FINAL PRELIMINARY ASSESSMENT AND SITE INSPECTION OF PER- AND POLYFLUOROALKYL SUBSTANCES

Fort Huachuca, Arizona

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Final Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

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EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at United States Army or Reserve installations nationwide. The PA identifies areas of potential interest (AOPIs) where PFAS-containing materials were used, stored, and/or disposed, or areas where known or suspected releases to the environment occurred. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required. This Fort Huachuca (FTHU) PA/SI was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and The National Oil and Hazardous Substances Pollution Contingency Plan, and Army/Department of Defense policy and guidance.

FTHU is located on approximately 73,000 acres in the southeastern portion of Arizona in Cochise County. FTHU is bisected by Arizona State Highway 90 and is divided into an East Reservation and a West Reservation. The East Reservation includes the East Range which mostly consists of open/operational areas, and the West Reservation includes the West Range, the South Range, the cantonment area, the Libby Army Airfield and supports the on-post population. The East Range was renamed the 1st Lt. John R. Fox Multi-Domain Operations Range in July 2022 but will be referred to throughout this report as the East Range for consistency with previous reports. FTHU is bordered on the east and southeast by the city of Sierra Vista (population 45,308 [U.S. Census Bureau 2020a]) and on the north by Huachuca City (population 1,626 [U.S. Census Bureau 2020b]). The Coronado National Forest lies to the west and south and the Huachuca Mountains form the southern and western boundaries of FTHU. The northern border parallels the Babocomari River, a tributary of the San Pedro River. West of FTHU are privately owned-ranches along with the Appleton-Whittell Research Ranch managed by the Audubon Society.

The FTHU PA identified 19 AOPIs for investigation during the SI phase. SI sampling results from all 19 AOPIs were compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, and PFBS. PFOS, PFOA, and/or PFBS were detected in soil and/or groundwater at 13 AOPIs; however, only six of the 19 AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The FTHU PA/SI identified the need for further study in a CERCLA remedial investigation. **Table ES-1** below summarizes the PA/SI sampling results and provides recommendations for further study in a remedial investigation or no action at this time at each AOPI.

Table ES-1. Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at FTHU, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Fire Station #1	NS	No	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Traffic Circle Car Fire	NS	No	No action at this time
Beehive on School Fence	NS	Yes	Further study in a remedial investigation
Former Fire Station #2	NS	Yes	Further study in a remedial investigation
LRC Fire Truck Maintenance	NS	No	No action at this time
Defuel Pad	NS	No	No action at this time
Former Firefighting Training Area	NS	Yes	Further study in a remedial investigation
Current Firefighting Training Area	NS	No	No action at this time
Fire Station #3	NS	Yes	Further study in a remedial investigation
Hangar 5	NS	No	No action at this time
South Ramp Taxiway and Drainage Basin	NS	Yes	Further study in a remedial investigation
Hangar 6	NS	ND	No action at this time
WWTP #1	NS	No	No action at this time
WWTP #2	NS	No	No action at this time
Mountain View Golf Course	NS	No	No action at this time
Outdoor Sports Complex	NS	No	No action at this time
Prosser Village Barracks Landscaping	NS	No	No action at this time
East Range Recharge Basins	Yes	No	Further study in remedial investigation
UAV Black Tower Building 11683	NS	No	No action at this time

Notes:
Light gray shading – detection greater than the OSD risk screening level

GW – groundwater
ND – non-detect
NS – not sampled
SO – soil

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12580 and is conducting the PA/SI consistent with its authority under CERCLA, 42 United States Code §§ 9600, et seq. (as amended), and the Defense Environmental Restoration Program, 10 United States Code §§ 2701, et seq. The PFAS PA/SI included two distinct efforts. The PA identified locations that are areas of potential interest (AOPIs) at Fort Huachuca (FTHU) based on the use, storage and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release has occurred, and the PFOS, PFOA, and PFBS results were compared to the Office of the Secretary of Defense (OSD) PFOS, PFOA, and PFBS risk screening levels to determine whether further investigation is warranted. This report provides the PA/SI for FTHU and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

PFAS are a class of compounds that have been used in a wide range of industrial applications and commercial products due to their unique surface tension/leveling properties. Due to industry and regulatory concerns about the potential health effects and adverse environmental impacts, there has been a reduction in the manufacture and use of PFAS worldwide. In the U.S., significant reductions in the production, importation, and use of PFOS and PFOA (two individual compounds in the PFAS class) occurred between 2001 and 2015 (Interstate Technology Regulatory Council 2017). PFBS replaced PFOS in some applications and is currently used and manufactured in the U.S.

In 2016, the United States Environmental Protection Agency (USEPA) established a lifetime health advisory of 70 nanograms per liter (ng/L) in drinking water for PFOS or PFOA and for the sum of PFOS and PFOA when both are present (USEPA 2016). On 15 October 2019, the OSD provided guidance on the investigation of PFOS, PFOA, and PFBS at Department of Defense (DoD) restoration sites (OSD 2019). The DoD guidance provides risk screening levels for PFOS, PFOA, and PFBS in tap water or soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. Following the issuance of the 2019 OSD memo, on 08 April 2021, USEPA published an updated toxicity assessment for PFBS (USEPA 2021). Based on the updated toxicity assessment for PFBS, the OSD issued a memorandum on 15 September 2021 to include updated PFBS risk screening levels (OSD 2021). The September 2021 Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program is provided for reference as **Appendix A**. The OSD risk screening levels for tap water (also used to evaluate groundwater or surface water used as drinking water sources) are 40 ng/L for PFOS and PFOA, and 600 ng/L for PFBS. The PFOS and PFOA soil screening levels for the residential and industrial/commercial scenarios are 0.13 milligrams per kilogram (mg/kg) (residential) and 1.6 mg/kg (industrial/commercial).

The soil screening levels for PFBS are 1.9 mg/kg (residential) and 25 mg/kg (industrial/commercial). These screening criteria are discussed further in **Section 6.5**.

1.2 PA/SI Objectives

This PA/SI was conducted consecutively because the results of the PA yielded AOPIs that necessitated continuing onto the SI phase in accordance with the CERCLA process. Consequently, this report provides the combined objectives of both PA and SI reports.

1.2.1 PA Objectives

During the PA, investigators collect readily available information and conduct site reconnaissance. This PA will evaluate and document areas where PFAS-containing materials were used, stored, and/or disposed, so the Army can distinguish between sites that pose little or no threat to human health and the environment and sites that require further investigation.

1.2.2 SI Objectives

An SI is conducted when the PA determines an AOPI exists based on probable use, storage, and/or disposal of PFAS-containing materials. The SI includes multi-media sampling at AOPIs to determine whether or not a release has occurred. The SI may conclude further investigation is warranted, a removal action is required to address immediate threats, or no further action is required.

Installation-specific data quality objectives (DQOs) and the sampling design and rationale are summarized in **Sections 6.1** and **6.2**.

1.3 PA/SI Process Description

For FTHU, PA/SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for FTHU. The PA and SI processes are documented in the PA/SI Quality Control Checklist included as **Appendix B**.

1.3.1 Pre-Site Visit

First, an installation kickoff teleconference was held between applicable points of contact (POCs) from United States Army Environmental Command (USAEC), FTHU, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 13 February 2019, 9 weeks before the site visit to discuss the goals and scope of the PA, project scheduling, installation access, timeline for the site visit, access to installation-specific databases, and to request available records.

Records review was conducted before the site visit to obtain electronically available documents from the installation and external sources for review. The purpose of the records research was to identify any area on the installation that may have been a location where PFAS-containing materials were used, stored, and/or disposed, as well as to gather information on the physical setting and site history at FTHU.

A read-ahead package was prepared and submitted to the appropriate POCs 2 weeks before the site visit. The read-ahead package contains the following information:

- The Installation Management Command (IMCOM) operation order
- The Army PA Operations Security requirements package, which includes the antiterrorism/operations security review cover sheet (**Appendix C**)
- The PFAS PA kickoff call minutes
- An information paper on the PA portion of the Army's PFAS PA/SI
- Contact information for key POCs
- A list of the data sources requested and reviewed
- A list of preliminary locations identified during the kickoff call and pre-site visit records review to be evaluated for use, storage, and/or disposal of PFAS-containing materials, where additional information on those areas will be collected through personnel interviews, additional document review, and site reconnaissance.
- A list of roles for the installation POC to consider when recommending potential interviewees.

1.3.2 Preliminary Assessment Site Visit

The site visit was conducted from 16 to 18 April 2019. An in-brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed.

Personnel interviews were conducted with individuals having significant historical knowledge at FTHU. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, and corroborating other interviewees' information.

Site reconnaissance included visual surveys that assessed the points of potential use, storage, and/or disposal of PFAS-containing materials, as well as potential secondary impacts, and the migration potential from each AOPI (e.g., stormwater drains, building drains and sumps, cracks in the floor/pavement). Physical attributes of the preliminary locations were documented, including local slope and ground and floor conditions (i.e., paved, unpaved, visual staining), surface water bodies and surface flow, potential receptors, and the distance to the installation boundary. Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for SI sampling. Photo documentation of the preliminary locations was collected, and access limitations or advantages related to potential future sampling activities were noted.

An informal exit briefing was offered to installation personnel at the conclusion of the site visit to raise any items identified during the site visit, discuss any follow-up items, and review the schedule for submitting deliverables. The exit briefing was conducted on-site on 18 April 2019 with the installation to discuss preliminary findings of the PA site visit, and the tasks completed.

1.3.3 Post-Site Visit

Information collected before, during, and after the site visit was reviewed and corroborated by cross-referencing records and reviewing interview details and observations noted during site visit reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and United States Army Corps of Engineers (USACE) regional POCs following the site visit. The information collected during the pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report (**Section 3**). Site data obtained during the PA were used to develop preliminary conceptual site models (CSMs) for each AOPI, which serve as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum.

1.3.4 Site Inspection Planning and Field Work

The SI process was initiated at the installation to evaluate PFOS, PFOA, and PFBS presence or absence at each AOPI and determine whether further investigation is warranted. First, an SI kickoff teleconference was held on 01 August 2019, between the Army PA team and FTHU.

The objectives of the SI kickoff teleconference were to:

- discuss the findings of the PA
- discuss the AOPIs selected for sampling
- gauge regulatory involvement (USEPA) requirements or preferences
- confirm the plan for investigation-derived waste (IDW) handling and disposal
- discuss general SI deliverable and field work schedule information and logistics

Following development of the SI sampling technical approach, an SI scoping teleconference was held to obtain concurrence on the SI sampling plan from USAEC, USACE, and the installation. Additional discussion topics included:

- discuss the proposed sampling plan for each AOPI
- identify specific installation access requirements and potential schedule conflicts
- provide an updated SI deliverable and field work schedule.

A Programmatic Uniform Federal Policy-Quality Assurance Project Plan (PQAPP) was developed and finalized in October 2019 for the USAEC PFAS PA/SI (Arcadis 2019). The PQAPP details general planning processes for collecting data and describes the implementation of quality assurance (QA) and quality control (QC) activities for the SI portion for Army installations nationwide. Additionally, an installation-specific QAPP Addendum was developed to define the DQOs, present the sampling design and rationale, and provide qualifications for project personnel. The SI field work was completed in accordance with the PQAPP (Arcadis 2019) and the approved installation-specific QAPP Addendum (Arcadis 2020). A Site Safety and Health Plan (SSHP) was also developed as an attachment to the QAPP Addendum to identify specific health and safety hazards that may be encountered at the installation during sampling. The SSHP was designed to supplement the Accident Prevention Plan (Arcadis 2018),

which was developed for Army installations nationwide. The QAPP Addendum and SSHP were submitted to the installation and finalized before commencement of field work.

The DQOs, sampling design and rationale, and field methods employed for the SI are summarized from the QAPP Addendum developed for FTHU (Arcadis 2020) in **Sections 6.1** through **6.3**.

After finalization of the QAPP Addendum and SSHP, field planning and coordination with the installation and subcontractors was completed. Once the schedule was determined, field teams mobilized to the installation to complete the scope of work defined in the QAPP Addendum.

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, and PFBS analysis by liquid chromatographic and tandem mass spectrometry and compliant with the DoD Quality Systems Manual (QSM) 5.3 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about FTHU, including the location and layout, the installation mission(s) over time, a brief site history, current and projected land use, climate, topography, geology, hydrogeology, surface water hydrology, potable wells within a 5-mile radius of the installation, and applicable ecological receptors.

2.1 Site Location

FTHU is located on approximately 73,000 acres on the western side of the Upper San Pedro River Valley in Cochise County in southeastern Arizona, about 75 miles southeast of Tucson and about 8 miles north of the U.S.-Mexico Border (**Figure 2-1**). FTHU is bisected by Arizona State Highway 90 and is divided into an East Reservation and a West Reservation (Vernadero Group 2010). The East Reservation is approximately 28,550 acres and consists of the 1st. Lt. John R. Fox Multi-Domain Operations (MDO) Range (formerly called the East Range[1]) and open land. The West Reservation is approximately 44,600 acres and includes the West Range, South Range, cantonment area, Libby Army Airfield (LAAF) and supports the on-post population. The Sierra Vista municipal airport is located within the outer footprint of FTHU in the West Range, though it is not formally included as part of the installation.

FTHU is bordered on the east and southeast by the city of Sierra Vista (population 45,308 [U.S. Census Bureau 2020a]) and on the north by Huachuca City (population 1,626 [U.S. Census Bureau 2020b]). The Coronado National Forest lies to the west and south and the Huachuca Mountains form the southern and western boundaries of FTHU. The northern border parallels the Babocomari River, a tributary of the San Pedro River (Vernadero Group 2010). West of FTHU are privately owned-ranches along with the Appleton-Whittell Research Ranch managed by the Audubon Society (USAEC 2016).

2.2 Mission and Brief Site History

The current missions at FTHU include the U.S. Army Intelligence Center of Excellence and their 111th Military Intelligence Brigade's training mission. Electronics testing missions are conducted by the Joint Interoperability Test Command, the Electronic Proving Ground, and other testing organizations. In 2003, the FTHU Garrison was transferred from the U.S. Army Training and Doctrine Command to the IMCOM (USAEC 2016).

The installation was founded in the 1880s as part of the western expansion and operated as a cavalry post until the outbreak of World War II, when it became a training base. The fort was inactive briefly in the early-1950s. Following reactivation in 1954, the fort's primary missions included signal communications and electronics testing. In 1954, the fort was designated as the U.S. Army Electronics Proving Ground. Since that time, additional missions have been added (e.g., communications testing, military intelligence training, and various. flight operations). The permanent population of service members and dependents is

[1] The 1st. Lt. John R. Fox Multi-Domain Operations [MDO] Range will be referred to as the East Range throughout this PA/SI Report for consistency with the QAPP Addendum (Arcadis 2020),

approximately 7,300. Several thousand civilian employees are employed at the installation during the day. (USAEC 2016).

2.3 Current and Projected Land Use

FTHU is located on the western side of the Upper San Pedro River Valley in Cochise County in southeastern Arizona, approximately 75 miles southeast of Tucson, and approximately 8 miles north of the U.S.-Mexico Border. Land surrounding FTHU is under the control of the Bureau of Land Management, U.S. Forest Service (USFS), and the Arizona State Land Department. Communities in the area include Sierra Vista, Benson, Tombstone, Huachuca City, and Bisbee.

The City of Sierra Vista lies immediately to the east and southeast of FTHU and serves as a regional residential and commercial center. Huachuca City is located directly north of FTHU. The Huachuca Mountains are located along and within the southern and western portions of FTHU. The northern border of FHTU runs parallel to the Babocomari River, a tributary to the San Pedro River.

FTHU is divided into the East Reservation (28,544 acres) and West Reservation (44,598 acres) by State Route 90. Land uses on these reservations are generally classified as either open and operational or developed areas. The West Reservation is subdivided into the West Range, South Range, and the cantonment area. The LAAF is in the northern part of the cantonment.

The operational areas on the West and East Reservations are used as training and testing ranges and encompass approximately 67,400 acres, or approximately 92 percent (%) of FTHU's 73,142 acres. Active, Reserve, and National Guard units of all services may use the training areas mainly for mountain and desert training, escape and evasion training, brigade-size field training exercises, and maneuver exercises (U.S. Fish and Wildlife Service 2014).

2.4 Climate

The climate at FTHU varies based on elevation and season, ranging from hot valleys to cool and moist mountains. The average temperature during the summer months is 88 degrees Fahrenheit and during the winter months is 32 degrees Fahrenheit (U.S. Fish and Wildlife Service 2014). Precipitation mainly occurs during two periods of the year, the first period being between May and October during monsoon season when Gulf of Mexico atmospheric moisture falls as afternoon and evening thundershowers. The other period where precipitation occurs is during winter when Pacific frontal storms reach the region and can produce light rain in the valley and snow on the surrounding mountains. Higher elevations receive an average annual precipitation up to 30 inches per year while the valley average is about 15 inches per year (Vernadero Group 2010).

2.5 Topography

FTHU is located within the Mexican highland section of the Basin and Range Physiographic Province which is made up of a series of isolated mountain ranges and broad, relatively flat valleys or basins. The San Pedro River Basin, which FTHU lies within, is comprised of elongated north-south trending block-faulted mountains surrounding a central valley filled with deep alluvium (U.S. Fish and Wildlife Service 2014). Ground surface elevations surrounding FTHU vary greatly. Elevations in the surrounding

mountains ranging from 4,400 to 9,500 feet above mean sea level (amsl). The valley floor slopes gradually from north to south, with ground surface elevations varying from approximately 4,800 feet amsl near the headwaters in Mexico to 3,300 feet amsl at the narrows. Ground surface elevations across FTHU reflect the diversity in the surrounding topography, ranging from approximately 3,925 feet amsl in the extreme northeastern portion of the installation to approximately 8,600 feet amsl above Scheelite Canyon, as shown on **Figure 2-2** (Army Intelligence Center and Fort Huachuca 2002).

2.6 Geology

FTHU includes the northeastern portion of the Huachuca Mountains and the western part of the upper San Pedro River Valley basin. The Huachuca Mountains are a faulted complex of Precambrian granitic rocks overlain by Paleozoic sedimentary and metamorphic rocks. Much of the valley has been dissected and deeply incised by intermittent drainages (URS Corporation 2008). Surficial deposits within the upper San Pedro River Valley consist of thin, unconsolidated, and discontinuous Pleistocene and Holocene alluvial deposits. Underlying the surficial deposits are sedimentary units consisting of an unconsolidated to moderately consolidated upper Pliocene to Pleistocene basin fill unit, an unconsolidated to moderately consolidated upper Miocene to Pliocene lower basin fill unit, and the well-consolidated upper Oligocene to lower Miocene Pantano Formation. The Pantano Formation is comprised of well-cemented gravel, conglomerate, sandstone, and siltstone and has a very low permeability. The Pantano Formation overlays bedrock, which lies at depths up to 5,500 feet below ground surface (bgs) in valley areas and at or near the land surface near the Huachuca Mountains (Vernadero Group 2010).

2.7 Hydrogeology

The regional groundwater reservoir includes the upper and lower basin fill units and the Pantano Formation. Water enters these units as recharge along the front of the Huachuca Mountains. Regionally the groundwater then flows northeastward towards the Babocomari River and east to the San Pedro River, where it discharges along some reaches of the rivers as base flow (Montgomery Watson 1994). The local groundwater flow direction is influenced by a cone of depression, as shown on **Figure 2-3**, caused from groundwater pumping by FTHU and the town of Sierra Vista.

As early as 1966, historical groundwater elevations across FTHU indicate a distinct cone of depression centered around the FTHU potable wells, extending into Sierra Vista. From 1966 to 2001, groundwater elevations under the cone of depression's pumping center declined by at least 50 feet. By 2001, depth to groundwater beneath the cone of depression exceeded 500 feet bgs, with the cone of depression running roughly parallel to the Huachuca Mountains to the northwest and southeast from Sierra Vista. According to the Arizona Department of Water Resources, the majority of wells in proximity to FTHU and outside of the central cone of depression experienced water level declines of approximately 1 foot per year from 1990 to 2001. Wells between Sierra Vista and Huachuca City, located in the central cone of depression, showed declines of 5 to 7 feet in the same 12-year period (0.4 to 0.6 feet per year) (U.S. Fish and Wildlife Service 2014). The location of the cone of depression is shown on **Figure 2-4**.

Regional groundwater surrounding FTHU generally occurs under unconfined conditions within the lower basin fill unit. Historical depth to groundwater extends as deep as 500 feet bgs in central FTHU, decreasing gradually to the northeast towards the Babocomari and San Pedro Rivers (U.S. Fish and

Wildlife Service 2014). Estimated saturated thickness in the regional aquifer ranges from more than 1,000 feet in the central basin to less than 100 feet near the mountain fronts (Montgomery Watson 1994).

Perched groundwater at depths of less than 10 feet bgs is locally present in areas along the mountain edges on and around FTHU. This occurrence is indicated by unusually high-water levels in wells where groundwater gradients are especially steep near the mountain fronts. The shallow perched aquifer is likely from recharge to shallow alluvial and upper basin fill sediments from streams that drain the adjacent portion of the Huachuca Mountains. Groundwater from these local perched zones appears to recharge the regional groundwater body in limited amounts (Montgomery Watson 1994).

2.8 Surface Water Hydrology

The installation lies within the Sierra Vista Sub watershed on the western portion of the San Pedro River Basin. The general direction of overland flow is to the north towards the eastward flowing Babocomari River. The Babocomari River, in turn, drains into the northward flowing San Pedro River. The source of all water in the San Pedro River Basin is from precipitation, much of the precipitation is lost to evapotranspiration; the remainder either flows overland to stream channels or infiltrates into the soil (JMM Consulting Engineering 1992a). Most surface water on FTHU is in the form of ephemeral streams, consisting of dry washes, arroyos, or continuous and discontinuous gullies. These periodic streams are typically narrow channels with a sand and gravel layer at the bottom of the channel and serve to carry runoff to larger drainage systems. Local surface water is generated as storm runoff, snowmelt, and discharge from springs into the stream channels. Springs were at one time the sole source of water for FTHU but by 1983, FTHU no longer used springs as a source of potable water and groundwater is the primary drinking water source on post (Vernadero Group 2010).

2.9 Relevant Utility Infrastructure

The following subsections provide general information regarding the installation's stormwater and wastewater management systems, including the influence of the utility infrastructure on the fate and transport of PFAS constituents at FTHU.

2.9.1 Stormwater Management System Description

As discussed in **Section 2.8**, much of the precipitation that occurs at FTHU is lost to evapotranspiration. The stormwater that does not evaporate either flows overland (e.g., through ditches, washes) to deposit in river drainages, or infiltrates into the soil. The contribution to the hydrologic system from surface water is minimal, with less than 1.0 inch of the approximately 15 inches of annual precipitation in the San Pedro Basin recorded as annual streamflow. Thus, most of the precipitation not lost to evapotranspiration serves to recharge the regional groundwater reservoir (Montgomery Watson 1994).

Sensitive surface water bodies in the region include the San Pedro River, and secondarily, its tributary the Babocomari River. FTHU has implemented a Stormwater Pollution Prevention Plan for all activities involving the disturbance of one or more acre, including degraded land on the East Range, which present a potential source of sediments and turbidity in the Babocomari and San Pedro River channels (Army Intelligence Center and Fort Huachuca 2002).

Prior to 2007, the Army constructed five stormwater detention basins, located near where the northwestern corner of Sierra Vista borders FTHU, to store and recharge captured urban runoff to the regional aquifer. The water recharged at these basins is dependent on the amount of precipitation each year and is monitored by the U.S. Geological Survey. Annual recharge at the detention basins from 2007 to 2011 ranged from 13 to 232-acre feet per year (AFY), with 106 AFY on average. The Army installed rooftop capture systems at the Electronic Proving Ground Warehouse, Barnes Field House, and military treatment facility, sized to capture a combined total 2 AFY of runoff. The total annual stormwater captured across the installation is estimated to be 108 AFY on average. In 2002, the Army constructed 50 acres of off-post wetlands near the eastern portion of the City of Sierra Vista, known as The Environmental Operations Park, of which 30 acres are treated wastewater recharge basins. According to groundwater demand accounting completed in 2011, 40% of the Sierra Vista population is attributable to FTHU's operations and activities. Therefore, the same percentage of the wastewater recharged at the Environmental Operations Park is attributed to FTHU (U.S. Fish and Wildlife Service 2014).

As part of a 2007 Biological Opinion with the U.S. Fish and Wildlife Service, FTHU committed to implement methods to decrease water use and increase groundwater recharge. FTHU committed to mitigate 1,001 AFY, including 116 AFY of water conservation, 639 AFY of stormwater recharge, and 246 AFY of effluent recharge at the FTHU's Recharge Facility on the East Range in the East Reservation (USEPA 2011).

The Army continues to evaluate and implement measures for water conservation, effluent reuse or recharge, purchase of conservation easements, and storm water recharge. As of 2014, the Army and Huachuca City have entered into an Intergovernmental Agreement in which FTHU has agreed to accept and treat influent from Huachuca City, and to recharge the treated effluent to the regional aquifer. Several zoning easements have been implemented to reduce groundwater extraction and increase surface water recharge (U.S. Fish and Wildlife Service 2014).

2.9.2 Sewer System Description

FTHU currently has one operational wastewater treatment plant (WWTP) (WWTP #2), which has a permitted capacity of 2.0 million gallons per day. A second WWTP (WWTP #1), with a design capacity of 1.0 million gallons per day, is present at the installation, but was closed in the early 1980s. After its closure, the effluent holding pond at WWTP #1 continues to store treated effluent from WWTP #2 (Army Environmental Hygiene Agency 1989).

WWTP #1, constructed in the early 1940s, received liquid waste from many facilities across FTHU, including the three fire stations and their associated wash racks, and from x-ray and photo processing facilities. Prior to its closure, sludge from WWTP #1 was discharged to 12 unlined drying beds immediately adjacent to the plant. WWTP #2 was constructed in the early 1940s with 22 unlined drying beds located immediately to the north of the plant which received sludge from WWTP #2. In the mid 1990s, eight of the southern-most drying beds were lined and use of the unlined drying beds was discontinued. In the late 2000's, the eight drying beds were redeveloped into four larger lined drying beds covering the footprint of the previous eight. According to FTHU personnel interviews, in approximately 1980, the dried sludge from both WWTP #1 and WWTP #2 was used as fertilizer, though the exact locations of its use are unknown. All effluent from WWTP #1 and WWTP #2 was treated with gaseous chlorine during the wastewater treatment process. Treated effluent from WWTP #2 has historically been

and continues to be stored at three lined effluent holding ponds adjacent to WWTP #1 and WWTP #2 prior to its release from the treatment plant.

In 1969, an unlined evaporation/percolation lagoon was constructed in the current footprint of the East Range Recharge Basins. Three additional unlined evaporation/percolation lagoons were constructed in the same area in 1976. Beginning in 1969, treated effluent from WWTP #1 and WWTP #2 was discharged to the four unlined evaporation/percolation lagoons. The exact location of effluent discharge from WWTP #1 and WWTP #2 prior to 1969 is unknown. Discharge from WWTP #1 ceased when it closed in the early 1980s, and WWTP #2 became the primary WWTP for FTHU. In 2002, WWTP #2 was upgraded, and the unlined evaporation/percolation lagoons were redeveloped and replaced with seven effluent recharge basins, and one stormwater recharge basin. This redevelopment is reflected in the current configuration of the East Range Recharge Basins. Following redevelopment, effluent from WWTP #2 began discharging to the newly constructed recharge basins. In the past, sewage was diverted without secondary treatment to the former unlined evaporation/percolation lagoons and the recharge basins located at the East Range Recharge Basins AOPI while the WWTPs were undergoing repairs (Army Environmental Hygiene Agency 1989).

Unit operations for the WWTPs include a barscreen, a pre-aeration chamber (WWTP #1) or grit chamber (WWTP #2), primary clarifiers, a trickling filter, a final clarifier, effluent holding ponds (two at WWTP #1 and one at WWTP #2), and a two-stage anaerobic digestion system (Army Environmental Hygiene Agency 1989; Army Intelligence Center and Fort Huachuca 2002).

In 2000, the FTHU wastewater treatment system was treating approximately 387 million gallons per year of storm and wastewater at WWTP #2. Approximately 37% (143 million gallons per year) of the treated wastewater was used for turfgrass irrigation at the Mountain View Golf Course, and the cantonment (Warrior Sentinel Fields [formerly called the Outdoor Sports Complex[2]], Former Chaffee Parade Field, and the grounds at Prosser Village Barracks. The remaining 63% (approximately 244 million gallons per year) was discharged to the East Range Recharge Basins. Approximately 14% (33 million gallons per year) of the wastewater discharged to the East Range Recharge Basins evaporated. The remaining 86% of the wastewater discharged to the East Range Recharge Basins (approximately 211 million gallons per year) was available for infiltration and subsequent recharge of the vadose zone, groundwater, and aquifers (Army Intelligence Center and Fort Huachuca 2002).

Current infiltration at the East Range Recharge Basins is rapid with very little evaporation loss. The annual effluent recharged from 2007 to 2011 ranged from 262 to 450 AFY, with 368 AFY on average (U.S. Fish and Wildlife Service 2014). As discussed in **Section 2.9.1**, in 2014 the Army agreed to accept and treat influent from Huachuca City, and to recharge the treated effluent at the East Range Recharge Basins or reuse it to offset existing outdoor irrigation. Project design anticipated that Huachuca City would deliver approximately 88 AFY to WWTP #2 (U.S. Fish and Wildlife Service 2014). Additionally, the Army constructed approximately 40,000 feet of force main sewer pipeline and three lift stations to connect the Huachuca City's wastewater treatment facility to WWTP #2 (USEPA 2011). Beginning in 2016, WWTP #2 began receiving and treating influent from Huachuca City.

[2] The Warrior Sentinel Fields will be referred to as the Outdoor Sports Complex throughout this PA/SI Report for consistency with the QAPP Addendum (Arcadis 2020).

In July 2008, cantonment turfgrass irrigation using treated wastewater ceased, and all treated wastewater for reuse was directed to the Mountain View Golf Course for irrigation or stored at WWTP #2 to be used in the waste treatment process. When the reuse storage basins at the Mountain View Golf Course and WWTP #2 are full, the reuse water gravity feeds to the East Range Recharge Basins.

2.10 Potable Water Supply and Drinking Water Receptors

Groundwater is the primary drinking water source at FTHU. There are eight wells used to provide drinking water to FTHU (Well 1 through Well 8) ranging in depth from 710 to 1,230 feet bgs. Two of the wells (Well 7 and Well 8) have a pumping capacity of 800 gallons per minute and are located on post on the East Range. Six wells (Well 1 through Well 6) have a pumping capacity of 500 to 700 gallons per minute and are located on post between the main gate and the east gate. Three of these wells (Wells 1 through Well 3) were temporarily offline awaiting repairs at the time of the PA site visit. FTHU personnel interviews indicated then that these repairs are expected to take a few years to complete. Two wells located in the perimeter of the Sierra Vista Municipal Airport, registered under well registry numbers 55-505189 and 55-562352, provide potable water for the Sierra Vista Municipal Airport. Though not on FTHU property, these wells are located within the greater footprint of FTHU. Potable wells Well 1 through Well 6 and the Sierra Vista Municipal Airport potable wells are located within the cone of groundwater depression caused by their own pumping of the groundwater, as shown on **Figure 2-4**. Well construction details for all the Sierra Vista Municipal Airport and all on-post potable wells are presented in **Table 2-1**.

FTHU participates in a water conservation program that has seen a steady decrease in water consumption. Part of this conservation program includes recharge of treated effluent, from both FTHU and Huachuca City, into the regional aquifer via the East Range Recharge Basins or re-use of treated effluent for irrigation (Vernadero Group 2010). According to interviews with the IRP Programs Manager of the Water Division, various locations around the post received treated effluent for irrigation beginning in approximately the late 1970s or early 1980s, including the Former Chaffee Parade Field, Prosser Village Barracks, Outdoor Sports Complex, and Mountain View Golf Course. Presently only the golf course uses effluent for irrigation.

An Environmental Data Resources, Inc. (EDR) report includes search results from a variety of environmental, state, city, and other publicly available databases for a referenced property. An EDR report was generated for FTHU, which along with state and county GIS provided by the installation identified several off-post public and private wells within 5 miles of the installation boundary (**Figure 2-3**). The EDR report with well search results is provided as **Appendix E**.

