FINAL
Preliminary Assessment Report
Kalaeloa Army Aviation Support Facility #1-JRF
Hawai'i Army National Guard, O'ahu, Hawai'i

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

October 2020

Prepared for:

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

UNCLASSIFIED

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AASF	Army Aviation Support Facility
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	area of interest
ARFF	aircraft rescue and firefighting
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
DON	Department of the Navy
EDR™	Environmental Data Resources, Inc.™
FTA	fire training area
HA	Health Advisory
HDOT	Hawai'i Department of Transportation
HIARNG	Hawai'i Army National Guard
mg/l	Milligrams per liter
NAS	Naval Air Station
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SI	Site Inspection
UCMR 3	Unregulated Contaminant Monitoring Rule 3
UIC	underground injection control
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

Executive Summary

The Army National Guard (ARNG) is performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. A PA for per- and polyfluoroalkyl substances (PFAS) containing materials was completed for Kalaeloa Army Aviation Support Facility (AASF) #1-JRF (also referred to as the "facility") in, O'ahu, Hawai'i to assess potential PFAS release areas and exposure pathways to receptors. Occupation of the property by Hawai'i ARNG (HIARNG) began in 1999.

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- ARNG conducted a ½ -day site visit on 2 May 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current Kalaeloa and Hawai'i Department of Transportation (HDOT) fire personnel during the site visit, including a Fire Captain;
- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

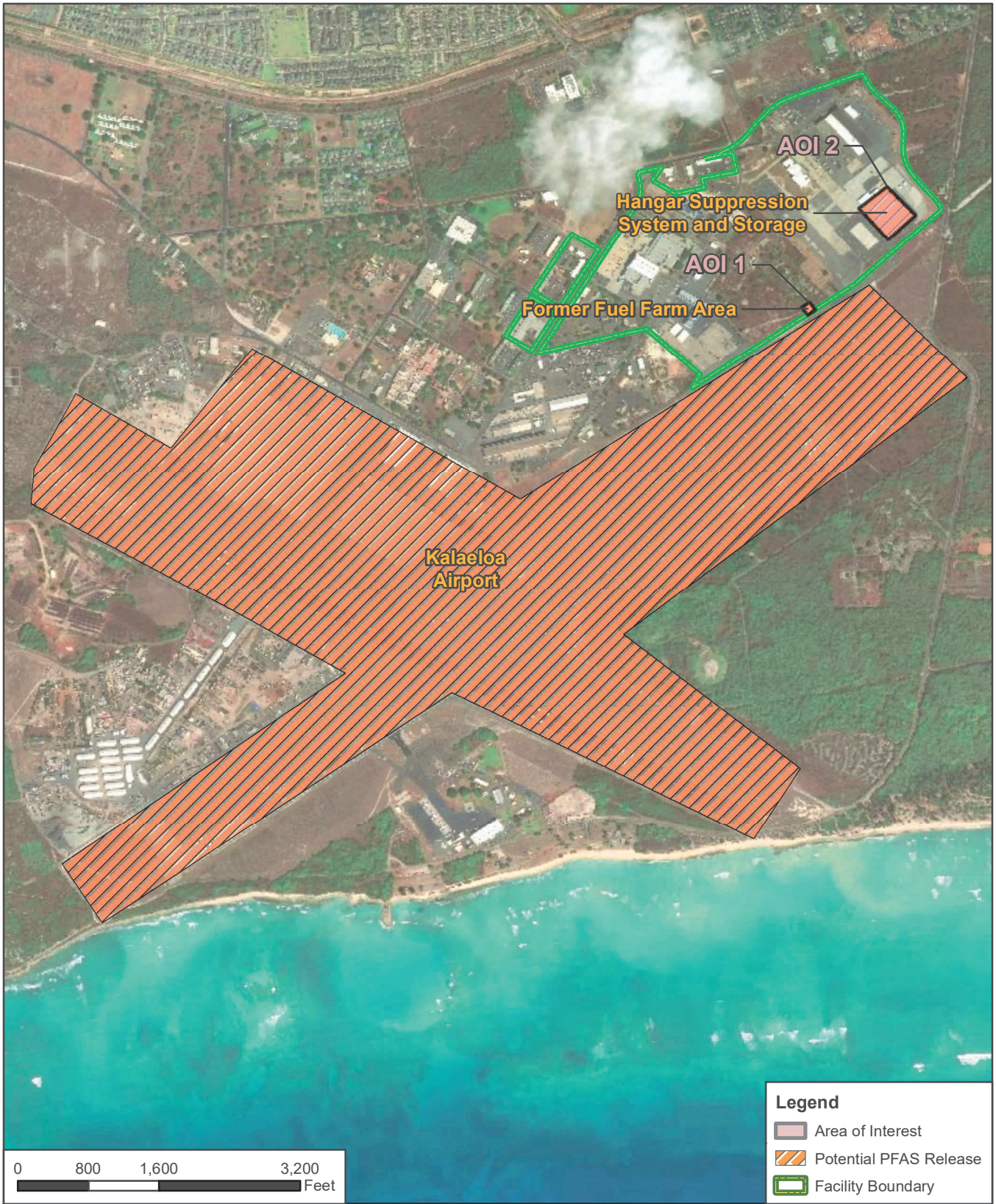
Two AOIs related to a potential PFAS release were identified at Kalaeloa AASF #1-JRF during preparation of this PA report. The potential releases are associated with a known release at a former fuel farm in 2017 and the presence and storage of aqueous film forming foam (AFFF) in the hangar. The AOIs are shown on **Figure ES-1** and described in **Table ES-1** below.

Table ES-1: AOIs at Kalaeloa AASF #1-JRF

Area of Interest	Name	Used by	Release Date
AOI 1	Former Fuel Farm Area	HDOT	Confirmed release: October 2017; unknown historical pump test frequency
AOI 2	Hangar Suppression System and Storage	HIARNG	Unknown; no documented releases

Based on the documented release and storage of AFFF at the facility, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for the Kalaeloa AASF #1-JRF**,** which presents the potential receptors and media impacted, is shown on **Figure ES-2**. Kalaeloa Municipal Airport is located immediately south of the identified AOIs at Kalaeloa AASF #1-JRF; a section of the northeastern runway is located cross-gradient to the southern portion of the facility boundary and may be a potential off-facility source of PFAS. Because this source is located cross-gradient of the facility, it is unknown how much of an impact the source would have on Kalaeloa AASF #1-JRF. Based on the United States (US) Environmental Protection Agency (USEPA) Unregulated Contaminant Monitoring Rule 3 (UCMR3) data, it was indicated that no PFAS were detected in a public water system above the

USEPA's lifetime Health Advisory (HA) within 20 miles of the facility. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.



