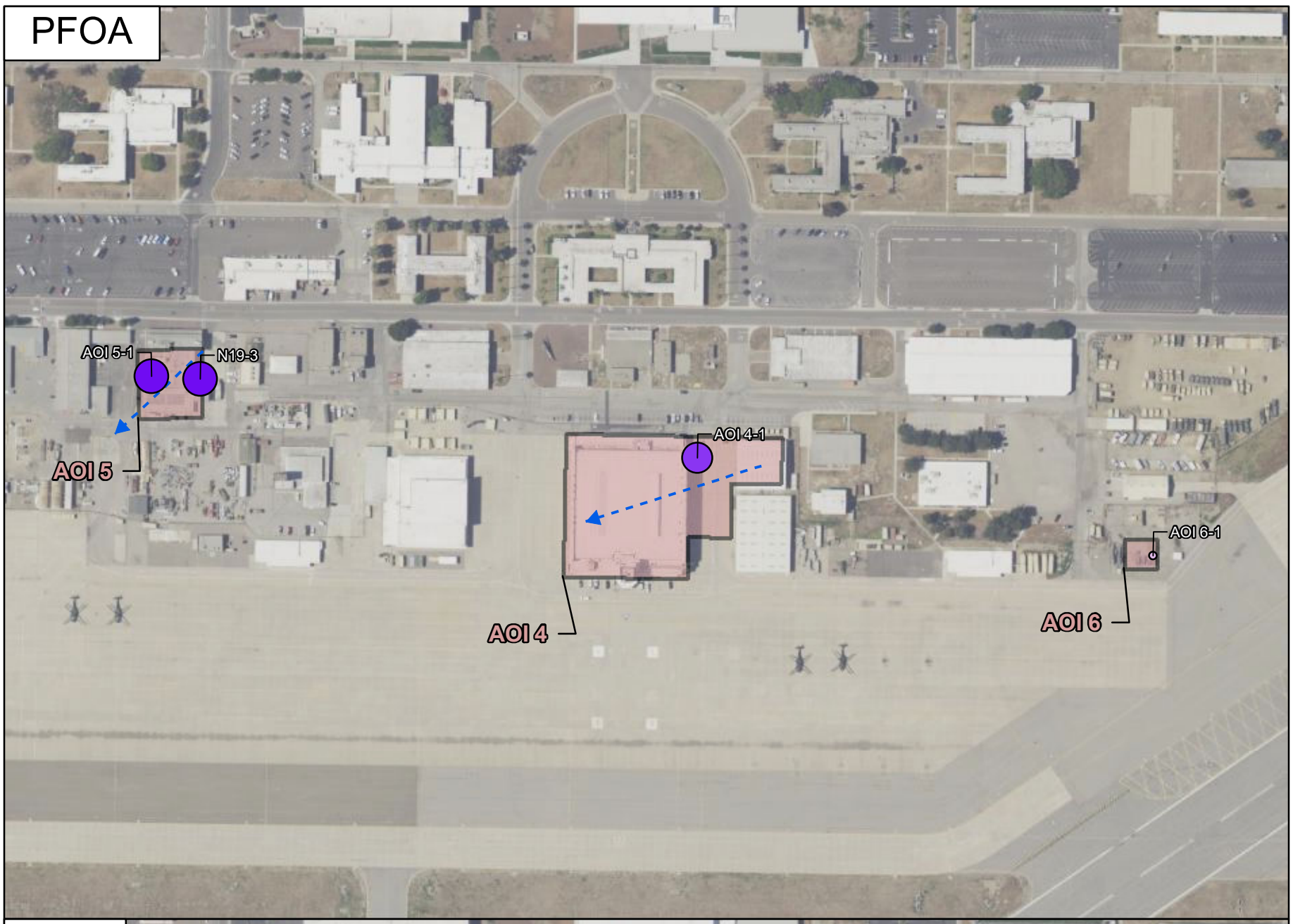
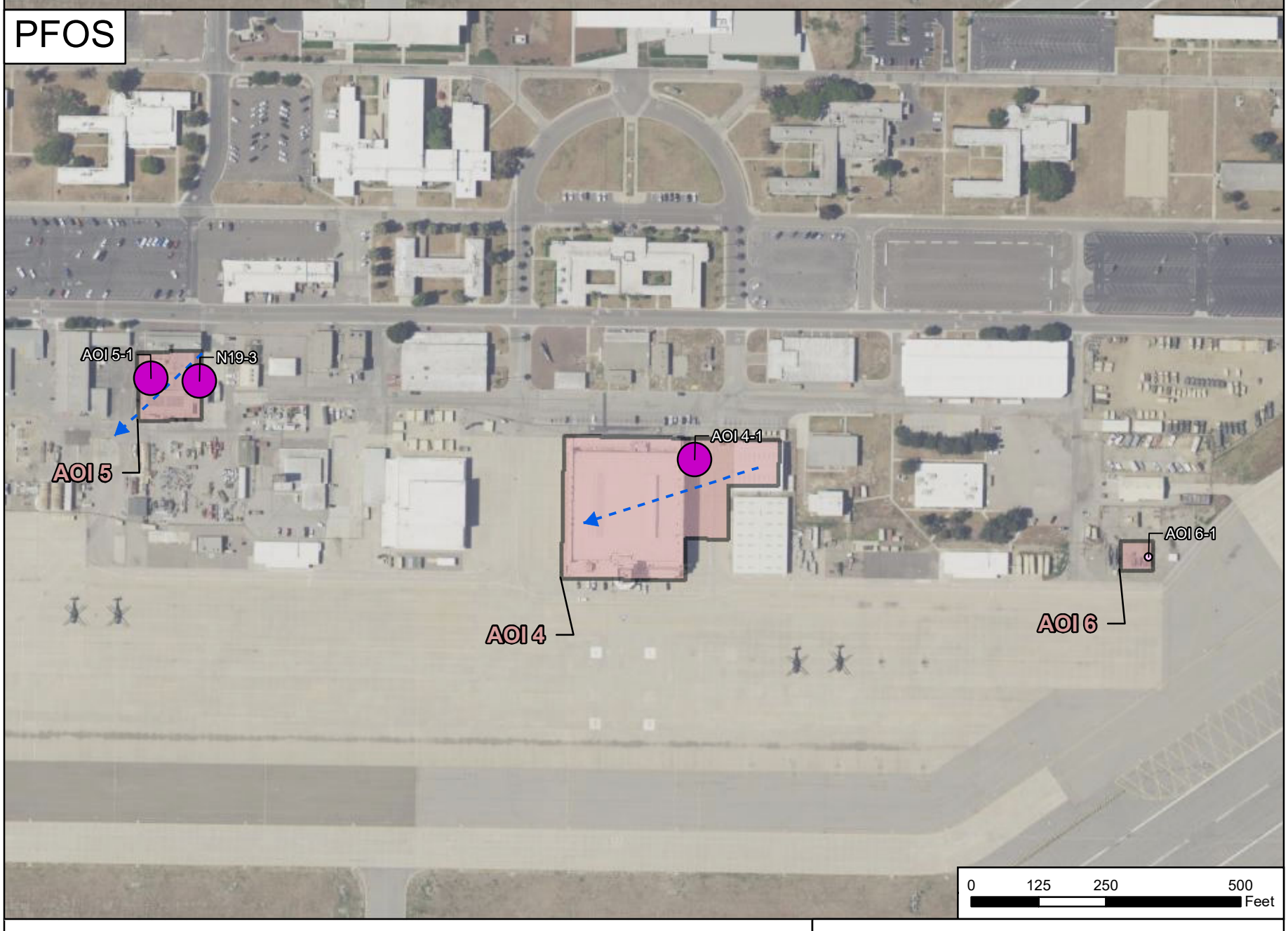
PFOA



PFOS



Area of Interest (AOI)
Facility Boundary
Inferred Groundwater Flow Direction

PFOA Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOS Results (ng/L)
- ND
- >ND - 10
- >10 - 40
- >40 - 70
- >70 - 400
- >400

PFOA & PFOS Detections in Groundwater, AOI 4, 5, 6

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	7/23/2020	GIS BY	MS	7/23/2020
SCALE	1:3,000	CHK BY	SL	7/23/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	7/23/2020