2.11 Ecological Receptors

The PA team collected information regarding ecological receptors that was available in the installation documents reviewed during the PA process. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

There is significant wildlife diversity found in the FTHU area that is directly related to the habitat diversity in the region. The isolation of the Huachuca Mountains from the other mountain ranges in the area results in “mountain islands.” These areas are known for their diversity of vegetation types, usually along an elevational gradient, and typically exhibit high degrees of species endemism. In addition, proximity to

Mexico results in some wildlife species here that are not known to occur elsewhere in the U.S., or that are more commonly associated with the tropics.

No native fish have been known to occur on FTHU since 1983. The three amphibians most found on the installation are the native red spotted (Bufo punctatus) and Couch's spade foot (Scaphiophus couchi) toads, and the introduced bullfrog (Rana catesbeiana). Two federally listed amphibians, the Sonoran tiger salamander and the Chiricahua leopard frog, and two candidates for federal listing, the Huachuca/Canelo population of the Arizona treefrog and the Mexican garter snake occur or have occurred on FTHU.

Southeastern Arizona possesses one of the greatest diversities of bird species of any similarly sized region in North America. More than 400 bird species occur here each year, and a total of almost 500 bird species has been recorded. Large mammals on FTHU include the Coues white-tailed deer (Odocoileus virginianus couesi), desert mule deer (O. hemionus eremicus), Chihuahuan pronghorn antelope (Antilocapra americana), collared peccary or javelina, puma (Puma concolor), and black bear (Ursus americanus).

FTHU contains 64 acres of wetlands and 770 acres of riparian habitat. This acreage amounts to approximately 1% of the installation's total area. Palustrine unconsolidated bottom wetlands are the predominant type, representing approximately 65% of the installation's wetlands. The next most common wetland type is palustrine emergent wetlands totaling 13 acres. The predominant riparian type is emergent alkali sacaton, totaling 188 acres or 24% of the riparian vegetation. Linear wetlands and riparian habitats account for 275 miles including rivers, streams, and vegetated habitats (Vernadero Group 2010).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to FTHU, including those not conducted by the Army, are summarized to provide full context of available PFAS data for FTHU. Only data collected by the Army, however, will be used to make recommendations for further investigation. A full summary of historical analytical PFAS results is included in **Table 2-2**.

PFAS sampling was conducted in May and November of 2014, and June, November, and December of 2015 for potable water supplies in FTHU and in communities near FTHU in response USEPA's third Unregulated Contaminant Monitoring Rule. Sampled locations included wells owned by Bella Water Company and Pueblo del Sol Water Company of Sierra Vista, Liberty Water Rio Rico of Rio Rico, and FTHU. Post-treatment drinking water samples were analyzed for six PFAS including PFOS, PFOA, PFBS, PFNA, PFHxS, and PFHpA. All results were non-detect (USEPA 2017).

In September 2018, the Army conducted PFAS sampling at FTHU's entry point distribution systems (EPDS) associated with the installation's drinking water supply wells. Post-treatment drinking water samples were analyzed for six PFAS, including PFOS, PFOA, PFBS. PFBS was detected at 2.2 ng/L in EPDS #3, which is solely supplied by potable Well 3. PFOA and PFOS were not detected in the sample associated with EPDS #3. PFAS was not detected in any of the other EPDS samples collected associated with Wells 4 through 8 (Army 2019). Wells 3 through 6 are located near the eastern post boundary adjacent to the town of Sierra Vista and are influenced by the cone of depression. Well 7 and Well 8 are located on the East Range (**Figure 2-4**).

In August 2020, the Army conducted a second round of PFAS sampling at FTHU's EPDS locations (except EPDS #3), this time analyzing for a total of 18 PFAS compounds, including PFOS, PFOA, and PFBS. EPDS #3 was not sampled, as its sole supplier, Well 3, was not functioning at the time of sampling. PFAS compounds were only detected at EPDS #2, which is supplied by Well 7 and Well 8, with detected concentrations of 5.7 ng/L PFOS and 9.9 ng/L PFOA, below the applicable OSD risk screening levels.

3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored and/or disposed at FTHU, data was collected from three principal sources of information:

1. Records review
2. Personnel interviews
3. Site reconnaissance.

These sources of data, along with their relative application to this PA, are discussed below. The specific findings of records review, personnel interviews, and site reconnaissance relevant to PFAS-containing materials at FTHU are described in **Section 4**.

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, Fort Huachuca Fire Department documents, FTHU directorate of public works (DPW) documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. A list of the specific documents reviewed for FTHU is provided in **Appendix F**.

3.2 Personnel Interviews

Interviews were conducted during the PA site visit. Before arriving for the PA site visit, Arcadis PA team members scheduled interviews using the preliminary list of individuals who had been identified by the installation POC to be knowledgeable about the installation's history. The interviewees were identified by the Arcadis PA team during the preliminary research, in the read-ahead package, by follow-up notification emails, during the in-brief meeting, and through conversations with installation personnel.

The interviews were conducted by the Arcadis PA team during the site visit. If a previously identified interviewee was not available during the site visit, attempts were made to complete the interview via telephone before or following the site visit or by contacting an alternate interviewee identified by the installation POC.

The list of roles for the installation personnel interviewed during the PA process for FTHU is presented below (affiliation is with FTHU unless otherwise noted).

- IRP Manager, Water Programs
- Compliance Branch Chief
- Environmental Contractor, LAAF Hangar 5 Support
- Hydrologist
- Conservation Branch Chief, Archaeologist
- LAAF Airfield Manager

- LAAF Aviation Safety Officer
- Contractor, Logistics Readiness Center (LRC) Maintenance Manager
- Fire Chief
- Assistant Fire Chief
- Former Interim Fire Chief (retired)
- Station Captain, Fire Station #3
- Station Lieutenant, Fire Station #3
- Station Captain, Fire Station #2
- Firefighter, Fire Station #1
- Firefighter, Fire Station #2
- Firefighter, Fire Station #3
- Sierra Vista Fire and Medical Services Firefighter

The compiled interview logs are provided in **Appendix G**.

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at the preliminary locations identified at FTHU during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. These areas were classified as an area not retained for further investigation or an AOPI based on a combination of information collected (e.g., records reviewed, personnel interviews, internet searches) as described in **Sections 5.1** and **5.2**, respectively. A photo log from the site reconnaissance is provided in **Appendix H**; photos were used to assist in verification of qualitative data collected in the field. The site reconnaissance logs are provided in **Appendix I**.

Preliminary locations of potential use, storage, and/or disposal of PFAS-containing materials were then evaluated in the PA (during records review, personnel interviews, and/or site reconnaissance) and were categorized as AOPIs or as areas not retained for further investigation at this time based on a combination of information collected (e.g., records reviewed, personnel interviews, internet searches). A summary of the observations made, and data collected through records reviews (**Appendix F**), installation personnel interviews (**Appendix G**), and site reconnaissance logs (**Appendix I**) during the PA process for FTHU is presented in **Section 4**. Further discussion regarding rationale for not retaining areas for further investigation is presented in **Section 5.1**, and further discussion regarding categorizing areas as AOPIs is presented in **Section 5.2**.

4 POTENTIAL PFAS USE, STORAGE, AND/OR DISPOSAL AREAS

FTHU was evaluated for all potential current and historical use, storage, and/or disposal of PFAS-containing materials. There are a variety of PFAS-containing materials used in relation to current and historical Army operations. However, the use, storage, and/or disposal of aqueous film-forming foam (AFFF) is the most prevalent potential source of PFAS chemicals at DoD facilities. As such, this section is organized to summarize the AFFF-related uses first, and all remaining potential PFAS-containing materials in the subsequent section.

4.1 AFFF Use, Storage, and Disposal Areas

AFFF was developed in the mid-1960s in response to a need for firefighting foams better suited to extinguish Class B, fuel-based fires. AFFF formulations consist of water, an organic solvent, up to 5% hydrocarbon surfactants, and 1 to 3% PFAS (Interstate Technology Regulatory Council 2020). AFFF concentrate is designed to be diluted with water to become a 1, 3, or 6% foam. AFFF releases at DoD facilities may have occurred during firefighter training, emergency response actions, equipment testing, or accidental releases. The military still primarily uses AFFF for Class B fires; however, the current formulations of AFFF contain significantly lower amounts of PFOS, PFOA, and their precursors, and significant operational changes have been implemented to restrict uncontrolled releases and non-essential use of PFAS-containing foams. Army installations may still house AFFF, commonly stored in closed containers (e.g., 55-gallon drums, 5-gallon buckets), within designated storage buildings or at firehouses.

During the PA, historical foam use, storage, and disposal activities were identified as described in the following subsections:

4.1.1 Storage

Arcadis interviewed employees and contractors of the Fort Huachuca Fire Department, DPW, LRC, and LAAF regarding AFFF use and storage. Additionally, information on AFFF storage was collected from historical reports and documents provided by the Army. Available historical records (**Appendix F**), including the 2016/2017 AFFF inventory provided by IMCOM, reported 1,500 gallons of AFFF in storage (twenty 50-gallon pails and twelve 55-gallon drums) and on vehicles (740 gallons) at FTHU.

During site reconnaissance (**Appendix I**), two 5-gallon buckets of Chemguard 3% Class B AFFF were observed in the fire department storage shed (Building 51027) located at Fire Station #1; and numerous 55-gallon drums of Chemguard 3% AFFF (some of the drums appeared to be empty) and 5-gallon buckets of Chemguard 3% AFFF and Purple K dry chem powder were observed on pallets on the northwest portion of the Current Firefighting Training Area pad. At the time of the PA site visit, Fire Station #3 was reported to be storing 600 gallons of AFFF in 55-gallon drums and 115 gallons in 5-gallon containers, although this was not observed. Historically, AFFF has reportedly been stored in 5-gallon containers along the bay wall at Fire Station #3, in 5-gallon containers along the wall of the back bay at Former Fire Station #2, and at Fire Station #1 (location other than the storage shed is unknown).

According to Fort Huachuca Fire Department personnel interviews, spills from AFFF storage containers have been observed to occur at Fire Station #1, and Former Fire Station #2. On multiple occasions, firetrucks at Fire Station #1 were observed to leak AFFF onto the bay floor and apron. When leaks occurred, a bucket and mop were used to clean up the concentrate, and the wastewater was dumped down the utility closet sink, or onto the rocks located next to the north side of the back apron bay door. Similarly, firefighter personnel reported observing firetrucks at Former Fire Station #2 leaking AFFF at the station, particularly in the bays. Spills were cleaned with a mop and bucket, and minimal AFFF was observed to flow onto the street. Additionally, firefighter personnel reported that sometime between 2010 and 2012, the fire department was transferring AFFF between storage containers behind the station, during which AFFF was spilled.

4.1.2 Fire Suppression Systems

There are several hangars at FTHU; however, only Hangar 5 and Hangar 6 (both at LAAF) and Building 11683 in the Unmanned Aerial Vehicle (UAV) Black Tower Complex (UAV Black Tower Building 11683) are reported to utilize foam fire suppression systems. UAVs are also referred to as Unmanned Aircraft Systems, however to maintain consistency with the QAPP Addendum (Arcadis 2020), the term UAV is used throughout this PA/SI Report when referring to the UAV Black Tower Building 11683 AOPI. Hangar 5 (Building 91120) is operated by FTHU Garrison Command, Hangar 6 (Building 14606) is tenant-occupied and operated by the Arizona Air National Guard, and the UAV Black Tower Complex (Building 11683) is tenant-occupied and operated by the Army's 2nd Battalion 13th Aviation Regiment. PFAS are not known to be associated with Class A or high expansion foams and are primarily associated with some types of Class B foams such as AFFF and some protein foams. Discussion of permanent foam fire suppression systems at FTHU is provided below:

- Hangar 5, located at LAAF, utilizes a fixed foam fire suppression system using Buckeye high-expansion 2.2% foam. The foam storage tank for the suppression system is located in the Fire Equipment Room #105 on the southwest corner of the hangar. According to FTHU personnel interviews, a fire suppression system acceptance test was performed in approximately November 2013 prior to the hangar being occupied. Foam, unknown if AFFF or not, was reportedly swept out of the north-facing hangar doors using brooms and likely water onto the concrete apron. On 01 October 2016, the contents of a 55-gallon foam tank containing Buckeye high-expansion 2.2% foam concentrate (approximately 400 pounds) leaked onto the fire equipment room floor. Concentrate was 2 to 3 inches thick in the approximately 16-foot by 10-foot room and it reportedly flowed out the door onto the cement driveway. The concentrate was cleaned up by mopping the spill into the adjacent stormwater drainage basin located on the west side of Hangar 5. Additional research completed after the SI indicated that Buckeye high-expansion 2.2% foam is fluorine-free, and does not contain AFFF (New York State Pollution Prevention Institute 2018), and no PFAS are listed in the Safety Data Sheet (SDS; Buckeye Fire Equipment 2015). Thus, any PFAs impacts observed at Hangar 5 are assumed to be either from previous AFFF potentially stored in the fire-suppression system, or from a secondary source.
- Hangar 6, located at LAAF, operates a fixed foam fire suppression system with a Chemguard high expansion foam tank. The fire suppression control panel and foam tank are located on the south end of the building in Room #112. A system acceptance test was performed in September

2014 and a witness stated that foam inside the hangar was approximately 4 feet high. Foam was pushed out of the north-facing hangar doors and onto the concrete apron. The witness stated that the foam then either floated away or settled into a retention basin beyond the western edge of the concrete apron. No other tests or incidents were reported to have occurred at Hangar 6. Additional research completed after the SI indicated that Tyco Fire Products, the owner of Chemguard since 2011, does not produce high-expansion foams using PFAS (Tyco Fire Products LP 2020), and no PFAS are listed in the SDS (Chemguard 2017).

- Building 11683, located in the UAV Black Tower Complex near the Rugge-Hamilton UAV Runway in the West Range, contains a fixed foam fire suppression system with a National Foam AFFF tank. A system acceptance test was performed prior to the building being occupied in approximately 2005. The test was performed using the test header into a hose which discharged to a tanker truck that the fire protection subcontractor hauled off-location. It is not known if the system acceptance test used water only or used AFFF. There are no other known system discharges, whether performed as a test or for an emergency. The suppression system AFFF tank and an additional 55-gallon drum of AFFF are located in a utility closet on the northeast side of the building and has exterior double doors and an interior floor drain.

4.1.3 Firetruck Testing and Maintenance

Multiple activities related to the testing and maintenance of firetrucks have spread AFFF across the installation. The washing of fire trucks may have spread AFFF through the dissolution of residual foam on fire trucks at Fire Station #1, Former Fire Station #2, and at Fire Station #3. Testing of fire truck fire suppression equipment has resulted in the spraying of AFFF onto the ground at the Former Fire Station #2, LRC Fire Truck Maintenance, Fire Station #3, and South Ramp Taxiway and Drainage Basin AOPIs. AFFF has spilled during the refilling of fire truck tanks at both the Current Firefighting Training Area and Fire Station #3 AOPIs. Additionally, fire truck maintenance at the LRC Fire Truck Maintenance AOPI has caused AFFF to leak from the fire truck tanks and hoses.

4.1.4 Firefighter Training

AFFF was used for firefighting training exercises at multiple locations, including the Former Fire Station #2, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, and the South Ramp Taxiway and Drainage Basin. Additionally, according to Fort Huachuca Fire Department personnel interviews, AFFF was used during a one-time firefighter training northwest of the wash rack at Fire Station #1, however the area has since been excavated and regraded.

4.1.5 Incident Response

AFFF has been used twice during fire incident responses at FTHU. Once, AFFF was used during firefighting activities in response to a car fire at the Traffic Circle Car Fire AOPI. The second AFFF incident response occurred at the Beehive on School Fence AOPI, when AFFF was used to aid in the extermination and removal of a beehive on the school fence.

4.1.6 Wastewater Treatment and Reuse

Sewage and wastewater at the installation, potentially containing AFFF residue, has been treated historically at WWTP #1, and continues to be treated at WWTP #2. Treated wastewater, potentially containing AFFF residue, has been used to irrigate various locations across the installation, including the Mountain View Golf Course, Outdoor Sports Complex, and Prosser Village Barracks Landscaping AOPIs. Additionally, treated wastewater is pumped to the East Range Recharge Basins to allow for groundwater recharge. Further details regarding wastewater treatment at FTHU are discussed in **Section 2.9.2**.

According to interviews with the Compliance Branch Chief, FTHU Directorate of Public Works, treated effluent from the WWTPs, which could potentially contain AFFF residue, was used as fertilizer in approximately 1980. The exact location where the sludge was placed is unknown.

4.2 Other PFAS Use, Storage, and/or Disposal Areas

Following document research, personnel interviews, and site reconnaissance at FTHU, areas related to solid waste disposal (i.e., landfills), vehicle washing and maintenance, vehicle painting, industrial laundry, pesticide mixing, and photo and x-ray processing facilities were also identified as preliminary locations for use, storage, and/or disposal of PFAS-containing materials. A summary of information gathered in the PA for each of these preliminary locations is described below. Specific discussion regarding areas not retained for further investigation is presented in **Section 5.1** and specific discussion regarding areas retained as AOPIs is presented in **Section 5.2**. No metals plating facilities that may have used PFAS-containing mist suppressants were identified at FTHU.

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potential PFAS-containing pesticides and insecticides used and/or stored at Army installations, and did not identify FTHU as an installation having used or stored PFAS-containing pesticides/insecticides. Additionally, the PA team reviewed available pesticide use inventory documentation provided by the installation and did not identify PFAS-containing pesticides use, storage, or disposal.

4.3 Readily Identifiable Off-Post PFAS Sources

An exhaustive search to identify all potential off-post PFAS sources (i.e., not related to operations at FTHU) is not part of the PA/SI. However, potential off-post PFAS sources within a 5-mile radius of the installation that were identified during the records search and site visit are described in **Table 4-1** below.

Table 4-1. Potential Use, Storage, or Disposal Areas of PFAS-Containing Material Off Post

Site Identifier	Date(s) of Relevant PFAS-Containing Material Use, Storage, or Disposal	Relevant Site History
Monument Fire	June 2011	In June 2011, a large wildfire ignited in the mountains south of Sierra Vista, and expanded towards the city, consuming several structures. The

Site Identifier	Date(s) of Relevant PFAS-Containing Material Use, Storage, or Disposal	Relevant Site History
		USFS, Sierra Vista Fire Department, and Fort Huachuca Fire Department banded together to fight the fire. It is unknown if USFS and Sierra Vista fire fighters used AFFF when fighting the fire, however firefighters from FTHU stated during interviews that they used an AFFF and water mixture on at least five buildings as a preventative spray. The structures where this mixture was deployed were eventually consumed by the fire.
Vehicle Fire (Fry Boulevard and 7th Street)	Approximately 2003	A vehicle fire occurred in Sierra Vista on Fry Boulevard and 7th Street. It is unknown if Sierra Vista firefighters used AFFF to fight the fire, however FTHU firefighters responding to provide mutual aid used AFFF in the process. Interviewed FTHU firefighters estimated that approximately half a tank of AFFF was dispensed at the site of the incident. The size of the AFFF tank is unknown. Latitude: 31°33'16.69" N Longitude: 110°17'28.46" W
Apache Landfill	03 and 04 December 2001	Approximately 200 tons of petroleum contaminated soils were removed from IRP Site FTHU-25, a firefighter training area in the south-central area of LAAF, and disposed of at the Apache Landfill. Contaminated soils were collected from the upper 3 feet of soil across an area of approximately 2,700 square feet. It is unknown if AFFF was used during firefighter training or not (EEC 2001).

5 SUMMARY AND DISCUSSION OF PA RESULTS

The preliminary locations evaluated for potential use, storage, and/or disposal of PFAS-containing materials at FTHU, were further refined during the PA process and identified either as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA/SI, 19 areas have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

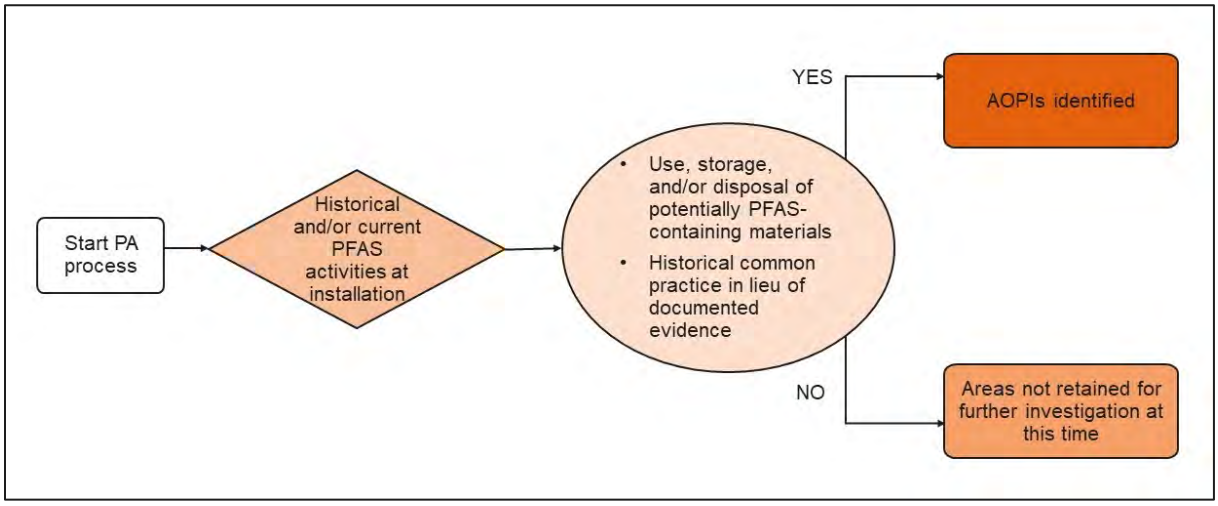

Figure 5-1: AOPI Decision Flowchart

The areas not retained for further investigation are presented in **Section 5.1**. The areas retained as AOPIs are presented in **Section 5.2**.

Data limitations for this PA/SI at FTHU are presented in **Section 9**.

5.1 Areas Not Retained for Further Investigation

Through the evaluation of information obtained during records review, personnel interviews, and/or site reconnaissance, the areas described below were categorized as areas not retained for further investigation at this time.

A brief site history and rationale for areas not retained for further investigation are presented in **Table 5-1**, below.

Table 5-1. Installation Areas Not Retained for Further Investigation

Area Description	Dates of Operation	Relevant Site History	Rationale
Splinter Village	05 July 1987	Twenty-one buildings constructed as temporary facilities during World War II were destroyed by fire. According to field Fort Huachuca Fire Department personnel interviews, no AFFF was used to extinguish the fire.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Fire Station #2 (Building 68328)	May 2012 to present	According to Fort Huachuca Fire Department personnel interviews, no AFFF has been used in equipment or stored at this station since it opened.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Aircraft Crash	17 March 1976	Georgia Army National Guard OV-1 Mohawk crash in the East Range area during a training flight about 1 mile east of Highway 90. According to FTHU personnel interviews, no AFFF was used to when responding to the crash.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
FTHU-65: East	Prior to 1989	An alleged mine shaft is located on a remote part of the East Range, reported to be approximately 100 to 500 feet deep. The shaft has reportedly been used for limited waste disposal, including trash, petroleum products (sometimes burned), small aircraft/drone bodies, and unexploded ordnance. In November 2000, a cap was installed over the shaft to prevent infiltration of precipitation into the filled mine shaft (FTHU Directorate of Public Works 2000)	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
AFFF Training Near Fire Station #1	Approximately 2014	In approximately 2014, a one-time firefighter training with AFFF occurred in a parking lot and unpaved vacant area immediately northwest of Fire Station #1. AFFF was sprayed for approximately 1 minute toward the Burger King located southwest of the training area. Following the training, the firetruck lines were flushed on site, and left to dry. Since the training	Potentially containing PFAS-material has been removed, regraded, and covered.

Area Description	Dates of Operation	Relevant Site History	Rationale
		occurred, the area has been regraded and landscaped for drainage. The location of excavated soil disposal is unknown. This area was categorized as an AOPI during the PA, though because the potentially containing PFAS-materials have been removed, and the area regraded and covered, it was not retained as an AOPI during the SI.	
Former Chaffee Parade Field	Late 1970s to 2008	The Former Chaffee Parade Field was a field that was watered with treated effluent from WWTP #2. WWTP #2 received residue of potential PFAS-containing materials from various locations across the installation, including Fire Station #1, Former Fire Station #2, and Fire Station #3. In July 2008, the Outdoor Sports Complex was covered with artificial turf, ending the need for irrigation. The treated effluent was used to water the field beginning as early as the late 1970s and continuing through July 2008. In approximately 2010, the Battalion Headquarters, an athletic field, and barracks were constructed covering the footprint of the Former Chaffee Parade Field. This area was categorized as an AOPI during the PA, though because the potentially containing PFAS-materials have been removed, and the area regraded and covered, it was not retained as an AOPI during the SI.	Potentially containing PFAS-material has been removed, regraded, and covered.
UAV or Airplane Hard Landing	Approximately 2006	According to FTHU personnel interviews, in approximately 2006, either an unmanned aerial vehicle or a pilot-operated airplane may have taken a hard landing (i.e., the landing gear was not deployed) on the eastern portion of the runway. No fire was caused from the crash, however some FTHU personnel interviewed	Location of possible PFAS-containing material use is unknown

Area Description	Dates of Operation	Relevant Site History	Rationale
		indicated that firefighting foams, potentially containing AFFF, may have been used as a preventative measure to cover any subsequent fuel spills. This area was previously characterized as an AOPI during the PA, but due to conflicting accounts regarding the exact location of the crash, or if AFFF firefighting foams were used, it was not retained as an AOPI during the SI.	
Tanker Truck Fire	19 July 2000	A tanker truck crashed and caught on fire at the bypass east of Van Deman Gate at Highways 90 and 92. There is conflicting speculation if foam may have been used but based on eye-witness interviews AFFF was not used.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Tanker Truck Crash/Fuel Spill	12 June 2006	A tanker truck crashed at the bypass east of East Gate (Van Deman Gate at Highways 90 and 92). Fuel leaked from the tanker onto adjacent soil and was excavated. According to eye-witness interviews, no fire occurred during the crash, and AFFF was not used.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Landfills	1930 to 1979	Solid waste at FTHU historically was disposed at 12 different landfills, identified as Former Landfills 1 through 9 (FTHU-05 through FTHU-13), 10, 11, and 14. Wastes disposed in the landfills included routine trash, burned landscaping debris and wood, rock, metal and construction debris, and herbicides and pesticides. Dried sludge from the WWTPs was disposed of at Former Landfill 8 (FTHU-12) prior to 1970. Since 1979, solid waste from FTHU has been disposed in the Huachuca City Landfill. Biosolid waste from WWTP #2 has been disposed of at the Cochise County Regional Landfill since 2003. It is unknown where biosolids from WWTP#1 and	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location

Area Description	Dates of Operation	Relevant Site History	Rationale
		WWTP#2 were disposed of prior to 2003. Three additional open burn/open detonation areas are located across the installation, including in the west range (FTHU-89), east range (FTHU-17), and south range (FTHU-18). These areas were historically used to destroy and dispose of munitions, and to complete various training activities related to their disposal (USAEC 2017). AFFF was not reported to have been used during any of the training activities.	
Vehicle Maintenance Areas	Prior to 1989 to Unknown	Vehicle maintenance at FTHU historically has occurred at multiple locations across the installation. Four of these locations were identified for IRP investigation: three automotive maintenance buildings (Buildings 30115 [FTHU-39 and FTHU-40], 51419 [FTHU-38], and 30013 [FTHU-39]), and one aviation maintenance location (building 91110 [FTHU-43]). All four IRP sites were opened for investigation of petroleum impacts (FTHU Directorate of Public Works, Environmental Division 2017). A U. S. Army Toxic and Hazardous Materials Agency report identified 11 additional vehicle maintenance locations (Buildings 22418, 30126, 41411, 51028, 51406, 51422, 51428, 51432, 52008, 61801, and 68328) and two auto craft shops (Buildings 30115 and 51424; U.S. Army Toxic and Hazardous Materials Agency 1980). No additional information regarding the detailed operations at these locations were identified.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location

Area Description	Dates of Operation	Relevant Site History	Rationale
Army Reserve Buildings	1980s to Unknown	The Army Reserves operated two vehicle maintenance shops at the installation: building 74902 (FTHU-42) and building 75801 (FTHU-41). Vehicle maintenance included the washing and repairing of tactical vehicles and tanks. Additionally, vehicle painting occurred at building 74902, which was demolished in 1999. Staining of the soils at building 75801, suspected to be caused by multiple overflows of the oil water separator, lead to investigations for petroleum impacts in 1989. No volatile organic compounds or total petroleum hydrocarbons were detected. Building 74902 was sampled for heavy metals released by painting activities, and identified as having high levels of cadmium, though concentrations were too low for the installation to designate as hazardous (FTHU Directorate of Public Works, Environmental Division 2017)	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Vehicle Wash Racks	Prior to 1978 to Present	In 1980, 15 on-post wash racks were identified, all of which drained to unlined arroyos (U.S. Army Toxic and Hazardous Materials Agency 1980). At the time of the PA site visit, field staff identified 12 wash racks across the installation: the portable Exchange Car Wash (often stored at area 15490), the Electronic Proving Ground Maintenance Motor Pool wash racks (Buildings 31114 and 68056), the Pan Am World Service Maintenance Support Unit wash rack (Building 75901; FTHU-37), the TMP Automatic Wash Rack (Building 76925, FTHU-68), the TMP Steam Cleaning Facility (Building 74907; FTHU-70), the Centralized Wash Facility with Soaking Capabilities (Building 76952), the Libby Army	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location

Area Description	Dates of Operation	Relevant Site History	Rationale
		Airfield Wash Rack (Building 91114, FTHU-57), the 11th Signal Motorpool Wash Rack (Building 91115, FTHU-71), the AMSA Wash Rack (FTHU-75), the Training Support Company Wash Rack (the exact location of which is unknown), and the currently active Centralized Wash Building (Building 91115). Wastewater from all identified wash racks flowed to unlined arroyos (Army Environmental Hygiene Agency 1989; FTHU Directorate of Public Works 2000).	
Vehicle/Car Wash (Building 76925)	Unknown to pre-1990s	According to FTHU personnel interviews, an automated bus washing facility, located at Building 76925, operated prior to the 1990s. All other vehicles were washed by hand at the wash racks. The automated bus wash was designated to wash buses; fire equipment was not washed at this location.	No evidence of vehicles containing PFAS-containing materials washed at this location
Former Post Laundry (Building 90201)	Early 1970s to Unknown	A laundry facility, located at Building 90201 and identified as IRP site FTHU-44, operated since the early 1970s supporting the installation. Wastewater from the laundry was discharged directly to the southernmost lagoon (Effluent Pond 4) at the East Range Recharge Basins prior to their reconstruction. All soaps used at the laundry were biodegradable. The site was investigated in the 1970s to evaluate potential impacts from industrial liquid waste and solvents potentially present in the laundry that may have spilled onto the soil at the site (U.S. Army Toxic and Hazardous Materials Agency 1980). The site was closed with no further action in June 1986 (USAEC 2017).	No evidence of laundry materials containing PFAS washed at this location

Area Description	Dates of Operation	Relevant Site History	Rationale
Painting Facilities	Prior to 1989 to Present	Multiple vehicle painting facilities have existed across the installation prior to 1989 continuing through the date of the PA/SI. Historical painting activities include the application of paints, polyester resins, chemical resistant coatings, and topcoats. Historical painting activities have occurred at Buildings 71810, 74905, 74810, 73903 (FTHU-34), 74902 (FTHU-42), 75907, 72908 (FTHU-32), 72907 (FTHU-66), and 82012. Historical investigations found impacts of hexavalent chromium at Building 72907 (FTHU-66) (U.S. Army Toxic and Hazardous Materials Agency 1980; Army Environmental Hygiene Agency 1989, FTHU Directorate of Public Works, Environmental Division 2017). According to FTHU personnel interviews, the only currently active painting facilities are located at Building 22524 and Building 72907. Vehicle painting facilities are also currently located at Building 74810 and Building 74095, though the spray-painting facility at Building 74810 is currently out of service, and Building 74095 has not been used since the early 2000s.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
Pesticide Mixing Areas	Prior to 1994 to Present	Pesticides and herbicides have been mixed at multiple locations across the installation. Historical locations for pesticide mixing include IRP site FTHU-73, located southwest of the main gate of the post, IRP site FTHU-74 located at Building 30033, and the mule barn (FTHU Directorate of Public Works, Environmental Division 2017). According to FTHU personnel interviews, pesticides are currently mixed at Building 30033 and stored nearby at Building 30034. No pesticides or herbicides containing	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location

Area Description	Dates of Operation	Relevant Site History	Rationale
		PFAS were identified as having been mixed at any of these locations.	
Photo Processing Facilities	Unknown	Photograph and motion picture film was processed at five locations across the installation, including Buildings 22418, 41411, 52008, 61801, and 74914. The film was processed using standard chemicals. Spent solutions were processed to recover the silver content before being discarded through the sanitary system leading to WWTP #1 and WWTP #2. Combined, it is estimated that the five processing facilities discarded approximately 2,000 liters per month of solution.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location
X-Ray Processing Facilities	Pre 1980s to Unknown	X-rays for veterinary, dental, and medical purposes at four locations across the installation, including Buildings 45001, 45005, 71219, and 30022. Dilute wastes from the x-ray production were disposed of through the sewer system draining to WWTP #1 and WWTP #2. Contaminated wastes were incinerated. X-rays continue to be currently processed at Building 45005 for dental purposes. Additional areas were identified where x-rays may have been processed historically, including Buildings 30010, 30009, 45006, 41408, 51101, 80503, 83519, and 84551, though no records confirming x-ray production were identified.	No evidence of PFAS-containing materials used, stored, and/or disposed of at this location

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. Three of the AOPIs overlap with FTHU IRP sites and/or Headquarters Army Environmental System sites (**Figure 5-2**). Each AOPI and its current site status are discussed within each AOPI subsection presented below. At the time of this PA, none of the FTHU IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 5-2**. Aerial photographs of each AOPI that also show the approximate extent of AFFF use (if applicable and known) are presented on **Figures 5-3** through **5-14** and include active monitoring wells in the vicinity of each AOPI where present.