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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/17/2020

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Summary of Findings

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Figure ES-1

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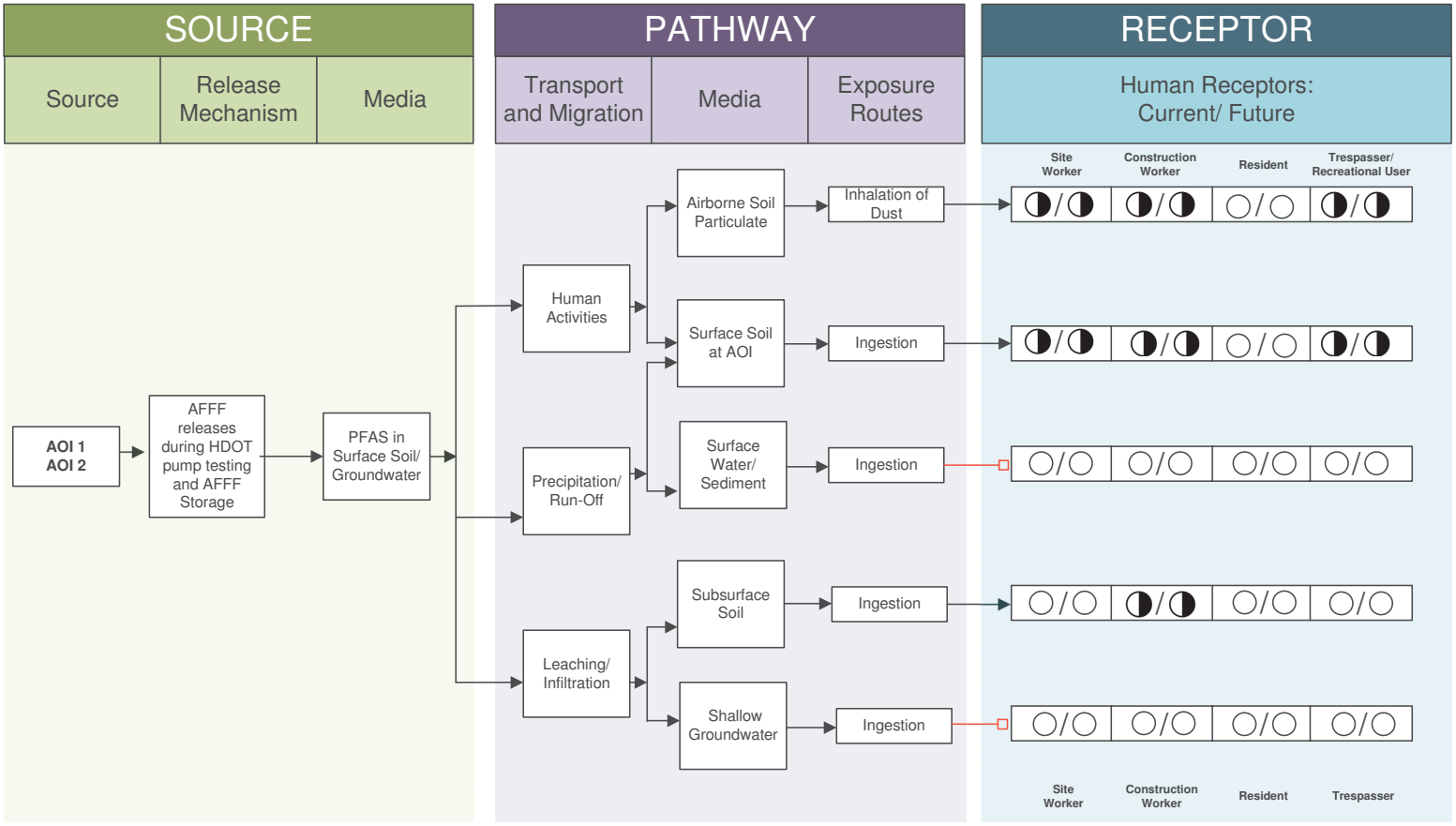


LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS

Figure ES-2
Preliminary Conceptual Site Model
Kalaeloa AASF #1-JRF, HI

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG) G9 is the lead agency in performing *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites 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 is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS) (a suite of related chemicals), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of these PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued a lifetime Drinking Water Health Advisory for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined.

This report presents findings of a PA for PFAS-containing materials at Kalaeloa Army Aviation Support Facility (AASF) #1-JRF (also referred to as the "facility") in Kalaeloa, O'ahu, Hawai'i in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and Army requirements and guidance.

This PA documents potential locations where PFAS may have been released into the environment at Kalaeloa AASF #1-JRF. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)™ report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- ARNG conducted a ½ -day site visit on 2 May 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed current Kalaeloa and Hawai'i Department of Transportation (HDOT) fire department personnel during the site visit, including a Fire Captain;

- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA, 1991). The report sections and descriptions of each are as follows:

- **Section 1** – **Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA.
- **Section 2** – **Fire Training Areas:** describes the fire training areas (FTAs) at the facility identified during the site visit.
- **Section 3** – **Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit.
- **Section 4** – **Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations.
- **Section 5** – **Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG.
- **Section 6** – **Preliminary Conceptual Site Model:** describes the pathways of potential PFAS transport and receptors at the facility.
- **Section 7** – **Conclusions:** summarizes the data findings and presents the conclusions and uncertainties of the PA.
- **Section 8** – **References:** provides the references used to develop this document
- **Appendix A** – Data Resources
- **Appendix B** – Preliminary Assessment Documentation
- **Appendix C** – Photographic Log

1.4 Facility Location and Description

Kalaeloa AASF #1-JRF is located on a portion of Former Naval Air Station (NAS) Barbers Point that was closed on 2 July 1999 as part of the Base Realignment and Closure Act. Kalaeloa AASF #1-JRF is located at Midway Street in Kapolei, Hawai'i on the island of O'ahu, **(Figure 1-1)**. In July 2016, HIARNG began leasing approximately 17 acres of adjacent land from HDOT for a term of 30 years. This additional parcel is located along the southeastern boundary of the facility and includes a former fuel farm area (approximately 7 acres) and access apron (approximately 10 acres). The facility is bordered by Campbell Industrial Park to the west, the city of Kapolei to the north, Ewa Beach residential communities to the east, and the Kalaeloa Airport (operated by HDOT) to the south.

Kalaeloa AASF #1-JRF provides training, maintenance, and flight operations for the various aviation units that support the Hawai'i ARNG (HIARNG). AASF #1-JRF consists of office areas, hangars, aircraft parking area, maintenance bays, and storages bays. The Kalaeloa AASF #1-JRF formally opened in 2018.

1.5 Facility Environmental Setting

The facility is located on the southern shore of O'ahu, approximately 5 miles west of the entrance to Pearl Harbor. The natural terrain in the area slopes gently southward, ranging from a maximum elevation of 0 to 65 feet above mean sea level over a distance of about 2 miles.

1.5.1 Geology

The near-surface geologic units encountered at Kalaeloa AASF #1-JRF are predominantly marine with minor terrestrial and fill sediments. Major units include coralline limestone, carbonate clastics, and construction fill material. The coral limestone is of Pleistocene age and was deposited in a shoreline or in shallow-water, near-shore environments. Within the carbonate clastics unit are minor layers of darker carbonate mud and reworked coralline rubble and sand (**Figure 1-2**) (Department of the Navy [DON], 2008).