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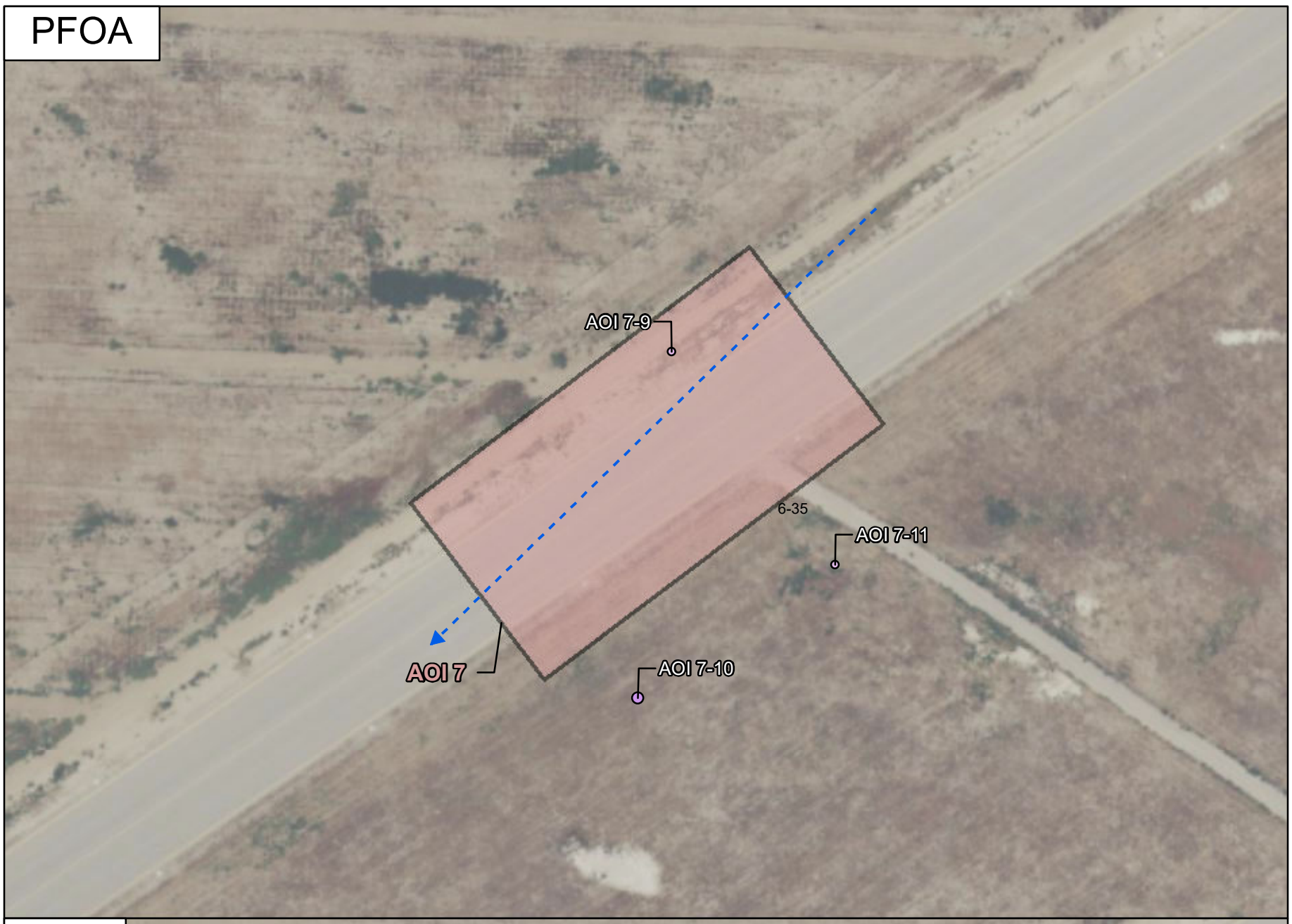
Germantown, MD 20876

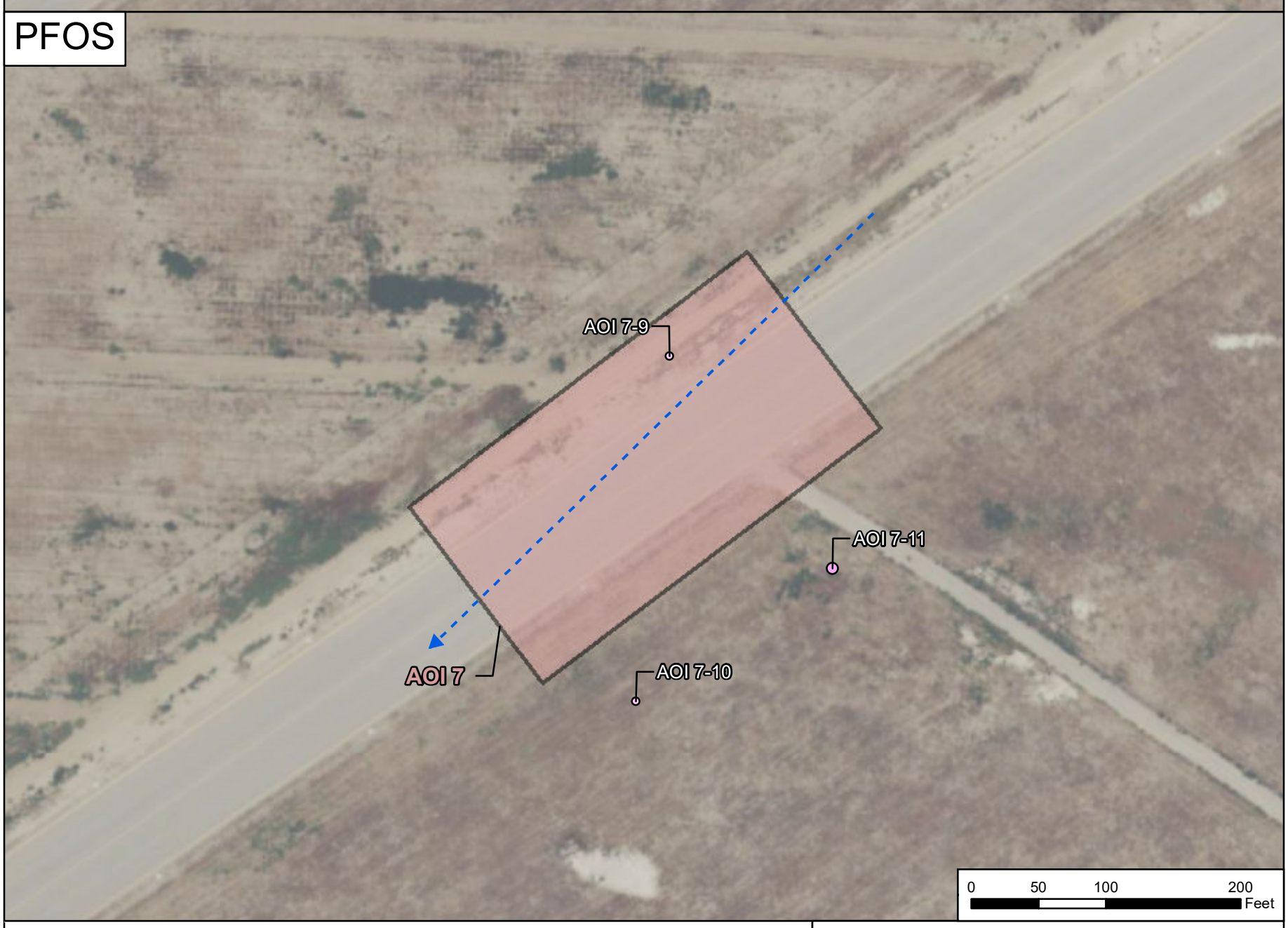
Figure 6-11

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXDs\CA\Los_Alamitos\SI_Figures\SI_Results_Figures\Fig_6-11_Los_Alamitos_GW_PFOA_PFOS_Combined_AOI_4_5_6.mxd

PFOA



PFOS



Area of Interest (AOI)

Inferred Groundwater Flow Direction

PFOA Results (ng/L)

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

PFOS Results (ng/L)

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

PFOA & PFOS Detections in Groundwater, AOI 7

CLIENT	ARNG			
PROJECT	Site Inspection for PFAS at Los Alamitos, CA			
REVISED	7/23/2020	GIS BY	MS	7/23/2020
SCALE	1:1,200	CHK BY	SL	7/23/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	7/23/2020

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-12

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PFOA

PFOS

AOI 1
AOI 2
AOI 3
AOI 4
AOI 5
AOI 6
AOI 7
AOI 8
AOI 8-3
AOI 8-4
AOI 8-5
AOI 8-6
AOI 8-7

0 500 1,000 2,000 Feet

Facility Boundary

PFOA Results (ng/L)
- ND
- >ND - 10
- >10 - 100
- >100 - 1,000
- >1,000

PFOS Results (ng/L)
- ND
- >ND - 10
- >10 - 100
- >100 - 1,000
- >1,000

N

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	3/20/2020	GIS BY	MS	3/20/2020
SCALE	1:12,000	CHK BY	SL	3/20/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/20/2020

PFOA and PFOS Detections in Surface Water

AECOM
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Germantown, MD 20876

Figure 6-13

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7.0 Exposure Pathways

The CSMs for each AOI, revised based on the SI findings, are presented on **Figure 7-1** through **Figure 7-8**. 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 no identified complete pathway generally warrant no further action. However, the pathway is considered potentially complete if PFOA, PFOS or PFBS are detected, in which case the CSM figure uses a half-filled circle symbol to represent a potentially complete exposure pathway. Additionally, a completely filled circle symbol is used to indicate when a potentially complete exposure pathway has detections of PFOA, PFOS, or PFBS above the SLs. Areas with an identified potentially complete pathway may warrant further investigation.

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

7.1 Soil Exposure Pathway

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

7.1.1 AOI 1

Until approximately 1983, an unknown amount of AFFF may have been released to soil at the two Old CFR Training Pits, located in close proximity to each other in the northwest portion of the JFTB LA. During the fire training exercises, fuels or other combustibles were ignited in the unlined pits, and the fires were extinguished using AFFF. The quantity of fuel used during each fire training session was reported to be approximately 500 to 1,000 gallons, and exercises were conducted six to eight times per week over the period that the pits were used. PFOA, PFOS and PFBS were detected in soil at AOI 1 and confirm the release of PFAS to soil in AOI 1. Based on the results of the SI in AOI 1, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities could also potentially result in future construction worker exposure to subsurface soil. No current construction is occurring at AOI 1. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to

PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 1 is presented on **Figure 7-1**.

7.1.2 AOI 2

The New CFR Training Pit is located to the south of the former JP-4 TFA, in the western portion of the JFTB LA. From 1983 until September 1987, an unknown quantity of unknown percentage of AFFF may have been released to surface soil at the unlined training pit during fire training exercises. Fire training exercises were conducted six to eight times per week over the approximate 5-year period the pit was used, and approximately 500 to 10,00 gallons of fuel were burned during each training session. PFOA, PFOS, and PFBS were detected in soil at AOI 2 and confirm the release of PFAS to soil in AOI 2. Based on the results of the SI in AOI 2, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities could also potentially result in future construction worker exposure to subsurface soil. No current construction is occurring at AOI 2. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 2 is presented on **Figure 7-2**.