5.2.1 Fire Station #1

Fire Station #1 (Building 51208) was constructed in the 1950s and currently remains an active fire station. AFFF has been stored historically and currently at Fire Station #1, in fire trucks and in a storage shed (Building 51027) on the west side of the station. At the time of the PA, AFFF was present at the station in one engine containing 40 to 50 gallons of AFFF (3% during the 2019 PA site visit; formerly was 6%), and in Building 51027. According to firefighter interviews, fire trucks have historically leaked AFFF onto the bay floor and apron. When leaks occurred, a bucket and mop were typically used to clean up the concentrate and wastewater dumped down the utility closet sink or onto the rocks next on the north side of the back apron bay door. Fire trucks were washed in the wash rack behind the station and historically on the front apron which slopes toward the road. The wastewater from the oil water separator and the station drains flows to the WWTP (formerly to WWTP #1, and currently to WWTP #2). According to Fort Huachuca Fire Department personnel interviews, in approximately 2014 a one-time firefighting training event using AFFF occurred in a parking lot and unpaved vacant area immediately northwest of the wash rack, however the area has since been excavated and regraded. Further details regarding the training event are described in **Section 5.1**.

The Fire Station #1 AOPI does not overlap with IRP sites and consists of the bays and front and back apron of the fire station, as well as the storage shed (Building 51027) and the oil water separator. **Figure 5-3** shows the aerial extent of this AOPI.

5.2.2 Traffic Circle Car Fire

According to Fort Huachuca Fire Department personnel interviews, in approximately 2005, the Fort Huachuca Fire Department responded to a car fire on the north side of the traffic circle at Cushing Street and Smith Avenue in front of the Southwest Credit Union. The fire truck sprayed in the direction of the bank (maximum of 40 to 50 gallons of AFFF used) leaving a large pool of runoff observed in the southwest portion of the traffic circle along the curb.

The Traffic Circle Car Fire AOPI does not overlap with IRP sites and consists of the entirety of the traffic circle and the surrounding curbs, sidewalks, and shoulders. **Figure 5-3** shows the aerial extent of this AOPI.

5.2.3 Beehive on School Fence

According to Fort Huachuca Fire Department personnel interviews, in approximately 2014 Fire Station #1 responded to a call regarding a beehive or bee swarm on a fence at General Meyers Elementary School. AFFF was sprayed for approximately 2 minutes (estimate of 3 to 4 gallons of AFFF concentrate) onto the bees and fence. Spray was directed west from the road toward the fence.

The Beehive on School Fence AOPI does not overlap with IRP sites and consists of the portion of fence that the beehive was located on, and a strip of soil on either side of the fence. **Figure 5-4** shows the aerial extent of this AOPI.

5.2.4 Former Fire Station #2

The Former Fire Station #2 (Building 68422), located on the northwest corner of Irwin Street and Railroad Avenue, was built in 1941 and demolished in 2012. The station has one front apron, and five bays with no floor drains. Historically, AFFF was stored at the station in fire trucks and in reserve buckets at the back of the station. According to firefighter interviews, fire trucks at the station leaked AFFF on numerous occasions. Additionally, sometime between 2010 and 2012, the Fort Huachuca Fire Department transferred old AFFF to drums behind the station building, and AFFF was reportedly spilled during the transfer. Historical accounts of AFFF spilling reported that little to no foam ran onto the street when being clean up.

Historically, the apron was used for annual hose pressure testing until the current firefighting training area opened in 2006. Training on a foam educator set (used in fighting wildland fires and suppressing carbon particles) was periodically conducted on the apron in front of the shorter bays. Fire trucks were often washed in the wash rack. Firefighter interviews indicated that foam and water from hose testing and firetruck washing would pool on the front apron until it evaporated. When rags were used to clean AFFF spills, they were cleaned in the washing machine at the station. The wastewater from the oil water separator and the station drained to WWTP #1 and WWTP #2.

The Former Fire Station #2 AOPI does not overlap with IRP sites and consists of the entire footprint of the former station, including its bays, aprons, wash rack, and the oil water separator. **Figure 5-5** shows the aerial extent of this AOPI.

5.2.5 Mountain View Golf Course

The Mountain View Golf Course, constructed in 1970, has historically been and is currently irrigated with treated effluent from the effluent holding ponds at former WWTP #1 and WWTP #2. WWTP #1 and WWTP #2 received potential PFAS-containing materials from multiple areas across the installation, including Fire Station #1, Former Fire Station #2, and Fire Station #3. Reclaimed water from the WWTPs is stored in a 30-mil high-density polyethylene-lined effluent holding basin at the golf course, and used for turf irrigation.

The Mountain View Golf Course overlaps with IRP sites FTHU-73, FTHU-74, CCFTH-92, and FTHU-005-R-01 identified by USAEC. FTHU-73 received a no further action declaration in 2002 and FTHU-74 received a no further action declaration in 2000. Used petroleum products associated with golf course maintenance equipment were routinely discarded improperly at CCFTHU-92, in the vicinity of the Mountain View Golf Course old maintenance facility. Improper disposal included discarding of used petroleum, oil, and lubricants (POL) through draining of equipment directly to the soil, covering discarded POL with sand, and when the sand was too deep, moving and dumping the contaminated material near the 17th hole. Several disposal areas awaiting investigation remain at CCFTHU-92. FTHU-005-R-01 was recommended to have no further action in the 2008 SI Report (USAEC 2017). **Figure 5-6** shows the aerial extent of this AOPI.

5.2.6 WWTP#1

WWTP #1, located at Building 90322, was constructed in the early 1940s as the primary WWTP at the installation. WWTP #1 received liquid waste from many facilities, including the three fire stations and their associated wash racks, and historically from x-ray and photo processing facilities. Sludge was discharged to 12 unlined drying beds immediately adjacent to the plant. In approximately1980, the dried sludge was reported as being used as fertilizer, though the location where the fertilizer was placed is unknown. Effluent was treated with gaseous chloride prior to its release from the treatment plant. Beginning in 1969 and continuing until the early 1980s, when WWTP #1 closed, treated effluent from WWTP #1 was discharged to a series of unlined evaporation/percolation lagoons located within the current footprint of the East Range Recharge Basins. The exact location of effluent discharge from WWTP #1 prior to 1969 is unknown. When WWTP #1 closed in the early 1980s, WWTP #2 became the primary wastewater treatment facility at FTHU, and continues to use the treated effluent holding ponds at WWTP #1.

The WWTP #1 AOPI does not overlap with IRP sites and consists of a barscreen, a pre-aeration chamber, primary clarifiers, a trickling filter, a final clarifier, two lined effluent holding ponds (which hold treated effluent from WWTP #2), a two-stage anaerobic digestion system, and 12 unlined sludge drying beds. All features are currently inactive except for the effluent holding ponds. **Figure 5-7** shows the aerial extent of this AOPI.

5.2.7 WWTP #2

WWTP #2, located at Building 90722, was constructed in approximately 1942, and is the only currently active WWTP at FTHU. Originally constructed as a secondary WWTP, WWTP #2 became the primary facility for wastewater treatment when WWTP #1 closed in the early 1980s. WWTP #2 has received liquid waste from many facilities, including the three fire stations and their associated wash racks, and historically from x-ray and photo processing facilities. WWTP #2 contains lined sludge drying beds and effluent holding ponds.

Dried sludge from the sludge drying beds was reportedly used as fertilizer in approximately 1980. Effluent from WWTP #2 is treated with gaseous chlorine is discharged to lined effluent holding ponds adjacent to WWTP #1 and WWTP #2. The treated effluent has been and continues to be used for groundwater recharge at the East Range Recharge Basins and as reuse for irrigation at the Mountain View Golf Course. In addition, reclaimed water from WWTP #2 has previously been used for irrigation at the Outdoor Sports Complex, the Former Chaffee Parade Field, and the grounds at Prosser Village Barracks.

The WWTP #2 does not overlap with IRP sites and consists of a barscreen, a grit chamber, primary clarifiers, a trickling filter, a final clarifier, one lined effluent holding pond, a two-stage anaerobic digestion system, and approximately 20 currently inactive unlined sludge drying beds. **Figure 5-8** shows the aerial extent of this AOPI.

5.2.8 LRC Fire Truck Maintenance

The LRC was constructed in the 1950s and has historically been used for vehicle and fire truck maintenance. Three buildings (Buildings 75901, 75902, and 75903) have been used for fire truck maintenance and repair, though fire trucks have also historically gone off post to Sierra Vista for repair.

Biannual inspections and maintenance are completed at the LRC for each of the Fort Huachuca Fire Department fire trucks. During biannual maintenance, firefighting foams are typically flushed through the system for a few seconds to test the cannons and then flushed with water. Following the biannual inspections, the fire trucks are washed on the wash rack. Fort Huachuca Fire Department personnel interviews indicate that firefighting foams, including AFFF, have been sprayed as part of truck maintenance in many locations outside of the three buildings and at least once inside one of the buildings, though it was not specified which one. Foam has also been spilled into the defunct wash rack on the south end of the buildings, and multiple times sprayed part way across the grassy field farther south of the defunct wash rack. The defunct wash rack was likely last used in the 1990s. The current wash rack has an oil water separator and is on the south end of Building 75901. When AFFF concentrate was spilled onto bay floors in the buildings, the spill was cleaned with a mop, and the wastewater was placed in a drum and given to the DPW for disposal. None of the bays have dedicated drains. Instead, water and foam are pushed onto the exterior paved surfaces which, particularly on the north-northeast end of the LRC, generally slope east-northeast toward a drainage basin which releases to a wash on the northern side of Thompson Street via an underground culvert.

The LRC Fire Truck Maintenance AOPI overlaps with FTHU-69, FTHU-36, FTHU-37, FTHU-70, and FTHU-67 identified by USAEC and consists of Buildings 75901, 75902, and 75903, the defunct wash rack, and the current wash rack. FTHU-69 and FTHU-70 received a no further action declaration in 2000 and FTHU-67 received a no further action declaration in 2002. FTHU-36 and FTHU-37 had no evidence of contamination, and no further investigation was recommended in 1980 (USAEC 2017). **Figure 5-9** shows the aerial extent of this AOPI.

5.2.9 Outdoor Sports Complex

From its construction in approximately the 1970s to 2008, the turf, trees and shrubs surrounding the Outdoor Sports Complex were irrigated with treated effluent from WWTP #2. WWTP #2 received residue of PFAS-containing materials from various locations across the installation, including Fire Station #1, Former Fire Station #2, and Fire Station #3. In July 2008, the Outdoor Sports Complex was covered with artificial turf, ending the need for irrigation.

The Outdoor Sports Complex AOPI does not overlap with IRP sites and consists of the entire sports complex, including Krueger Track, Warrior-Sentinel Fields, the roads, bleachers, and dining areas dividing and surrounding them. **Figure 5-10** shows the aerial extent of this AOPI.

5.2.10 Prosser Village Barracks Landscaping

From its construction in approximately the 1970s to 2008, the landscaping in the Prosser Village Barracks, which consists of trees and shrubs, was irrigated with treated effluent from WWTP #2. WWTP #2 received residue of PFAS-containing materials from various locations across the installation, including Fire Station #1, Former Fire Station #2, and Fire Station #3.

The Prosser Village Barracks Landscaping AOPI does not overlap with IRP sites and consists of the entire footprint of the Prosser Village Barracks. **Figure 5-10** shows the aerial extent of this AOPI.

5.2.11 Hangar 6

Hangar 6 (Building 14606), used by the Air National Guard, has a foam fire suppression system with a Chemguard high expansion foam tank. System acceptance testing was performed in September 2014 before the hangar could be occupied and witnesses stated that foam was at least 4 feet high inside the hangar. The foam was pushed out the hangar doors and onto the concrete apron. The foam then either floated away or settled into a retention basin beyond the western edge of the concrete apron. There is a long trench drain on the inside floor of the hangar doors. The trench drains to an oil water separator located on the side of the building. Much of the perimeter of the apron adjacent to Hangar 6 has been regraded for development. Additional research completed after the SI indicated that Tyco Fire Products, the owner of Chemguard since 2011, does not produce high-expansion foams using PFAS (Tyco Fire Products LP 2020), and no PFAS are listed in the SDS (Chemguard 2017).

The Hangar 6 AOPI does not overlap with IRP sites and consists of the Hangar 6 bay, back apron, the oil water separator, and a portion of the unpaved soil surrounding the back apron. **Figure 5-11** shows the aerial extent of this AOPI.

5.2.12 Defuel Pad

The defuel pad is a concrete pad situated slightly below ground level and was identified during Fort Huachuca Fire Department personnel interviews as being located just west of the current and former firefighting training areas. The Fort Huachuca Fire Department indicated that the defuel pad was used once or twice for firefighting training with AFFF.

The Defuel Pad AOPI does not overlap with IRP sites and consists of the entirety of the indicated concrete pad, and the unpaved soils surrounding its perimeter. **Figure 5-12** shows the aerial extent of this AOPI.

5.2.13 Former Firefighting Training Area

This area was used by the Fort Huachuca Fire Department from approximately 1963 to 1986 as a firefighting training area. The southern portion was used to store and burn waste fuels, other flammable liquids, and solvents. There was a circular earthen pit at the northern end that was used for firefighting training and open burning. The fuels and solvents were poured on old or abandoned automobiles or directly onto the soil (likely only within the pit), and then ignited and extinguished by firefighters using protein foam and, later, AFFF. Two fire trucks would typically park north of the pit. The approximate volume of protein foam and/or AFFF used during these trainings is unknown. Fire truck lines would typically be flushed back at the respective fire station. Approximately 174 tons of petroleum-impacted soil was excavated from the southern area where fuels/solvents were stored and disposed offsite at the Apache Junction Landfill in 2000. A shallow north-flowing drainage channel on the west side of the area described in earlier investigations was not discernible in subsequent investigations (JMM Consulting Engineering 1992b). The precise location of the former pit was not identifiable during the PA site visit because of the remedial soil excavation and subsequent area regrading.

The Former Firefighting Training Area AOPI overlaps with FTHU-52 identified by USAEC and consists of the entire unpaved training area indicated by firefighters during the PA interview process. FTHU-52

received a no further action declaration in 2002 (USAEC 2017). **Figure 5-12** shows the aerial extent of this AOPI.

5.2.14 Current Firefighting Training Area

Beginning in approximately 2005 and continuing through when this PA/SI was conducted, firefighting training for the Fort Huachuca Fire Department occurred at the Current Firefighting Training Area, which consists of a large concrete pad with a propane fueled fuselage prop and a Conex box that is the primary AFFF storage location for the Fort Huachuca Fire Department. The Fort Huachuca Fire Department has used AFFF at the Current Firefighting Training Area for live-fire firefighting training, "demonstration of capability," and for refractometer testing, foam checks, and filling the AFFF reservoirs on the trucks. Foam has been sprayed across much of the training area and was either left in place or rinsed off the pad with a hose. AFFF is typically stored in a Conex box in the southwest corner of the pad or directly on the pad itself in 55-gallon drums. According to Fort Huachuca Fire Department personnel interviews, AFFF concentrate has been spilled multiple times over the years during reservoir refilling/emptying activities. A drainage channel runs north along the west side of the concrete pad and turns eastward on the north side of the pad.

The Current Firefighting Training Area AOPI does not overlap with IRP sites and consists of the concrete pad and a perimeter area of unpaved soil surrounding the pad. **Figure 5-12** shows the aerial extent of this AOPI.

5.2.15 Fire Station #3

Fire Station #3, located at LAAF (Building 91253), was constructed in 1957 and continues as a functioning fire station through when this PA/SI was conducted. AFFF has been stored at the station historically and currently in firefighting trucks and in pails along the wall of the bay. At the time of the PA, three crash trucks containing 130 to 380 gallons of AFFF, and one engine containing 40 to 50 gallons of AFFF were present at the station. According to Fort Huachuca Fire Department personnel interviews, many incidental spills and leaks, particularly from older fire trucks, have occurred at the station, including on the wash rack and the apron. When spills occurred, firefighting foams would often be left in place to dry or would be cleaned with rags that would be washed in the washing machine at the station.

The apron was used several times for weekly, quarterly, and annual foam checks, quarterly and annual refractometer testing, and for filling truck foam reservoirs. Truck lines were typically flushed with water onto the apron or tarmac after a response that used firefighting foams, including AFFF. The wash rack drains into an oil water separator, which in turn drains along with other wastewater from the station to WWTP #1 and WWTP #2. Additionally, a drainage ditch flows eastward into a culvert underneath the station apron on the north side of the station.

The Fire Station #3 AOPI does not overlap with IRP sites and consists of the entire Fire Station #3 footprint, including the apron, wash rack, bay, and oil water separator. **Figure 5-12** shows the aerial extent of this AOPI.

5.2.16 Hangar 5

Hangar 5 (Building 91120) has a foam fire suppression system and in approximately November 2013, a system acceptance test was performed prior to the hangar being occupied. The foam (unknown if AFFF or not) was pushed out the hangar doors facing north using brooms and likely water onto the concrete apron. Drains running parallel to the front of the hangar doors drain to an oil water separator. In October 2016, the fire suppression system foam tank, located in the Hangar 5 Fire Equipment Room 105 on the southwest corner of Building 91120 released approximately 55 gallons of Buckeye high-expansion 2.2% foam concentrate (approximately 400 pounds). Concentrate was 2 to 3 inches thick on the floor of the approximately 160 square foot room, and it flowed out the door onto the cement driveway. The concentrate was swept from Room 105 and the cement driveway into the adjacent drainage basin located on the west side of Hangar 5. Buckeye high-expansion 2.2% foam is fluorine-free, and does not contain AFFF (New York State Pollution Prevention Institute 2018), and no PFAS are listed in the SDS (Buckeye Fire Equipment 2015). Thus, any PFAS impacts observed at Hangar 5 are assumed to be either from previous AFFF potentially stored in the fire suppression system, or from a secondary source.

The Hangar 5 AOPI does not overlap with any IRP sites and consists of the building 91120, the concrete apron, the driveway, and an area of unpaved soil beyond. **Figure 5-12** shows the aerial extent of this AOPI.

5.2.17 South Ramp Taxiway and Drainage Basin

Occasional firefighting training with AFFF and monthly and quarterly foam checks have occurred along the main ramp taxiway north of the ramadas between taxiways C and D and taxiways D and F, either on the tarmac or onto the adjacent grassy areas. In approximately 2009, there was a quick discharge of AFFF between taxiways C and D to clear a stuck valve on a P19 fire truck. Once or twice during firefighting trainings AFFF was sprayed into and adjacent to the stormwater retention basin in the grassy area immediately north of the ramadas (also known as the aircraft canopies). The southwest/northeast-trending stormwater retention basin has an inflow culvert on the southwest end, but no obvious outflow was observed during the PA or identified during site reconnaissance.

The South Ramp Taxiway and Drainage Basin AOPI does not overlap with any IRP sites and consists of the main taxiway and the stormwater retention basin. **Figure 5-12** shows the aerial extent of this AOPI.

5.2.18 East Range Recharge Basins

The East Range Recharge Basins are located east of Highway 90 on the eastern portion of the installation. The East Range Recharge Basins originally consisted of four unlined evaporation/percolation lagoons. The first of the lagoons was constructed in 1969, and the remaining three were constructed in 1976. In 2002, the recharge facility was upgraded through improvements to the WWTP, and the construction of seven effluent recharge basins and one stormwater recharge basin, increasing the recharge rate to virtually eliminate evaporation. The seven current recharge basins were constructed in the footprint of the four unlined evaporation/percolation lagoons (U.S. Fish and Wildlife Service 2014). The unlined evaporation/percolation lagoons historically received treated effluent discharge from WWTP #2. Additionally, stormwater from an unnamed wash would mix with treated effluent from the WWTPs and discharge to the unlined evaporation/percolation lagoons. Beginning in 2002, treated effluent from WWTP

#2 began discharging to the newly constructed recharge basins, and stormwater from the unnamed wash and roads was directed to the newly constructed stormwater recharge basin. In the past, sewage has been diverted without secondary treatment to the former unlined evaporation/percolation lagoons and the recharge basins located at the East Range Recharge Basins AOPI while the WWTPs were undergoing repairs (Army Environmental Hygiene Agency 1989). WWTP #1 and WWTP #2 received residue of PFAS-containing materials from various locations across the installation, including Fire Station #1, Former Fire Station #2, and Fire Station #3. In 2016 WWTP #2 began receiving and treating influent from Huachuca City. Wastewater from the former laundry (FTHU-44, Building 90201) was discharged directly to the former lagoon 1 (most southerly) of the East Range Recharge Basins.

The East Recharge Basins AOPI does not overlap with IRP sites and consists of the four percolation lagoons and the area between them, as well as an area directly downstream of the lagoons. **Figure 5-13** shows the aerial extent of this AOPI.

5.2.19 UAV Black Tower Building 11683

Building 11683, located in the UAV Black Tower Complex near the Rugge-Hamilton UAV CRunway in the West Range, is tenant-occupied by the Army's 2nd Battalion 13th Aviation Regiment, and contains a fixed foam fire suppression system with a National Foam AFFF tank. A system acceptance test was performed prior to the building being occupied in approximately 2005. The test was performed using the test header into a hose which discharged to a tanker truck that the fire protection subcontractor hauled off location. It is not known if the system acceptance test used water only or AFFF. There are no other known system discharges, whether performed as a test or for an emergency. The suppression system AFFF tank and an additional 55-gallon drum of AFFF are located in a utility closet on the northeast side of the building and has exterior double doors and an interior floor drain. The building floor drains to a single outlet which can be directed to either WWTP #2 or to the environment via a discharge pipe located in a gravel area on the north side of the building. The gravel area slopes to the north.

The UAV Black Tower Building 11683 AOPI does not overlap with IRP sites and consists of the building footprint, the gravel area to the north, and a portion of the paved and unpaved areas surrounding the building to the south, east, and west. **Figure 5-14** shows the aerial extent of this AOPI.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at FTHU, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at FTHU at all 19 of the AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. Three areas were identified during that PA that were not sampled during the SI. These areas include the AFFF Training Near Fire Station #1, Former Chaffee Parade Field, and UAV or Airplane Hard Landing areas, discussed in detail in **Section 5.1**. Additional information collected during the PA indicated that the potentially impacted soils at the AFFF Training Near Fire Station #1, and the Former Chaffee Parade Field had been excavated, and the areas had been regraded and covered. The UAV or Airplane Hard Landing was not sampled due to conflicting accounts regarding the exact location of the crash.

An installation-specific QAPP Addendum (Arcadis 2020) was developed to supplement the general information provided in the PQAPP (Arcadis 2019) and to detail the site-specific proposed scopes of work for the SI. A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, Engineer Manual 200-1-12 (USACE 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water, and/or sediment pathways as potentially complete which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in December 2020 through the collection of field data and analytical samples.

The SI field work was completed in accordance with the standard operating procedures (SOPs), technical guidance instructions (TGIs), sampling design, and QA/QC requirements as detailed in the QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at FTHU. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.4**. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

As identified during the DQO process and outlined in the site-specific QAPP Addendum (Arcadis 2020), the objective of the SI is to identify whether there has been a release to the environment at the AOPIs identified in the PA and to determine if further investigation is warranted. This SI evaluated groundwater and soil for PFOS, PFOA, or PFBS presence or absence at each of the sampled AOPIs.

6.2 Sampling Design and Rationale

The rationale for sampling at each AOPI is illustrated on **Figure 6-1** below.

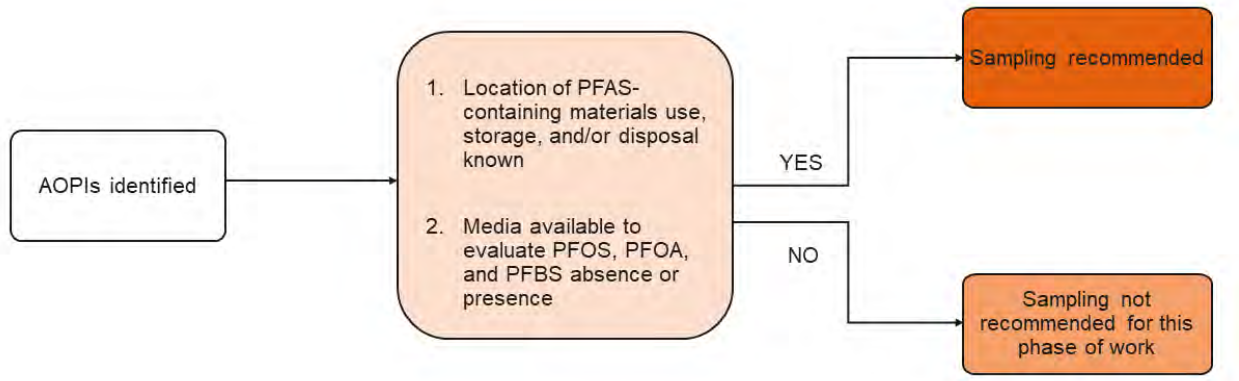

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at FTHU is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Briefly, samples were collected from the soil underlying potential PFOS-, PFOA-, and/or PFBS-containing material use, storage, or disposal areas, and from existing downgradient on-post monitoring wells where available. Due to the significant depth to water across the installation (greater than 500 feet bgs [Montgomery Watson 1994]), where existing downgradient on-post monitoring wells did not exist in proximity to an AOPI, soil samples were assessed in place of groundwater sampling, as agreed upon during the SI scoping call with USAEC, USACE, and FTHU personnel.

The sampling depths at existing monitoring wells were at approximately the center of the saturated screened interval. **Table 6-1** includes the monitoring well construction details for the wells sampled during the SI (if available).

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019), the SOPs and TGIs included as Appendix A to the PQAPP, the QA/QC requirements identified in Worksheet #20 of the PQAPP, the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2020), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2020). The sampling methods described in the SOPs and TGIs establish equipment requirements, procedures for preparing equipment and containers before sampling, sampling procedures under various conditions, and procedures for storing samples to ensure that sample contamination does not occur during collection, and transport. In general, sampling techniques used in the SI were consistent with conventional sampling techniques used in the environmental industry, but special considerations were made regarding PFAS-containing materials and equipment and cross-contamination potential.

The sampling methods employed during the SI are detailed in the PQAPP (Arcadis 2019) and QAPP Addendum (Arcadis 2020). The subsections below provide a summary of the field methods and procedures utilized to complete the SI scope of work. Field notes and field forms (i.e., shallow soil sampling logs, groundwater purging and sampling forms, and equipment calibration forms) documenting the SI sampling activities are included in **Appendices J** and **K**, respectively. Photographs of the sampling activities are included in **Appendix L**.

6.3.1 Field Methods

Soil samples were collected via hand auger from the top 2 feet of surface soil at each sampling location. Where soil sampling locations were overlain by asphalt, the asphalt was cut using a walk behind floor saw and manually removed prior to collection of the soil samples. Soil descriptions were documented on field forms. Soil cuttings were containerized, and sand was used to backfill the boreholes.

Groundwater samples were collected from existing monitoring wells with dedicated submersible pumps located in approximately the center of the saturated screened interval at existing monitoring wells. To ensure the dedicated pump and tubing were made of PFAS-free materials, dedicated equipment background (DEB) samples were collected, as described in **Section 6.3.3**.

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.5**.

6.3.2 Quality Assurance/Quality Control

Worksheets #20 of the PQAPP and QAPP Addendum provide QA/QC requirements for field duplicates, matrix spike/matrix spike duplicates, equipment blanks (EBs), source blanks for water used in the initial decontamination step for drill tooling, and field blanks for laboratory-supplied water used in the final decontamination step.

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2020), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, and PFBS only. EBs were collected for media sampled for PFOS, PFOA, and PFBS, at a frequency of one per piece of relevant equipment for each sampling event, as specified in the QAPP Addendum (Arcadis 2020). The decontaminated reusable equipment from which EBs were collected include shovels, breaker bars, and hand augers as applicable to the sampled media. Source blanks were collected from the water used to pressure-wash drill tooling. Analytical results for blank samples are discussed in **Section 7.22**.

6.3.3 Dedicated Equipment Background

DEB samples were collected at a frequency of one DEB per AOPI at AOPIs where groundwater sampling was conducted at existing monitoring wells that contained dedicated, down-hole equipment. When collecting samples from monitoring wells with dedicated, down-hole equipment, two water samples were taken from one monitoring well at each AOPI. One DEB sample was collected from the first water produced through the pump and tubing and was used to evaluate whether the dedicated equipment may be impacting the PFOS, PFOA, and/or PFBS results, as it is unknown if the dedicated equipment was comprised of PFAS-containing components; PFOS, PFOA, and/or PFBS concentrations in the DEBs reflect concentrations of stagnant groundwater, and they may be biased high by contributions from equipment that contains PFOS, PFOA, and/or PFBS components. The parent sample was collected after the well was purged until the field parameters stabilized. Further DEB analysis is included in **Section 7.20**.

6.3.4 Field Change Reports

No instances of major scope modifications (i.e., those that may have had a significant impact on the project scope and/or data usability/quality, or required stop-work, and warranted discussion with USACE) were encountered during the FTHU SI work.

In some cases, clarifications to the established scope of work were needed but do not necessarily constitute a non-conformance from the sampling plans described in the QAPP Addendum. Minor modifications from and clarifications for the procedures and scope of work detailed in the QAPP Addendum and PQAPP and that did not affect DQOs are documented in Field Change Reports included as **Appendix M** and are summarized below:

- Defuel Pad: Soil sample FTHU-DF-03-SO was collected approximately 32 feet south of the originally planned location to avoid sampling through a paved surface.
- Fire Station #3: Soil sample FTHU-FS3-03-SO was collected approximately 19 feet south of the originally planned location to avoid sampling soil which had been excavated and regraded for airport security and roadway improvements.
- East Range Recharge Basin: The originally proposed boring location for soil sample FTHU-ERB-03-SO was not completed because the basin in which this sampling location was placed was filled with water at the time of the sampling event. The East Range Recharge Basin system is comprised of a series of spill-over lagoons and the basin where the proposed boring FTHU-ERB-03-SO was placed is in the middle of the seven basins. Therefore, since samples were collected from the basins on each side of the proposed FTHU-ERB-03-SO boring location, a representative sample set from the East Range Recharge Basin was still collected, and the DQOs were not affected.

6.3.5 Decontamination

Non-dedicated reusable sampling equipment (e.g., hand augers, water-level meters) that came into direct contact with sampling media was decontaminated before first use, between sampling locations/intervals, and before demobilization in accordance with P-09, TGI - Groundwater and Soil Sampling Equipment Decontamination (Arcadis 2019; Appendix A).

6.3.6 Investigation-Derived Waste

Solid and liquid IDW (including soil cuttings, groundwater purged during sampling, and water from decontamination of sampling equipment) were discharged to the ground at the point of collection. Equipment IDW, including personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan tubes, and high-density polyethylene and silicon tubing) that may come in contact with sampling media, waste drained of water, bagged, and disposed of in the waste receptacles on post. Non-IDW wastes were removed from the site upon completion of each day’s field activities.

6.4 Data Analysis

The subsections below summarize the laboratory analytical methods and the methodology used to evaluate data collected during the SI through data verification and usability assessments (as completed by a project chemist, independent of the project team).