1.5.2 Hydrogeology

The shallow groundwater beneath Kalaeloa AASF #1-JRF is perched and occurs within the caprock. The caprock consists of alternating layers of permeable marine sedimentary rock and alluvial deposits that overlie the basal volcanic aquifer. Caprock pore water is largely separate from the deeper basal groundwater, occurring above and frequently within caprock sediments and extending from the ocean edge to approximately 1 mile inland (Earth Tech and Tetra Tech, 2005). This type of groundwater is usually connected with the ocean and therefore has high concentrations of total dissolved solids and is considered non-potable. Depth to groundwater at Former NAS Barbers Point was measured at approximately 36 to 39 feet below ground surface (bgs), and groundwater has a south-southeasterly gradient (Earth Tech and Tetra Tech, 2005).

The hydrologic and geologic classification of the upper aquifer in the Ewa aquifer system (Aquifer Code 3-02-04-116, Status Code 23321) describes the aquifer as a basal, unconfined aquifer in sedimentary or non-volcanic lithology. The groundwater status for the upper aquifer is classified as: neither a drinking water source nor ecologically important; moderate salinity level of 1,000 to 5,000 milligrams per liter (mg/L) chloride; replaceable in uniqueness; and highly vulnerable to contamination (Mink and Lau, 1990).

An EDR™ report conducted a well search for a 1-mile radius surrounding the facility (**Appendix A**). Using additional online resources, such as state and local Geographic Information System databases, wells were researched to a 4-mile radius of the facility. Several irrigation and industrial wells lie in the inferred upgradient and cross-gradient pathway to the facility. The USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data indicate that PFOS/PFOA were not detected in a public water system above the USEPA HA within a 20-mile radius of the facility. The HA is 70 parts per trillion for PFOS and PFOA, individually or combined. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today. Groundwater features are presented in **Figure 1-2**.

1.5.3 Hydrology

No perennial streams or drainage ways exist on Kalaeloa AASF #1-JRF due to relatively low precipitation (20 inches/year) and highly permeable coralline limestone. Storm water runoff follows the topography (**Figure 1-3**), flowing south toward the Pacific Ocean until it percolates (DON, 2002). Local drainage diversions also convey runoff into a series of dry wells (Earth Tech and Tetra Tech, 2005). An underground injection control (UIC) well (Well #73) is located at the southern border of the facility, in the vicinity of the former fuel farm. Details regarding the UIC well were not available at the time of the PA.

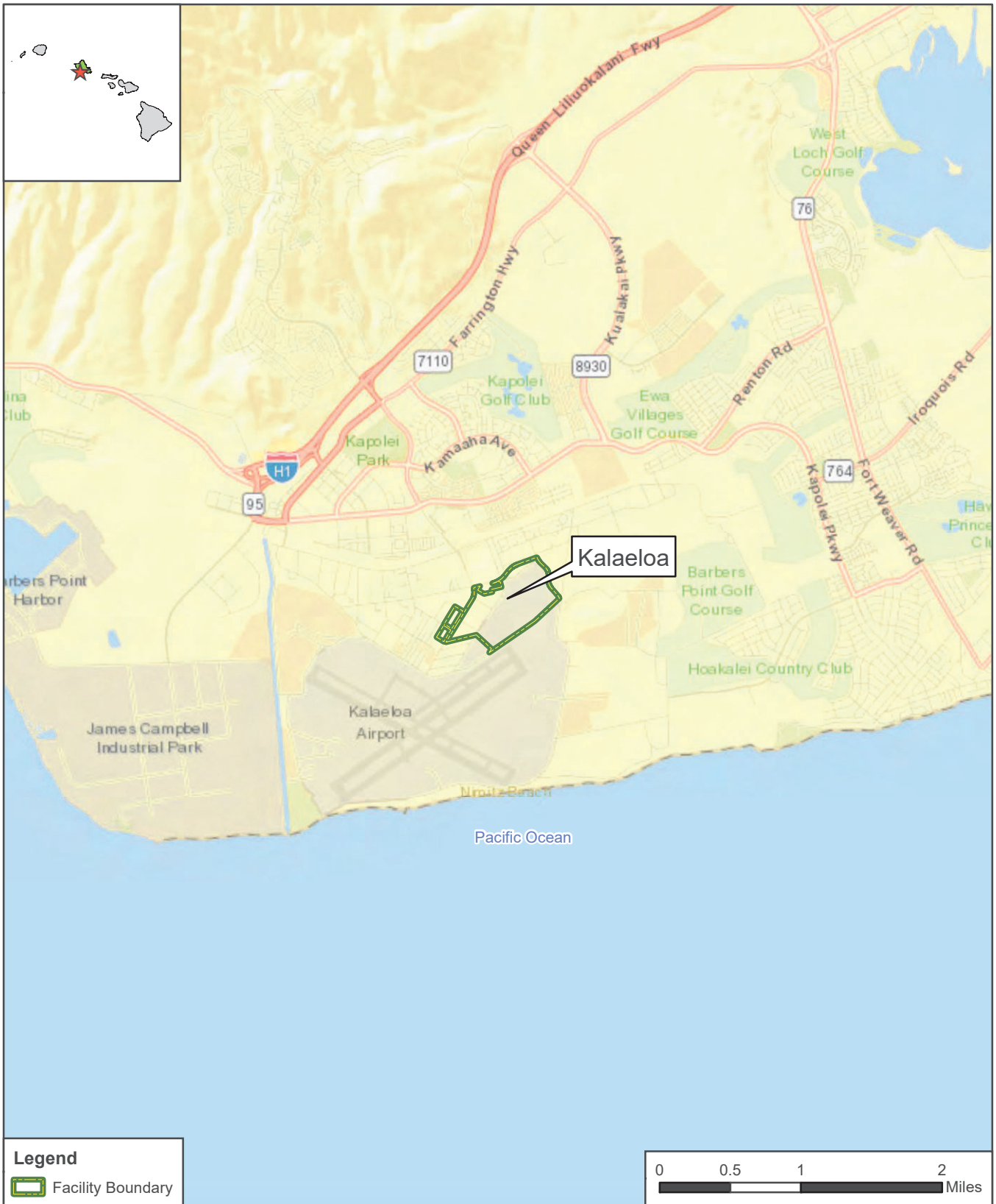
1.5.4 Climate

O'ahu is located in the tropics, with a climate characterized by mild temperatures, northeasterly trade winds year-round, and moderate humidity. Hawai'i has two seasons: summer (between May and October) and winter (between October and April). The average coastal temperature is approximately 79 degrees Fahrenheit (°F), with temperatures decreasing at higher elevations. The coldest temperatures are in January (72°F) and the warmest temperatures are in August (89°F). Humidity on O'ahu ranges from approximately 30 to 90 percent. Precipitation predominantly occurs when the island's mountain masses capture and cool the rising, warm, moist ocean air, producing higher rainfall in the windward and mountain areas and lower rainfall in the leeward and coastal zones. Annual rainfall ranges from 20 inches in the leeward coastal areas to 250 inches on the Ko'olau mountain peaks (Macdonald, Abbott, and Peterson 1983). Kalaeloa HIARNG has a mean annual rainfall of approximately 20 inches (National Oceanic and Atmospheric Administration [NOAA], 2019).