7.1.3 AOI 3

The WEF FTA is located at the northwest edge of the paved runway area, in the northwest portion of the JFTB LA. According to PA findings, fire training exercises were conducted in the WEF area within the last 20 years. An unknown amount of 3% AFFF was applied to simulated targets on the concrete portion of the tarmac during each training session. The residual AFFF was sprayed off the concrete with water into the grass and soil covered areas west of the concrete tarmac. In addition, AFFF equipment nozzle testing was conducted between approximately 2000 to 2017 on a monthly basis in the southwest corner of the WEF. During the tests, 3% AFFF was sprayed through equipment nozzles for approximately 10 seconds. The stream of AFFF spray was directed to the grassy area west of the WEF's concrete surface. PFOA, PFOS, and PFBS were detected in soil at AOI 3 and confirm the release of PFAS to soil in AOI 3. Based on the results of the SI in AOI 3, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities could also potentially result in future construction worker exposure to subsurface soil. No current construction is occurring at AOI 3. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 3 is presented on **Figure 7-3**.

7.1.4 AOI 4

The JFTB LA Hangar 1 is located to the north of the approximate center of the flightline and west of the wash rack and Building 914. In October 2012, approximately 100 gallons of 3% AFFF were reported to have been released into Hangar 1 during the fire suppression system testing. The helicopter that was being serviced in the hangar when the event occurred was hosed off with water in the wash rack area situated west of the hangar. AFFF in the hangar was pushed out to the concrete driveway area between the hangar and wash rack. During the PA visit, a 750-gallon capacity AST containing 3% AFFF was observed outdoors, in the northeast corner of the hangar.

Although AFFF was released to the paved surface, cracks in the concrete observed during the PA visit in the driveway areas in the vicinity of Hangar 1 and Building 34 may be conduits for PFAS migration to soil. PFOA and PFOS were detected in soil at AOI 4 and confirm the release of PFAS to soil in AOI 4. Based on the results of the SI in AOI 4, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA

and PFOS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities could also potentially result in future construction worker exposure to subsurface soil. No current construction is occurring at AOI 4, and the area is paved. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA and PFOS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 4 is presented on **Figure 7-4**.

7.1.5 AOI 5

Building 34 (JFTB LA Fire Station) is located south of Constitution Avenue, east of Building 35. The Fire Station operates four firefighting trucks that are filled with 3% AFFF in a concrete driveway area on the west side of the building. The firefighting trucks are parked in multiple areas around the Fire Station, including both the east and west sides of the station and the station bays. According to PA findings, 3% AFFF is occasionally spilled and leaked onto the driveway where the firefighting trucks are filled. The spills and leaks were reported to be on the order of a few drops to a few gallons. In addition, approximately 48 55-gallon plastic drums and 36 5-gallon plastic containers containing various brands of AFFF products were observed in the AFFF storage area located in the southwest portion of Building 34 during PA visit.

Although AFFF was released to the paved surface, cracks in the asphalt may be conduits for PFAS migration to soil. PFOA, PFOS, and PFBS were detected in soil at AOI 5 and confirm the release of PFAS to soil in AOI 5. Based on the results of the SI in AOI 5, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA, PFOS, and PFBS via inhalation of dust or ingestion of surface soil. Ground-disturbing activities could also potentially result in future construction worker exposure to subsurface soil. No current construction is occurring at AOI 5. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA, PFOS, and PFBS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 5 is presented on **Figure 7-5**.

7.1.6 AOI 6

According to PA findings, approximately 70 to 80 gallons of 3% AFFF were expelled from a firefighting truck into an abandoned structure located to the south of the existing Building 80 for insect abatement purpose. The structure was subsequently demolished and removed at an unknown time. The area surrounding Building 80 is paved with concrete. PFOA and PFOS were detected in soil at AOI 6 at several orders of magnitude lower than SLs and primarily concentrated at the surface. Based on the results of the SI in AOI 6, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers to PFOA and PFOS via inhalation of dust or ingestion of surface soil. No current construction is occurring at AOI 6. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA and PFOS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant, especially given the low concentrations detected in soil at AOI 6. The CSM for AOI 6 is presented on **Figure 7-6**.

7.1.7 AOI 7

An estimated 70 to 100 gallons of 3% AFFF were reported to be released to the approximate mid-point of the Alpha Hammer-Head taxiway during an emergency response to a wheel-brake fire. The taxiway is situated in the northeastern corner of the JFTB LA. PFOA and PFOS were detected in soil at AOI 7 at several orders of magnitude lower than SLs and primarily concentrated at the surface. Based on the results of the SI in AOI 7, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA and PFOS via inhalation of dust or ingestion of surface soil. No current construction is occurring at AOI 7. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to

PFOA and PFOS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 7 is presented on **Figure 7-7**.

7.1.8 AOI 8

The WDD is a mostly unlined and open ditch that parallels the JFTB LA western property boundary. The drainage ditch leaves the facility in a direction to the southwest and discharges into the Los Alamitos Retarding Basin and the San Gabriel River before entering the Pacific Ocean. The WDD is considered a potential release area, as surface water and sediment potentially impacted from various AFFF release sites on the west portion of the property may have migrated to the WDD. In addition, water in the WDD may be marginally influent to the shallow groundwater zone during the rainy season based on available hydrogeological data. PFOA and PFOS were detected in soil at AOI 8 at several orders of magnitude lower than SLs and primarily concentrated at the surface. Based on the results of the SI in AOI 8, ground-disturbing activities could potentially result in site worker, future construction worker, and trespassers exposure to PFOA and PFOS via inhalation of dust or ingestion of surface soil. No current construction is occurring at AOI 8. Additionally, off-facility recreational users and off-facility residents may potentially be exposed to PFOA and PFOS via inhalation of dust caused by on-facility ground disturbing activities, although this exposure is likely insignificant. The CSM for AOI 8 is presented on **Figure 7-8**.

7.2 Groundwater Exposure Pathway

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

7.2.1 AOI 1

PFOA, PFOS, and PFBS were detected in groundwater from temporary monitoring wells at the source area and exceeded the SLs for PFOS and PFOA at seven temporary monitoring wells in the Old CFR Training Pits. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. The ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 1 is presented on **Figure 7-1**.

7.2.2 AOI 2

PFOA, PFOS, and PFBS were detected in groundwater from one temporary monitoring well at the source area and exceeded the SLs for PFOS and PFOA at one temporary monitoring well in the New CFR Training Pits. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. The ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 2 is presented on **Figure 7-2**.

7.2.3 AOI 3

PFOA, PFOS, and PFBS were detected in groundwater from five temporary monitoring wells at the source area and exceeded the SLs for PFOS and PFOA at five temporary monitoring wells in the WEF FTA with the exception of no detection of PFOS in AOI3-9. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. The ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 3 is presented on **Figure 7-3**.

7.2.4 AOI 4

PFOA, PFOS, and PFBS were detected in groundwater from one temporary monitoring well at the source area and exceeded the SLs for PFOS and PFOA at one temporary monitoring well in the Hangar 1 area. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. The ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 4 is presented on **Figure 7-4**.

7.2.5 AOI 5

PFOA, PFOS, and PFBS were detected in groundwater from one temporary monitoring well and one existing monitoring well at the source area and exceeded the SLs for PFOS and PFOA at one temporary monitoring well and one existing monitoring well in the JFTB LA Fire Station area. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. The ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 5 is presented on **Figure 7-5**.

7.2.6 AOI 6

PFBS was detected in groundwater from one temporary monitoring well at the source below the SL for PFBS at one temporary monitoring well monitoring well in the Building 80 area. PFOA and PFOS were not detected in the groundwater at the source area. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. Additionally, the ingestion exposure pathway is potentially complete for future construction workers during trenching activities deep enough to encounter shallow groundwater. The CSM for AOI 6 is presented on **Figure 7-6**.

7.2.7 AOI 7

PFOA and PFOS were detected in groundwater from two temporary monitoring wells at the source below the individual SL for PFOA and PFOS at two temporary monitoring well monitoring wells in

the Emergency Response area. PFBS was not detected in the groundwater at the source area. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. Additionally, the ingestion exposure pathway is potentially complete for future construction workers during trenching activities deep enough to encounter shallow groundwater. The CSM for AOI 7 is presented on **Figure 7-7**.

7.2.8 AOI 8

PFOA, PFOS, and PFBS were detected in groundwater from one existing monitoring well at the source area and exceeded the SLs for PFOS and PFOA at one existing monitoring well in the WDD. Although drinking water wells are located downgradient of the site, the screen intervals of these wells are significantly deeper than the shallow groundwater sampled during the SI. Therefore, the exposure pathway via ingestion of groundwater is considered potentially complete for off-facility residents. Additionally, the ingestion exposure pathway for future construction workers is considered complete due to the exceedance of the SL for PFOS and PFOA, although this exposure is likely insignificant because groundwater is deeper than 15 feet bgs and construction worker contact is unlikely. The CSM for AOI 8 is presented on **Figure 7-8**.