6.4.1 Laboratory Analytical Methods

Analytical samples collected during the SI were submitted to Pace South Carolina (formerly Shealy Environmental Services, Inc.), an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, and PFBS, by liquid chromatography with tandem mass spectrometry. Laboratory analyses associated with the SI were completed in accordance with Worksheets #12.1 through #12.5 in the PQAPP (Arcadis 2019). Eighteen PFAS-related compounds, including PFOS, PFOA, and PFBS, were analyzed for in groundwater and soil samples using an analytical method that is ELAP-accredited and compliant with QSM 5.3 (DoD and Department of Energy 2019), Table B-15.

Additionally, the following general chemistry and physical characteristic analyses were completed for select soil and sediment samples in accordance with Worksheet #18 of the QAPP Addendum (Arcadis 2020) by the analytical method noted:

- Total organic carbon (TOC) by USEPA 9060A
- Grain size analysis by American Society for Testing and Materials D7928
- pH by USEPA 9045D.

These data are collected as they may be useful in future fate and transport studies.

The laboratory limit of detection (LOD) is defined as “the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence” (DoD 2017). The lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias is known as the limit of quantitation (LOQ; DoD 2017). Concentrations detected between the LOD and LOQ, therefore, are considered estimates and are qualified as such on laboratory analytical reports. Instrument-specific detection limits (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99% confidence; DoD 2017), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports included in the Data Usability Summary Report (DUSR; **Appendix N**).

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.3 (DoD and Department of Energy 2019), the DoD General Data Validation Guidelines (DoD 2019), the DoD Final Data Validation Guidelines Module 3 for PFAS (DoD 2020), and the PQAPP (Arcadis 2019). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in

Appendix N. The Level IV analytical reports are included within **Appendix N** in the final electronic deliverable only.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at FTHU. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix N**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation Guidelines Module 3: Data Validation Procedure for Per-and Polyfluoroalkyl Substances Analysis by QSM Table B-15 (DoD 2020), that reviewed precision, accuracy, completeness, representativeness, comparability, and sensitivity. A statement of overall data usability is included in the DUSR.

Based on the final data usability assessment, the environmental data collected at FTHU during the SI were found to be acceptable and usable for this SI evaluation with the qualifications documented in the DUSR and its associated data validation reports (**Appendix N**), and as indicated in the full analytical tables (**Appendix O**) provided for the SI results. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and FTHU QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at FTHU are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of DUSR. Qualifiers for data shown on figures are defined in the notes of figures. Where discussed in the text, data marked with a "J" qualifier indicates that the analyte was positively identified, but the associated numerical value is an estimated concentration only.

6.5 Office of the Secretary of Defense Risk Screening Levels

The OSD risk screening levels for PFOS, PFOA, and PFBS in groundwater (tap water) and soil were calculated using the USEPA's RSL calculator for residential and industrial/commercial worker receptor scenarios and current toxicity values. These risk screening levels are shown in **Table 6-2**.

Table 6-2 OSD Risk Screening Levels Calculated for PFOS, PFOA, and PFBS in Tap Water and Soil Using USEPA's Regional Screening Level Calculator

Chemical	Residential Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator		Industrial/Commercial Scenario Risk Screening Levels Calculated Using USEPA RSL Calculator
	Tap Water (ng/L or ppt) [1]	Soil (mg/kg or ppm) [1,2]	Soil (mg/kg or ppm) [1,2]
PFOS	40	0.13	1.6
PFOA	40	0.13	1.6
PFBS	600	1.9	25

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet bgs), regardless of the current and projected land use of the AOPI.
mg/kg = milligram per kilogram
ng/L = nanograms per liter
ppm = parts per million
ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at FTHU are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 9**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at FTHU (field duplicate results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2020). The sample results discussion below focuses on the PFOS, PFOA, and PFBS analytical results because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the OSD risk screening levels.

Tables 7-1 and **7-2** provide a summary of the groundwater and soil analytical results for PFOS, PFOA, and PFBS. **Table 7-3** summarizes AOPIs and whether their SI results exceed the OSD risk screening levels. **Appendix O** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at FTHU with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2** through **7-13** show the PFOS, PFOA, and PFBS analytical results in soil and groundwater for each AOPI. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, and/or PFBS greater than the applicable OSD risk screening levels are highlighted in summary tables and on figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Data marked with a "J" qualifier indicates that the analyte was positively identified, but the associated numerical value is an estimated concentration only. Groundwater data collected during the SI are reported in ng/L, or parts per trillion, and soil data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection and for surface water during sample collection are provided on the field forms in **Appendix K**. Soil descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 373 to 414 feet below top of casing near the East Range Recharge Basin AOPI.

Table 7-3 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
Fire Station #1	No
Traffic Circle Car Fire	No
Beehive on School Fence	Yes
Former Fire Station #2	Yes
LRC Fire Truck Maintenance	No
Defuel Pad	No
Former Firefighting Training Area	Yes
Current Firefighting Training Area	No
Fire Station #3	Yes
Hangar 5	No

AOPI Name	OSD Exceedances (Yes/No)
South Ramp Taxiway and Drainage Basin	Yes
Hangar 6	No
WWTP #1	No
WWTP #2	No
Mountain View Golf Course	No
Outdoor Sports Complex	No
Prosser Village Barracks Landscaping	No
East Range Recharge Basins	No
UAV Black Tower Building 11683	No

7.1 Fire Station #1

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Fire Station #1.

7.1.1 Soil

Seven soil samples and one soil field duplicate sample were collected around the Fire Station #1 AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at one sampling location at a concentration of 0.00094 J mg/kg (FTHU-FS1-06), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all seven sampling locations, at concentrations ranging from 0.001 mg/kg (FTHU-FS1-07) to 0.071 mg/kg (FTHU-FS1-06), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2** and **Figure 7-2**)

7.1.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.2 Traffic Circle Car Fire

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Traffic Circle Car Fire.

7.2.1 Soil

Seven soil samples were collected around the Traffic Circle Car Fire AOPI. PFBS and PFOA was not detected at any of the sampling locations. PFOS was detected at six sampling locations with

concentrations ranging from 0.00063 J mg/kg (FTHU-TCCF-02) to 0.024 mg/kg (FTHU-TCCF-06), less than the OSD risk screening level of 0.13 mg/kg (**Table 7-2 and Figure 7-2**).

7.2.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.3 Beehive on School Fence

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Beehive on School Fence.

7.3.1 Soil

Three soil samples were collected around the Beehive on School Fence AOPI. PFBS was detected at one sampling location with a concentration of 0.0017 mg/kg (FTHU-BSF-02), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at two sampling locations with concentrations of 0.0023 mg/kg (FTHU-BSF-01) and 0.025 mg/kg (FTHU-BSF-02), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at two sampling locations with concentrations of 0.009 mg/kg (FTHU-BSF-01) and 0.21 J mg/kg (FTHU-BSF-02). The qualifier “J” indicates that the sample was diluted within the calibration range during analysis, and the reported result is an estimate. The PFOS concentration at FTHU-BSF-02 is greater than the OSD risk screening level of 0.13 mg/kg. PFOS, PFOA, and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels. (**Table 7-2 and Figure 7-3**)

7.3.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.4 Former Fire Station #2

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Former Fire Station #2.

7.4.1 Soil

Eight soil samples were collected around the Former Fire Station #2 AOPI. PFBS was detected at two locations with concentrations of 0.00056 J mg/kg (FTHU-FFS2-05) and 0.0042 mg/kg (FTHU-FFS2-03), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at all sampling locations with concentrations ranging from 0.00095 mg/kg (FTHU-FFS2-02) to 0.025 mg/kg (FTHU-FFS2-03), less than

the OSD screening level of 0.13 mg/kg. PFOS was detected at all sampling locations with concentrations ranging from 0.0014 mg/kg (FTHU-FFS2-02) to 0.27 J mg/kg (FTHU-FFS2-04). The qualifier "J" indicates that the sample was diluted within the calibration range during analysis, and the reported result is an estimate. The PFOS concentration of FTHU-FFS2-04 and FTHU-FFS2-05 are greater than the OSD risk screening level of 0.13 mg/kg. PFOS, PFOA and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels. (**Table 7-2 and Figure 7-4**)

7.4.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.5 Mountain View Golf Course

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Mountain View Golf Course.

7.5.1 Soil

Five soil samples were collected around the Mountain View Golf Course AOPI. PFBS not detected at any of the sampling locations. PFOA was detected at three sampling locations with concentrations of 0.0005 J mg/kg (FTHU-MVGC-01), 0.00082 J (FTHU-MVGC-02), and 0.0012 mg/kg (FTHU-MVGC-03), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all five sampling locations with concentrations ranging from 0.0037 mg/kg (FTHU-MVGC-04) to 0.016 mg/kg (FTHU-MGVC-03), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-5**)

7.5.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.6 WWTP #1

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with WWTP #1.

7.6.1 Soil

Six soil samples were collected around the WWTP #1 AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at four sampling locations with concentrations ranging from 0.0019 mg/kg (FTHU-WWTP1-03) to 0.007 mg/kg (FTHU-WWTP1-05), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at five sampling locations with concentrations ranging from

0.0064 mg/kg (FTHU-WWTP1-01) to 0.031 mg/kg (FTHU-WWTP1-04), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-6**)

7.6.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.7 WWTP #2

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with WWTP #2.

7.7.1 Soil

Six soil samples and one soil field duplicate sample were collected around the WWTP #2 AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at three sampling locations with concentrations of 0.0006 J mg/kg (FTHU-WWTP2-05), 0.0007 J mg/kg (FTHU-WWTP2-04), and 0.0036 mg/kg (FTHU-WWTP2-03), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at four sampling locations with concentrations ranging from 0.0034 mg/kg (FTHU-WWTP2-03) to 0.014 mg/kg (FTHU-WWTP2-04), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-7)**

7.7.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.8 LRC Fire Truck Maintenance

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with LRC Fire Truck Maintenance.

7.8.1 Soil

Eight soil samples were collected around the LRC Fire Truck Maintenance AOPI. PFBS was detected at one sampling location with a concentration of 0.0014 mg/kg (FTHU-LRC-07), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at three sampling locations with concentrations of 0.00074 J mg/kg (FTHU-LRC-08), 0.00076 J mg/kg (FTHU0LRC-06), and 0.001 mg/kg (FTHU-LRC-07), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at seven sampling locations with concentrations ranging from 0.00083 J mg/kg (FTHU-LRC-01) to 0.079 mg/kg (FTHU-LRC-07), less than the OSD risk screening level of 0.13 mg/kg (**Table 7-2** and **Figure 7-8**).

7.8.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.9 Outdoor Sports Complex

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Outdoor Sports Complex.

7.9.1 Soil

Three soil samples were collected around the Outdoor Sports Complex AOPI. PFBS and PFOA were not detected at any of the sampling locations. PFOS was detected at all three sampling locations with concentrations of 0.00056 J mg/kg (FTHU-OSC-03), 0.00077 J mg/kg (FTHU-OSC-02), and 0.0012 mg/kg (FTHU-OSC-01), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-9**)

7.9.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.10 Prosser Village Barracks Landscaping

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Prosser Village Barracks Landscaping.

7.10.1 Soil

Five soil samples were collected around the Prosser Village Barracks Landscaping AOPI. PFBS and PFOA was not detected at any of the sampling locations. PFOS was detected at two sampling locations with concentrations of 0.00063 J mg/kg (FTHU-PVBL-04) to 0.0011 mg/kg (FTHU-PVBL-03), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-9**)

7.10.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.11 Hangar 6

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Hangar 6.

7.11.1 Soil

One soil sample was collected around the Hangar 6 AOPI. PFBS, PFOA, and PFOS concentrations were not detected at this sampling location. (**Table 7-2** and **Figure 7-10**).

7.11.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.12 Defuel Pad

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Defuel Pad.

7.12.1 Soil

Four soil samples were collected around the Defuel Pad AOPI. PFBS was detected at two sampling locations with concentrations of 0.00057 J mg/kg (FTHU-DF-03) and 0.0066 J- mg/kg (FTHU-DF-01), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at all four sampling locations with concentrations ranging from 0.00076 J mg/kg (FTHU-DF-02) to 0.015 mg/kg (FTHU-DF-01), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all four sampling locations with concentrations ranging from 0.01 mg/kg (FTHU-DF-02) to 0.12 mg/kg (FTHU-DF-03), less than the OSD risk screening level of 0.13 mg/kg**.** (**Table 7-2** and **Figure 7-11a**)

7.12.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.13 Former Firefighting Training Area

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Former Firefighting Training Area.

7.13.1 Soil

Twelve soil samples and one soil field duplicate sample were collected around the Former Firefighting Training Area AOPI. PFBS was detected at five sampling locations with concentrations ranging from 0.00056 J mg/kg (FTHU-FFTA-09) to 0.01 J mg/kg (FTHU-FFTA-12), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at six sampling locations with concentrations ranging from 0.00074 J mg/kg (FTHU-FFTA-10) to 0.018 J mg/kg (FTHU-FFTA-12), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at eleven sampling locations with concentrations ranging from 0.00061 J mg/kg (FTHU-FFTA-01) to 0.70 J mg/kg (FTHU-FFTA-09)**.** The qualifier "J" indicates that the sample was diluted within the calibration range during analysis, and the reported result is an estimate. The PFOS concentrations of FTHU-FFTA-09 and FTHU-FFTA-12 are greater than the OSD risk screening level of 0.13 mg/kg. PFOS, PFOA and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels (**Table 7-2** and **Figure 7-11a**).

7.13.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.14 Current Firefighting Training Area

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Current Firefighting Training Area.

7.14.1 Soil

Six soil samples were collected around the Current Firefighting Training Area AOPI. PFBS was detected at one sampling location with a concentration of 0.00053 J mg/kg (FTHU-CFTA-05), less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at three sampling locations with concentrations of 0.001 J mg/kg (FTHU-CFTA-03), 0.0023 mg/kg (FTHU-CFTA-04), and 0.0057 mg/kg (FTHU-CFTA-05), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all six sampling locations with concentrations ranging from 0.0017 mg/kg (FTHU-CFTA-02) to 0.016 mg/kg (FTHU-CFTA-04), less than the OSD risk screening level of 0.13 mg/kg**.** (**Table 7-2** and **Figure 7-11a**)

7.14.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.15 Fire Station #3

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Fire Station #3.

7.15.1 Soil

Three soil samples and one soil field duplicate sample were collected around the Fire Station #3 AOPI. PFBS was detected at two sampling locations with a concentration of 0.00056 J mg/kg detected in the field duplicate collected at FTHU-FS3-01, and a concentration of 0.0014 mg/kg detected at FTHU-FS3-02. Both concentrations detected were less than the OSD risk screening level of 1.9 mg/kg. PFOA was detected at two sampling locations with a concentration of 0.0028 mg/kg detected in the field duplicate collected at FTHU-FS3-01, and a concentration of 0.012 mg/kg detected at FTHU-FS3-02. Both concentrations detected were less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all sampling locations with concentrations ranging from 0.01 mg/kg (FTHU-FS3-03) to 1.2 J mg/kg (FTHU-FS3-02). The qualifier “J” indicates that the sample was diluted within the calibration range during analysis, and the reported result is an estimate. The PFOS concentration of FTHU-FS3-02 is greater than the OSD risk screening level of 0.13 mg/kg. PFOS, PFOA and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels (**Table 7-2** and **Figure 7-11b**)

7.15.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.16 Hangar 5

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with Hangar 5.

7.16.1 Soil

Seven soil samples were collected around the Hangar 5 AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at one sampling location with a concentration of 0.00098 J mg/kg (FTHU-H5-01), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at five sampling locations with concentrations ranging from 0.00073 J mg/kg (FTHU-H5-04) to 0.008 J mg/kg (FTHU-H5-01), less than the OSD risk screening level 0.13 mg/kg. (**Table 7-2** and **Figure 7-11b**).

7.16.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.17 South Ramp Taxiway and Drainage Basin

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with South Ramp Taxiway and Drainage Basin.

7.17.1 Soil

Six soil samples were collected around the South Ramp Taxiway and Drainage Basin AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at three sampling locations with concentrations of 0.0007 J mg/kg (FTHU-SRT-01), 0.0019 mg/kg (FTHU-SRT-06), and 0.0034 mg/kg (FTHU-SRT-02), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at all six sampling locations with concentrations ranging from 0.0016 mg/kg (FTHU-SRT-03) to 0.17 mg/kg (FTHU-SRT-06). The PFOS concentration of FTHU-SRT-06 is greater than the OSD risk screening level of 0.13 mg/kg. PFOS, PFOA and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels. (**Table 7-2** and **Figure 7-11b**)

7.17.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.18 East Range Recharge Basins

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with East Range Recharge Basins.

7.18.1 Soil

Seven soil samples and one soil field duplicate sample were collected around the East Range Recharge Basins AOPI. PFBS was not detected at any of the sampling locations. PFOA was detected at one sampling location with a concentration 0.00083 J mg/kg (FTHU-ERB-07), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at five sampling locations with concentrations ranging from 0.0007 J mg/kg (FTHU-ERB-05) to 0.0028 mg/kg (FTHU-ERB-01), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2** and **Figure 7-12**)

7.18.2 Groundwater

Two groundwater samples and one groundwater field duplicate sample were collected around the East Range Recharge Basins AOPI**.** PFBS was detected at both sampling locations with concentrations ranging from 5.8 ng/L (FTHU-MW-POC-1) to 14 ng/L (FTHU-MW-POC-2), less than the OSD risk screening level of 600 ng/L. PFOA was detected at one sampling location with a concentration of 32 ng/L, less than the OSD risk screening level of 40 ng/L. PFOS was detected at one sampling location with a concentration of 92 ng/L (FTHU-MW-POC-2), greater than the OSD risk screening level of 40 ng/L.

PFOS, PFOA and PFBS concentrations at all other sampling locations were lower than the OSD risk screening levels. (**Table 7-1** and **Figure 7-12**)

7.19 UAV Black Tower Building 11683

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with UAV Black Tower Building 11683.

7.19.1 Soil

Five soil samples were collected around the UAV Black Tower Building 11683 AOPI. PFBS not detected at any of the sampling locations. PFOA was detected at one of the sampling locations with a concentration of 0.0012 mg/kg (FTHU-UAVBT-01), less than the OSD risk screening level of 0.13 mg/kg. PFOS was detected at one sampling location with a concentration of 0.068 mg/kg (FTHU-UAVBT-02), less than the OSD risk screening level of 0.13 mg/kg. (**Table 7-2 and Figure 7-13**)

7.19.2 Groundwater

No downgradient existing monitoring wells were identified in proximity to this AOPI. Due to the significant depth to water (greater than 500 feet bgs [Montgomery Watson 1994]) across the installation, it was determined during the scoping call that soil samples would be assessed in place of groundwater sampling.

7.20 Dedicated Equipment Background Samples

One DEB was collected at MW-POC2. PFOS, PFOA, and PFBS were non-detect in the DEB sample (**Table 7-1**), indicating no PFOS, PFOA, and/or PFBS was present in the dedicated downhole equipment to present a potential contamination source. A complete summary of the analytical results is presented in **Appendix O**.

7.21 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS, one soil sample per AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 1,160 to 36,600 mg/kg. The TOC at this installation was within range of that typically observed in desert soils (less than 5,000 mg/kg) and topsoil (5,000 to 30,000 mg/kg). The combined percentage of fines (i.e., silt and clay) in soils at FTHU ranged from 6 to 48.9% with an average of 25.7%. In general, PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The percent moisture of the soil (5% on average) was typical for sandy soil (0 to 10%). The pH of the soil (7.6 standard units on average) was slightly alkaline (7 to 9 standard units).

7.22 Blank Samples

PFOS was detected at a minimal concentration of 3.5 J ng/L in equipment blank FTHU-EB-01-120920. The equipment from which equipment blank FTHU-EB-01-12092020 was collected was not marked on the field forms included in **Appendix K**. Post-field communication with field staff indicated that this sample was collected from the hand auger bucket. Potentially affected samples include three soil samples collected at the Traffic Circle Car Fire AOPI (FTHU-TCCF-03, FTHU-TCCF-06 and FTHU-TCFF-07), and all soil samples collected at Fire Station #1.

During the data validation process, a blank action level (BAL) of five times the PFOS concentration detected in equipment blank FTHU-EB-01-120920 was calculated for comparison with the associated soil samples collected at the Traffic Circle Car Fire and Fire Station #1 AOPIs. The detected concentration of PFOS in the equipment blank was reported in ng/L, equivalent to parts per trillion, 1,000,000 times smaller than the soil detections reported in mg/kg, or parts per million. The calculated BAL was well below the detection limit for PFOS in soil. Therefore, it was determined during the data validation process that the PFOS detection in equipment blank FTHU-EB-01-120920 had no effect on the reported PFOS results for the associated soil samples from the Traffic Circle Car Fire and Fire Station #1 AOPIs.

Other than noted above, concentrations of PFOS, PFOA, PFBS in all other QA/QC samples were not detected. The full analytical results for blank samples collected during the SI are included in **Appendix O**.

7.23 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2020) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-14** through **7-22** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

Many of the PFAS constituents found in AFFF and metal plating operations are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally-relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, and PFBS are each negatively charged at environmentally-relevant pH. The media potentially affected by PFOS, PFOA, PFBS releases at Army installations are soil, groundwater, surface water, and sediment. Once released to the environment, a primary factor that inhibits the movement of PFAS constituents is the presence of organic matter and organic co-constituents in soils and sediments. Generally, PFAS constituents are mobile in the potentially affected media, and they are not known to be fully broken down by natural processes.

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPIs, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, groundwater recharge by intermittent surface water/stormwater, and adsorption/desorption between surface water and sediment. Generic categories of potential human receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a

residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

Human exposure pathways are shown as “complete”, “potentially complete”, or “incomplete” on the CSM figures. A complete exposure pathway consists of a constituent source and release mechanism, a transport or retention medium, an exposure point where human contact with the contaminated medium could occur, and an exposure route at the exposure point. If any of these elements is missing, the exposure pathway is incomplete. Pathways are “potentially complete” where data are insufficient to conclude the pathway is either “complete” or “incomplete”. Additionally, the CSMs do not include ecological receptors and exposure pathways. The potential for ecological exposures to PFOS, PFOA, and PFBS may be evaluated at a future date if those pathways warrant further consideration.

CSMs were developed for each individual AOPI and were combined where source media, potential migration pathways and exposure media, and human exposure pathway determinations are congruent. The following exposure pathway determination applies to all CSMs:

- Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.

Additional exposure pathway descriptions for each CSM are listed below by figure.

Figure 7-14 shows the CSM for the Fire Station #1, Traffic Circle Car Fire, and Former Fire Station #2 AOPIs. These AOPIs have potential for PFAS presence due to the use of AFFF during fire station activities and an emergency response.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. The AOPIs are not likely to be regularly accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- Groundwater samples associated with these AOPIs were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to any of the AOPIs. Drinking water in the vicinity of the installation is pumped from the local aquifer. The confirmed presence of PFOS, PFOA, and/or PFBS in the soils at these AOPIs indicates the potential for groundwater impacts. The Fire Station #1 and Traffic Circle Car Fire are cross-gradient to the on-post drinking water supply wells, and the Former Fire Station #2 is within the cone of depression and is considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for site workers and residents are potentially complete.
- Groundwater originating from these AOPIs could eventually flow off post, either through the installation’s eastern or northern boundary or through the installation’s northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.

- There are no surface water bodies or major drainage courses near these AOPIs, and intermittent stormwater is lost to evaporation. Therefore, surface water and sediment are not included as potential exposure media on **Figure 7-14**.

Figure 7-15 shows the CSM for the Beehive on School Fence and Outdoor Sports Complex AOPIs. These AOPIs have potential for PFAS presence due to the use of AFFF during fire station response activities and secondary releases from wastewater reuse for irrigation.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers and recreational users could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathways for on-installation site workers and recreational users are complete. The AOPIs are not likely to be regularly accessed by on-installation residents or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- Groundwater samples associated with these AOPIs were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to any of the AOPIs. The confirmed presence of PFOS, PFOA, and/or PFBS in the soils at these AOPIs indicates the potential for groundwater impacts. Beehive on School Fence is cross-gradient to the on-post drinking water supply wells, and the Outdoor Sports Complex straddles the cone of depression and is considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating from these AOPIs could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- There are no surface water bodies or major drainage courses near these AOPIs, and intermittent stormwater is lost to evaporation. Therefore, surface water and sediment are not included as potential exposure media on **Figure 7-15**.

Figure 7-16 shows the CSM for the LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, and South Ramp Taxiway and Drainage Basin AOPIs. These AOPIs have potential for PFAS presence due to the use of AFFF in firefighting equipment maintained and tested in these areas, during fire station or firefighting training activities, and in fire suppression systems.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. The AOPIs are not likely to be regularly accessed by on-installation residents and recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.

- Groundwater samples associated with these AOPIs were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to any of the AOPIs. The confirmed presence of PFOS, PFOA, and/or PFBS in the soils at these AOPIs indicates the potential for groundwater impacts. The LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, and South Ramp Taxiway and Drainage Basin are all cross-gradient to the on-post drinking water supply wells, and the Hangar 5 straddles the cone of depression and is considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for site workers and residents are potentially complete.
- Groundwater originating from these AOPIs could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- The ephemeral surface water features on-post are not used for drinking water. Due to the high potential for evaporation and infiltration of stormwater, exposure to constituents in surface water is unlikely; therefore, the surface water exposure pathways for on-installation receptors are incomplete. The ephemeral surface water features are not likely to flow off-post. Therefore, the surface water and sediment exposure pathways for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in the sediment/soil of the drainage ditches immediately downstream of the LRC Fire Truck Maintenance AOPI, and in the stormwater retention basin associated with the other AOPIs. Site workers could contact constituents (via incidental ingestion and dermal contact) in sediment/soil of the drainage ditches or stormwater retention basins associated with these AOPIs; therefore, the sediment exposure pathway for on-installation site workers is complete. On-installation residents and recreational users are not likely to contact sediment/soil of the drainage ditches or stormwater retention basins; therefore, the sediment exposure pathways for on-installation residents and recreational users are incomplete.

Figure 7-17 shows the CSM for the Hangar 6 AOPI. This AOPI has potential for PFAS presence due to the potential of historical use of AFFF within the fire suppression system.

- PFOS, PFOA, and/or PFBS were not detected in soil sampled at this AOPI, therefore all soil exposure pathways at this AOPI are incomplete.
- Groundwater samples associated with these AOPIs were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to any of the AOPIs. As PFOS, PFOA, and PFBS were non-detect in the soil samples collected at Hangar 6, and the high expansion foams don't usually contain PFAS, it is reasonable to conclude PFOS, PFOA, and PFBS are not likely present in the groundwater and that the Hangar 6 AOPI is not the source of the constituents detected in sediment/soil of the stormwater retention basin. Therefore, the groundwater, surface water, and sediment/soil exposure pathways are incomplete.

Figure 7-18 shows the CSM for the Prosser Village Barracks Landscaping AOPI. This AOPI has potential for PFAS presence due to the reuse of wastewater, potentially containing AFFF, for irrigation.

- PFOS, PFOA, and/or PFBS were detected in soil at this AOPI. Site workers and residents could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathways for on-installation site workers and residents are complete. This AOPI is not likely to be regularly accessed by on-installation recreational users or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- Groundwater samples associated with this AOPI were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to this AOPI. The confirmed presence of PFOS, PFOA, and/or PFBS in the soils at this AOPI indicates the potential for groundwater impacts. The Prosser Village Barracks Landscaping AOPI is within the cone of depression and is considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating from this AOPI could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- There are no surface water bodies or major drainage courses near this AOPI, and intermittent stormwater is lost to evaporation. Therefore, surface water and sediment are not included as potential exposure media on **Figure 7-18**.

Figure 7-19 shows the CSM for the WWTP #1 and WWTP #2 AOPIs. These AOPIs have potential for PFAS presence due to potentially AFFF-containing wastewaters being treated at these sites.

- PFOS, PFOA, and/or PFBS were detected in soil/sludge at these AOPIs, and site workers could contact constituents in soil/sludge via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil/sludge exposure pathway for on-installation site workers is complete. The AOPIs are not likely to be regularly accessed by on-installation residents or recreational users, or by off-installation receptors. Therefore, the soil/sludge exposure pathways for these receptors are incomplete.
- Groundwater samples associated with these AOPIs were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to any of the AOPIs. The confirmed presence of PFOS, PFOA, and/or PFBS in the soil/sludge at these AOPIs indicates the potential for groundwater impacts. The AOPIs are within the cone of depression and are considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating from these AOPIs could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area,

the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.

- The effluent holding ponds are lined and covered with floating covers. No surface water or sediment samples were collected from the effluent holding ponds. Site workers are not expected to contact constituents in the lined and covered WWTP effluent holding ponds, and on-installation residents and recreational users are not expected to be present at the WWTP. Therefore, the surface water and sediment exposure pathways for all receptors are incomplete.
- The effluent holding ponds are not connected to off-post drainage channels. Therefore, the surface water and sediment exposure pathways for off-installation receptors are incomplete.

Figure 7-20 shows the CSM for the Mountain View Golf Course AOPI. This AOPI has potential for PFAS presence due to the reuse of wastewater, potentially containing AFFF, for irrigation.

- PFOS, PFOA, and/or PFBS were detected in soil at this AOPI. Site workers (e.g., maintenance workers), on-installation recreational users, and public visitors to the golf course could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathways for these receptors are complete. The Mountain View Golf Course AOPI is not used for residential purposes, therefore the soil exposure pathway for on-installation residents is incomplete.
- Groundwater samples associated with this AOPI were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to this AOPI. The confirmed presence of PFOS, PFOA, and/or PFBS in the soils indicates the potential for groundwater impacts. This AOPI is within the cone of depression and is considered up-gradient of on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating from this AOPI could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- The effluent holding pond at the Mountain View Golf Course is lined and covered with a floating cover, preventing sampling of surface water and sediment. However, reclaimed water from the effluent holding ponds is used to irrigate the Mountain View Golf Course, and PFOS, PFOA, and/or PFBS were detected in soil at this AOPI. The presence of PFOS, PFOA, and/or PFBS in soil indicates the potential for PFOS, PFOA, and/or PFBS presence within the effluent holding ponds when full. Site workers are not expected to contact surface water and sediment in the effluent holding ponds, however they could contact constituents in water used to irrigate the golf course. Therefore, the sediment exposure pathway is incomplete and the surface water exposure pathway for on-installation site workers is potentially complete. On-installation residents and recreational users are not expected to contact the effluent holding ponds or irrigation water; therefore, the surface water and sediment exposure pathways for these receptors are incomplete.

- The effluent holding ponds at the Mountain View Golf Course are not connected to off-post drainage channels. Therefore, the surface water and sediment exposure pathways for off-installation receptors are incomplete.

Figure 7-21 shows the CSM for the East Range Recharge Basins AOPI. This AOPI has the potential for PFAS presence from the receipt of treated effluent from WWTP #1 and WWTP #2, potentially containing AFFF, at the recharge basins and former unlined evaporation/percolation lagoons.

- PFOS, PFOA, and/or PFBS were detected in recharge basin soils at this AOPI, and site workers could contact constituents in recharge basin soils via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the recharge basin soil exposure pathway for on-installation site workers is complete. On-installation residents and recreational users are not expected to contact the recharge basins. Therefore, the recharge basin soil exposure pathways for on-installation residents and recreational users are incomplete.
- Though treated effluent was present within the recharge basins at the time of the SI, surface water samples were not collected. The presence of PFOS, PFOA, and/or PFBS in recharge basin soils and groundwater present at the site indicates a potential for surface water impacts. Site workers could contact constituents in the effluent recharge basins through incidental ingestion and dermal contact; therefore, the surface water pathway for on-installation site workers is potentially complete.
- The recharge basins were historically connected to ephemeral surface water features, however, due to the high potential for evaporation and infiltration of surface water, the surface water features were not likely to flow off post. In the early 2000s when the current recharge basins were constructed over the former unlined evaporation lagoons, the ephemeral stream was re-routed around the recharge basins. Therefore, the surface water and sediment exposure pathways for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater samples associated with this AOPI. This AOPI is within the cone of depression and is considered up-gradient of two on-post drinking water wells. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.
- Groundwater originating from this AOPI could eventually flow off-post, either through the installation's eastern or northern boundary or through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors are potentially complete.

Figure 7-22 shows the CSM for the UAV Black Tower Building 11683 AOPI. This AOPI has potential for PFAS presence due to the use and storage of AFFF in a fire suppression system at the site.

- PFOS, PFOA, and/or PFBS were detected in soil at this AOPI, and site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-installation site workers is complete. This AOPI is not likely to be

regularly accessed by on-installation recreational users, residents, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.