1.5.5 Current and Future Land Use

Current Kalaeloa AASF #1-JRF operations include training and maintenance for the various aviation units, which support the HIARNG. In addition to aircraft maintenance and aircraft support for HIARNG, periodic training exercises and course work for the National Guard/Army Reserve units are conducted at the facility's training facility. AASF #1-JRF shares tarmac space with the neighboring Kalaeloa Airport to the south. Portions of the eastern and western borders of Kalaeloa AASF #1-JRF are abutted primarily by commercial properties. Residential homes border the northeastern border of the facility.

Reasonably anticipated future land use is not expected to change from the current land use described above.



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Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	8/6/2020

Facility Location

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Figure 1-1

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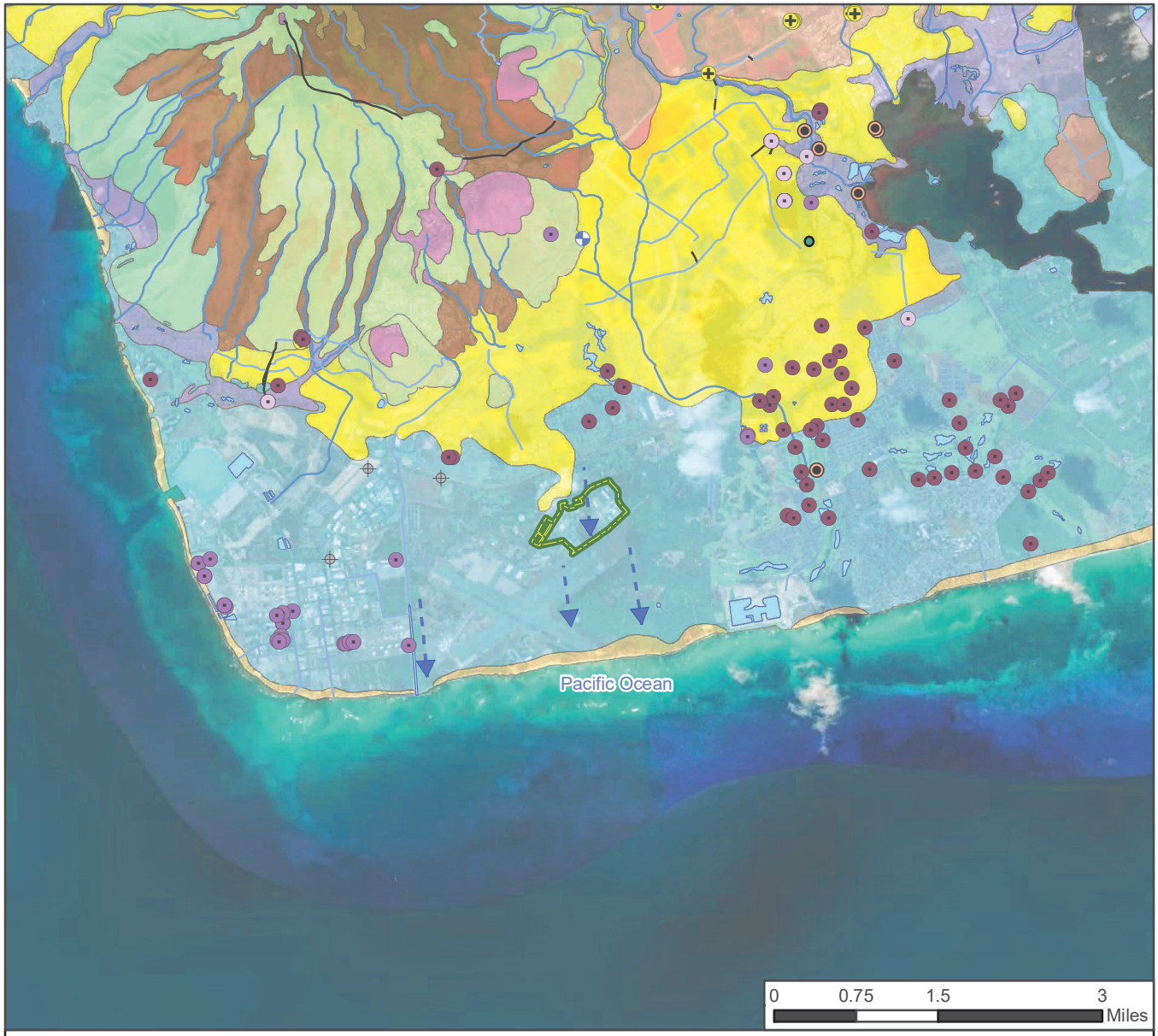

Legend

- Facility Boundary
- Water Body
- Wetland
- River/Stream
- Canal/Ditch
- Pipeline
- Inferred Groundwater Flow Direction

Geology

- Beach Deposits
- Lagoon and Reef Deposits
- Manmade Fill
- Alluvium
- Older Alluvium
- Koolan Basalt
- Kolekole Volcanics; Lava Flows
- Kolekole Volcanics; Vent Deposits
- Waianae Volcanics, Palehua member; Lava Flows
- Waianae Volcanics, Palehua member; Vent Deposits
- Waianae Volcanics – Kamaileunu member
- Waianae Volcanics – Lualualei member

Wells

- Domestic Well
- Agricultural Well
- Industrial Well
- Irrigation Well
- Military
- Municipal Water Supply Well
- Other Well

CLIENT	ARNG			
Preliminary Assessment for PFAS at Kalaeloa, HI				
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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/17/2020