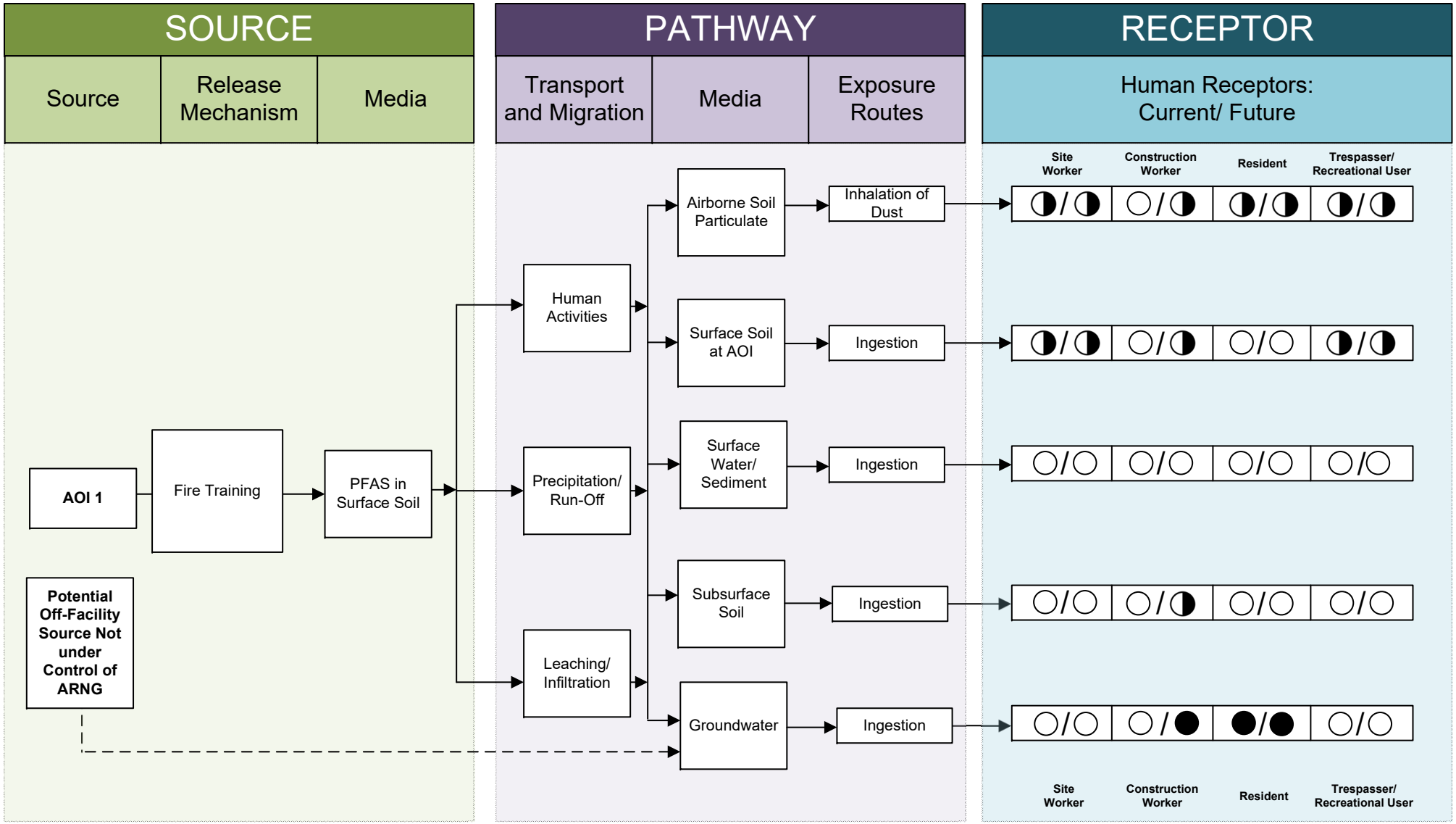
7.3 Surface Water Exposure Pathway

The SI results for PFOA, PFOS, and PFBS in surface water were used to determine whether a potentially complete pathway exists between the source and potential receptors.

7.3.1 AOI 8

Surface water entering storm drains at the flight line, main roadways, and other areas within the operational cantonment areas of the JFTB LA flows to an outfall structure located in the WDD, south of the JP-4 containment system. Surface water entering all other catch basins at the facility, with exception to water entering catch basins associated with the various wash rack facilities, drain to the WDD. In addition, a majority of surface water runoff from the cantonment areas of the facility and from areas generally in the western side of the facility, likely flows to and is captured by the WDD. Significant volumes of groundwater extracted historically by various remediation systems were passed through granular activated carbon vessels subsequent to which the effluent was ultimately discharged to the WDD.

PFOA, PFOS, and PFBS were detected in surface water samples collected at AOI 8. Therefore, the exposure pathways for surface water via ingestion are potentially complete for site workers and construction workers for the portion of the WDD that flows onsite, and for nearby off-facility residents and recreational users of the offsite portion of the WDD. The ingestion exposure pathway for groundwater is potentially complete for workers and construction workers. The CSM for AOI 8 is presented on **Figure 7-8**.