- Groundwater samples associated with this AOPI were not collected during the SI as no existing downgradient monitoring wells were identified in proximity to this AOPI. There are no on-installation potable wells that are side- or down-gradient from this AOPI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.
- Groundwater originating from this AOPI could eventually flow off-post, through the installation's northern boundary and in the direction of municipal wells located at the Sierra Vista Municipal Airport north of LAAF. Due to the absence of land use controls preventing the potable use of off-post groundwater in the area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- There are no surface water bodies or major drainage courses near this AOPI, and intermittent stormwater is lost to evaporation. Therefore, surface water and sediment are not included as potential exposure media on **Figure 7-22**

Following the SI sampling, 18 out of the 19 AOPIs had confirmed PFOS, PFOA, and/or PFBS presence and were considered to have complete or potentially complete exposure pathways. Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for remedial investigation is based on the comparison of analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**).

8 OFF-POST PRIVATE POTABLE WELL INVESTIGATION

Based on SI sampling results, off-post private potable wells were evaluated for potential sampling as part of the PA/SI at FTHU to determine whether there are off-post impacts to drinking water due to Army operations. These wells are located near the approximate boundary of the cone of depression (discussed in **Section 2.7** and shown on **Figure 2-3**) which also encompasses the groundwater monitoring wells at the East Range Recharge Basins where PFOS was detected at concentrations greater than the USEPA lifetime health advisory. Due to the potential for variable groundwater flow direction within the cone of depression, all potable wells located within its boundaries are considered potentially down or side gradient of the groundwater wells at the East Range Recharge Basins. To identify potential potable wells that were downgradient of the installation boundary, an off-post well survey was completed using readily available information from the online Registry of Wells in Arizona (Wells 55) (Arizona Department of Water Resources 2021). County records were also reviewed to identify wells that may not be included in the Wells 55 database. After reviewing the available information in groundwater modeling reports (i.e., United States Geological Survey reports or other) for the area, off-post potable wells were identified for possible sampling as part of this investigation based on the understanding of the relationship between on- and off-post hydrogeological conditions. If off-post private potable well sampling is proposed, community outreach and notification will be coordinated between the Army PA/SI team: FTHU, Headquarters of the Department of the Army, and USAEC to sample wells located immediately downgradient of the installation boundary. A letter report presenting a summary of the off-post private well investigation results and the associated laboratory reports would be included in a subsequent addendum.

9 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at FTHU based on the use, storage, and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release of PFOS, PFOA, and PFBS to the environment occurred.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, and PFBS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFOS, PFOA, and PFBS use, storage, and/or disposal at FTHU. Following the evaluation, 19 AOPIs were identified.

On-post drinking water is sourced from the regional aquifer, and currently supplied by potable Wells 4 through 8. Potable Wells 1 through 3 have historically provided potable water at the installation but were offline awaiting repairs at the time of the PA/SI. In 2014 and 2015, post-treatment drinking water samples were collected from potable water supplies on FTHU, and in the surrounding communities, including wells located in Sierra Vista and Rio Rico. The samples were analyzed for six PFAS, including PFOS, PFOA, and PFBS. All results were non-detect, with reporting limits of 40 ng/L, 20 ng/L, and 90 ng/L for PFOS, PFOA, and PFBS, respectively (USEPA 2017).

In 2018 and 2020, the Army collected post-treatment drinking water samples from EPDS locations associated with the on-post potable wells. Samples were collected in 2018 from EPDS systems associated with Wells 3 through 8, and analyzed for a total of 14 PFAS, including PFOS, PFOA, and PFBS. PFBS was detected at a concentration of 2.2 ng/L, below the OSD risk screening levels, in EPDS003, associated with Well 3. All other results were non-detect for PFOS, PFOA, and PFBS (Army 2019). In 2020, samples were collected from EPDS locations associated with Wells 4 through 8 and analyzed for 18 PFAS, including PFOS, PFOA, and PFBS. PFOS and PFOA were detected at concentrations of 5.7 and 9.9 ng/L, respectively, below the applicable OSD risk screening levels, in EPDS002, associated with Well 7 and Well 8. All other results were non-detect for PFOS, PFOA, and PFBS (Army 2020). A complete summary of historical results is presented in **Table 2-2**.

All AOPIs were sampled during the SI at FTHU to identify the presence or absence of PFOS, PFOA, and PFBS at each AOPI. The SI scope of work was completed in accordance with the Final PQAPP (Arcadis 2019) and the FTHU QAPP Addendum (Arcadis 2020).

Eighteen AOPIs had detections of PFOS, PFOA, and/or PFBS in soil and/or groundwater, however, only six AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels: Beehive on School Fence, Former Fire Station #2, Former Firefighting Training Area, Fire Station #3, South Ramp Taxiway and Drainage Basin, and East Range Recharge Basins. Below is a summary of the SI sampling event and results.

Shallow Soil (0 to 2 feet)

For this evaluation, the OSD risk screening levels used to compare soil data are 0.13 mg/kg for PFOS and PFOA and 1.9 mg/kg for PFBS (i.e., for the residential receptor scenarios).

- PFOS was detected in 88 of the 107 primary soil samples collected, with detections occurring at the following AOPIs: Fire Station #1, Traffic Circle Car Fire, Beehive on School Fence, Former Fire Station #2, Mountain View Golf Course, WWTP #1, WWTP #2, LRC Fire Truck Maintenance, Outdoor Sports Complex, Prosser Village Barracks Landscaping, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, South Ramp Taxiway and Drainage Basin, East Range Recharge Basins, and UAV Black Tower Building 11683. The maximum detected concentration occurred at Fire Station #3, with a concentration of 1.2 J mg/kg. The qualifier "J" indicates that the sample was diluted within the calibration range during analysis, and the reported result is an estimate. PFOS was detected in exceedance of the OSD risk screening levels at five AOPIs, including the following: Fire Station #2, Fire Station #3, Former Firefighting Training Area, Beehive on School Fence, and South Ramp Taxiway Drainage Basin.
- PFOA was detected in 44 of the 107 primary soil samples at the following AOPIs: Fire Station #1, Beehive on School Fence, Former Fire Station #2, Mountain View Golf Course, WWTP #1, WWTP #2, LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, South Ramp Taxiway and Drainage Basin, East Range Recharge Basins, and UAV Black Tower Building 11683. The maximum detected concentration occurred at the Beehive School Fence, with a concentration of 0.025 mg/kg, below the OSD risk screening levels.
- PFBS was detected in 15 of the 107 primary soil samples, at the following AOPIs: Beehive on School Fence, Former Fire Station #2, LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, and Fire Station #3. The maximum detected concentration occurred at the Former Firefighting Training Area, with a concentration of 0.01 mg/kg, below the OSD risk screening levels.

Groundwater

For this evaluation, the OSD risk screening levels used to compare groundwater data are 40 ng/L for PFOS and PFOA and 600 ng/L for PFBS.

- PFOS was detected in one of the two primary groundwater samples collected. The PFOS detection occurred in monitoring well MW-POC2, located within the East Range Recharge Basin AOPI and the cone of depression, at a concentration of 92 ng/L, in exceedance of the OSD risk screening level.
- PFOA was detected in one of the two primary groundwater samples collected. The PFOA detection occurred in monitoring well MW-POC2, located within the East Range Recharge Basin AOPI and the cone of depression, at a concentration of 32 ng/L, below the OSD risk screening level.
- PFBS was detected in both of the two primary groundwater samples collected. Both groundwater samples were collected from monitoring wells either within or downgradient of the East Range Recharge Basin AOPI and located within the cone of depression. The maximum PFBS detection occurred at MW-POC2, at a concentration of 14 ng/L, below the OSD risk screening level.

Following the SI sampling, all 18 AOPIs with confirmed PFOS, PFOA, and/or PFBS presence were considered to have complete or potentially complete exposure pathways.

Complete exposure pathways include:

- Soil exposure pathways for site workers at the Traffic Circle Car Fire, Fire Station #1, Former Fire Station #2, Beehive on School Fence, Outdoor Sports Complex, LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, South Ramp Taxiway and Drainage Basin, Prosser Village Barracks Landscaping, WWTP #1, WWTP #2, Mountain View Golf Course, and UAV Black Tower Building 11683 AOPIs.
- Soil exposure pathways for residents at the Prosser Village Barracks Landscaping AOPI.
- Soil exposure pathways for recreational users at the Beehive on School Fence, Outdoor Sports Complex, and Mountain View Gold Course AOPIs.
- Soil exposure pathways for off-post receptors at the Mountain View Gold Course AOPI.
- Sediment/soil exposure pathways for site workers exposed to the drainage basin associated with the LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, and South Ramp Taxiway and Drainage Basin AOPIs, and for site workers exposed to the recharge basins at the East Range Recharge Basins AOPI.

Potentially complete exposure pathways include:

- Groundwater exposure pathways for site workers, residents, and off-post receptors at the Traffic Circle Car Fire, Fire Station #1, Former Fire Station #2, Beehive on School Fence, Outdoor Sports Complex, LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, South Ramp Taxiway and Drainage Basin, Prosser Village Barracks Landscaping, WWTP #1, WWTP #2, Mountain View Golf Course, East Range Recharge Basins, and UAV Black Tower Building 11683 AOPIs.
- Surface water exposure pathways for site workers at the Mountain View Golf Course and East Range Recharge Basins AOPIs.

Although the CSMs indicate complete or potentially complete exposure pathways may exist, the recommendation for future study in a remedial investigation or no action at this time is based on the comparison of the SI analytical results for PFOS, PFOA, and PFBS to the OSD risk screening levels (**Table 6-2**). **Table 9-1** below summarizes the AOPIs identified at FTHU and PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at FTHU. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

Table 9-1 Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at FTHU, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)		Recommendation
	GW	SO	
Fire Station #1	NS	No	No action at this time
Traffic Circle Car Fire	NS	No	No action at this time
Beehive on School Fence	NS	Yes	Further study in a remedial investigation
Former Fire Station #2	NS	Yes	Further study in a remedial investigation
LRC Fire Truck Maintenance	NS	No	No action at this time
Defuel Pad	NS	No	No action at this time
Former Firefighting Training Area	NS	Yes	Further study in a remedial investigation
Current Firefighting Training Area	NS	No	No action at this time
Fire Station #3	NS	Yes	Further study in a remedial investigation
Hangar 5	NS	No	No action at this time
South Ramp Taxiway and Drainage Basin	NS	Yes	Further study in a remedial investigation
Hangar 6	NS	ND	No action at this time
WWTP #1	NS	No	No action at this time
WWTP #2	NS	No	No action at this time
Mountain View Golf Course	NS	No	No action at this time
Outdoor Sports Complex	NS	No	No action at this time
Prosser Village Barracks Landscaping	NS	No	No action at this time
East Range Recharge Basins	Yes	No	Further study in remedial investigation
UAV Black Tower Building 11683	NS	No	No action at this time

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
ND – non-detect
NS – not sampled
SO – soil

Data collected during the PA (**Sections 3** through **5**) and SI (**Sections 6** through **7**) were sufficient to draw conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at FTHU are discussed below.

Records gathered for the use, storage and/or disposal of PFAS-containing materials were reviewed during the PA process. Documentation specific to AFFF may have been limited (e.g., each AFFF use; procurement records, documentation of AFFF used during crash responses or fire training activities) due to lack of recordkeeping requirements for the full timeline of common AFFF practices. Anecdotal accounts of AFFF use (and therefore likely PFOS, PFOA, and PFBS use) were limited to available installation personnel, whose knowledge of AFFF use may have been restricted by their time spent at the installation or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS-containing material) use.

Results of the PA confirm the use of AFFF at FTHU during firefighting training activities and fire department equipment testing and maintenance. Estimates of the volume of AFFF were provided in some cases; however, other specifics such as AFFF brand and mixture concentrations and overall volume of AFFF used per event or collectively are uncertain.

Fort Huachuca Fire Department personnel interviews indicated that AFFF was stored at multiple locations at Fire Station #1. Interviewed personnel were able to confirm that AFFF was stored within the storage shed, though the exact location of other storage areas was unknown.

Characterization of exposure pathways as complete or incomplete was limited by the media types sampled. All potentially incomplete exposure pathways (those for sediment and surface water at WWTP #1, WWTP #2, and the Mountain View Golf Course, those for surface water at the East Range Recharge Basins, and those for groundwater at all AOPIs except Hangar 6 and the East Range Recharge Basins) could not be categorized as complete or incomplete as these media were not directly sampled.

FTHU personnel interviews indicated that in approximately 1980, dried sludge from WWTP #1 and WWTP #2 was used as fertilizer at an unknown location. SI sampling results indicate that soils at both WWTP #1 and WWTP #2 contain detectable quantities of PFOS and PFOA at levels below the OSD risk screening levels. The location of this sludge reuse, though unknown, may be impacted with PFAS as well.

In 2014, a one-time firefighting training event occurred near Fire Station #1. The area has since been excavated and regraded, though the location of soil disposal is unknown. AFFF used during the firefighting training event was removed with the excavated soils, potentially resulting in PFAS impacts at the point of disposal.

Additionally, FTHU personnel interviews indicated that in approximately 2006, either an UAV or a pilot-operated aircraft may have taken a hard landing (i.e., the landing gear was not deployed) on the eastern portion of the LAAF runway. No fire was caused from the crash, however some Fort Huachuca Fire Department personnel interviewed indicated that firefighting foams, potentially containing AFFF, may have been used as a preventative measure to cover any subsequent fuel spills. There are conflicting accounts regarding the exact location of the crash, or if AFFF firefighting foams were used. If AFFF was used, this area may have PFAS-related impacts.

At the time of the PA, painting facilities were considered out of the scope of locations to be investigated during the SI and were therefore not sampled. Historical reports indicate that some of the topcoats used at the painting facilities at FTHU, particularly at building 72907 (FTHU-66), may potentially have

contained PFAS compounds. Additionally, historical investigations found high levels of hexavalent chromium at building 72907, indicative of metals plating operations involving PFAS-containing materials (Army Environmental Hygiene Agency 1989). Though these painting facilities were not included in the scope of the SI sampling event, it is possible that PFAS-containing materials may have been used at these locations, particularly at building 72907.

Prior to 1970, dried sludge from the WWTPs was disposed of at Former Landfill 8. Currently, the dried sludge from the WWTPs is disposed into the Cochise County Western Regional Landfill. At the time of the PA, landfill inspections were considered out of the scope of locations to be investigated during the SI and were therefore not sampled. During the SI, PFAS was detected in dried sludge present at the WWTPs, indicating the potential for PFAS present in soils removed from the WWTPs, both currently and prior to 1970, which may remain at Former Landfill 8 and at the Cochise County Western Regional Landfill.

As discussed in **Section 7.22**, PFOS was detected at a minimal concentration of 3.5 J ng/L in equipment blank FTHU-EB-01-120920. This field blank was collected from the hand auger used to collect three soil samples at the Traffic Circle Car Fire AOPI (FTHU-TCCF-03, FTHU-TCCF-06 and FTHU-TCFF-07), and all soil samples Fire Station #1. It was determined during the data validation process that the PFOS detection in the equipment blank was not high enough to produce a significant effect on the associated soil samples.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to what is contained in the off-post well search results (**Appendix E**).

The searches for ecological receptors and off-post PFOS, PFOA, and PFBS sources were not exhaustive and were limited to easily identifiable and readily available information evaluated during the relevant documents review, FTHU personnel interviews, and site reconnaissance.

Additionally, the CSMs do not include ecological receptors and exposure pathways. The potential for ecological exposures to PFOS, PFOA, and PFBS may be evaluated at a future date if those pathways warrant further consideration.

Finally, the available PFOS, PFOA, and PFBS analytical data is limited to historical data provided by the installation (as described in **Section 2.12**) and the data collected during the SI. Available data, including PFOS, PFOA, and/or PFBS, is listed in **Appendix O**, which were analyzed per the selected analytical method. The approved sampling scope of the SI focused on identifying presence or absence of PFOS, PFOA, and PFBS at the AOPIs. SI sampling at locations at or in close proximity of the AOPIs did not delineate the extent of PFOS, PFOA, and PFBS impacts or identify the primary migration pathways for the chemicals.

Results for this PA/SI indicate further study in a remedial investigation is warranted at FTHU in accordance with the guidance provided by the OSD.

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ACRONYMS

%	percent
AFY	acre feet per year
AFFF	aqueous film-forming foam
AOPI	area of potential interest
amsl	above mean sea level
Arcadis	Arcadis U.S., Inc.
Army	United States Army
BAL	blank action level
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
DEB	dedicated equipment background
DoD	Department of Defense
DPW	directorate of public works
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
EPDS	entry point distribution systems
FTHU	Fort Huachuca
GIS	geographic information system
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation
IRP	Installation Restoration Program
LAAF	Libby Army Airfield
LOD	limit of detection
LOQ	limit of quantitation

LRC	Logistics Readiness Center
mg/kg	milligrams per kilogram (parts per million)
ng/L	nanograms per liter (parts per trillion)
OSD	Office of the Secretary of Defense
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of contact
POL	petroleum, oil, and lubricants
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	Regional Screening Level
SDS	Safety Data Sheet
SI	site inspection
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
TGI	technical guidance instruction
TOC	total organic carbon
UAV	Unmanned Aerial Vehicle
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
USFS	United States Forest Service

WWTP	wastewater treatment plant

TABLES

Table 2-1 - Potable Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

Well Registry No.	Well ID	Well Installation Date	Latitude	Longitude	Ground Elevation	Total Casing Depth	Depth to TOS	Depth to BOS	Screen Length	Depth to Water	Pump Type	Pump Capacity	Well Diameter	Well Casing Material
					ft amsl	ft bgs	ft bgs	ft bgs	ft	ft bgs		gpm	inches	
Fort Huachuca Potable Wells														
55-626112	Well 1	1939	-110.30819113000	31.55371595050	4641	823	--	--	--	510.8 - 530.5	Turbine	500	14	Steel
55-626111	Well 2	1940	-110.30773856900	31.55368452180	4641	710	--	--	--	521.0 - 523	Turbine	700	14	Steel
55-626110	Well 3	1942	-110.31022578600	31.56174211640	4619	802	--	--	--	453.2 - 517.0	Turbine	700	18	Steel
55-626109	Well 4	1942	-110.31289078400	31.56750854010	4619	912	--	--	--	488 - 494.2	Turbine	700	18	Steel
55-626108	Well 5	1942	-110.31956234200	31.57381188650	4600	800	--	--	--	468 - 486	Turbine	700	18	Steel
55-626107	Well 6	1958	-110.31569446900	31.56187172510	4645	803	--	--	--	516	Turbine	700	16	Steel
55-626106	Well 7	1976	-110.30831396100	31.59829330310	4475	762	--	--	--	500	Turbine	800	16	Steel
55-626105	Well 8	1971	-110.31071456500	31.60898094100	--	807	--	--	--	500	Turbine	800	16	Steel
Sierra Vista Municipal Wells														
55-505189	505189	5/26/1983	31.59195478130	-110.32847694000	--	800	40.25	240.82	200	427	Turbine	850	12	Steel
55-562352	562352	8/8/1997	31.59376555330	-110.33486518300	--	800	--	--	300	443	Submersible	500	12	Steel

Acronyms:

amsl = above mean sea level
bgs = below ground surface
BOS = bottom of screen
ft = feet
gpm = gallons per minute
ID = identification
PVC = polyvinyl chloride
TOS = top of screen
-- = information not available

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Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	Sample ID	Sample Date	EtFOSAA	MeFOSAA	PFBS
					ng/L	ng/L	ng/L
USEPA, 2017							
Bella Vista City	EPDS001	--	3174099	1/21/2015	--	--	<90
Bella Vista City	EPDS001	--	3280645	7/14/2015	--	--	<90
Bella Vista City	EPDS002	--	3174063	1/21/2015	--	--	<90
Bella Vista City	EPDS002	--	3280236	7/14/2015	--	--	<90
Bella Vista City	EPDS003	--	3174382	1/21/2015	--	--	<90
Bella Vista City	EPDS003	--	3280382	7/14/2015	--	--	<90
Bella Vista City	EPDS005	--	3174432	1/21/2015	--	--	<90
Bella Vista City	EPDS005	--	3280304	7/14/2015	--	--	<90
Bella Vista City	EPDS007	--	3061523	7/10/2014	--	--	<90
Bella Vista City	EPDS007	--	3174478	1/21/2015	--	--	<90
Bella Vista City	EPDS008	--	3174109	1/21/2015	--	--	<90
Bella Vista City	EPDS008	--	3280454	7/14/2015	--	--	<90
Bella Vista City	EPDS009	--	3174399	1/21/2015	--	--	<90
Bella Vista City	EPDS009	--	3280254	7/14/2015	--	--	<90
Bella Vista City	EPDS011	--	3174081	1/21/2015	--	--	<90
Bella Vista City	EPDS011	--	3281556	7/14/2015	--	--	<90
Bella Vista City	EPDS012	--	3061585	7/10/2014	--	--	<90
Bella Vista City	EPDS012	--	3174446	1/21/2015	--	--	<90
Bella Vista City	EPDS014	--	3061572	7/10/2014	--	--	<90
Bella Vista City	EPDS014	--	3174090	1/21/2015	--	--	<90
Bella Vista City	EPDS015	--	3174420	1/21/2015	--	--	<90
Bella Vista City	EPDS015	--	3280223	7/14/2015	--	--	<90
Bella Vista City	EPDS016	--	3061510	7/10/2014	--	--	<90
Bella Vista City	EPDS016	--	3174469	1/21/2015	--	--	<90
Bella Vista City	EPDS018	--	3061559	7/10/2014	--	--	<90
Bella Vista City	EPDS018	--	3174511	1/21/2015	--	--	<90
Bella Vista City	EPDS019	--	3174458	1/21/2015	--	--	<90
Bella Vista City	EPDS019	--	3280353	7/14/2015	--	--	<90
Bella Vista City	EPDS020	--	3061537	7/10/2014	--	--	<90
Bella Vista City	EPDS020	--	3174118	1/21/2015	--	--	<90
Liberty Water Rio Rico	Well 15	Well 15	2982275	2/26/2014	--	--	<90
Liberty Water Rio Rico	Well 15	Well 15	3087086	8/19/2014	--	--	<90
Liberty Water Rio Rico	Well 5	Well 5	2982363	2/26/2014	--	--	<90
Liberty Water Rio Rico	Well 5	Well 5	3087016	8/19/2014	--	--	<90
Liberty Water Rio Rico	Well 52	Well 52	2982207	2/26/2014	--	--	<90
Liberty Water Rio Rico	Well 52	Well 52	3087031	8/19/2014	--	--	<90
Liberty Water Rio Rico	Well 6	Well 6	2982417	2/26/2014	--	--	<90
Liberty Water Rio Rico	Well 6	Well 6	3086991	8/19/2014	--	--	<90
Liberty Water Rio Rico	Well 8	Well 8	2982336	2/26/2014	--	--	<90
Liberty Water Rio Rico	Well 8	Well 8	3087066	8/19/2014	--	--	<90
Liberty Water Rio Rico	Well 86	Well 86	2986344	3/5/2014	--	--	<90
Liberty Water Rio Rico	Well 86	Well 86	3087046	8/19/2014	--	--	<90
Pueblo del Sol Water Co.	Well #2	Well #2	3127546	10/22/2014	--	--	<90
Pueblo del Sol Water Co.	Well #2	Well #2	3225464	4/15/2015	--	--	<90
Pueblo del Sol Water Co.	Well #3	Well #3	3127577	10/22/2014	--	--	<90
Pueblo del Sol Water Co.	Well #3	Well #3	3225398	4/15/2015	--	--	<90
Pueblo del Sol Water Co.	Well #4	Well #4	3127533	10/22/2014	--	--	<90
Pueblo del Sol Water Co.	Well #4	Well #4	3225352	4/15/2015	--	--	<90
Pueblo del Sol Water Co.	Well #5	Well #5	3127555	10/22/2014	--	--	<90
Pueblo del Sol Water Co.	Well #5	Well #5	3225549	4/15/2015	--	--	<90
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	3269639	6/24/2015	--	--	<90
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	3372896	12/9/2015	--	--	<90
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	3269648	6/24/2015	--	--	<90

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFDA	PFDoA	PFHpA	PFHxS	PFHxA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
Bella Vista City	EPDS001	--	--	--	<10	<30	--
Bella Vista City	EPDS001	--	--	--	<10	<30	--
Bella Vista City	EPDS002	--	--	--	<10	<30	--
Bella Vista City	EPDS002	--	--	--	<10	<30	--
Bella Vista City	EPDS003	--	--	--	<10	<30	--
Bella Vista City	EPDS003	--	--	--	<10	<30	--
Bella Vista City	EPDS005	--	--	--	<10	<30	--
Bella Vista City	EPDS005	--	--	--	<10	<30	--
Bella Vista City	EPDS007	--	--	--	<10	<30	--
Bella Vista City	EPDS007	--	--	--	<10	<30	--
Bella Vista City	EPDS008	--	--	--	<10	<30	--
Bella Vista City	EPDS008	--	--	--	<10	<30	--
Bella Vista City	EPDS009	--	--	--	<10	<30	--
Bella Vista City	EPDS009	--	--	--	<10	<30	--
Bella Vista City	EPDS011	--	--	--	<10	<30	--
Bella Vista City	EPDS011	--	--	--	<10	<30	--
Bella Vista City	EPDS012	--	--	--	<10	<30	--
Bella Vista City	EPDS012	--	--	--	<10	<30	--
Bella Vista City	EPDS014	--	--	--	<10	<30	--
Bella Vista City	EPDS014	--	--	--	<10	<30	--
Bella Vista City	EPDS015	--	--	--	<10	<30	--
Bella Vista City	EPDS015	--	--	--	<10	<30	--
Bella Vista City	EPDS016	--	--	--	<10	<30	--
Bella Vista City	EPDS016	--	--	--	<10	<30	--
Bella Vista City	EPDS018	--	--	--	<10	<30	--
Bella Vista City	EPDS018	--	--	--	<10	<30	--
Bella Vista City	EPDS019	--	--	--	<10	<30	--
Bella Vista City	EPDS019	--	--	--	<10	<30	--
Bella Vista City	EPDS020	--	--	--	<10	<30	--
Bella Vista City	EPDS020	--	--	--	<10	<30	--
Liberty Water Rio Rico	Well 15	Well 15	--	--	<10	<30	--
Liberty Water Rio Rico	Well 15	Well 15	--	--	<10	<30	--
Liberty Water Rio Rico	Well 5	Well 5	--	--	<10	<30	--
Liberty Water Rio Rico	Well 5	Well 5	--	--	<10	<30	--
Liberty Water Rio Rico	Well 52	Well 52	--	--	<10	<30	--
Liberty Water Rio Rico	Well 52	Well 52	--	--	<10	<30	--
Liberty Water Rio Rico	Well 6	Well 6	--	--	<10	<30	--
Liberty Water Rio Rico	Well 6	Well 6	--	--	<10	<30	--
Liberty Water Rio Rico	Well 8	Well 8	--	--	<10	<30	--
Liberty Water Rio Rico	Well 8	Well 8	--	--	<10	<30	--
Liberty Water Rio Rico	Well 86	Well 86	--	--	<10	<30	--
Liberty Water Rio Rico	Well 86	Well 86	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #2	Well #2	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #2	Well #2	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #3	Well #3	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #3	Well #3	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #4	Well #4	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #4	Well #4	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #5	Well #5	--	--	<10	<30	--
Pueblo del Sol Water Co.	Well #5	Well #5	--	--	<10	<30	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	--	--	<10	<30	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	--	--	<10	<30	--
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	--	--	<10	<30	--

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFNA	PFOS	PFOA	PFTeDA	PFTrDA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
Bella Vista City	EPDS001	--	<20	<40	<20	--	--
Bella Vista City	EPDS001	--	<20	<40	<20	--	--
Bella Vista City	EPDS002	--	<20	<40	<20	--	--
Bella Vista City	EPDS002	--	<20	<40	<20	--	--
Bella Vista City	EPDS003	--	<20	<40	<20	--	--
Bella Vista City	EPDS003	--	<20	<40	<20	--	--
Bella Vista City	EPDS005	--	<20	<40	<20	--	--
Bella Vista City	EPDS005	--	<20	<40	<20	--	--
Bella Vista City	EPDS007	--	<20	<40	<20	--	--
Bella Vista City	EPDS007	--	<20	<40	<20	--	--
Bella Vista City	EPDS008	--	<20	<40	<20	--	--
Bella Vista City	EPDS008	--	<20	<40	<20	--	--
Bella Vista City	EPDS009	--	<20	<40	<20	--	--
Bella Vista City	EPDS009	--	<20	<40	<20	--	--
Bella Vista City	EPDS011	--	<20	<40	<20	--	--
Bella Vista City	EPDS011	--	<20	<40	<20	--	--
Bella Vista City	EPDS012	--	<20	<40	<20	--	--
Bella Vista City	EPDS012	--	<20	<40	<20	--	--
Bella Vista City	EPDS014	--	<20	<40	<20	--	--
Bella Vista City	EPDS014	--	<20	<40	<20	--	--
Bella Vista City	EPDS015	--	<20	<40	<20	--	--
Bella Vista City	EPDS015	--	<20	<40	<20	--	--
Bella Vista City	EPDS016	--	<20	<40	<20	--	--
Bella Vista City	EPDS018	--	<20	<40	<20	--	--
Bella Vista City	EPDS018	--	<20	<40	<20	--	--
Bella Vista City	EPDS019	--	<20	<40	<20	--	--
Bella Vista City	EPDS019	--	<20	<40	<20	--	--
Bella Vista City	EPDS020	--	<20	<40	<20	--	--
Bella Vista City	EPDS020	--	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 15	Well 15	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 15	Well 15	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 5	Well 5	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 5	Well 5	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 52	Well 52	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 52	Well 52	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 6	Well 6	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 6	Well 6	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 8	Well 8	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 8	Well 8	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 86	Well 86	<20	<40	<20	--	--
Liberty Water Rio Rico	Well 86	Well 86	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #2	Well #2	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #2	Well #2	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #3	Well #3	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #3	Well #3	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #4	Well #4	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #4	Well #4	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #5	Well #5	<20	<40	<20	--	--
Pueblo del Sol Water Co.	Well #5	Well #5	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<20	<40	<20	--	--

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFUdA	HFPODA	9Cl-PF3ONS	11Cl-PF3OUdS	DONA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
Bella Vista City	EPDS001	--	--	--	--	--	--
Bella Vista City	EPDS001	--	--	--	--	--	--
Bella Vista City	EPDS002	--	--	--	--	--	--
Bella Vista City	EPDS002	--	--	--	--	--	--
Bella Vista City	EPDS003	--	--	--	--	--	--
Bella Vista City	EPDS003	--	--	--	--	--	--
Bella Vista City	EPDS005	--	--	--	--	--	--
Bella Vista City	EPDS005	--	--	--	--	--	--
Bella Vista City	EPDS007	--	--	--	--	--	--
Bella Vista City	EPDS007	--	--	--	--	--	--
Bella Vista City	EPDS008	--	--	--	--	--	--
Bella Vista City	EPDS008	--	--	--	--	--	--
Bella Vista City	EPDS009	--	--	--	--	--	--
Bella Vista City	EPDS009	--	--	--	--	--	--
Bella Vista City	EPDS011	--	--	--	--	--	--
Bella Vista City	EPDS011	--	--	--	--	--	--
Bella Vista City	EPDS012	--	--	--	--	--	--
Bella Vista City	EPDS012	--	--	--	--	--	--
Bella Vista City	EPDS014	--	--	--	--	--	--
Bella Vista City	EPDS014	--	--	--	--	--	--
Bella Vista City	EPDS015	--	--	--	--	--	--
Bella Vista City	EPDS015	--	--	--	--	--	--
Bella Vista City	EPDS016	--	--	--	--	--	--
Bella Vista City	EPDS016	--	--	--	--	--	--
Bella Vista City	EPDS018	--	--	--	--	--	--
Bella Vista City	EPDS018	--	--	--	--	--	--
Bella Vista City	EPDS019	--	--	--	--	--	--
Bella Vista City	EPDS019	--	--	--	--	--	--
Bella Vista City	EPDS020	--	--	--	--	--	--
Bella Vista City	EPDS020	--	--	--	--	--	--
Liberty Water Rio Rico	Well 15	Well 15	--	--	--	--	--
Liberty Water Rio Rico	Well 15	Well 15	--	--	--	--	--
Liberty Water Rio Rico	Well 5	Well 5	--	--	--	--	--
Liberty Water Rio Rico	Well 5	Well 5	--	--	--	--	--
Liberty Water Rio Rico	Well 52	Well 52	--	--	--	--	--
Liberty Water Rio Rico	Well 52	Well 52	--	--	--	--	--
Liberty Water Rio Rico	Well 6	Well 6	--	--	--	--	--
Liberty Water Rio Rico	Well 6	Well 6	--	--	--	--	--
Liberty Water Rio Rico	Well 8	Well 8	--	--	--	--	--
Liberty Water Rio Rico	Well 8	Well 8	--	--	--	--	--
Liberty Water Rio Rico	Well 86	Well 86	--	--	--	--	--
Liberty Water Rio Rico	Well 86	Well 86	--	--	--	--	--
Pueblo del Sol Water Co.	Well #2	Well #2	--	--	--	--	--
Pueblo del Sol Water Co.	Well #2	Well #2	--	--	--	--	--
Pueblo del Sol Water Co.	Well #3	Well #3	--	--	--	--	--
Pueblo del Sol Water Co.	Well #3	Well #3	--	--	--	--	--
Pueblo del Sol Water Co.	Well #4	Well #4	--	--	--	--	--
Pueblo del Sol Water Co.	Well #4	Well #4	--	--	--	--	--
Pueblo del Sol Water Co.	Well #5	Well #5	--	--	--	--	--
Pueblo del Sol Water Co.	Well #5	Well #5	--	--	--	--	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	--	--	--	--	--
US Army Fort Huachuca	EPDS001	Well 1 & Well 2	--	--	--	--	--
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	--	--	--	--	--