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Groundwater Features

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Figure 1-2

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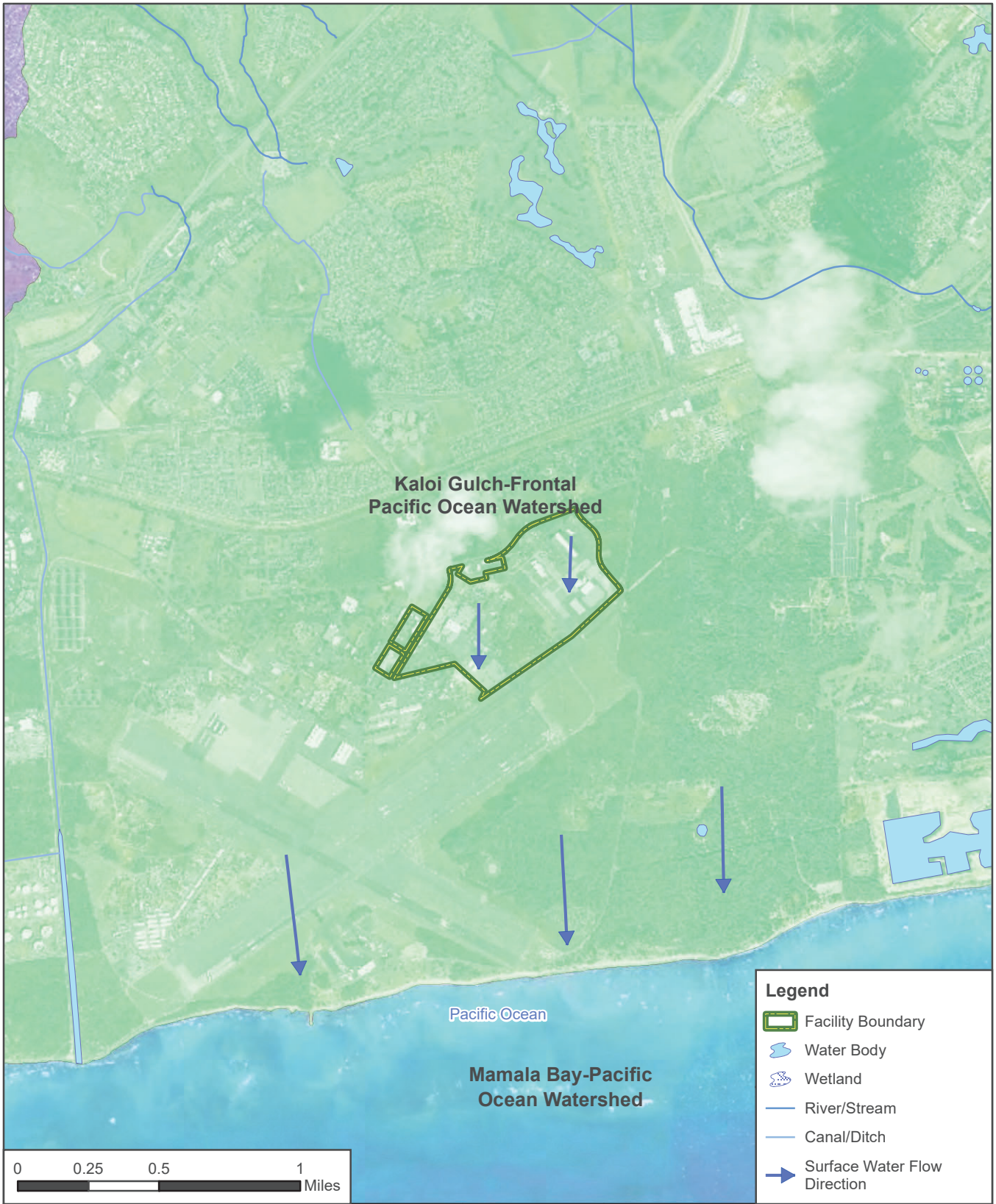

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

No FTAs were identified within the facility during the PA through interviews (**Appendix B**), EDR™ reports (**Appendix A**), or observations made by ARNG personnel during a brief visual site inspection. The personnel interviewed had institutional knowledge spanning from 2014 to present.

3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA is included in **Appendices A** and **B**. Two non-FTAs were identified during the PA. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**. Photographs taken during the site visit appear in **Appendix C**.

3.1 Former Fuel Farm Area

HIARNG began leasing a portion of HDOT property that contains a former fuel farm area in July 2016. HDOT operates the adjacent Kalaeloa Airport and maintains an aircraft rescue and firefighting (ARFF) unit, hereafter referred to as HDOT Kalaeloa ARFF Unit. During the PA, interviewees indicated that the HDOT Kalaeloa ARFF Unit conducts pump tests of their firetrucks at random locations surrounding the adjacent airport runway. Pump testing is sometimes conducted with AFFF mixed into the water tank of the trucks.

On 12 October 2017, HIARNG personnel observed an unknown foam-like substance present on a walkway located within the former fuel farm area near UIC well #73. As documented in the subsequent spill report (**Appendix A**) and confirmed by an interview with the unit fire chief, it was determined that the HDOT Kalaeloa ARFF Unit discharged the contents of a firetruck's water tank during pump testing/repair. The water tank reportedly contained 25-gallons of 1.6% AFFF mixed with water. Tank contents flowed onto the former fuel farm area leased by HIARNG from the point of release along the fence line that separates HDOT-controlled property from the former fuel farm. HDOT Kalaeloa ARFF Unit personnel were unaware that the former fuel farm area was no longer under HDOT control. Unit personnel were following the historical practice of performing pump testing over the fence line that separates the former fuel farm from the active runway. HIARNG personnel did not participate in pump testing activities.

In addition to the foam observed on the walkway, HIARNG personnel observed flattened vegetation among the surrounding areas, indicating that the foam mixture likely affected a larger area. The spill report notes that based on the direction of flattened vegetation adjacent to UIC Well #73, it is suspected some of the AFFF mixture may have also entered the UIC well.

3.2 Hangar Suppression System and Storage

The hangar at Kalaeloa AASF #1-JRF was constructed in 2017 and is equipped with an AFFF fire suppression system. The system consists of an 800-gallon tank that contains approximately 440-gallons of Ansulite AFC-3MS 3% AFFF (NSN 4210-01-144-0291) concentrate. The AFFF tank is located within the mechanical room of the hangar. An additional, eight 55-gallon drums of the same Ansulite 3% AFFF are stored on secondary containment pallets within the facility's hangar. The drums of AFFF are reportedly moved within the hangar as needed and have temporarily been stored outside the hangar on at least one occasion.

The hangar suppression system is supplied water by an external aboveground storage tank and associated Fire Pump Building located northeast of the hangar. The Fire Pump Building contains the diesel-powered water pump system that services the hangar building (Amec Foster Wheeler Environment & Infrastructure, Inc., 2019). AFFF is not currently or historically stored within the Fire Pump Building.

The hangar was not inspected during the visual site inspection. Information provided by HIARNG indicates that the system has never been tested, and there have been no known instances of leaks or spills from either the system or the drums of AFFF. However, because AFFF is stored at the facility, there is potential for it to have been incidentally released to the environment during

handling or via leaks. If a spill or system release occurred within the hangar or mechanical room, it would likely flow into floor drains that connect to an oil/water separator and subsequently discharge to the sanitary sewer. Incidental spills that may have occurred or been tracked outside the hangar would travel via stormwater as sheet flow across impervious pavement to areas of crushed concrete that surround the hangar and subsequently to drainage pits and/or UIC wells.

CLIENT	ARNG			
Preliminary Assessment for PFAS at Kalaeloa, HI				
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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/17/2020

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Non-Fire Training Area

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Figure 3-1

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4. Emergency Response Areas

Emergency responses to crashes sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF. No emergency response areas were identified at Kalaeloa AASF #1-JRF during the PA based on interviews, and online research. The facility relies on Honolulu Fire Department for emergency needs (**Appendix B.1**).

5. Adjacent Sources

One off-facility source of PFAS (the Kalaeloa Airport) located adjacent to the Kalaeloa AASF #1-JRF was identified during PA interviews (**Appendix B.1)**. A description of the adjacent source is presented below, and the adjacent source is shown on **Figure 5-1**.