LEGEND

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

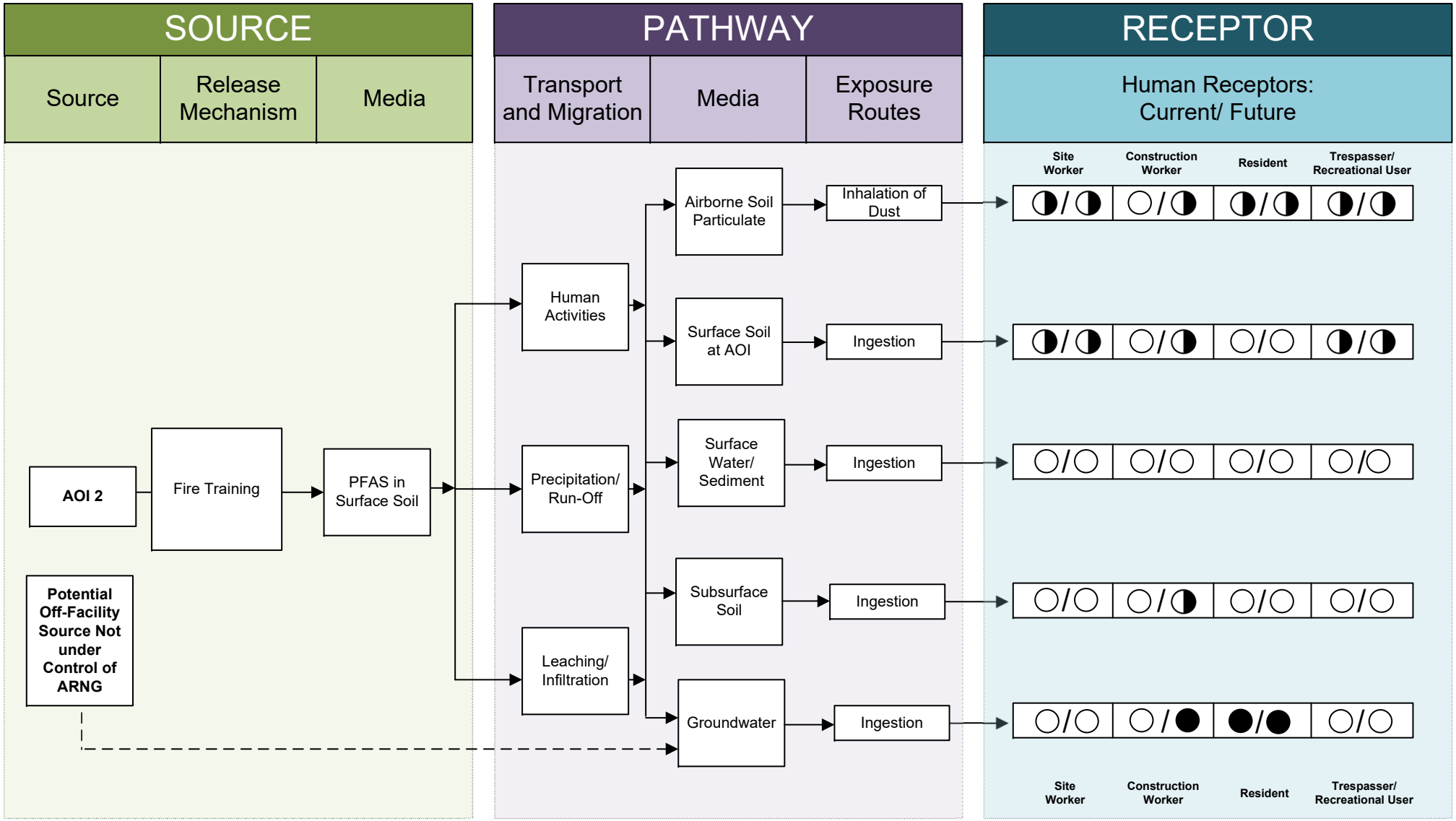
NOTES

1. The resident and recreational user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-1. Conceptual Site Model

AOI 1 – Old Crash Fire Training Pits

Joint Forces Training Base Los Alamitos



LEGEND

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

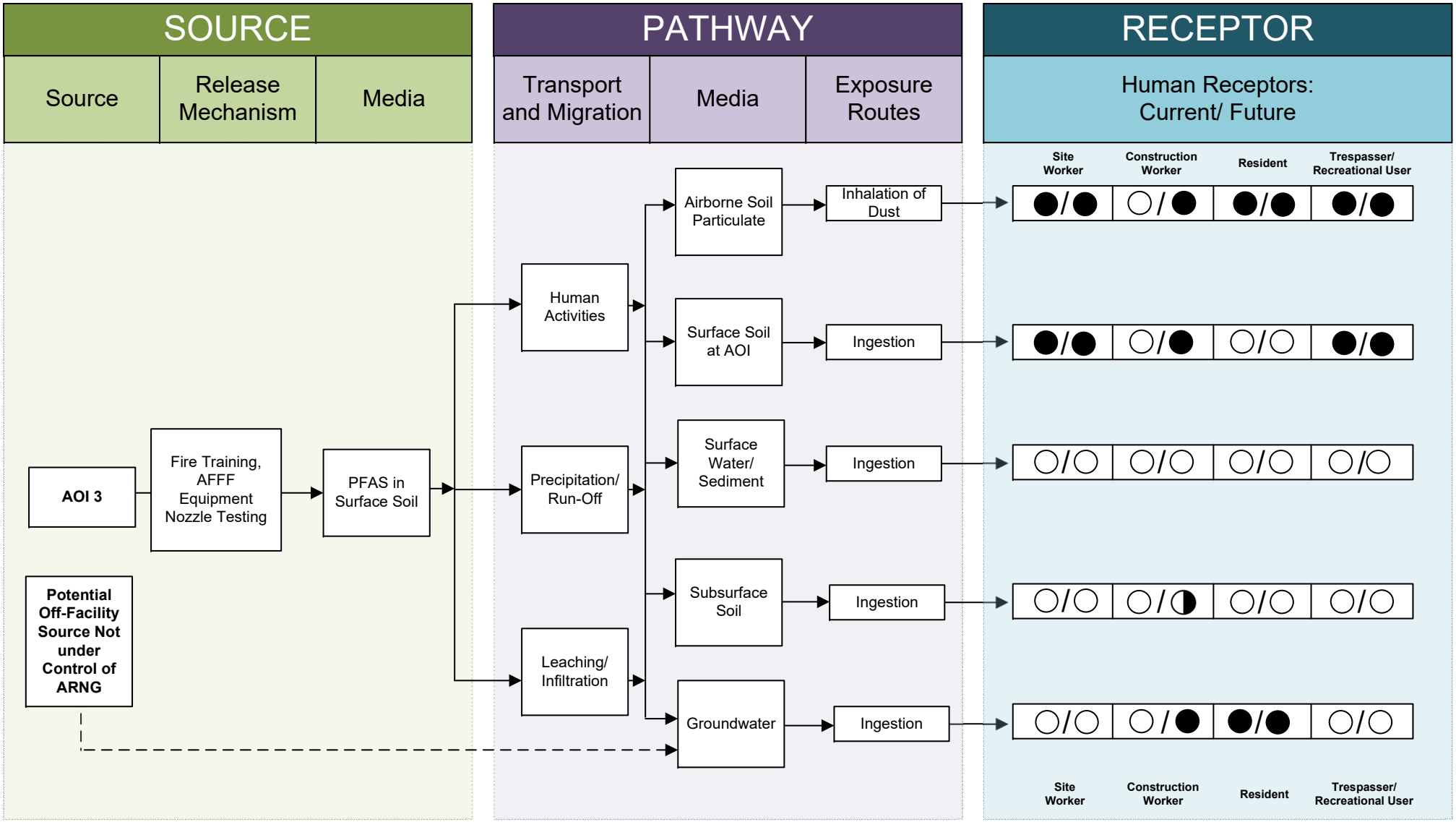
NOTES

1. The resident and recreational user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-2. Conceptual Site Model

AOI 2 – New Crash Fire Rescue Training Pit

Joint Forces Training Base Los Alamitos



LEGEND

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

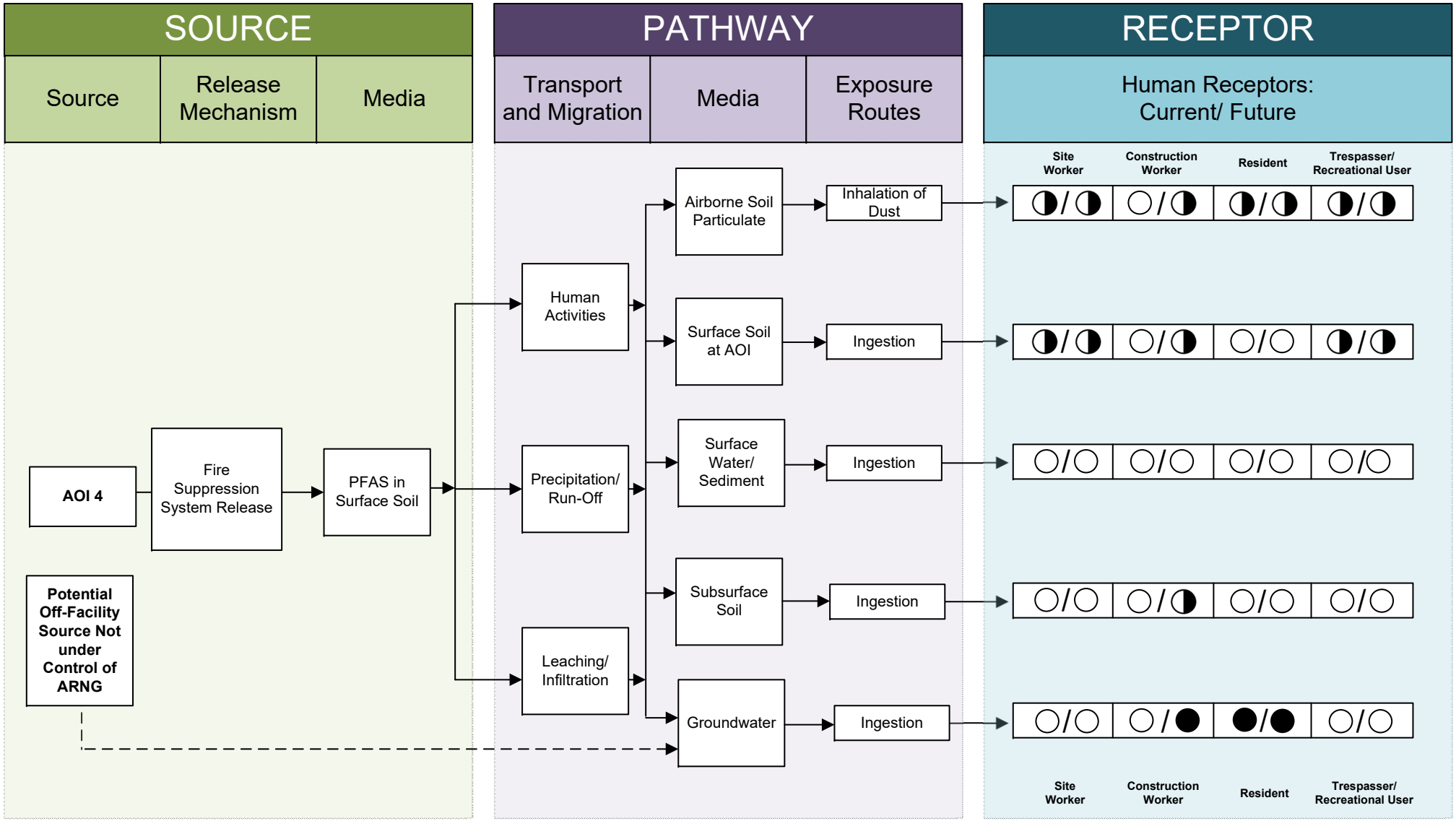
NOTES

1. The resident and recreational user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-3. Conceptual Site Model

AOI 3 – West End of the Flightline Fire Training Area