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	Sample ID	Sample Date	EtFOSAA	MeFOSAA	PFBS
					ng/L	ng/L	ng/L
USEPA, 2017							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	3372877	12/9/2015	--	--	<90
US Army Fort Huachuca	EPDS003	Well 3	3032396	5/21/2014	--	--	<90
US Army Fort Huachuca	EPDS003	Well 3	3145698	11/25/2014	--	--	<90
US Army Fort Huachuca	EPDS004	Well 4	3032585	5/21/2014	--	--	<90
US Army Fort Huachuca	EPDS004	Well 4	3145716	11/25/2014	--	--	<90
US Army Fort Huachuca	EPDS005	Well 5	3032598	5/21/2014	--	--	<90
US Army Fort Huachuca	EPDS005	Well 5	3357228	11/10/2015	--	--	<90
US Army Fort Huachuca	EPDS006	Well 6	3032406	5/21/2014	--	--	<90
US Army Fort Huachuca	EPDS006	Well 6	3145689	11/25/2014	--	--	<90
US Army Public Health Center, 2018							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	EPDS002	9/4/2018	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS003	Well 3	EPDS003	9/4/2018	<1.8	<1.8	**2.2**
US Army Fort Huachuca	EPDS004	Well 4	EPDS004	9/4/2018	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	EPDS005	9/4/2018	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS006	Well 6	EPDS006	9/4/2018	<1.9	<1.9	<1.9
US Army Public Health Center, 2020							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	EPDS-002	8/31/2020	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS004	Well 4	EPDS-004	8/31/2020	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	EPDS-005	8/31/2020	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS006	Well 6	EPDS-006	8/31/2020	<1.9	<1.9	<1.9

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFDA	PFDoA	PFHpA	PFHxS	PFHxA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	--	--	<10	<30	--
US Army Fort Huachuca	EPDS003	Well 3	--	--	<10	<30	--
US Army Fort Huachuca	EPDS003	Well 3	--	--	<10	<30	--
US Army Fort Huachuca	EPDS004	Well 4	--	--	<10	<30	--
US Army Fort Huachuca	EPDS004	Well 4	--	--	<10	<30	--
US Army Fort Huachuca	EPDS005	Well 5	--	--	<10	<30	--
US Army Fort Huachuca	EPDS005	Well 5	--	--	<10	<30	--
US Army Fort Huachuca	EPDS006	Well 6	--	--	<10	<30	--
US Army Fort Huachuca	EPDS006	Well 6	--	--	<10	<30	--
US Army Public Health Center, 2018							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS003	Well 3	<1.8	<1.8	**3.7**	**15**	**5.6**
US Army Fort Huachuca	EPDS004	Well 4	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS006	Well 6	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Public Health Center, 2020							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.9	<1.9	**2.4**	**9.6**	**4.9**
US Army Fort Huachuca	EPDS004	Well 4	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS006	Well 6	<1.9	<1.9	<1.9	<1.9	<1.9

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFNA	PFOS	PFOA	PFTeDA	PFTrDA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS003	Well 3	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS003	Well 3	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS004	Well 4	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS004	Well 4	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS005	Well 5	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS005	Well 5	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS006	Well 6	<20	<40	<20	--	--
US Army Fort Huachuca	EPDS006	Well 6	<20	<40	<20	--	--
US Army Public Health Center, 2018							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS003	Well 3	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS004	Well 4	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS006	Well 6	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Public Health Center, 2020							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.9	**5.7**	**9.9**	<1.9	<1.9
US Army Fort Huachuca	EPDS004	Well 4	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS006	Well 6	<1.9	<1.9	<1.9	<1.9	<1.9

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Public Water Source	Sample Location	Associated Well ID	PFUdA	HFPODA	9Cl-PF3ONS	11Cl-PF3OUdS	DONA
			ng/L	ng/L	ng/L	ng/L	ng/L
USEPA, 2017							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	--	--	--	--	--
US Army Fort Huachuca	EPDS003	Well 3	--	--	--	--	--
US Army Fort Huachuca	EPDS003	Well 3	--	--	--	--	--
US Army Fort Huachuca	EPDS004	Well 4	--	--	--	--	--
US Army Fort Huachuca	EPDS004	Well 4	--	--	--	--	--
US Army Fort Huachuca	EPDS005	Well 5	--	--	--	--	--
US Army Fort Huachuca	EPDS005	Well 5	--	--	--	--	--
US Army Fort Huachuca	EPDS006	Well 6	--	--	--	--	--
US Army Fort Huachuca	EPDS006	Well 6	--	--	--	--	--
US Army Public Health Center, 2018							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.8	--	--	--	--
US Army Fort Huachuca	EPDS003	Well 3	<1.8	--	--	--	--
US Army Fort Huachuca	EPDS004	Well 4	<1.8	--	--	--	--
US Army Fort Huachuca	EPDS005	Well 5	<1.8	--	--	--	--
US Army Fort Huachuca	EPDS006	Well 6	<1.9	--	--	--	--
US Army Public Health Center, 2020							
US Army Fort Huachuca	EPDS002	Well 7 & Well 8	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS004	Well 4	<1.8	<1.8	<1.8	<1.8	<1.8
US Army Fort Huachuca	EPDS005	Well 5	<1.9	<1.9	<1.9	<1.9	<1.9
US Army Fort Huachuca	EPDS006	Well 6	<1.9	<1.9	<1.9	<1.9	<1.9

Table 2-2
Historical PFOS and PFOA Analytical Results
USAEC PFAS Preliminary Assessments/Site Inspections
Fort Huachuca, Arizona

Acronyms:
-- = Information not available
< = Not detected above the listed minimum reportable level
DONA = Diphenyl oxazolenonanoic acid
EtFOSAA = N-Ethyl perfluorooctane sulfonamidoacetic acid
HFPODA = Hexafluoropropylene oxide-dimer acid
ID = identification
MeFOSAA = N-Methylperfluoroocatane sulfonamidoacetic acid
ng/L = nanograms per liter (as reported by the laboratory)
PFBS = Perfluorobutane sulfonic acid
PFDA = Perfluorodecanoic acid
PFDoA = Perfluorododecanoic acid
PFHpA = Perfluoroheptanoic acid
PFHxS = Perfluorohexane sulfonic acid
PFHxA = Perfluorohexanoic acid
PFNA = Perfluorononanoic acid
PFOA = Perfluorooctanoic acid
PFOS = Perfluorooctane sulfonate
PFTeDA = Perfluorotetradecanoic acid
PFTrDA = Perfluorotridecanoic acid
PFUdA = Perfluoroundecanoic acid
USEPA = United States Environmental Protection Agency
9Cl-PF3ONS = 9-Chlorohexadecafluoro-3-oxanone-1-sulfonic acid
11Cl-PF3OUdS = 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid

Notes:
1. All samples were collected post-chlorination treatment
2. All samples reported from the UCMR 3 database (USEPA 2017) were reported in micrograms per liter, and converted to nanograms per liter for presentation on this table.
3. All samples were analyzed under USEPA Method 537

References:
USEPA. 2017. Occurrence Data for the Unregulated Contaminant Monitoring Rule: UCMR 3 (2013-2015) Occurrence Data. Available online at: https://www.epa.gov/monitoring-unregulated-drinking-water-contaminants/occurrence-data-unregulated-contaminant#3. Retrieved: November 15, 2021.

2018. US Army Public Health Center. Memorandum for Drinking Water Quality Branch, Subject: Laboratory Sciences (LAB) Final Analytical Report. Project Site: Ft. Huachuca_S.0056051_PFAS IMCOM FY18. Report Serial #: H18-01203 - FINAL REPORT. November 14.

2020. US Army Public Health Center. Memorandum for Drinking Water Quality Branch, Subject: Laboratory Sciences (LAB) Final Analytical Report. Project Site: S.0071536_IMCOM PFAS in DW-FY20_Fort Huachuca. Report Serial #: H20-02029 - FINAL REPORT. September 28.

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

Well ID	Well Installation Date	Latitude	Longitude	Total Depth	Depth to Water
				ft bgs	ft bgs
Fort Huachuca Monitoring Wells					
POC-1	7/27/2000	-110.31221900000	31.58129800000	479	401 - 413.7
POC-2	7/26/2000	-110.31318000000	31.58775700000	460	355 - 371.6

Acronyms:

bgs = below ground surface
ft = feet
ID = identification

References:

U.S. Army. 2020. Email from Chris Higgins (U.S. Army) to Layne Young (Arcadis) re: [Non-DoD Source] Army PFAS PA/SI, Fort Huachuca, SI Kick Off Call Meeting Minutes, W912DR-18-D-0004/W912DR18F0685

Table 7-1 - Groundwater PFOS, PFOA and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

				Analyte	PFBS (ng/L)		PFOA (ng/L)		PFOS (ng/L)	
				OSD Tapwater Risk Screening Level	600		40		40	
Associated AOPI	Location	Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
East Range Recharge Basins	FTHU-MW-POC-1	FTHU-FD-07-GW-120820 / FTHU-MW-POC1-120820	12/08/2020	FD	**5.8**	--	3.6	U	3.6	U
		FTHU-MW-POC1-120820	12/08/2020	N	**6.2**	--	3.5	U	3.5	U
		FTHU-MW-POC2-DEB-120820	12/08/2020	DEB	3.7	U	3.7	U	3.7	U
	FTHU-MW-POC-2	FTHU-MW-POC2-120820	12/08/2020	N	**14**	--	**32**	--	**92**	--

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for the residential tapwater exposure scenario (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15.).
3. Gray shaded value indicates the detected concentration is greater than or equal to the Office of the Secretary of Defense (OSD) risk screening level for the residential exposure scenario.

Acronyms/Abbreviations:
-- = not applicable
AOPI = Area of Potential Interest
DEB = dedicated equipment blank
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

Table 7-2 - Soil PFOS, PFOA and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

					Analyte		PFBS (mg/kg)		PFOA (mg/kg)		PFOS (mg/kg)	
					OSD Industrial/Commerical Risk Screening Level		25		1.6		1.6	
					OSD Residential Risk Screening Level		1.9		0.13		0.13	
Associated AOPI	Location	Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual		
Fire Station #1	FTHU-FS1-01	FTHU-FS1-01-SO-120920	12/09/2020	N	0.00094	U	0.00094	U	**0.0065**			
	FTHU-FS1-02	FTHU-FS1-02-SO-120920	12/09/2020	N	0.00090	U	0.00090	U	**0.062**			
		FTHU-FD-01-SO-120920 / FTHU-FS1-02-SO-120920	12/09/2020	FD	0.00090	U	0.00090	U	**0.051**			
	FTHU-FS1-03	FTHU-FS1-03-SO-120920	12/09/2020	N	0.00092	U	0.00092	U	**0.0045**			
	FTHU-FS1-04	FTHU-FS1-04-SO-120920	12/09/2020	N	0.00089	U	0.00089	U	**0.0020**			
	FTHU-FS1-05	FTHU-FS1-05-SO-120920	12/09/2020	N	0.00092	U	0.00092	U	**0.0023**			
	FTHU-FS1-06	FTHU-FS1-06-SO-120920	12/09/2020	N	0.0010	U	**0.00094**	J	**0.071**			
	FTHU-FS1-07	FTHU-FS1-07-SO-120920	12/09/2020	N	0.00090	U	0.00090	U	**0.0010**			
Traffic Circle Car Fire	FTHU-TCCF-01	FTHU-TCCF-01-SO-121020	12/10/2020	N	0.0010	U	0.0010	U	**0.0047**			
	FTHU-TCCF-02	FTHU-TCCF-02-SO-121020	12/10/2020	N	0.00087	U	0.00087	U	**0.00063**	J		
	FTHU-TCCF-03	FTHU-TCCF-03-SO-120920	12/09/2020	N	0.00090	U	0.00090	U	**0.0010**			
	FTHU-TCCF-04	FTHU-TCCF-04-SO-121020	12/10/2020	N	0.00092	U	0.00092	U	**0.0056**			
	FTHU-TCCF-05	FTHU-TCCF-05-SO-121020	12/10/2020	N	0.0010	U	0.00098	U	**0.0012**			
	FTHU-TCCF-06	FTHU-TCCF-06-SO-120920	12/09/2020	N	0.0010	U	0.0010	U	**0.024**			
	FTHU-TCCF-07	FTHU-TCCF-07-SO-120920	12/09/2020	N	0.0010	U	0.0010	U	0.0010	U		
Beehive on School Fence	FTHU-BSF-01	FTHU-BSF-01-SO-121420	12/14/2020	N	0.00090	U	**0.0023**		**0.0090**			
	FTHU-BSF-02	FTHU-BSF-02-SO-121420	12/14/2020	N	**0.0017**		**0.025**		**0.21**	J		
	FTHU-BSF-03	FTHU-BSF-03-SO-121420	12/14/2020	N	0.00086	U	0.00086	U	0.00086	U		
Former Fire Station #2	FTHU-FFS2-01	FTHU-FFS2-01-SO-121620	12/16/2020	N	0.0010	U	**0.0010**		**0.085**			
	FTHU-FFS2-02	FTHU-FFS2-02-SO-121620	12/16/2020	N	0.00091	U	**0.00095**		**0.0015**			
		FTHU-FD-02-SO-121620 / FTHU-FFS2-02-SO-121620	12/16/2020	FD	0.00088	U	**0.00095**		**0.0014**			
	FTHU-FFS2-03	FTHU-FFS2-03-SO-121620	12/16/2020	N	**0.0042**		**0.025**		**0.098**			
	FTHU-FFS2-04	FTHU-FFS2-04-SO-121620	12/16/2020	N	0.00094	U	**0.0017**		**0.27**	J		
	FTHU-FFS2-05	FTHU-FFS2-05-SO-121620	12/16/2020	N	**0.00056**	J	**0.0055**		**0.25**	J		
	FTHU-FFS2-06	FTHU-FFS2-06-SO-121620	12/16/2020	N	0.00088	U	**0.0017**		**0.037**			
	FTHU-FFS2-07	FTHU-FFS2-07-SO-121620	12/16/2020	N	0.00099	U	**0.0016**		**0.11**			
LRC Fire Truck Maintenance	FTHU-LRC-01	FTHU-LRC-01-SO-121020	12/10/2020	N	0.0010	U	0.0010	U	**0.00083**	J		
	FTHU-LRC-02	FTHU-LRC-02-SO-121120	12/11/2020	N	0.0012	U	0.0012	U	**0.0034**			
	FTHU-LRC-03	FTHU-LRC-03-SO-121020	12/10/2020	N	0.0010	U	0.0010	U	**0.012**			
	FTHU-LRC-04	FTHU-LRC-04-SO-121020	12/10/2020	N	0.0011	U	0.0011	U	**0.0040**			
	FTHU-LRC-05	FTHU-LRC-05-SO-121020	12/10/2020	N	0.0011	U	0.0011	U	**0.0088**			
	FTHU-LRC-06	FTHU-LRC-06-SO-121020	12/10/2020	N	0.0011	U	**0.00076**	J	**0.027**			
	FTHU-LRC-07	FTHU-LRC-07-SO-121020	12/10/2020	N	**0.0014**		**0.0010**		**0.079**			
	FTHU-LRC-08	FTHU-LRC-08-SO-121020	12/10/2020	N	0.00098	U	**0.00074**	J	0.00098	U		

Table 7-2 - Soil PFOS, PFOA and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

					Analyte		PFBS (mg/kg)		PFOA (mg/kg)		PFOS (mg/kg)	
					OSD Industrial/Commerical Risk Screening Level		25		1.6		1.6	
					OSD Residential Risk Screening Level		1.9		0.13		0.13	
Associated AOPI	Location	Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual		
Defuel Pad	FTHU-DF-01	FTHU-DF-01-SO-121820	12/18/2020	N	**0.0066**	J-	**0.015**		**0.11**			
	FTHU-DF-02	FTHU-DF-02-SO-121820	12/18/2020	N	0.00095	U	**0.00076**	J	**0.010**			
	FTHU-DF-03	FTHU-DF-03-SO-121820	12/18/2020	N	**0.00057**	J	**0.0016**		**0.12**			
	FTHU-DF-04	FTHU-DF-04-SO-121820	12/18/2020	N	0.00099	U	**0.00087**	J	**0.093**			
Former Firefighting Training Area	FTHU-FFTA-01	FTHU-FFTA-01-SO-122120	12/21/2020	N	0.0010	UJ	0.0010	UJ	**0.00061**	J		
		FTHU-FD-03-SO-122120 / FTHU-FFTA-01-SO-122120	12/21/2020	FD	0.0010	UJ	0.0010	UJ	0.0010	UJ		
	FTHU-FFTA-02	FTHU-FFTA-02-SO-122120	12/21/2020	N	0.00099	UJ	0.00099	UJ	**0.0011**	J		
	FTHU-FFTA-03	FTHU-FFTA-03-SO-122120	12/21/2020	N	0.0010	UJ	0.0010	UJ	**0.00070**	J		
	FTHU-FFTA-04	FTHU-FFTA-04-SO-122120	12/21/2020	N	0.0010	UJ	0.0010	UJ	**0.0044**	J		
	FTHU-FFTA-05	FTHU-FFTA-05-SO-122120	12/21/2020	N	0.0010	UJ	0.0010	UJ	0.0010	UJ		
	FTHU-FFTA-06	FTHU-FFTA-06-SO-122120	12/21/2020	N	**0.00064**	J	**0.00081**	J	**0.031**	J		
	FTHU-FFTA-07	FTHU-FFTA-07-SO-122120	12/21/2020	N	**0.0015**	J	**0.0093**	J	**0.058**	J		
	FTHU-FFTA-08	FTHU-FFTA-08-SO-122120	12/21/2020	N	**0.00089**	J	0.00096	UJ	**0.0079**	J		
	FTHU-FFTA-09	FTHU-FFTA-09-SO-122120	12/21/2020	N	**0.00056**	J	**0.0067**	J	**0.70**	J		
	FTHU-FFTA-10	FTHU-FFTA-10-SO-122120	12/21/2020	N	0.00091	UJ	**0.00074**	J	**0.10**	J		
	FTHU-FFTA-11	FTHU-FFTA-11-SO-122220	12/22/2020	N	0.0010	UJ	**0.0014**	J	**0.019**	J		
	FTHU-FFTA-12	FTHU-FFTA-12-SO-122220	12/22/2020	N	**0.010**	J	**0.018**	J	**0.14**	J		
Current Firefighting Training Area	FTHU-CFTA-01	FTHU-CFTA-01-SO-121720	12/17/2020	N	0.00088	U	0.00088	U	**0.0067**			
	FTHU-CFTA-02	FTHU-CFTA-02-SO-121820	12/18/2020	N	0.0010	U	0.0010	U	**0.0017**			
	FTHU-CFTA-03	FTHU-CFTA-03-SO-121720	12/17/2020	N	0.0011	U	**0.0010**	J	**0.012**			
	FTHU-CFTA-04	FTHU-CFTA-04-SO-121720	12/17/2020	N	0.0010	U	**0.0023**		**0.016**			
	FTHU-CFTA-05	FTHU-CFTA-05-SO-121820	12/18/2020	N	**0.00053**	J	**0.0057**		**0.0051**			
	FTHU-CFTA-06	FTHU-CFTA-06-SO-121820	12/18/2020	N	0.00087	U	0.00087	U	**0.0027**			
Fire Station #3	FTHU-FS3-01	FTHU-FS3-01-SO-121720	12/17/2020	N	**0.00070**	J	**0.0029**		**0.073**			
		FTHU-FD-04-SO-121720 / FTHU-FS3-01-SO-121720	12/17/2020	FD	**0.00056**	J	**0.0028**		**0.063**			
	FTHU-FS3-02	FTHU-FS3-02-SO-121720	12/17/2020	N	**0.0014**		**0.012**		**1.2**	J		
	FTHU-FS3-03	FTHU-FS3-03-SO-121720	12/17/2020	N	0.0009	U	0.00090	U	**0.010**			
Hangar 5	FTHU-H5-01	FTHU-H5-01-SO-122220	12/22/2020	N	0.00098	UJ	**0.00098**	J	**0.0080**	J		
	FTHU-H5-02	FTHU-H5-02-SO-122220	12/22/2020	N	0.0011	UJ	0.0011	UJ	**0.0023**	J		
	FTHU-H5-03	FTHU-H5-03-SO-122220	12/22/2020	N	0.0009	UJ	0.00090	UJ	**0.00090**	J		
	FTHU-H5-04	FTHU-H5-04-SO-122220	12/22/2020	N	0.00094	UJ	0.00094	UJ	**0.00073**	J		
	FTHU-H5-05	FTHU-H5-05-SO-122220	12/22/2020	N	0.0011	UJ	0.0011	UJ	**0.0011**	J		
	FTHU-H5-06	FTHU-H5-06-SO-122220	12/22/2020	N	0.00090	UJ	0.00090	UJ	0.00090	UJ		
	FTHU-H5-07	FTHU-H5-07-SO-122220	12/22/2020	N	0.00087	UJ	0.00087	UJ	0.00087	UJ		

Table 7-2 - Soil PFOS, PFOA and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

					Analyte	PFBS (mg/kg)		PFOA (mg/kg)		PFOS (mg/kg)	
					OSD Industrial/Commerical Risk Screening Level	25		1.6		1.6	
					OSD Residential Risk Screening Level	1.9		0.13		0.13	
Associated AOPI	**Location**	**Sample ID**	**Sample Date**	**Sample Type**		**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
South Ramp Taxiway and Drainage Basin	FTHU-SRT-01	FTHU-SRT-01-SO-121720	12/17/2020	N		0.0010	U	**0.00070**	J	**0.016**	
	FTHU-SRT-02	FTHU-SRT-02-SO-121720	12/17/2020	N		0.00094	U	**0.0034**		**0.013**	
	FTHU-SRT-03	FTHU-SRT-03-SO-121720	12/17/2020	N		0.0010	U	0.0010	U	**0.0016**	
	FTHU-SRT-04	FTHU-SRT-04-SO-121720	12/17/2020	N		0.0010	U	0.0010	U	**0.0073**	
	FTHU-SRT-05	FTHU-SRT-05-SO-121720	12/17/2020	N		0.00092	U	0.00092	U	**0.0049**	
	FTHU-SRT-06	FTHU-SRT-06-SO-121720	12/17/2020	N		0.00091	U	**0.0019**		**0.17**	
Hangar 6	FTHU-H6-01	FTHU-H6-01-SO-121520	12/15/2020	N		0.00098	U	0.00098	U	0.00098	U
WWTP #1	FTHU-WWTP1-01	FTHU-WWTP1-01-SO-120720	12/07/2020	N		0.00085	U	0.00085	U	**0.0064**	
	FTHU-WWTP1-02	FTHU-WWTP1-02-SO-120720	12/07/2020	N		0.0010	U	0.0010	U	0.0010	U
	FTHU-WWTP1-03	FTHU-WWTP1-03-SO-120720	12/07/2020	N		0.00093	U	**0.0019**		**0.0069**	
	FTHU-WWTP1-04	FTHU-WWTP1-04-SO-120720	12/07/2020	N		0.00091	U	**0.0027**		**0.031**	
	FTHU-WWTP1-05	FTHU-WWTP1-05-SO-120720	12/07/2020	N		0.0010	U	**0.0070**		**0.016**	
	FTHU-WWTP1-06	FTHU-WWTP1-06-SO-120720	12/07/2020	N		0.00091	U	**0.0040**	J+	**0.0071**	J-
WWTP #2	FTHU-WWTP2-01	FTHU-WWTP2-01-SO-121420	12/14/2020	N		0.0010	U	0.0010	U	0.0010	U
		FTHU-FD-05-SO-121420 / FTHU-WWTP2-01-SO-121420	12/14/2020	FD		0.00096	U	0.00096	U	0.00096	U
	FTHU-WWTP2-02	FTHU-WWTP2-02-SO-121420	12/14/2020	N		0.0010	U	0.0010	U	0.0010	U
	FTHU-WWTP2-03	FTHU-WWTP2-03-SO-121420	12/14/2020	N		0.00092	U	**0.0036**		**0.0034**	
	FTHU-WWTP2-04	FTHU-WWTP2-04-SO-121420	12/14/2020	N		0.00090	U	**0.00070**	J	**0.014**	
	FTHU-WWTP2-05	FTHU-WWTP2-05-SO-121420	12/14/2020	N		0.0011	U	**0.00060**	J	**0.0053**	
	FTHU-WWTP2-06	FTHU-WWTP2-06-SO-121420	12/14/2020	N		0.0010	U	0.0010	U	**0.0091**	
Mountain View Golf Course	FTHU-MVGC-01	FTHU-MVGC-01-SO-121620	12/16/2020	N		0.00091	U	**0.00050**	J	**0.0066**	
	FTHU-MVGC-02	FTHU-MVGC-02-SO-121620	12/16/2020	N		0.00098	U	**0.00082**	J	**0.015**	
	FTHU-MVGC-03	FTHU-MVGC-03-SO-121620	12/16/2020	N		0.0011	U	**0.0012**		**0.016**	
	FTHU-MVGC-04	FTHU-MVGC-04-SO-121620	12/16/2020	N		0.0010	U	0.0010	U	**0.0037**	
	FTHU-MVGC-05	FTHU-MVGC-05-SO-121620	12/16/2020	N		0.00091	U	0.00091	U	**0.0070**	
Outdoor Sports Complex	FTHU-OSC-01	FTHU-OSC-01-SO-121520	12/15/2020	N		0.00088	U	0.00088	U	**0.0012**	
	FTHU-OSC-02	FTHU-OSC-02-SO-121520	12/15/2020	N		0.00098	U	0.00098	U	**0.00077**	J
	FTHU-OSC-03	FTHU-OSC-03-SO-121520	12/15/2020	N		0.00090	U	0.00090	U	**0.00056**	J
Prosser Village Barracks Landscaping	FTHU-PVBL-01	FTHU-PVBL-01-SO-121520	12/15/2020	N		0.0011	U	0.0011	U	0.0011	U
	FTHU-PVBL-02	FTHU-PVBL-02-SO-121520	12/15/2020	N		0.00092	U	0.00092	U	0.00092	U
	FTHU-PVBL-03	FTHU-PVBL-03-SO-121520	12/15/2020	N		0.0010	U	0.0010	U	**0.0011**	
	FTHU-PVBL-04	FTHU-PVBL-04-SO-121520	12/15/2020	N		0.00088	U	0.00088	U	**0.00063**	J
	FTHU-PVBL-05	FTHU-PVBL-05-SO-121520	12/15/2020	N		0.00099	U	0.00099	U	0.00099	U

Table 7-2 - Soil PFOS, PFOA and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Huachuca, Arizona

				Analyte	PFBS (mg/kg)		PFOA (mg/kg)		PFOS (mg/kg)	
				OSD Industrial/Commerical Risk Screening Level	25		1.6		1.6	
				OSD Residential Risk Screening Level	1.9		0.13		0.13	
Associated AOPI	Location	Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
East Range Recharge Basins	FTHU-ERB-01	FTHU-ERB-01-SO-120820	12/08/2020	N	0.00098	U	0.00098	U	**0.0020**	
		FTHU-FD-06-SO-120820 / FTHU-ERB-01-SO-120820	12/08/2020	FD	0.00090	U	0.00090	U	**0.0028**	
	FTHU-ERB-02	FTHU-ERB-02-SO-120820	12/07/2020	N	0.0012	U	0.0012	U	0.0012	U
	FTHU-ERB-04	FTHU-ERB-04-SO-120820	12/08/2020	N	0.00096	U	0.00096	U	**0.0011**	
	FTHU-ERB-05	FTHU-ERB-05-SO-120820	12/08/2020	N	0.00086	U	0.00086	U	**0.0007**	J
	FTHU-ERB-06	FTHU-ERB-06-SO-120820	12/08/2020	N	0.00096	U	0.00096	U	0.00096	U
	FTHU-ERB-07	FTHU-ERB-07-SO-120820	12/08/2020	N	0.00089	U	**0.00083**	J	**0.010**	
UAV Black Tower Building 11683	FTHU-UAVBT-01	FTHU-UAVBT-01-SO-121120	12/11/2020	N	0.00087	U	**0.0012**		0.00087	U
	FTHU-UAVBT-02	FTHU-UAVBT-02-SO-121120	12/11/2020	N	0.00093	U	0.00093	U	**0.068**	
	FTHU-UAVBT-03	FTHU-UAVBT-03-SO-121120	12/11/2020	N	0.0011	U	0.0011	U	0.0011	U
	FTHU-UAVBT-04	FTHU-UAVBT-04-SO-121120	12/11/2020	N	0.0010	U	0.0010	U	0.0010	U
	FTHU-UAVBT-05	FTHU-UAVBT-05-SO-121120	12/11/2020	N	0.0010	U	0.0010	U	0.0010	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the Office of the Secretary of Defense (OSD) risk screening levels for the residential and industrial/commercial receptor scenarios (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15.).
3. Gray shaded value indicates the detected concentration is greater than or equal to the Office of the Secretary of Defense (OSD) risk screening level for the residential exposure scenario.

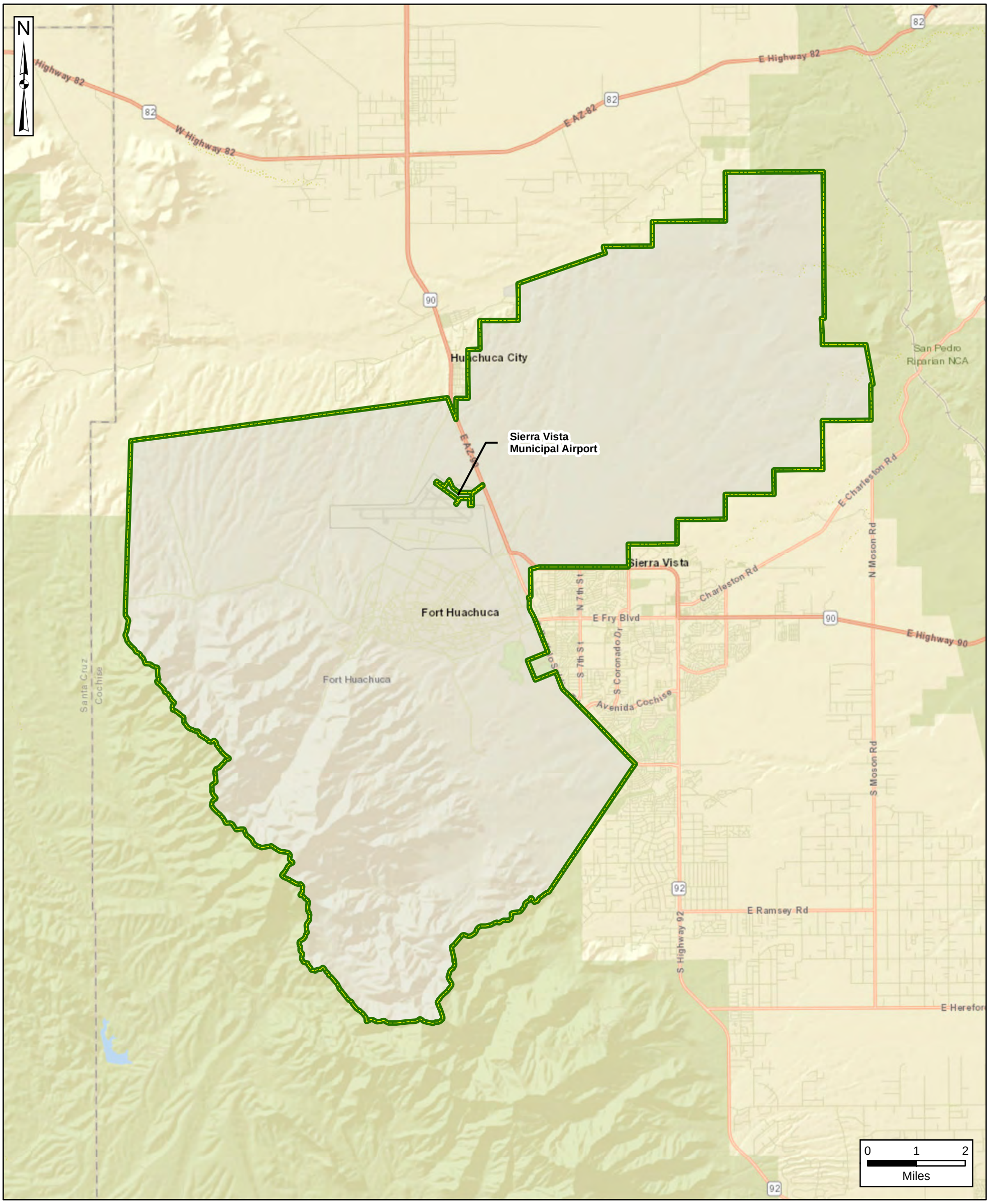
Acronyms/Abbreviations:
AOPI = area of potential interest
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
J+	The result is an estimated quantity; the result may be biased high.
J-	The result is an estimated quantity; the result may be biased low.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).
UJ	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and
J	Diluted PFAS sample result within calibration range. Refortification of extracted internal standards negated isotope dilution. Result is an estimate.