5.1 Kalaeloa Airport

No visual site inspection was performed at the adjacent Kalaeloa Airport during the PA. However, the Kalaeloa Airport is considered an adjacent PFAS source, as runways are typically the location of crash sites requiring the usage of AFFF in emergency response, and aviation hangars may have fire suppression systems charged with AFFF. Additionally, personnel interviewed during the PA stated that pump testing of HDOT Kalaeloa ARFF Unit firetrucks was conducted on the empty areas controlled by the HDOT and around the airstrip. One such pump testing location was a former fuel farm that was previously controlled by HDOT until July 2016 when HIARNG began leasing the property, described in **Section 3.1**. Previous pump testing may have also occurred at the former fuel farm area while it was under HDOT control. The exact locations of all pump testing areas at Kalaeloa Airport are unknown. Although the pump testing was typically conducted with water, AFFF was sometimes mixed in the water tank; thus, residual PFAS may have been released from the previous testing of equipment with AFFF. Pump testing began at an unknown time and is conducted once a month. Review of the EDR™ reports did not reveal other likely PFAS sources near the facility.

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Adjacent Source

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Figure 5-1

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6. Conceptual Site Model

Based on the PA findings, one AOI was identified at Kalaeloa AASF #1-JRF. The AOI is shown on **Figures 6-1**. The following sections describe the CSM components and the specific preliminary CSMs developed for each AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, and (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

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 (National Ground Water Association, 2018). Receptors at Kalaeloa AASF #1-JRF include site workers, construction workers, and trespassers. The preliminary CSM for the AOI indicates which specific receptors could potentially be exposed to PFAS. Kalaeloa Airport is an adjacent source of PFAS located immediately downgradient of the AOI (**Figure 6-1**).

6.1 AOI 1: Former Fuel Farm Area

AFFF was released within the AOI 1 area during pump testing activities at the Former Fuel Farm Area. The area of the AOI is mostly vegetated or paved. Ground-disturbing activities in release areas could result in site worker, construction worker, and trespasser exposure to potential PFAS contamination via inhalation of dust or ingestion of surface soil. Ground-disturbing activities to subsurface soil could result in site and construction worker exposure.

Because AFFF was released directly to the surface at the AOI, surface soil is considered a potentially complete pathway to site workers, construction workers, and trespassers via ingestion and inhalation of soil particulates. PFAS may have also infiltrated from surface soil to the subsurface, and ground-disturbing activities within the AOI may expose construction workers to potential PFAS in subsurface soil via ingestion and inhalation. Based on the spill incident report (**Appendix A**), AFFF likely also drained into UIC Well #73, which may also potentially expose construction workers to PFAS through ingestion of subsurface soil.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching; however, drinking water at Kalaeloa AASF #1-JRF is resourced from public drinking water wells. No drinking water wells exist at the facility, and no private supply wells exist downgradient. Furthermore, groundwater in the upper, unconfined aquifer is not used for drinking water purposes due to the salinity levels and high vulnerability to contamination (Mink and Lau, 1990). Groundwater is approximately 36 to 39 feet bgs in the area of AOI 1 (Earth Tech and Tetra Tech, 2005). As such, groundwater is not considered a complete pathway via drinking water ingestion for any receptor nor via incidental ingestion during excavation activities by construction workers.

The surface water/ sediment pathway is considered incomplete, since there are no surface water bodies at the facility, and storm water runoff from the facility is captured in dry wells, UIC Well #73, or is conveyed to open areas for percolation (Earth Tech and Tetra Tech, 2005). Although there is a hydraulic connection to the Pacific Ocean, approximately 1 mile downgradient of the facility, any PFAS in groundwater that discharges to the ocean is largely diluted and is unlikely to present a complete pathway to recreational users.

6.2 AOI 2: Hangar Suppression System and Storage

AOI 2 is the location of the hangar and the surrounding area at Kalaeloa AASF #1-JRF. Although there have been no known incidences of AFFF release, the hangar and the surrounding area are

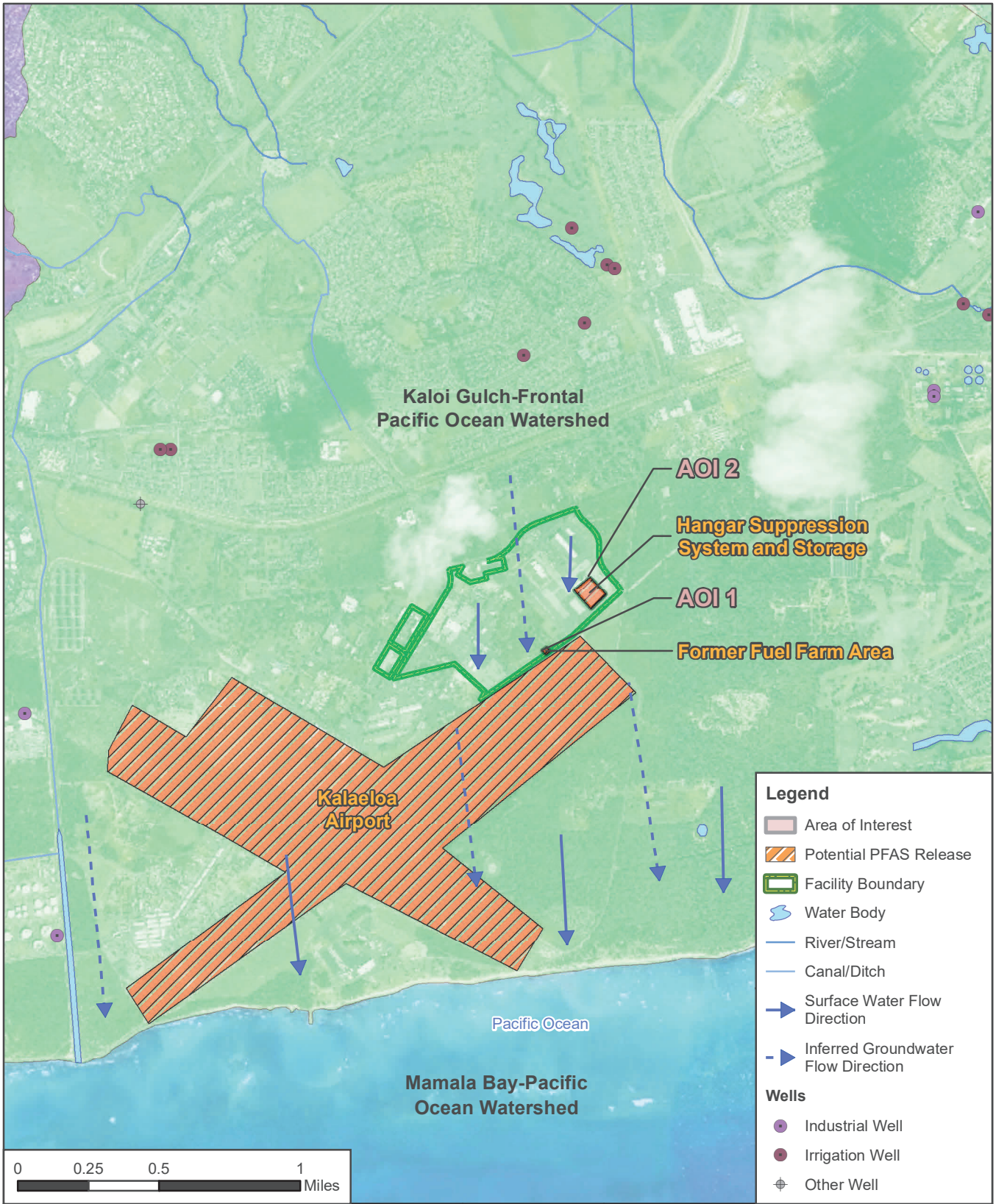
conservatively considered a potential PFAS release area based on the presence of the AFFF charged fire suppression system and the storage of eight 55-gallon drums of 3% AFFF.