Joint Forces Training Base Los Alamitos



LEGEND

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

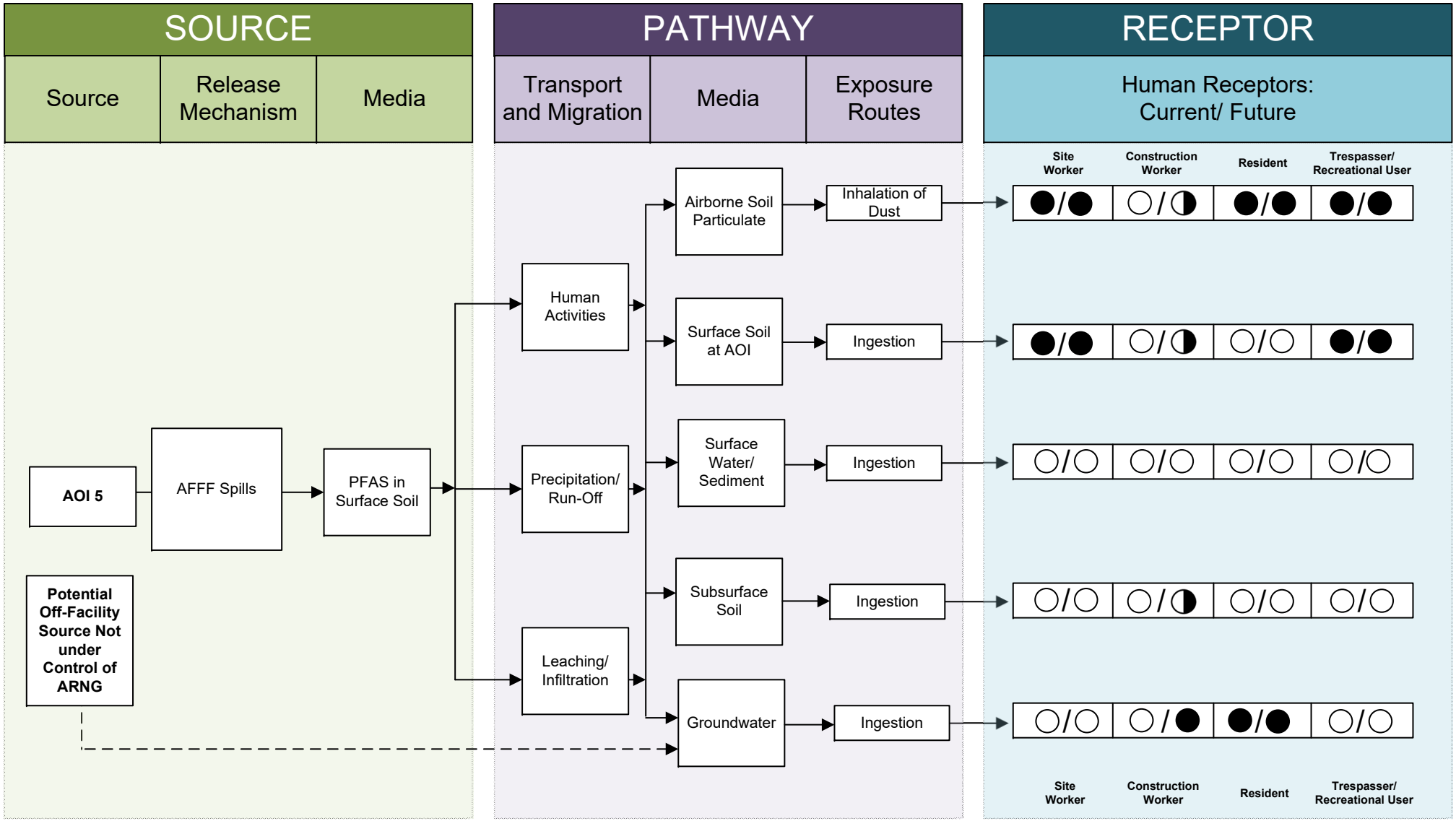
NOTES

1. The resident and recreational user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-4. Conceptual Site Model

AOI 4 – Hangar 1

Joint Forces Training Base Los Alamitos



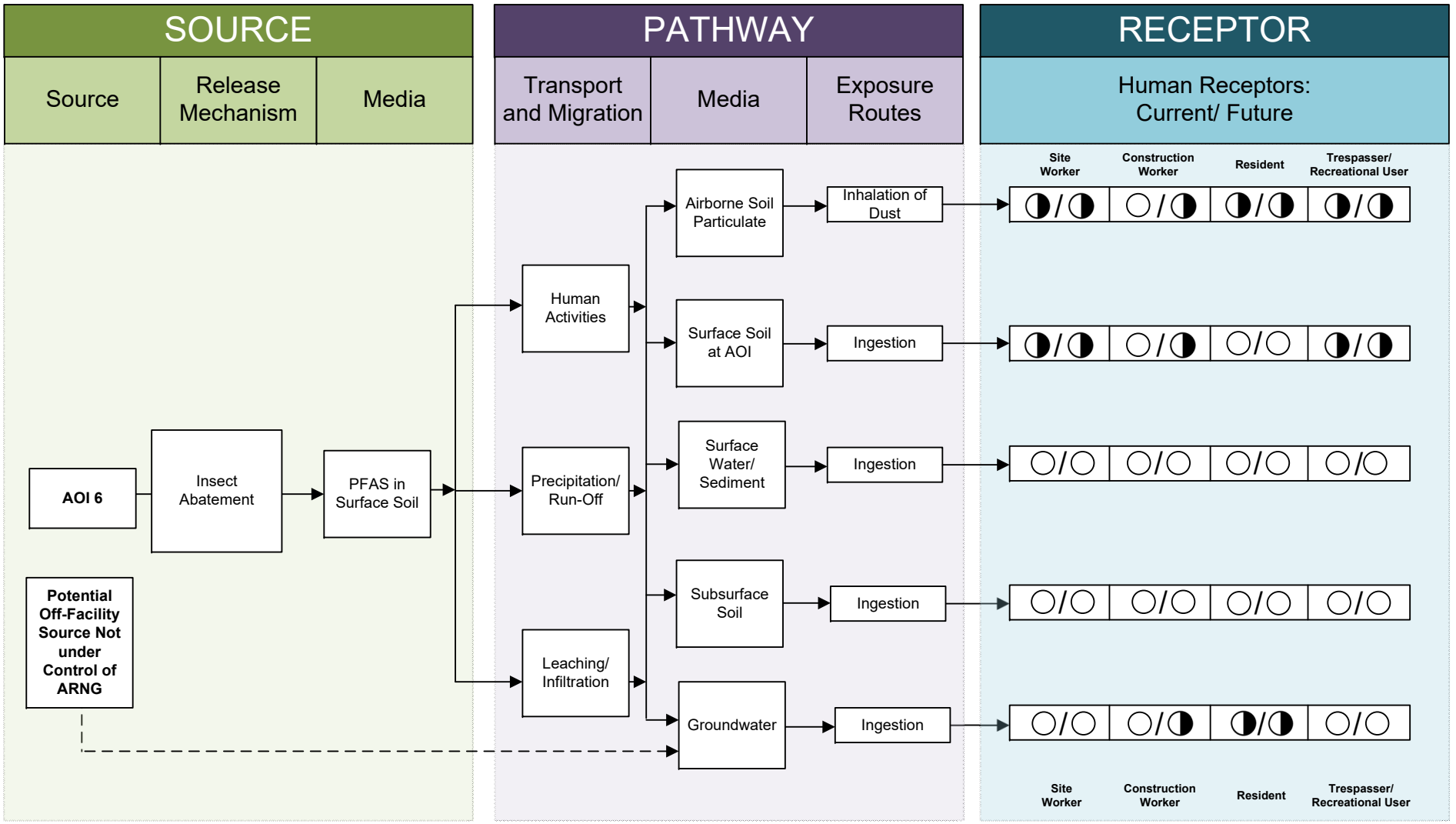
LEGEND

- 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 user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-5. Conceptual Site Model
AOI 5 – Building 34 (JFTB LA Fire Station)
Joint Forces Training Base Los Alamitos



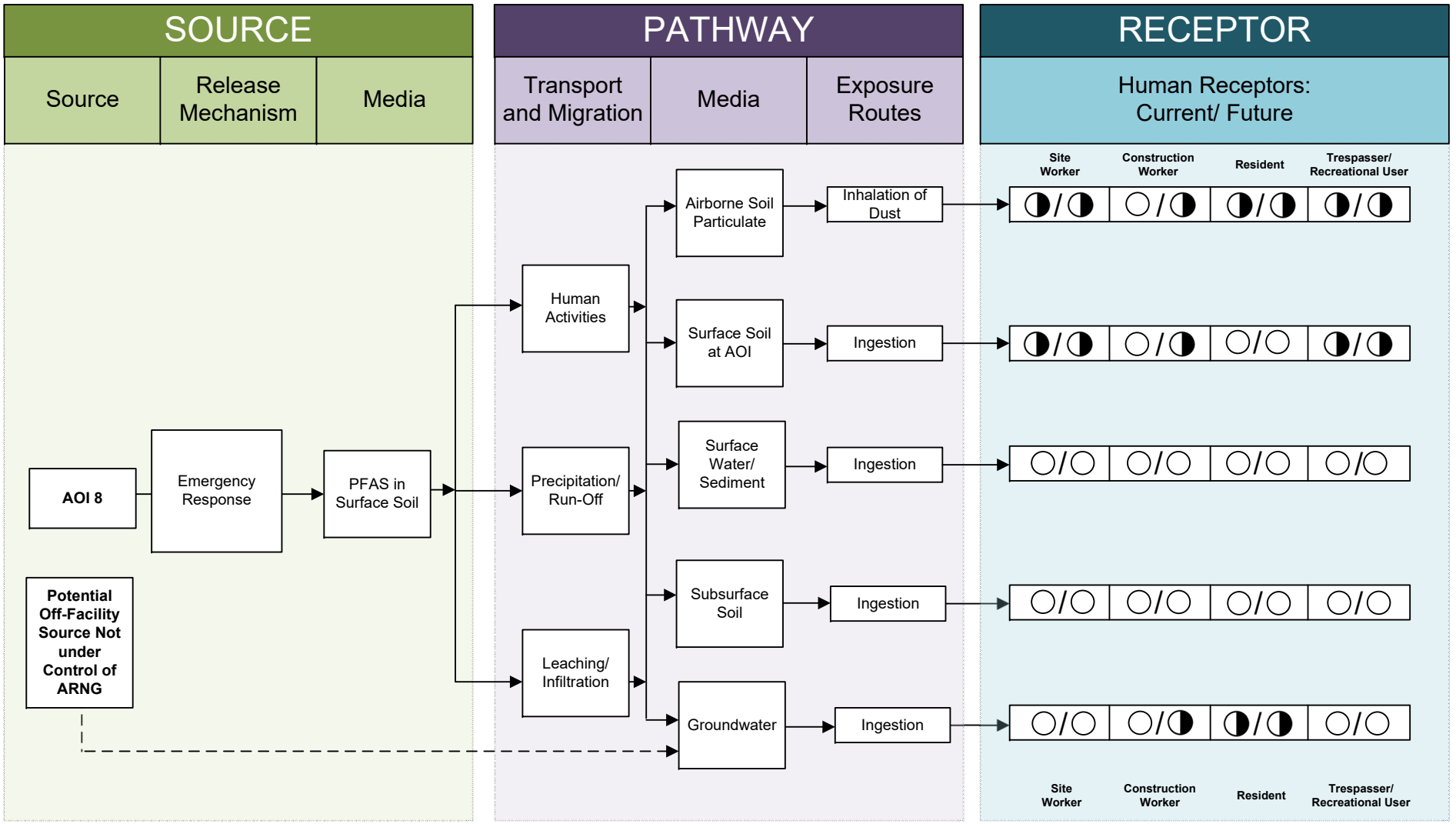
LEGEND

- 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 user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-6. Conceptual Site Model
AOI 6 – AFFF Release in the Vicinity of Building 80
Joint Forces Training Base Los Alamitos