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 2-1
Site Location



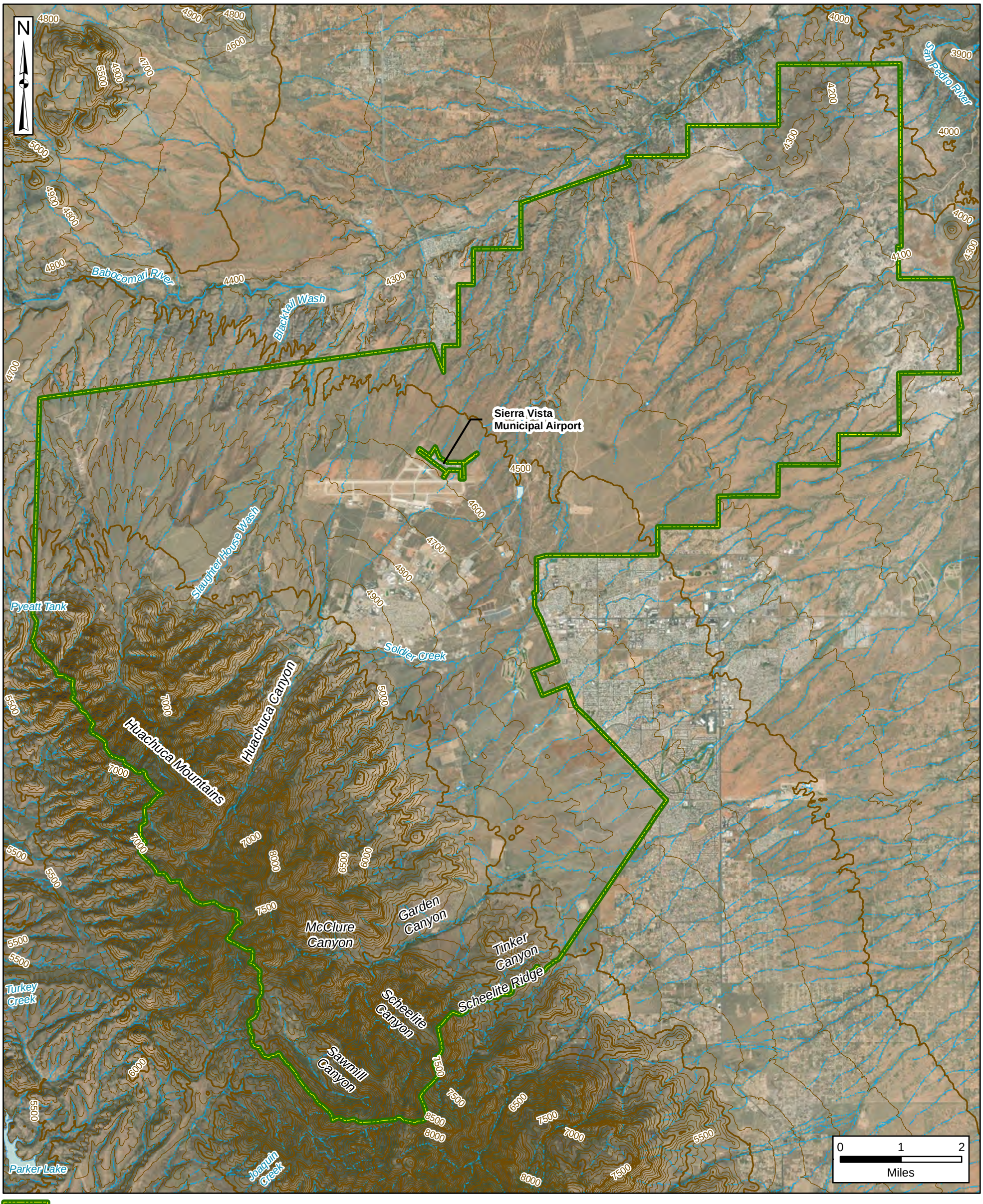
Installation Boundary

Data Sources:
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 2-2
Topographic Map



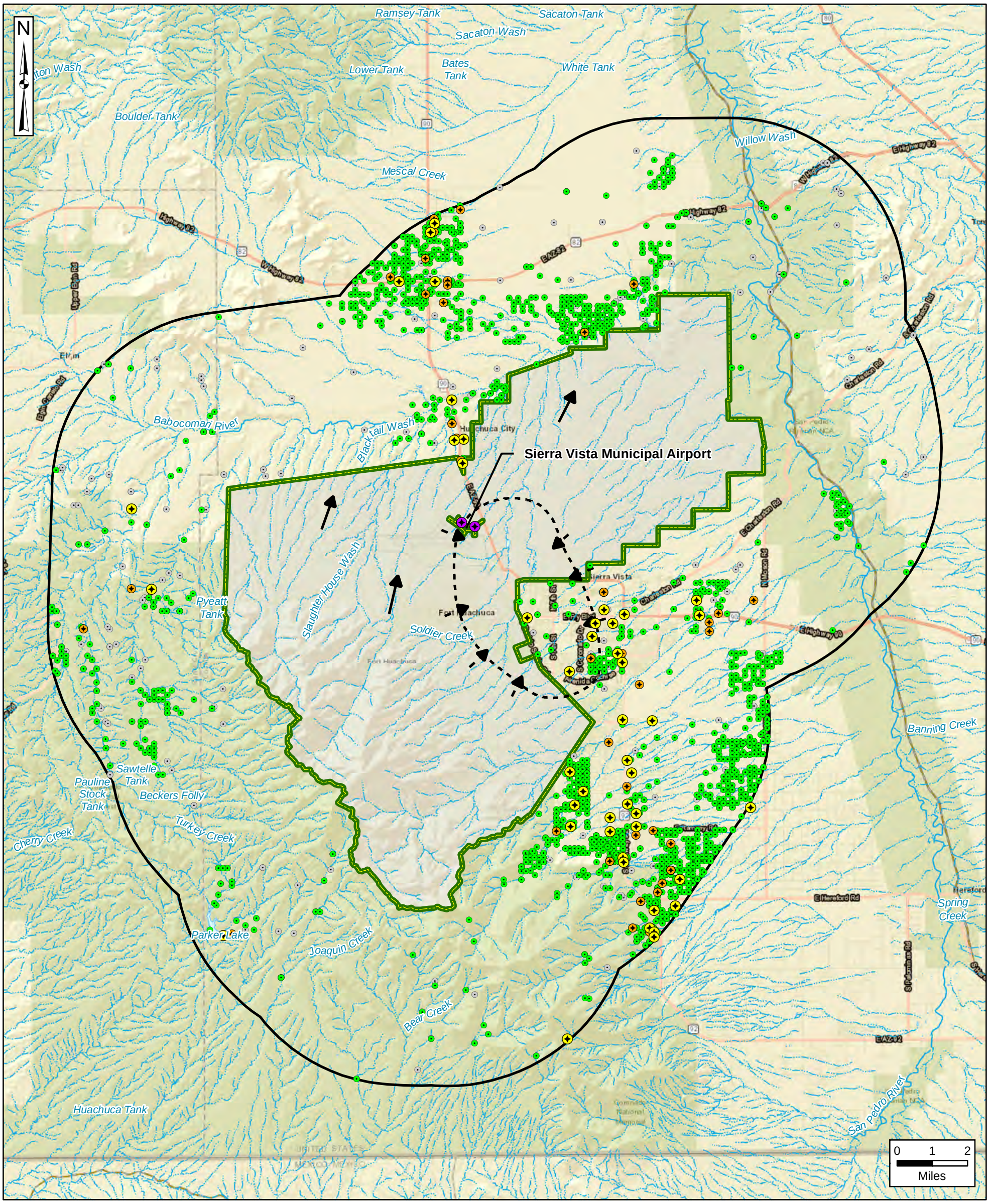
Installation Boundary
River/Stream (Perennial)
River/Stream (Intermittent/Ephemeral)
Water Body
Elevation Contour (Index) (feet)
Elevation Contour (Intermediate) (feet)

Data Sources:
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 2-3
Off-Post Potable Supply Wells

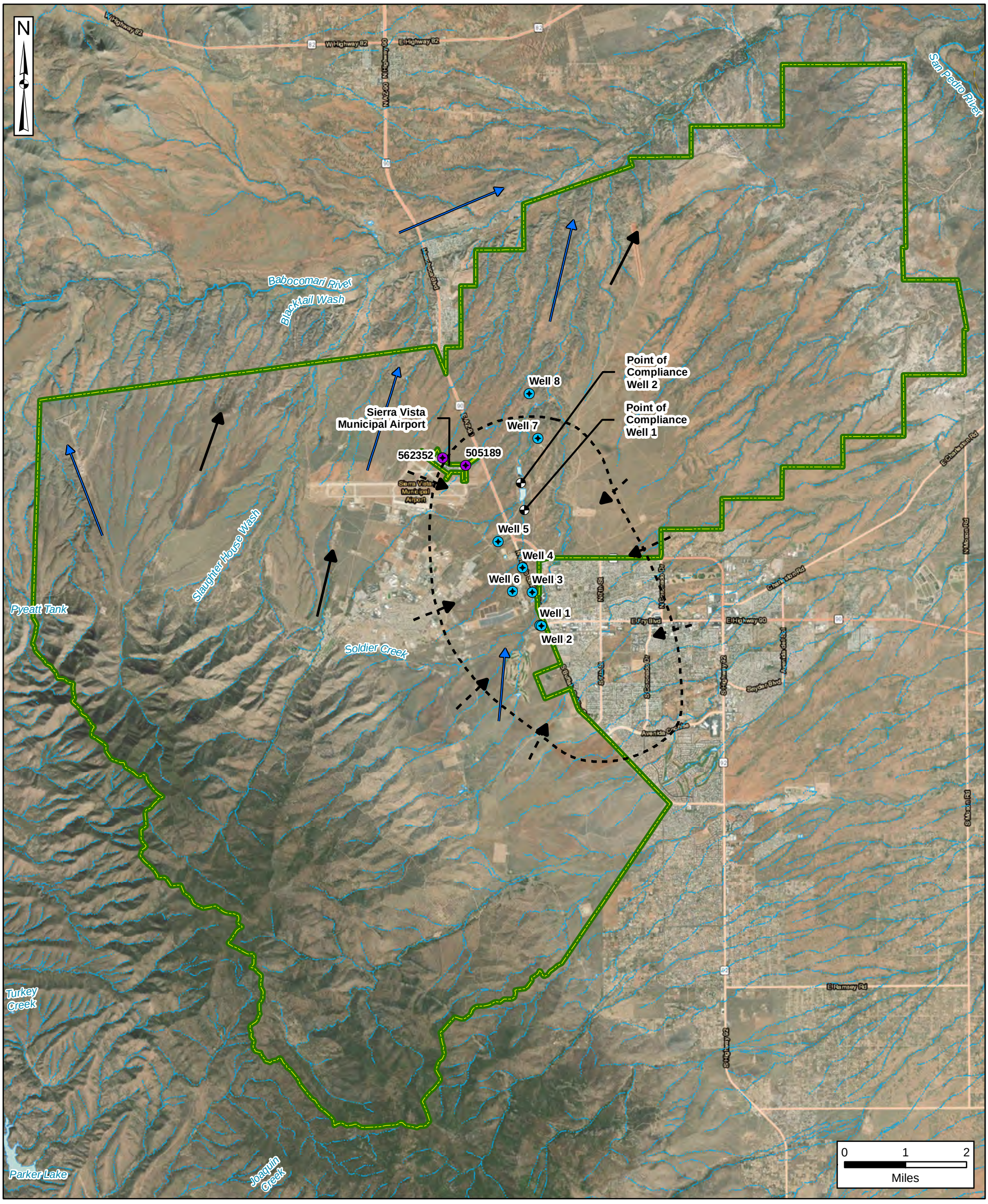


Data Sources:
EDR, Well Data, 2018
ADWR, Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

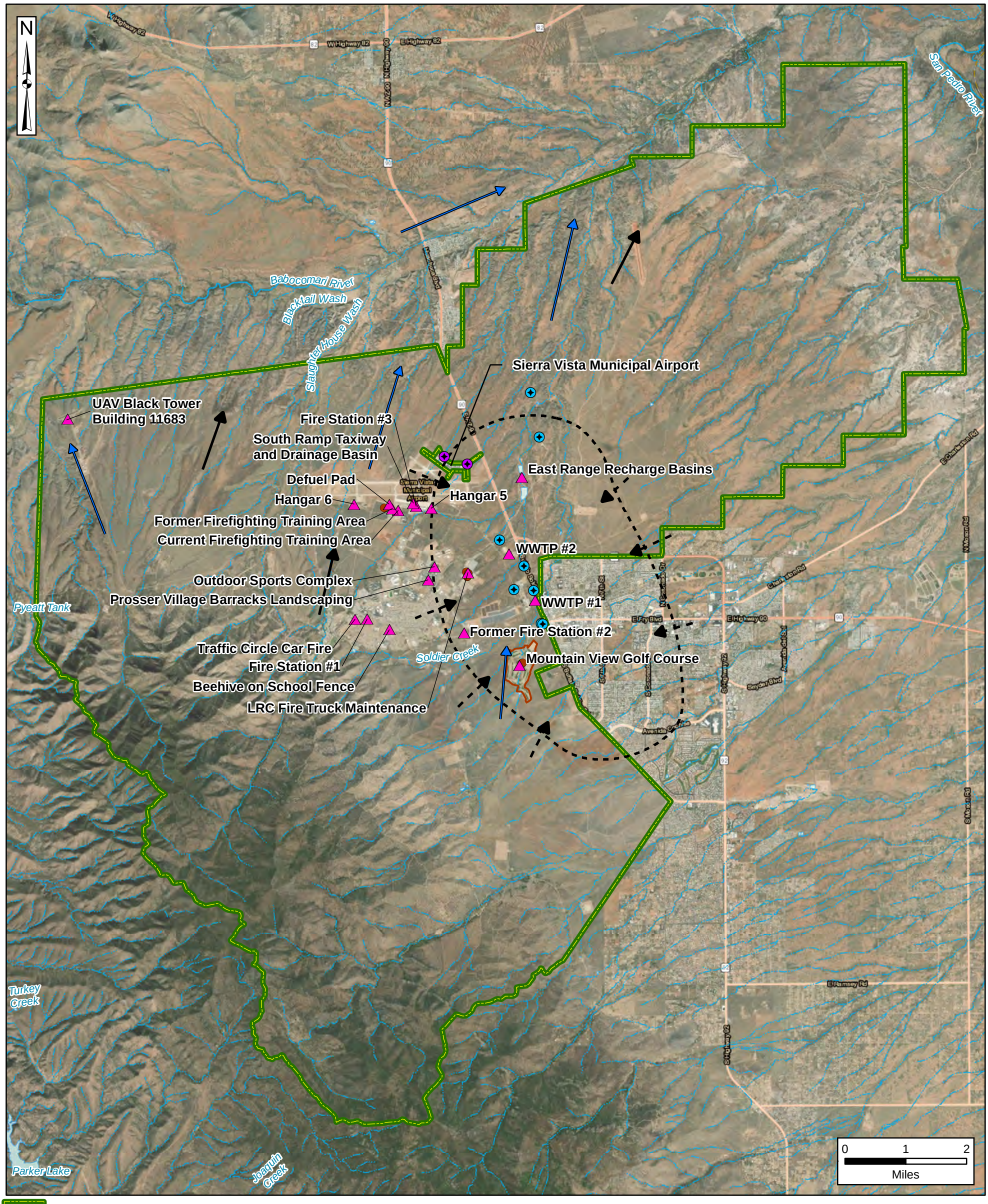
Figure 2-4
Site Layout



USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

ARCADIS

Figure 5-2
AOPI Locations



- Installation Boundary
- AOPI
- IRP Site Location
- IRP Site Boundary
- River/Stream (Perennial)
- River/Stream (Intermittent/Ephemeral)
- Water Body
- Installation Production Well
- Sierra Vista Airport Municipal Well
- Cone of Depression
- Approximate Groundwater Flow Direction
- Inferred Groundwater Flow Direction in Cone of Depression
- Surface Water Flow Direction

AOPI = area of potential interest
IRP = Installation Restoration Program
LRC = Logistics Readiness Center
UAV = unmanned aerial vehicle
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

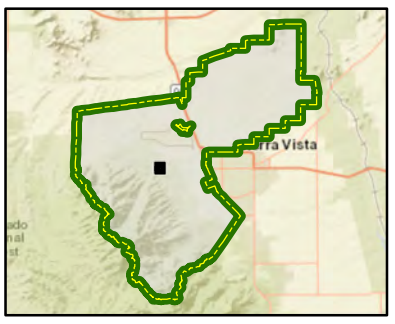


Figure 5-3
Aerial Photo of
Traffic Circle Car Fire and Fire Station #1 AOPIs

Installation Boundary
AOPI
Inferred AFFF Use Area
Approximate Groundwater Flow Direction

AFFF = aqueous film-forming foam
AOPI = area of potential interest

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

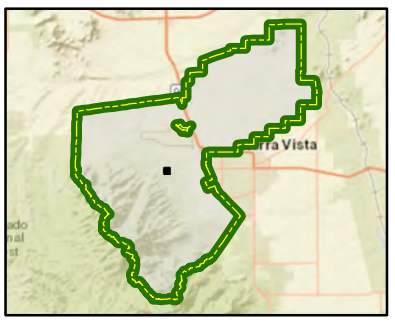


Figure 5-4
Aerial Photo of
Beehive on School Fence AOPI

Installation Boundary

AOPI

Approximate Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

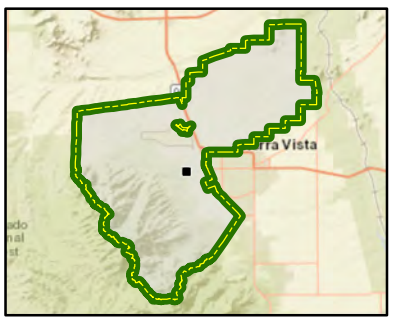


Figure 5-5
Aerial Photo of
Former Fire Station #2 AOPI

Installation Boundary

AOPI

Approximate Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

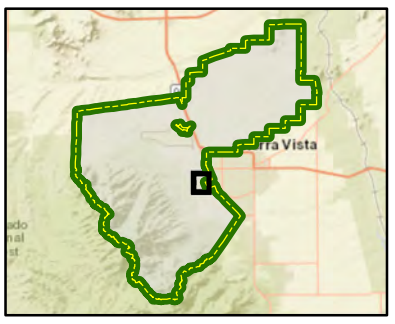


Figure 5-6
Aerial Photo of
Mountain View Golf Course AOPI

Installation Boundary
AOPI
River/Stream (Intermittent/Ephemeral)
Water Body
Cone of Depression
Approximate Groundwater Flow Direction
Surface Water Flow Direction
IRP Site Location
IRP Site Boundary

AOPI = area of potential interest
FTHU = Fort Huachuca
IRP = Installation Restoration Program

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

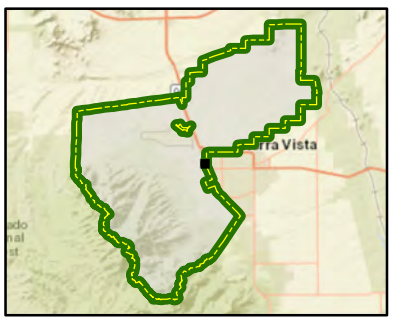


Figure 5-7
Aerial Photo of
WWTP #1 AOPI

Installation Boundary
AOPI
River/Stream (Intermittent/Ephemeral)
Approximate Groundwater Flow Direction
Surface Water Flow Direction
Surface Runoff Flow Direction

AOPI = area of potential interest
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

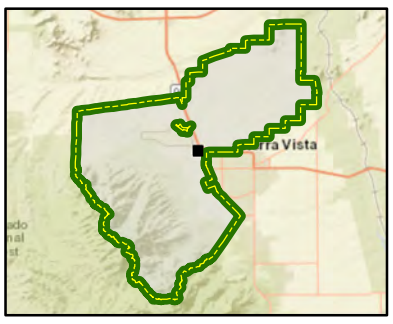
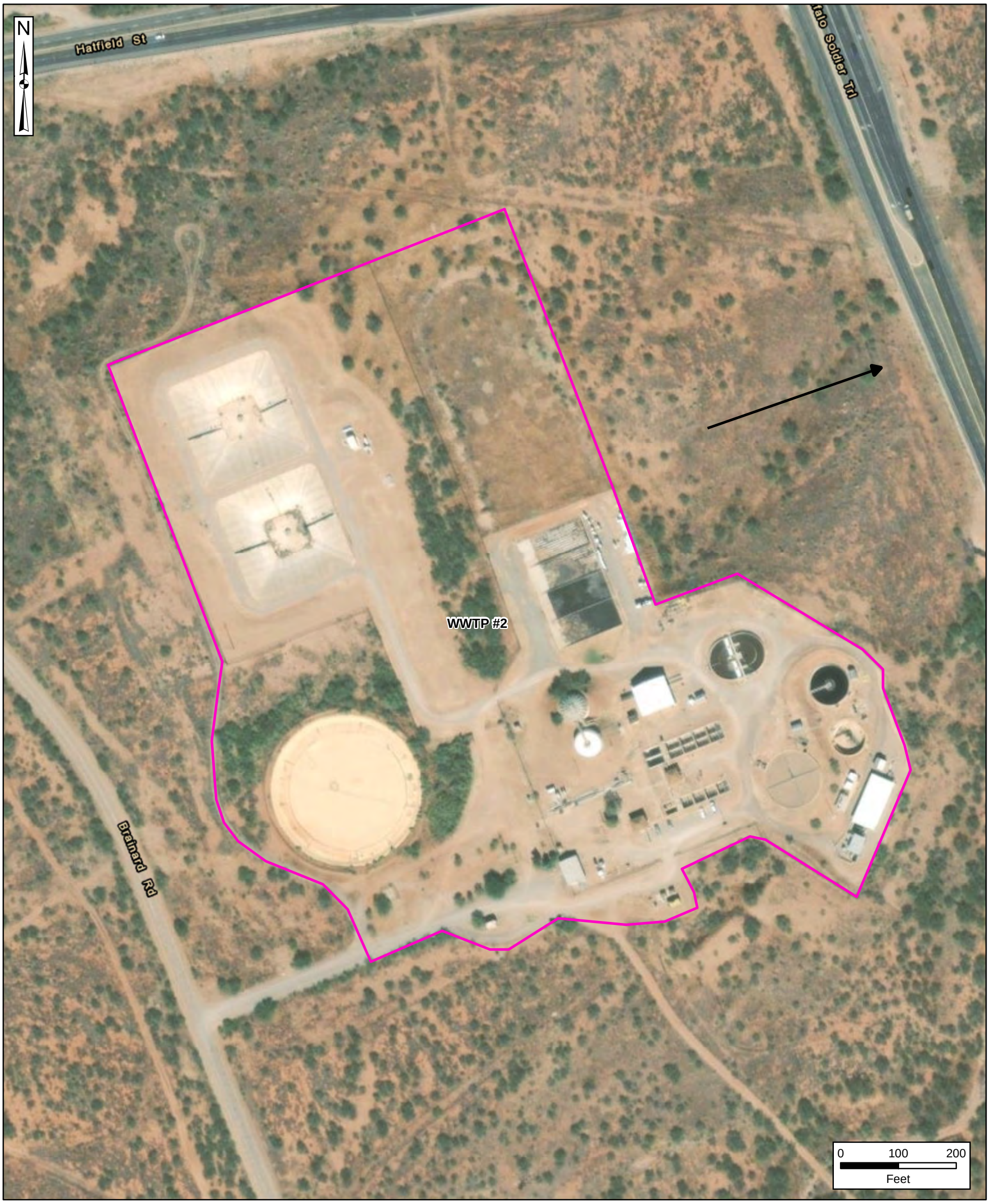


Figure 5-8
Aerial Photo of
WWTP #2 AOPI



Installation Boundary

AOPI

Approximate Groundwater Flow Direction

AOPI = area of potential interest
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

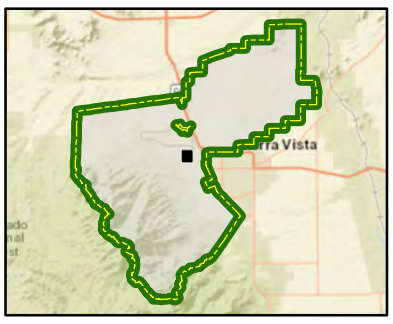


Figure 5-9
Aerial Photo of
LRC Fire Truck Maintenance AOPI

Installation Boundary
AOPI
Inferred AFFF Use Area
Approximate Groundwater Flow Direction
IRP Site Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
FTHU = Fort Huachuca
IRP = Installation Restoration Program
LRC = Logistics Readiness Center

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

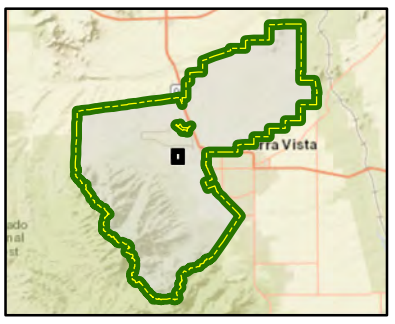


Figure 5-10
Aerial Photo of
Outdoor Sports Complex and
Prosser Village Barracks Landscaping AOPIs

Installation Boundary

AOPI

Approximate Groundwater Flow Direction

Cone of Depression

AOPI = area of potential interest

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

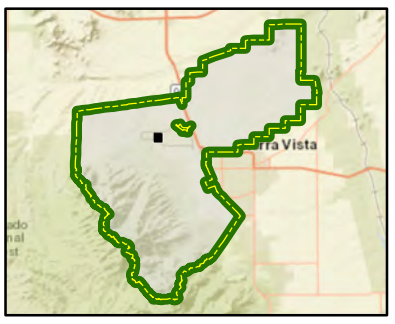
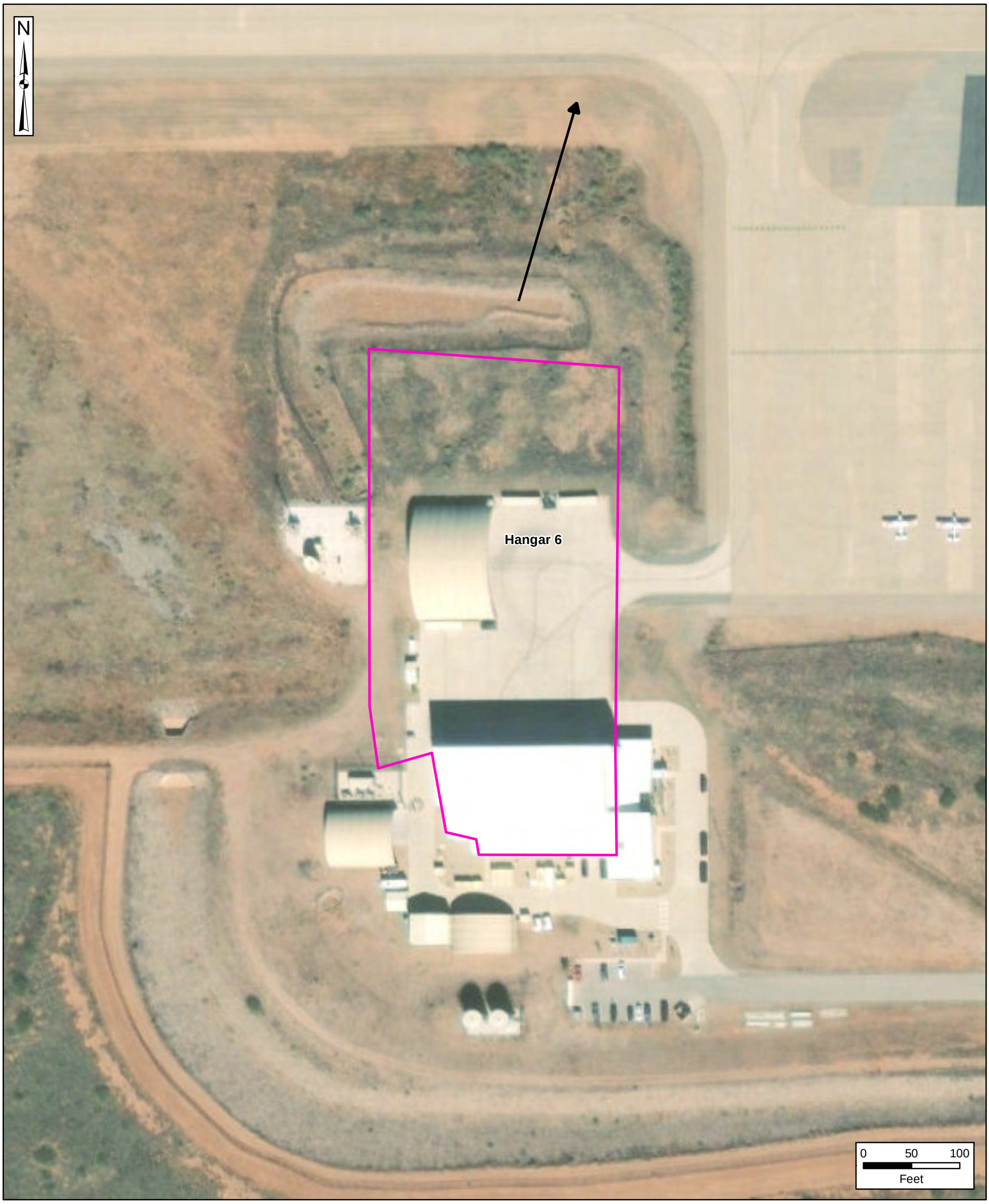