Potential AFFF releases would have occurred either inside the enclosed mechanical room within the hangar or where the drums of AFFF are stored. The hangar and mechanical room are constructed with floor drains that lead to an OWS that subsequently discharges to the sanitary sewer. If AFFF was rinsed into the floor drains, any cracks or leaks are present within the drainage system may have facilitated the movement of PFAS into the subsurface.

The area within and surrounding AOI 2 is a combination of impervious paved areas and crushed concrete laid over soil substrate (Amec Foster Wheeler Environment & Infrastructure, Inc., 2019). Although the topography at the facility is relatively level, stormwater is anticipated to generally flow to the south-southwest and is directed to UIC wells, drainage pits, and detention basins that are located at numerous points across the apron. Any AFFF that may have exited the hangar (i.e., via tracking or outdoor storage) would have likely been washed into the surrounding areas of crushed concrete via sheet flow and infiltrated to the underlying soil. Significant rainfall could carry PFAS to detention basins to the south and southwest of the hangar and subsequently to UIC wells for subsurface infiltration.

For the above reasons, there is a potentially complete pathway for subsurface soil to construction workers. Because it is possible that PFAS could have been washed into the surrounding areas of crushed concrete, surface soil is considered a potentially complete pathway to site workers, construction workers, and trespassers via ingestion and inhalation of soil particulates.

Like AOI 1 (**Section 6.1**), groundwater pathways are also considered incomplete for all receptors because there are no drinking water intakes at or downgradient of the facility and the depth to groundwater is anticipated to be approximately 36 to 39 feet bgs. The surface water/sediment pathway is also considered incomplete because there are no surface water bodies at the facility and storm water runoff is captured in dry wells. The preliminary CSM for AOI 2 is the same as for AOI 1 and is shown on **Figure 6-2**.



CLIENT	ARNG			
Preliminary Assessment for PFAS at Kalaeloa, HI				
REVISED	9/17/2020	GIS BY	SK	9/17/2020
SCALE	1:31,680	CHK BY	CR	9/17/2020
Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/17/2020

Area of Interest

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 6-1

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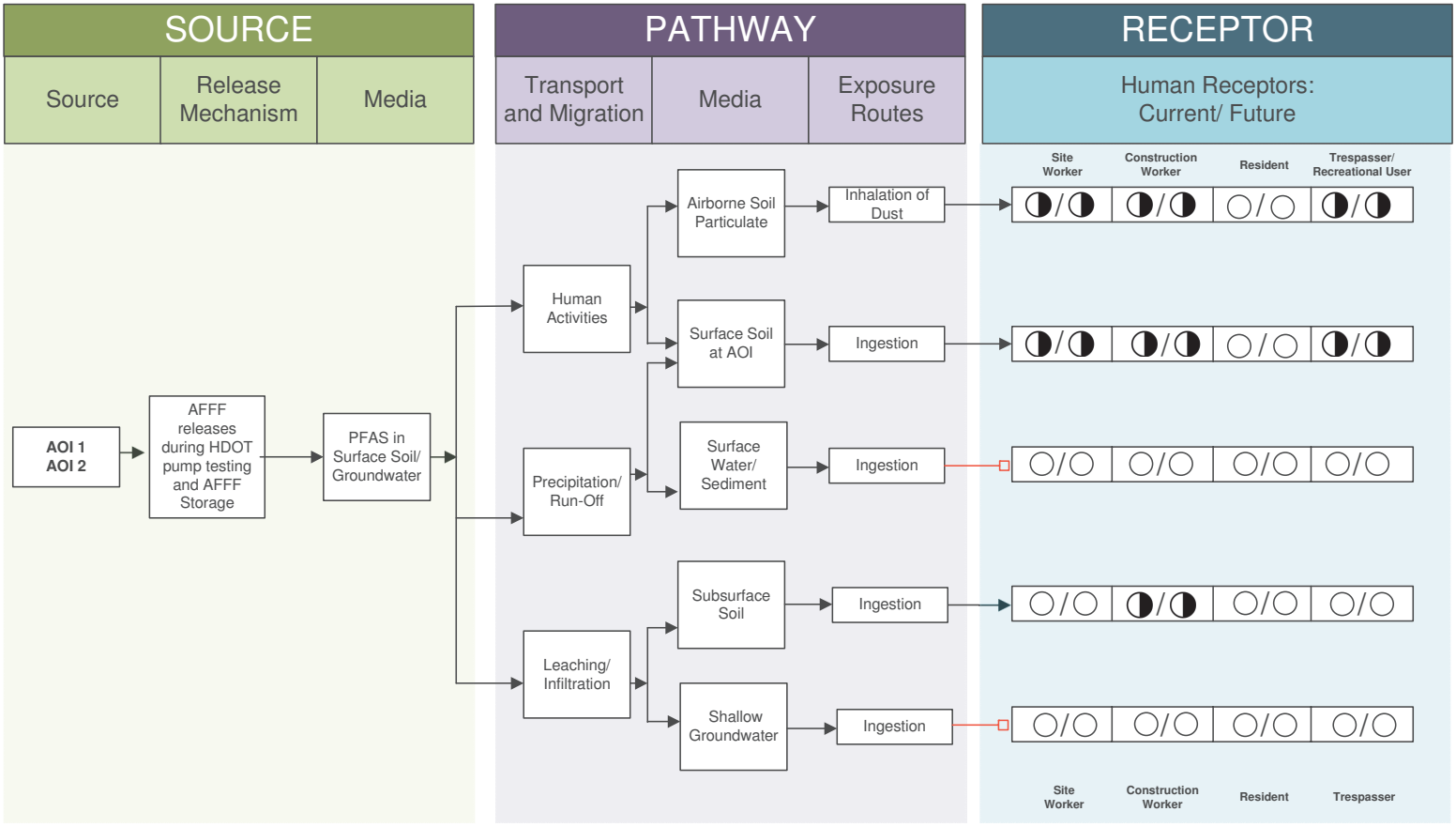


LEGEND

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

Notes:
1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. Dermal contact exposure pathway is incomplete for PFAS

Figure 6-2
Preliminary Conceptual Site Model
Kalaeloa AASF #1-JRF, HI

7. Conclusions

This report presents a summary of available information gathered during PA efforts on the use and storage of AFFF at the Kalaeloa AASF #1-JRF. The PA findings are based on the information presented in **Appendix A** and **Appendix B**.

7.1 Findings

Two AOIs related to potential PFAS releases were identified at the Kalaeloa AASF #1-JRF during the PA. **Figure 7-1** and **Table 7-1** present a summary of PA findings.

Kalaeloa Municipal Airport is located immediately to the south of the identified AOI, at Kalaeloa HIARNG Facility, and is a potential off-facility source of PFAS.