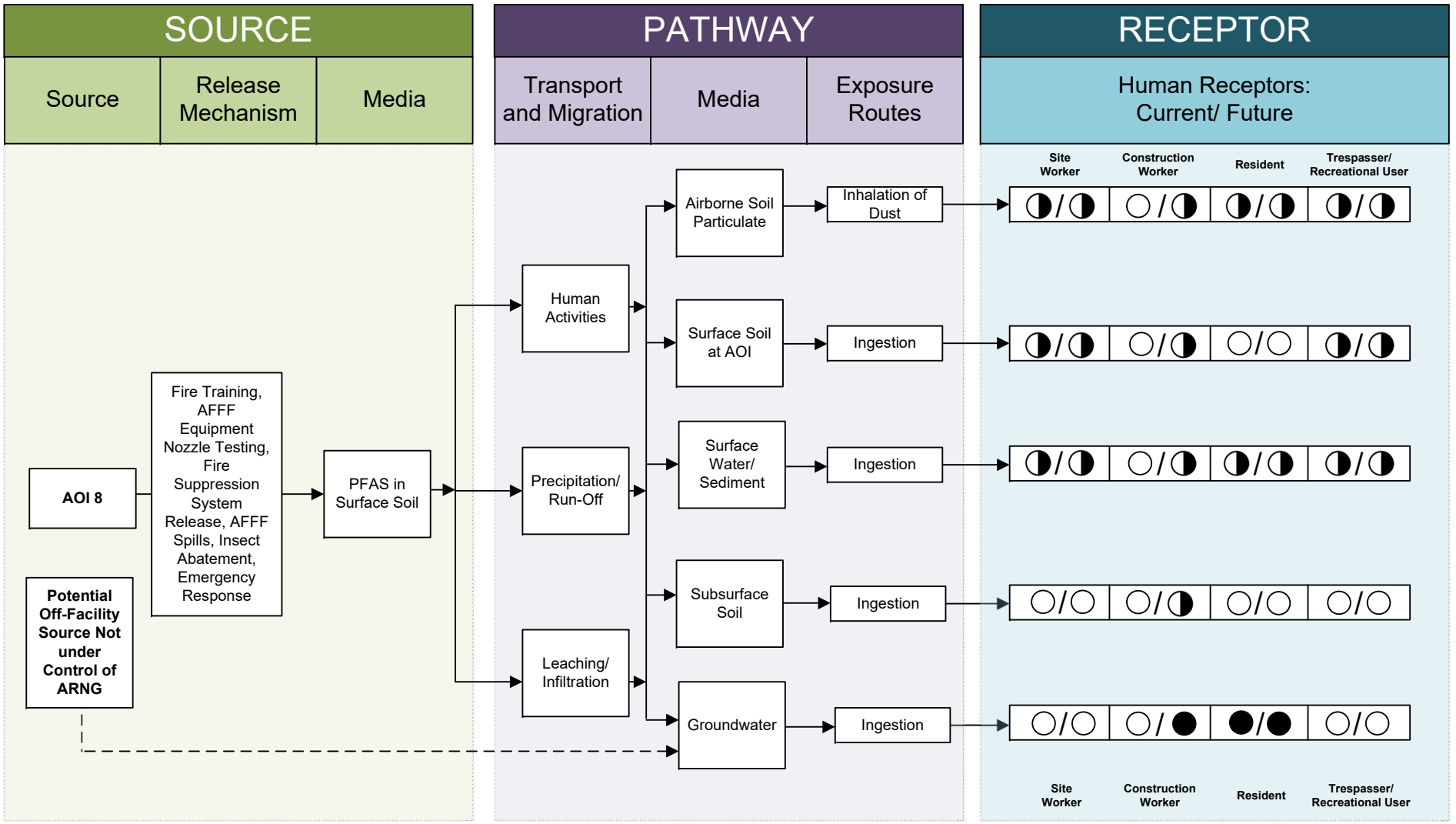
LEGEND

- 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 user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-7. Conceptual Site Model
AOI 7 – Emergency Response Area
Joint Forces Training Base Los Alamitos



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 user receptors refer to an off-site resident or recreational user.
2. Human consumption of agricultural products potentially affected by PFAS is possible.
3. Dermal contact exposure pathway is incomplete for PFAS

Figure 7-8. Conceptual Site Model
AOI 8 – Western Drainage Ditch
Joint Forces Training Base Los Alamitos

8.0 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 Summary

The SI field activities at JFTB LA were conducted from 21 to 29 October 2019. The SI field activities included soil, groundwater, and surface water sampling. Field activities were conducted in accordance with the QAPP Addendum (AECOM, 2019b), except as previously noted in **Section 5.7**.

To fulfill the project DQOs set forth in the approved SI QAPP Addendum (AECOM, 2019b), samples were collected and analyzed for a subset of PFAS by LC/MS/MS QSM 5.1 Table B-15 as follows. The 18 PFAS analyzed as part of the ARNG SI program are specified in **Section 5.6** of this report:

- 76 soil samples from 40 locations (soil borings or hand auger locations);
- 19 grab groundwater samples from temporary well locations;
- Two (2) low-flow groundwater samples from existing monitoring wells; and
- Five (5) surface water samples.

This information gathered during this investigation was used to determine the PFOA, PFOS, and PFBS at or above SLs. Additionally, the CSMs were refined to assess whether a complete pathway exists between the source and potential receptors for potential exposure to PFOA, PFOS and PFBS at the AOIs, which are described in **Section 7.0**.

8.2 SI Goals Evaluation

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

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

   PFOA, PFOS, and PFBS were detected at the Site in soil, groundwater, and surface water. PFOA, PFOS, and PFBS were detected both at the source areas, as well as near the facility boundary between source areas and potential drinking water receptors. Detections in soil exceeded the SLs for PFOA and PFOS at AOI 3 and AOI 5. Detections in groundwater exceeded the SLs for PFOA and PFOS at AOI 1, AOI 2, AOI 3, AOI 4, AOI 5, and AOI 8. The detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs

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

   Two potential PFAS release areas were removed from further consideration based on the groundwater and soil data collected during the SI: AFFF Release in the vicinity of Building 80 (AOI 6) and Emergency Response Area (AOI 7). PFOA and PFOS were not detected in groundwater above the SLs at AOI 6 and AOI 7; therefore, these areas pose no significant threat to human health or the environment. Although AOI 6 will not be listed as an individual site in the RI because PFOA and PFOS concentrations detected at this site

did not exceed DoD screening levels, additional groundwater sampling and analysis (using methods with lowered detection limits) will be conducted at AOI 6 during the RI, as part of the site-wide OU 1 groundwater investigation.

3. *Determine the potential need for a removal action.*

   Based on the data collected during this SI, no need for a removal action was identified.

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

   The geological data collected as part of the SI indicate a permeable and conductive environment with soils dominated by sandy silt, silty sand, and poorly graded sand.

   Depth to shallow groundwater at JFTB LA ranged from approximately 7 to 22 feet btoc. Groundwater beneath the facility generally flows to the southwest. These geologic and hydrogeologic observations inform development of technical approach for the RI.

5. *Identify within 4 miles of the installation other potential PFAS sources (fire stations, major manufacturers, other DoD facilities) and receptors, including both groundwater and surface water receptors, to determine whether the ARNG is the likely source of PFAS, or whether there is an off-facility source of PFAS responsible for installation detections of PFAS (USEPA, 2005).*

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

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

   Detections of PFOA, PFOS, and PFBS in soil and groundwater at source areas and the facility boundary indicate there are potentially complete pathways for site and construction workers, off-site residents, and a complete pathway for future construction workers.

8.3 Outcome

Based on the CSMs developed and revised based on the SI findings, there is potential for exposure to nearby off-facility residential drinking water receptors, site workers, construction workers, and recreational users from sources at JFTB LA from releases resulting from historical DoD activities.

Sample chemical analytical concentrations collected during this SI were compared against the project SLs for PFOA, PFOS and PFBS in soil and groundwater as described in **Table 6-1**. Maximum detected concentrations for PFOA and PFOS in groundwater, soil, and surface water are shown on **Figure 8-1** through **Figure 8-5**. The following bullets summarize the SI results:

- PFOS and PFOA in soil at AOI 3: West End of the Flightline exceeded the individual SLs of 130 µg/Kg with maximum concentrations of 1570 µg/Kg (AOI3-2) and 219 µg/Kg (AOI 3-12), respectively. Based on the results of the SI, further evaluation of AOI 3 is warranted in the RI.
- PFOA and PFOS in soil at AOI 5: Building 34 exceeded the individual SLs of 130 µg/Kg with concentrations of 134 µg/Kg and 352 µg/Kg, respectively. Based on the results of the SI, further evaluation of AOI 5 is warranted in the RI.

- PFOA in groundwater at AOI 1: Old CFR Training Pits exceeded the SL of 40 ng/L, with maximum concentration of 166,000 ng/L at location AOI 1-5. Additionally, PFOS in groundwater at AOI 1 exceeded the SL of 40 ng/L, with maximum concentration of 11,100 J- ng/L at location AOI 1-2. Based on the results of the SI, further evaluation of AOI 1 is warranted in the RI.
- PFOA and PFOS in groundwater at AOI 2: New CFR Training Pit exceeded the individual SLs of 40 ng/L ,with concentrations of 62,900 ng/L and 1,620 ng/L, respectively, at location AOI 2-5. Based on the results of the SI, further evaluation of AOI 2 is warranted in the RI.
- PFOA and PFOS in groundwater at AOI 3: West End of the Flightline exceeded the individual SLs of 40 ng/L, with maximum concentrations of 6,380 ng/L and 16,600 J- ng/L, respectively, at location AOI 3-11. Based on the results of the SI, further evaluation of AOI 3 is warranted in the RI.
- PFOA and PFOS in groundwater at AOI 4: Hangar 1 exceeded the individual SLs of 40 ng/L, with concentrations of 245 ng/L and 401 ng/L, respectively, at location AOI 4-1. Based on the results of the SI, further evaluation of AOI 4 is warranted in the RI.
- PFOA and PFOS in groundwater at AOI 5: Building 34 exceeded the individual SLs of 40 ng/L, with maximum concentrations of 31,300 ng/L and 16,800 J ng/L, respectively, at location AOI 5-1. Based on the results of the SI, further evaluation of AOI 5 is warranted in the RI.
- PFOA and PFOS in groundwater at AOI 6: Although AOI 6 will not be listed as an individual site in the RI because PFOA and PFOS concentrations detected at this site did not exceed DoD screening levels, additional groundwater sampling and analysis (using methods with lowered detection limits) will be conducted at AOI 6 during the RI, as part of the site-wide OU 1 groundwater investigation.
- PFOA and PFOS in groundwater at AOI 8: Western Drainage Ditch exceeded the individual SLs of 40 ng/L with concentrations of 3,740 ng/L and 4,880 ng/L, respectively, at location AOI 8-X3. Based on the results of the SI, further evaluation of AOI 8 is warranted in the RI.
- The detected concentrations of PFOA, PFOS, and PFBS in soil samples from all AOIs were below the SLs.