Table 7-1: AOIs at Kalaeloa AASF #1-JRF

Area of Interest	Name	Used by	Release Dates
AOI 1	Former Fuel Farm Area	HDOT	Confirmed release: 12 October 2017; unknown historical pump test frequency
AOI 2	Hangar Suppression System and Storage	HIARNG	Unknown; no documented releases

Based on the known or potential PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for the AOI at Kalaeloa AASF #1-JRF details the specific pathways and receptors for the AOI and are shown on **Figures 6-2.**

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

The conclusions of this PA are based on all available information, including: previous environmental reports, EDRs™, observations made during the visual site inspection, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS were first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. Comprehensive information on all industrial practices that may potentially be sources of PFAS is incomplete. Therefore, this PA may not identify all potential PFAS sources.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

Interviews were not conducted with municipal airport staff, and the site visit did not include visiting municipal airport assets and hangars because the focus of the assessment was to evaluate

potential PFAS related activities and sources at HIARNG properties, not formally assess adjacent sources. AFFF storage or use is commonly associated with such municipal airport facilities. **Table 7-2** summarizes the uncertainties associated with the PA.

Table 7-2: Summary of Uncertainties

Location	Source of Uncertainty
AOI 1 – Former Fuel Farm Area	Fuel Farm: While a spill report was available, records documenting the frequency that pump tests were conducted in the area were not available. It is possible that release of AFFF during pump tests have occurred in the past prior to interviewees' knowledge.
HDOT Kalaeloa ARFF Unit pump testing (unknown locations)	PA interviewees stated that monthly pump tests occur at random locations across Kalaeloa Airport. The exact locations are unknown. It is possible there are other locations of releases within the AASF #1-JRF that are not documented.
AOI 2 – Hangar Suppression System and Storage	The hangar was not inspected at the time of the site visit. There are no documented tests or releases of the suppression system. However, it is not known if any incidental releases occurred during AFFF handling.

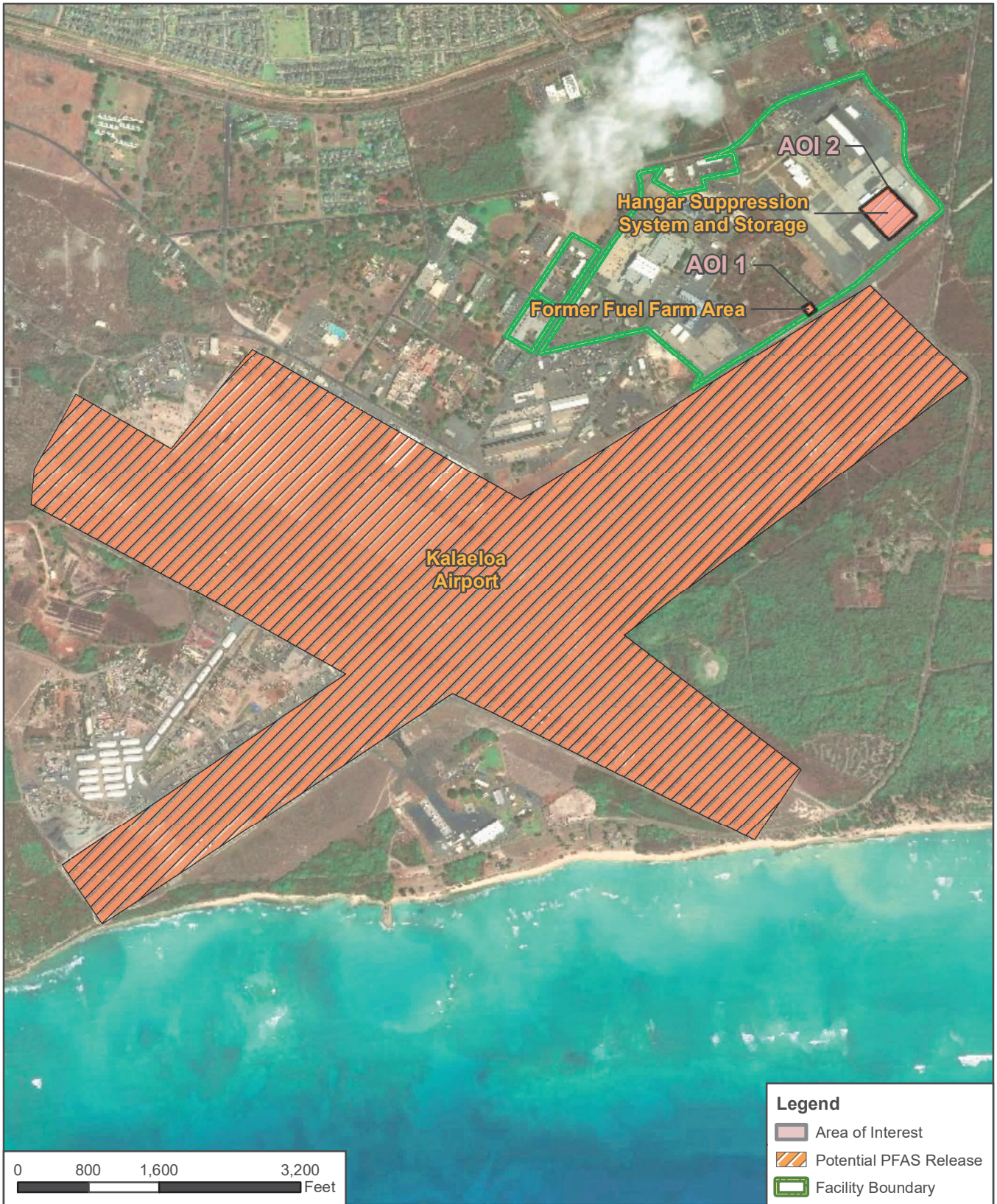
7.3 Potential Future Actions

The degree of uncertainties associated with the interviews and data collected during the PA indicates that current or former HDOT Kalaeloa ARFF Unit activities may have resulted in potential PFAS releases at the one AOI identified during the PA. Based on the preliminary CSM developed for the AOI, there is potential for receptors to be exposed to PFAS contamination in soil, subsurface soil, and groundwater at this AOI. **Table 7-3** summarizes the rationale used to determine if the AOI should be considered for further investigation under the CERCLA process and undergo an SI.

Table 7-3: PA Findings Summary

Area of Interest	AOI Location	Rational	Potential Future Action
AOI 1 – Former HDOT Fuel Farm Area	21°19'0.02"N, 158° 3'41.81"W	HDOT Kalaeloa ARFF Unit released AFFF during water pump testing	Proceed to an SI; focus on soil
AOI 2 – Hangar Suppression System and Storage	21°19'11.67"N, 158° 3'30.09"W	Potential PFAS release a result of AFFF system and storage	Proceed to an SI; focus on soil

ARNG is evaluating an SI at Kalaeloa AASF #1-JRF based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources.



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REVISED	9/17/2020	GIS BY	SK	9/17/2020
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Base Map: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	9/17/2020

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Summary of Findings

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 7-1

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