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

Table 8-2 summarizes the rationale used to determine if an AOI should be considered for further investigation under CERCLA and undergo an RI. Based on the results of this SI, further evaluation is warranted in the RI for AOI 1: the Old CFR Training Pits, AOI 2: the New CFR Training Pits, AOI 3: the WEF FTA and AFFF Equipment Nozzle Testing Area, AOI 4: Hangar 1, including the nearby wash rack, AOI 5: Building 34, the JFTB LA Fire Station, and AOI 8: the WDD.

Table 8-1 Summary of Site Inspection Findings

AOI	Potential PFAS Release Area	Soil – Source Area	Groundwater – Source Area	Groundwater – Facility Boundary
1	Old CFR Training Pits	◐	●	NA
2	New CFR Training Pit	◐	●	NA
3	West End of the Flightline	●	●	NA
4	Hangar 1	◐	●	NA
5	Building 34 (JFTB LA Fire Station)	●	●	NA
6	AFFF Release in Vicinity of Building 80	◐	◐	NA
7	Emergency Response	◐	◐	NA
8	Western Drainage Ditch	NA	NA	●

Legend:

AFFF = Aqueous Film Forming Foam
CFR = Crash Fire Rescue
JFTB LA = Joint Force Training Base Los Alamitos
NA = not applicable

● = detected; exceedance of the screening levels
◐ = detected; no exceedance of the screening levels
○ = not detected

Table 8-2 Site Inspection Recommendations

AOI	Description	Rationale	Future Action
1	Old CFR Training Pits	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
2	New CFR Training Pit	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
3	West End of the Flightline	Exceedances of SLs in groundwater at source area. Exceedances of SLs in soil at source area.	Proceed to RI
4	Hangar 1	Exceedances of SLs in groundwater at source area. No exceedances of SLs in soil.	Proceed to RI
5	Building 34 (JFTB LA Fire Station)	Exceedances of SLs in groundwater at source area. Exceedances of SLs in soil at source area.	Proceed to RI
6	AFFF Release in Vicinity of Building 80	Detections in groundwater but no exceedance of SLs. No exceedances of SLs in soil.	No further action
7	Emergency Response	Detections in groundwater but no exceedance of SLs. No exceedances of SLs in soil.	No further action
8	Western Drainage Ditch	Exceedances of SLs in groundwater at the facility boundary. No soil samples collected.	Proceed to RI

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CLIENT	ARNG
	Site Inspection for PFAS at Los Alamitos, CA

REVISED	3/26/2020	GIS BY	MS	3/26/2020
SCALE	1:14,400	CHK BY	SL	3/26/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/26/2020

Area of Interest (AOI)
Facility Boundary
Inferred Groundwater Flow Direction
Public Supply Well
Monitoring Well
Non-Potable Water Well

Sample ID	
Sample Date	
Constituent	Value

N

Maximum PFOA Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 8-1

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Notes:

ND = Non Detect
J = Estimated concentration
J- = Estimated concentration, biased low

Results are reported in nanograms per liter (ng/L)

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	3/26/2020	GIS BY	MS	3/26/2020
SCALE	1:14,400	CHK BY	SL	3/26/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/26/2020

Area of Interest (AOI)
Facility Boundary
Inferred Groundwater Flow Direction
Public Supply Well
Monitoring Well
Non-Potable Water Well

Sample ID	
Sample Date	
Constituent	Value

N

Maximum PFOS Detections in Groundwater

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 8-2

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Notes:

J = Estimated concentration

Results are reported in micrograms per kilogram (µg/Kg)

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	3/25/2020	GIS BY	MS	3/25/2020
SCALE	1:12,000	CHK BY	SL	3/25/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/25/2020

Area of Interest (AOI)

Facility Boundary

Sample ID	
Sample Date	
Constituent	Value

N

Maximum PFOA Detections in Soil

AECOM

12420 Milestone Center Drive
Germantown, MD 20876

Figure 8-3

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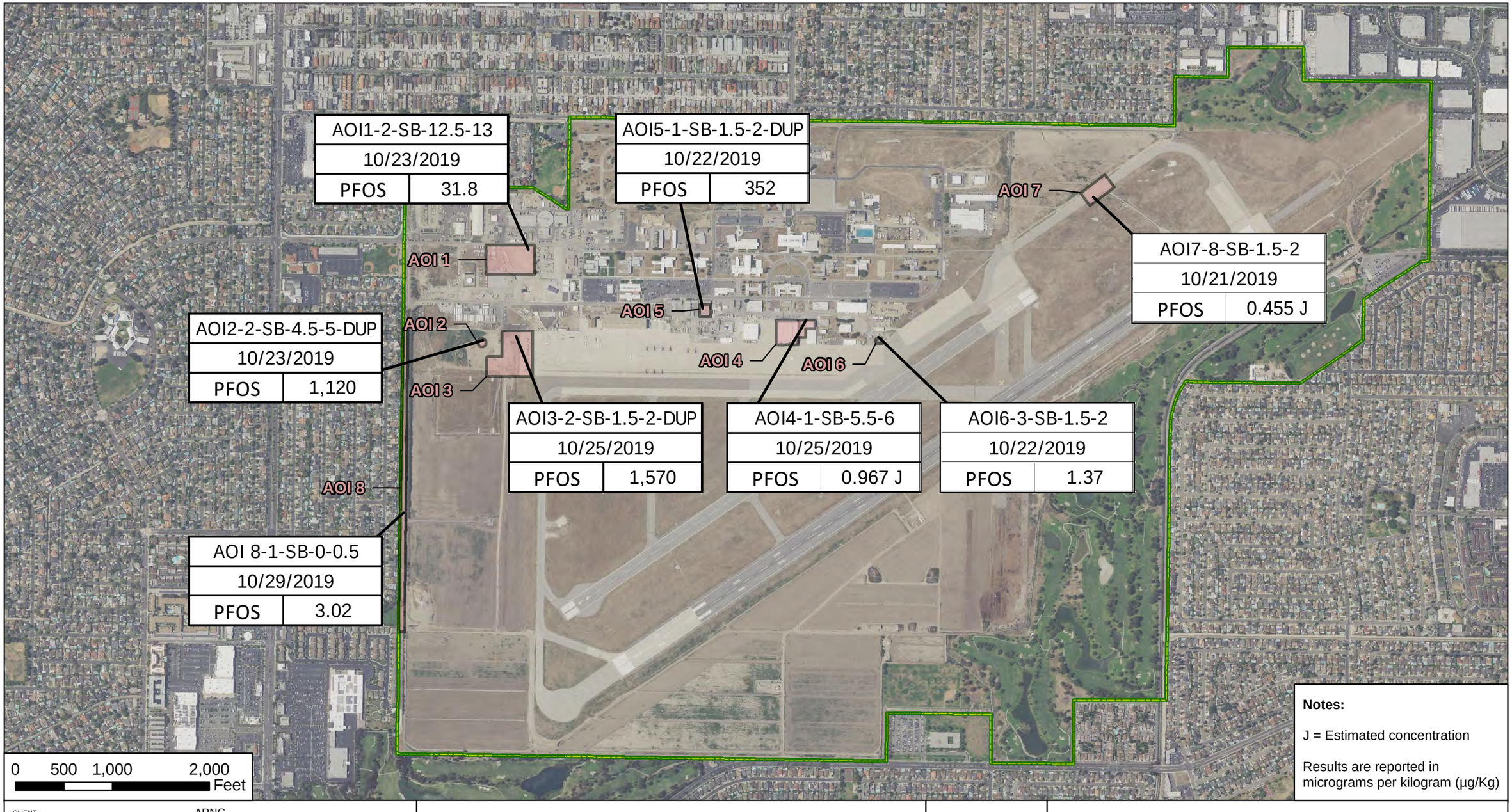

Notes:

J = Estimated concentration

Results are reported in micrograms per kilogram (µg/Kg)

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	3/25/2020	GIS BY	MS	3/25/2020
SCALE	1:12,000	CHK BY	SL	3/25/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/25/2020

Area of Interest (AOI)

Facility Boundary

Sample ID

Sample Date

Constituent | Value

N

Maximum PFOS Detections in Soil

AECOM 12420 Milestone Center Drive Germantown, MD 20876

Figure 8-4

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Notes:

J+ = Estimated concentration, biased high

Results are reported in nanograms per liter (ng/L)

CLIENT	ARNG			
Site Inspection for PFAS at Los Alamitos, CA				
REVISED	3/27/2020	GIS BY	MS	3/27/2020
SCALE	1:12,000	CHK BY	SL	3/27/2020
Base Map: National Agricultural Imagery Program, 2016		PM	RG	3/27/2020

Area of Interest (AOI)
Facility Boundary

Sample ID	
Sample Date	
Constituent	Value

N

Maximum PFOA and PFOS Detections in Surface Water

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 8-5

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