Figure 5-11
Aerial Photo of
Hangar 6 AOPI



Installation Boundary

AOPI

Approximate Groundwater Flow Direction

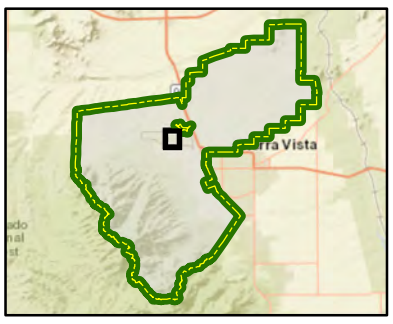
AOPI = area of potential interest

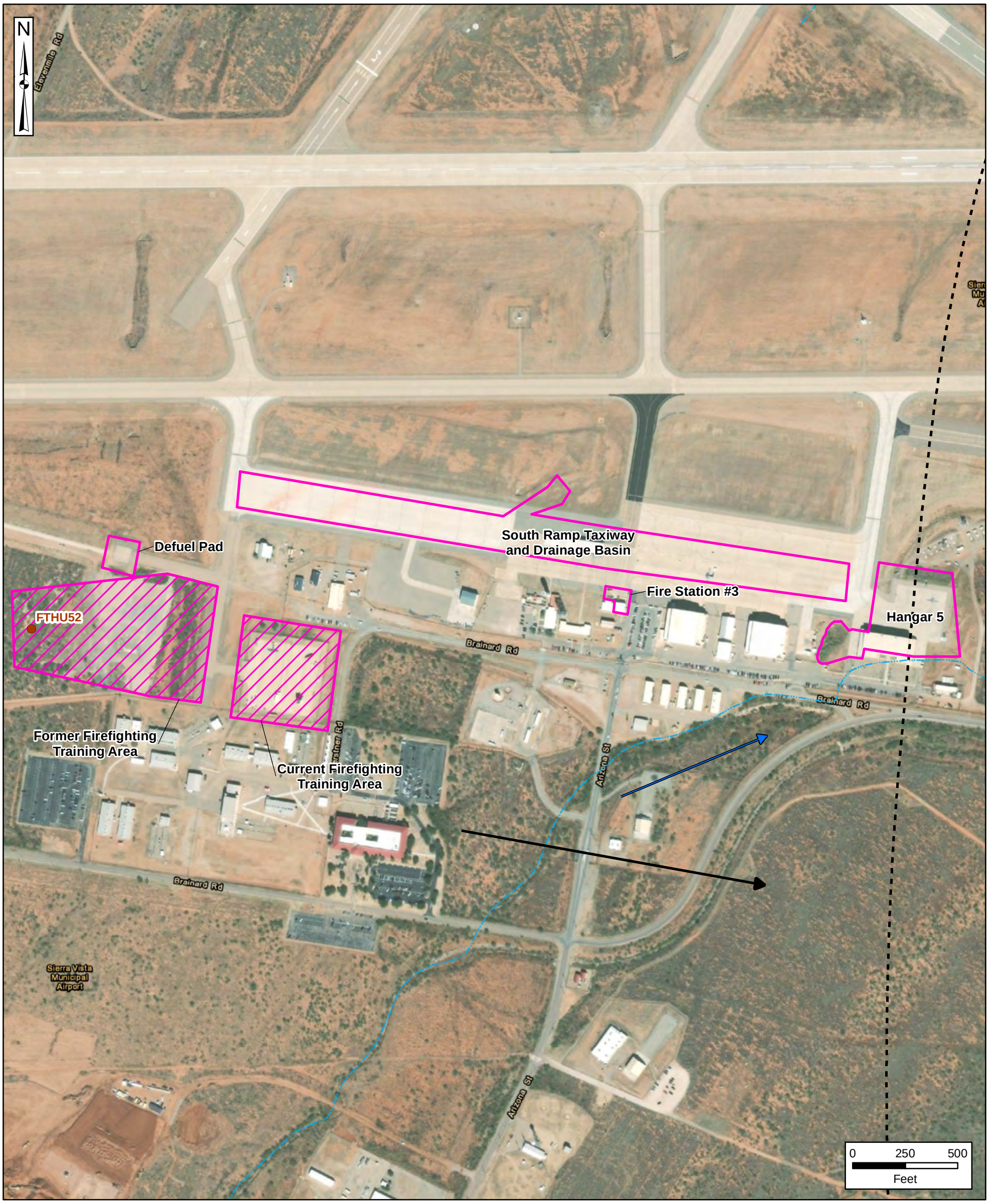
Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 5-12
Aerial Photo of Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, and South Ramp Taxiway and Drainage Basin AOPIs





- Installation Boundary
- AOPI
- Inferred AFFF Use Area
- River/Stream (Intermittent/Ephemeral)
- Cone of Depression
- Approximate Groundwater Flow Direction
- Surface Water Flow Direction
- IRP Site Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
FTHU = Fort Huachuca
IRP = Installation Restoration Program

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

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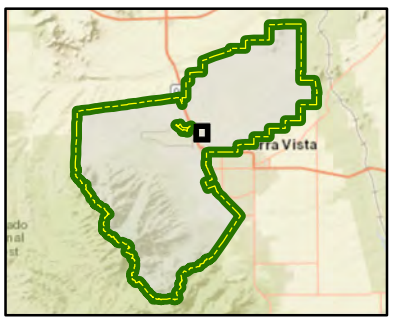
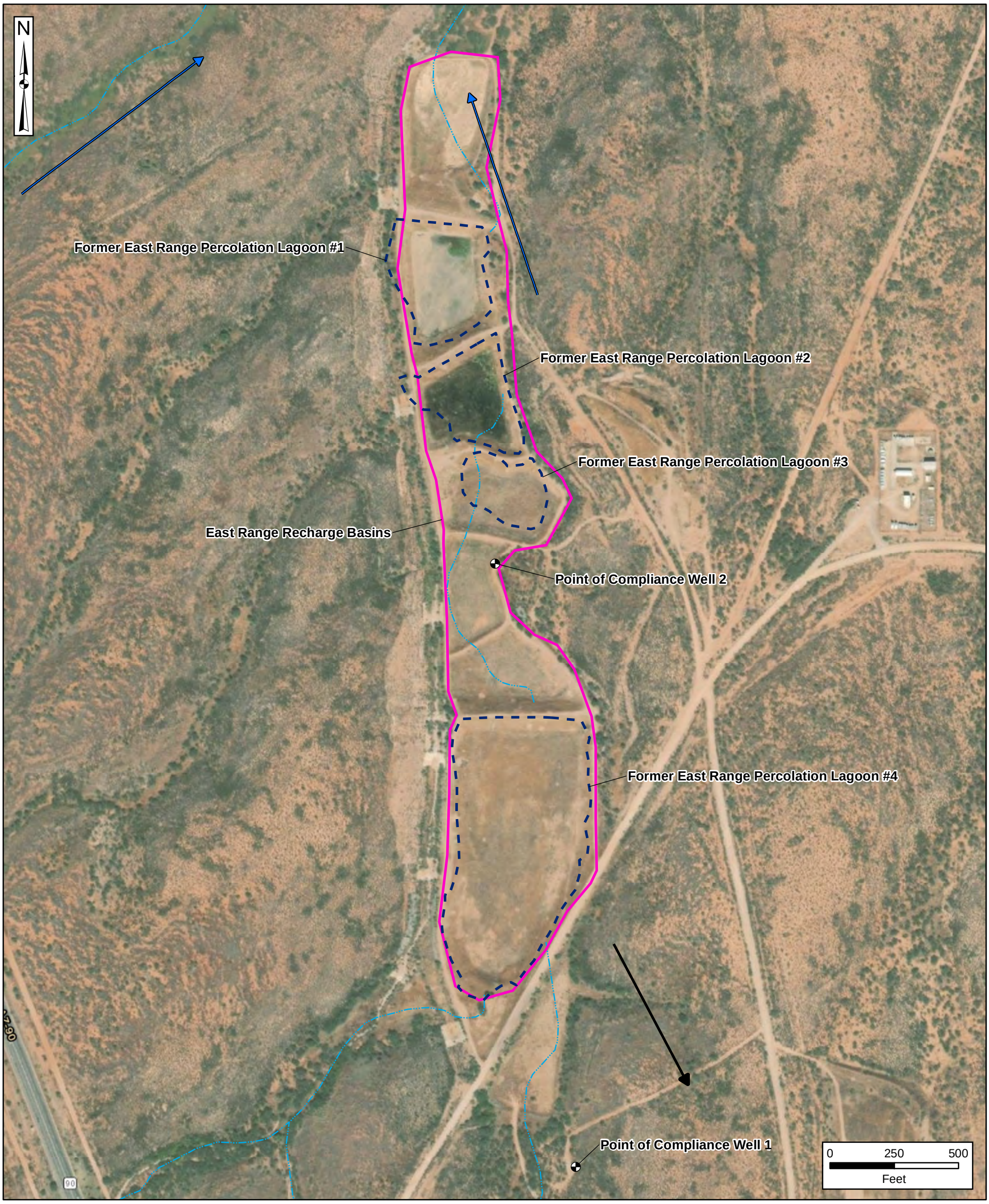


Figure 5-13
Aerial Photo of
East Range Recharge Basins AOPI



Installation Boundary
AOPI
Former Percolation Lagoon
River/Stream (Intermittent/Ephemeral)
Monitoring Well
Approximate Groundwater Flow Direction
Surface Water Flow Direction

AOPI = area of potential interest

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
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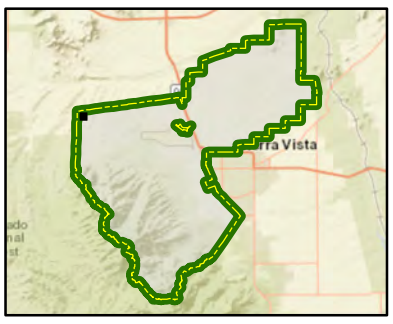


Figure 5-14
Aerial Photo of
UAV Black Tower Building 11683 AOPI

Installation Boundary

AOPI

Approximate Groundwater Flow Direction

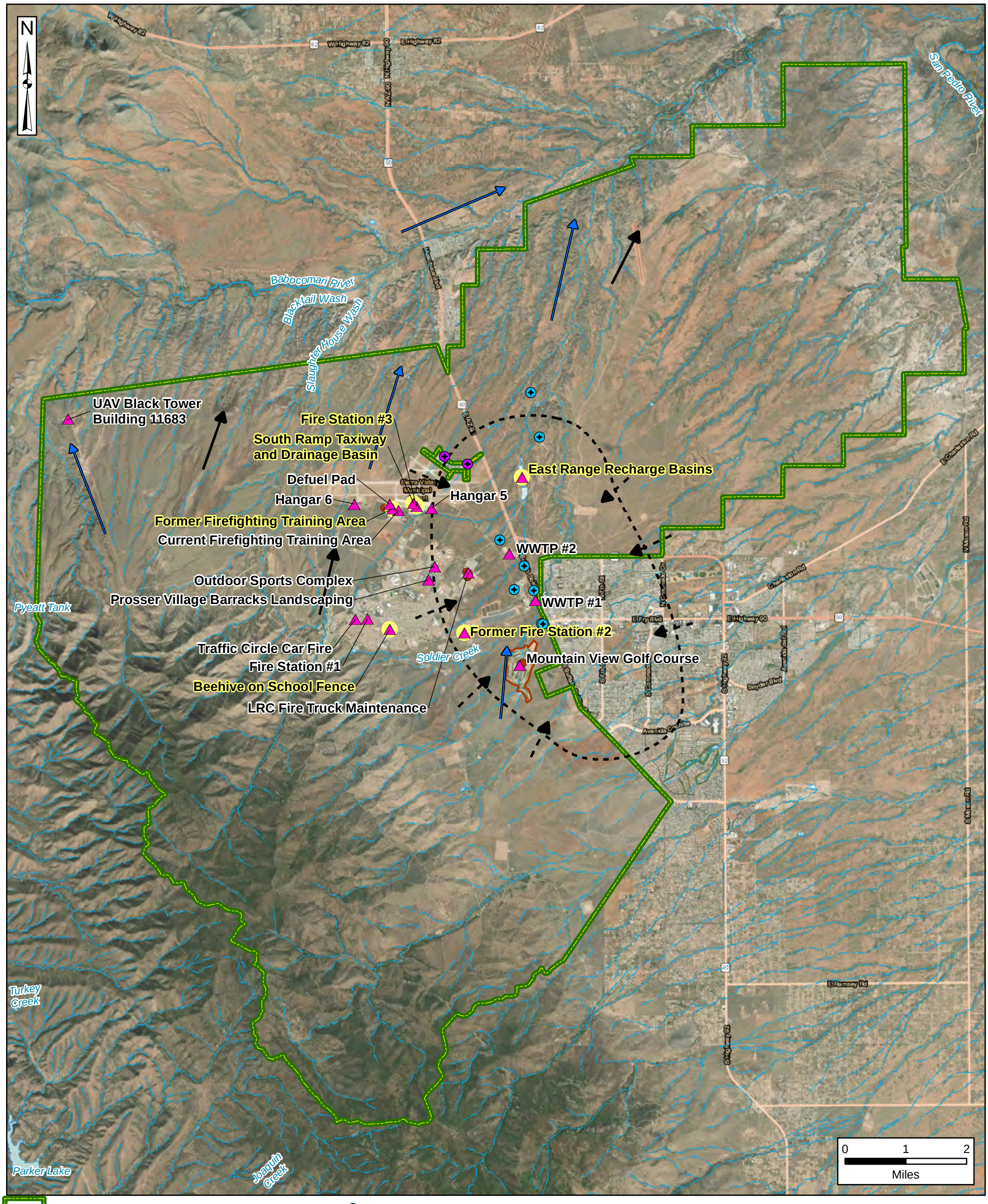
AOPI = area of potential interest
UAV = unmanned aerial vehicle

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 7-1
AOPI Locations and
OSD Risk Screening Level Exceedances



- Installation Boundary
- AOPI
- AOPI with OSD Risk Screening Level Exceedance
- River/Stream (Perennial)
- River/Stream (Intermittent/Ephemeral)
- Water Body
- Cone of Depression
- Installation Production Well
- Sierra Vista Airport Municipal Well
- Approximate Groundwater Flow Direction
- Inferred Groundwater Flow Direction in Cone of Depression
- Surface Water Flow Direction
- IRP Site Location
- IRP Site Boundary

AOPI = area of potential interest
IRP = Installation Restoration Program
LRC = Logistics Readiness Center
OSD = Office of the Secretary of Defense
UAV = unmanned aerial vehicle
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

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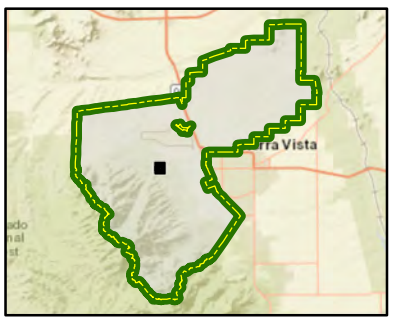


Figure 7-2
Traffic Circle Car Fire and Fire Station #1 AOPIs
PFOS, PFOA, and PFBS Analytical Results

FTHU-TCCF-02-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.00063 J**
PFOA	0.00087 U
PFBS	0.00087 U

FTHU-TCCF-03-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.001**
PFOA	0.00090 U
PFBS	0.00090 U

FTHU-TCCF-04-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.0056**
PFOA	0.00092 U
PFBS	0.00092 U

FTHU-TCCF-05-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.0012**
PFOA	0.00098 U
PFBS	0.00098 U

FTHU-TCCF-06-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.024**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-TCCF-01-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.0047**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-TCCF-07-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	0.0010 U
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-FS1-02-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.062 [0.051]**
PFOA	0.00090 U [0.00090 U]
PFBS	0.00090 U [0.00090 U]

FTHU-FS1-03-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.0045**
PFOA	0.00092 U
PFBS	0.00092 U

FTHU-FS1-04-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.002**
PFOA	0.00089 U
PFBS	0.00089 U

FTHU-FS1-06-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.071**
PFOA	**0.00094 J**
PFBS	0.0010 U

FTHU-FS1-07-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.001**
PFOA	0.00090 U
PFBS	0.00090 U

FTHU-FS1-01-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.0065**
PFOA	0.00094 U
PFBS	0.00094 U

FTHU-FS1-05-SO	
Date	12/9/2020
Depth	0-2 ft bgs
PFOS	**0.0023**
PFOA	0.00092 U
PFBS	0.00092 U

Traffic Circle Car Fire

Fire Station #1

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Field duplicate sample results are shown in brackets.
3. Bolded values indicate detections.
4. The blue arrows at the Traffic Circle Car Fire AOPI represent traffic flow direction. They are part of the basemap and cannot be removed.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 100 200
Feet

Installation Boundary
AOPI
Inferred AFFF Use Area
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

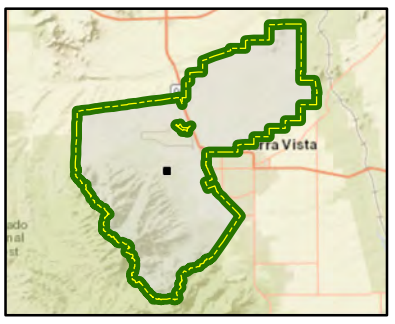
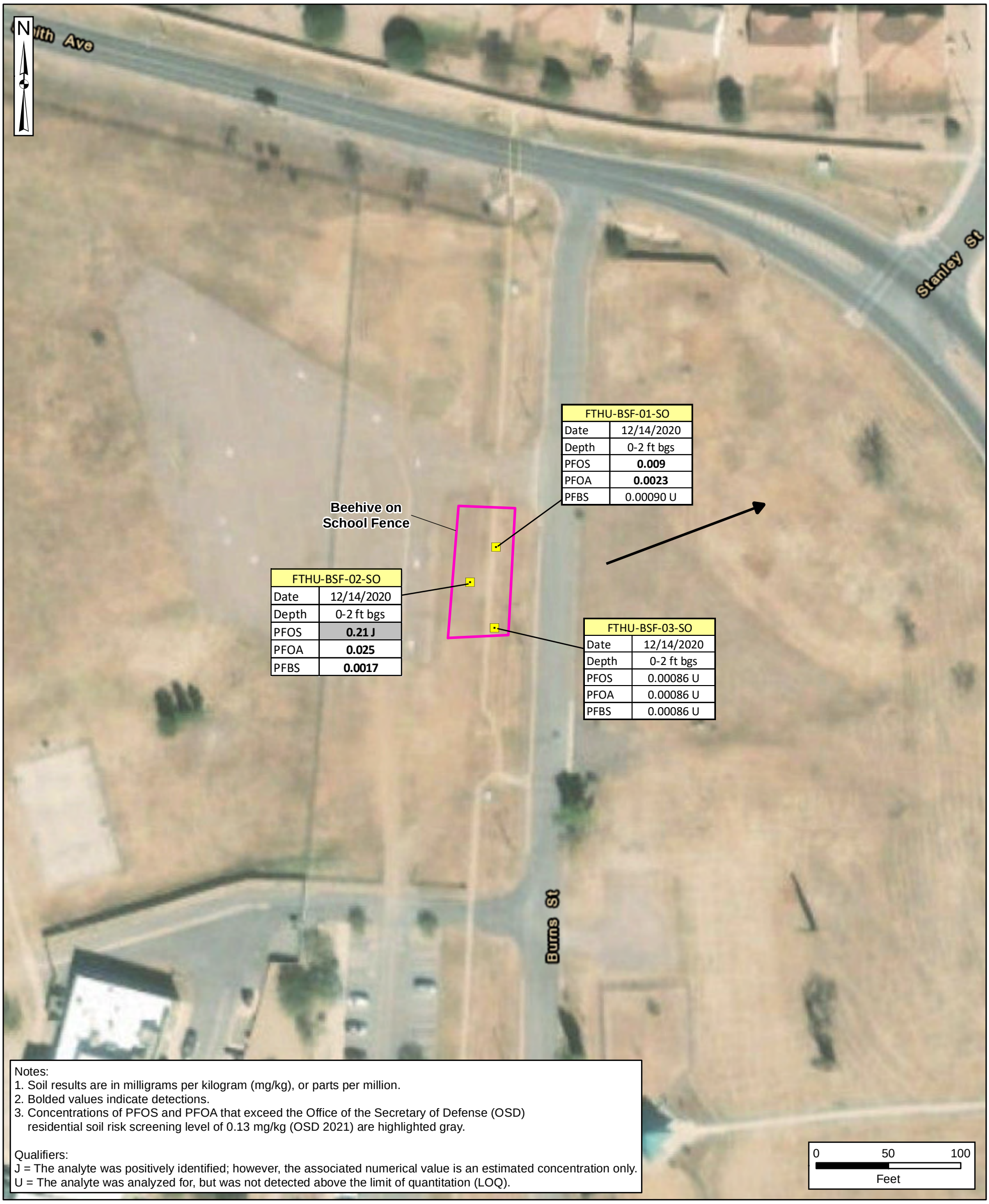


Figure 7-3
Beehive on School Fence AOPI
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Bolded values indicate detections.
3. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

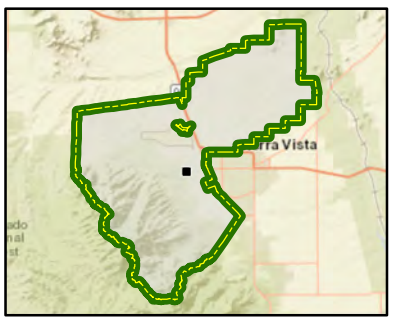


Figure 7-4
Former Fire Station #2 AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-FFS2-01-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.085**
PFOA	**0.001**
PFBS	0.0010 U

FTHU-FFS2-02-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.0015 [0.0014]**
PFOA	**0.00095 [0.00095]**
PFBS	0.00091 U [0.00088 U]

FTHU-FFS2-03-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.098**
PFOA	**0.025**
PFBS	**0.0042**

FTHU-FFS2-04-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.27 J**
PFOA	**0.0017**
PFBS	0.00094 U

FTHU-FFS2-05-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.25 J**
PFOA	**0.0055**
PFBS	**0.00056 J**

FTHU-FFS2-06-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.037**
PFOA	**0.0017**
PFBS	0.00088 U

FTHU-FFS2-07-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.11**
PFOA	**0.0016**
PFBS	0.00099 U

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Field duplicate sample results are shown in brackets.
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 50 100
Feet

Installation Boundary
AOPI
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

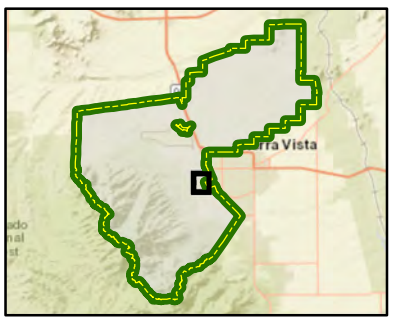


Figure 7-5
Mountain View Golf Course AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-MVGC-01-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.0066**
PFOA	**0.0005 J**
PFBS	0.00091 U

FTHU-MVGC-02-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.015**
PFOA	**0.00082 J**
PFBS	0.00098 U

FTHU-MVGC-03-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.016**
PFOA	**0.0012**
PFBS	0.0011 U

FTHU-MVGC-04-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.0037**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-MVGC-05-SO	
Date	12/16/2020
Depth	0-2 ft bgs
PFOS	**0.007**
PFOA	0.00091 U
PFBS	0.00091 U

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Bolded values indicate detections.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 250 500
Feet

Installation Boundary
AOPI
River/Stream (Intermittent/Ephemeral)
Water Body
Surface Soil Sample Location (Hand Auger)
Cone of Depression
Approximate Groundwater Flow Direction
Surface Water Flow Direction
IRP Site Location
IRP Site Boundary

AOPI = area of potential interest
ft bgs = feet below ground surface
FTHU = Fort Huachuca
IRP = Installation Restoration Program
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

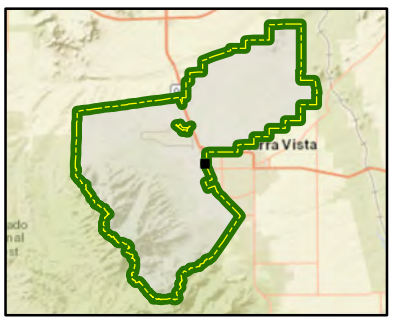


Figure 7-6
WWTP #1 AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-WWTP1-01-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	**0.0064**
PFOA	0.00085 U
PFBS	0.00085 U

FTHU-WWTP1-02-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	0.0010 U
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-WWTP1-03-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	**0.0069**
PFOA	**0.0019**
PFBS	0.00093 U

FTHU-WWTP1-04-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	**0.031**
PFOA	**0.0027**
PFBS	0.00091 U

FTHU-WWTP1-05-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	**0.016**
PFOA	**0.007**
PFBS	0.0010 U

FTHU-WWTP1-06-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	**0.0071 J-**
PFOA	**0.004 J+**
PFBS	0.00091 U

WWTP #1

Machol Ave

N Garden Ave

N Buffalo Soldier Trl

Fort Ave

16th St

0 100 200
Feet

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Bolded values indicate detections.

Qualifiers:
J+ = The result is an estimated quantity; the result may be biased high.
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
River/Stream (Intermittent/Ephemeral)
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction
Surface Water Flow Direction
Surface Runoff Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

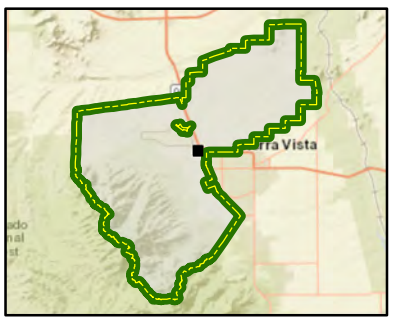


Figure 7-7
WWTP #2 AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-WWTP2-01-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	0.0010 U [0.00096 U]
PFOA	0.0010 U [0.00096 U]
PFBS	0.0010 U [0.00096 U]

FTHU-WWTP2-02-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	0.0010 U
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-WWTP2-03-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	**0.0034**
PFOA	**0.0036**
PFBS	0.00092 U

FTHU-WWTP2-04-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	**0.014**
PFOA	**0.0007 J**
PFBS	0.00090 U

FTHU-WWTP2-05-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	**0.0053**
PFOA	**0.0006 J**
PFBS	0.0011 U

FTHU-WWTP2-06-SO	
Date	12/14/2020
Depth	0-2 ft bgs
PFOS	**0.0091**
PFOA	0.0010 U
PFBS	0.0010 U

Hatfield St
Buffalo Soldier Trl
WWTP #2
Brainard Rd
N
0 100 200
Feet

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Field duplicate sample results are shown in brackets.
3. Bolded values indicate detections.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
WWTP = wastewater treatment plant

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

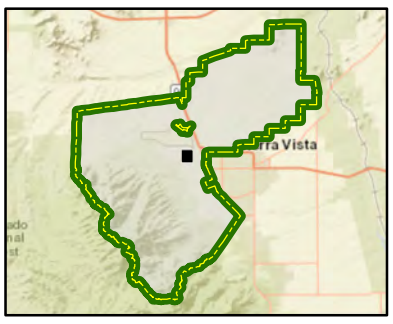


Figure 7-8
LRC Fire Truck Maintenance AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-LRC-03-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.012**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-LRC-04-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.004**
PFOA	0.0011 U
PFBS	0.0011 U

FTHU-LRC-02-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	**0.0034**
PFOA	0.0012 U
PFBS	0.0012 U

FTHU-LRC-01-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.00083 J**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-LRC-05-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.0088**
PFOA	0.0011 U
PFBS	0.0011 U

FTHU-LRC-06-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.027**
PFOA	**0.00076 J**
PFBS	0.0011 U

FTHU-LRC-08-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	0.00098 U
PFOA	**0.00074 J**
PFBS	0.00098 U

FTHU-LRC-07-SO	
Date	12/10/2020
Depth	0-2 ft bgs
PFOS	**0.079**
PFOA	**0.001**
PFBS	**0.0014**

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Field duplicate sample results are shown in brackets.
3. Bolded values indicate detections.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Inferred AFFF Use Area
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction
IRP Site Location

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
FTHU = Fort Huachuca
IRP = Installation Restoration Program
LRC = Logistics Readiness Center
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

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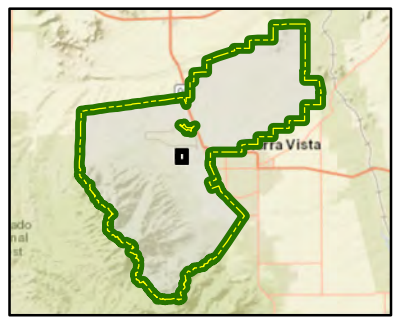
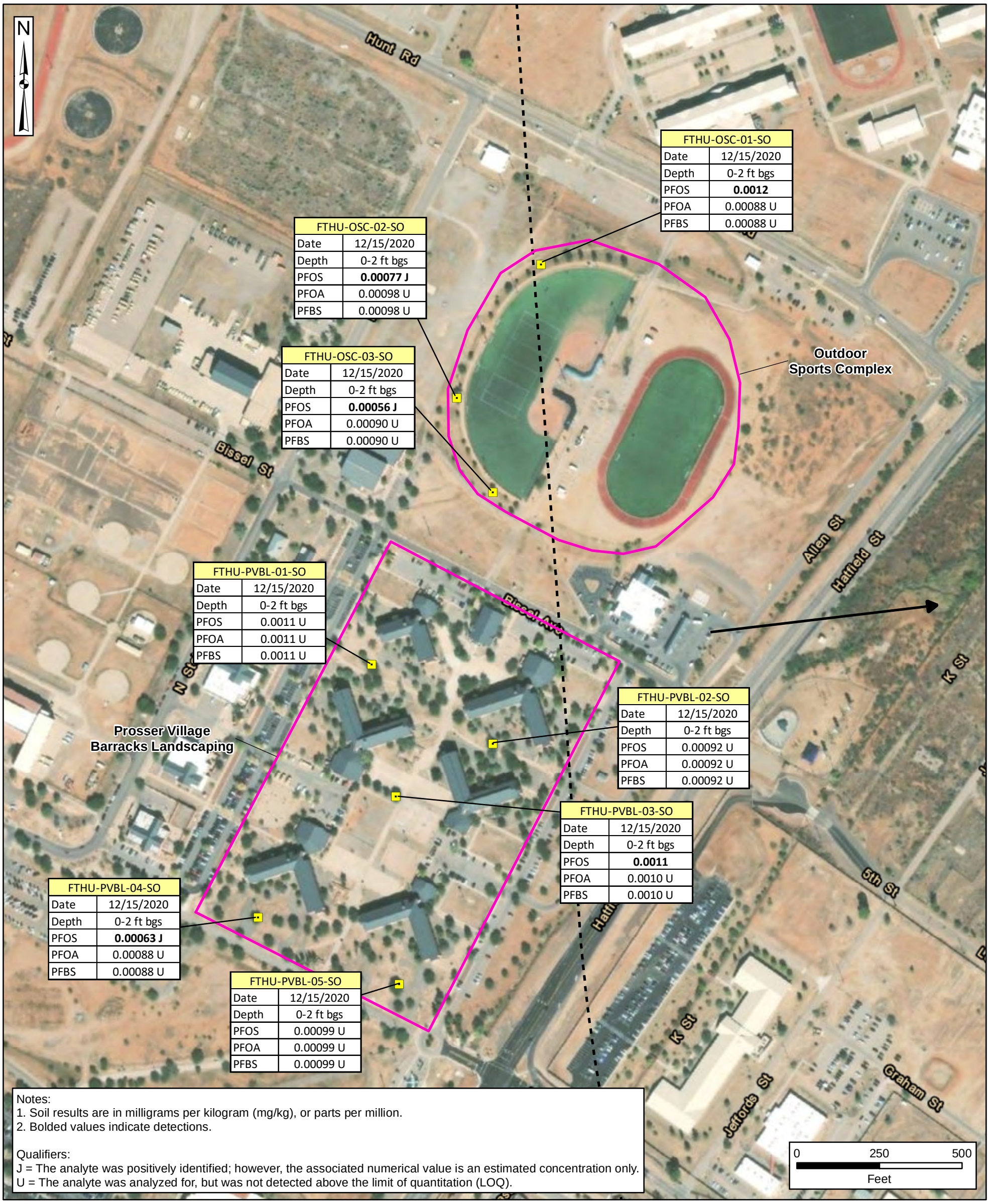
Fort Huachuca, AZ

Figure 7-9
Outdoor Sports Complex and Prosser Village Barracks Landscaping AOPIs PFOS, PFOA, and PFBS Analytical Results





FTHU-OSC-01-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	**0.0012**
PFOA	0.00088 U
PFBS	0.00088 U

FTHU-OSC-02-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	**0.00077 J**
PFOA	0.00098 U
PFBS	0.00098 U

FTHU-OSC-03-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	**0.00056 J**
PFOA	0.00090 U
PFBS	0.00090 U

FTHU-PVBL-01-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	0.0011 U
PFOA	0.0011 U
PFBS	0.0011 U

FTHU-PVBL-02-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	0.00092 U
PFOA	0.00092 U
PFBS	0.00092 U

FTHU-PVBL-03-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	**0.0011**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-PVBL-04-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	**0.00063 J**
PFOA	0.00088 U
PFBS	0.00088 U

FTHU-PVBL-05-SO	
Date	12/15/2020
Depth	0-2 ft bgs
PFOS	0.00099 U
PFOA	0.00099 U
PFBS	0.00099 U

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Bolded values indicate detections.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Approximate Groundwater Flow Direction
Cone of Depression
Surface Soil Sample Location (Hand Auger)

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

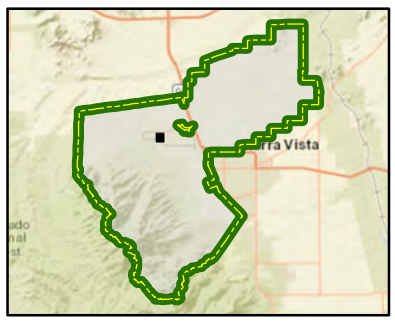
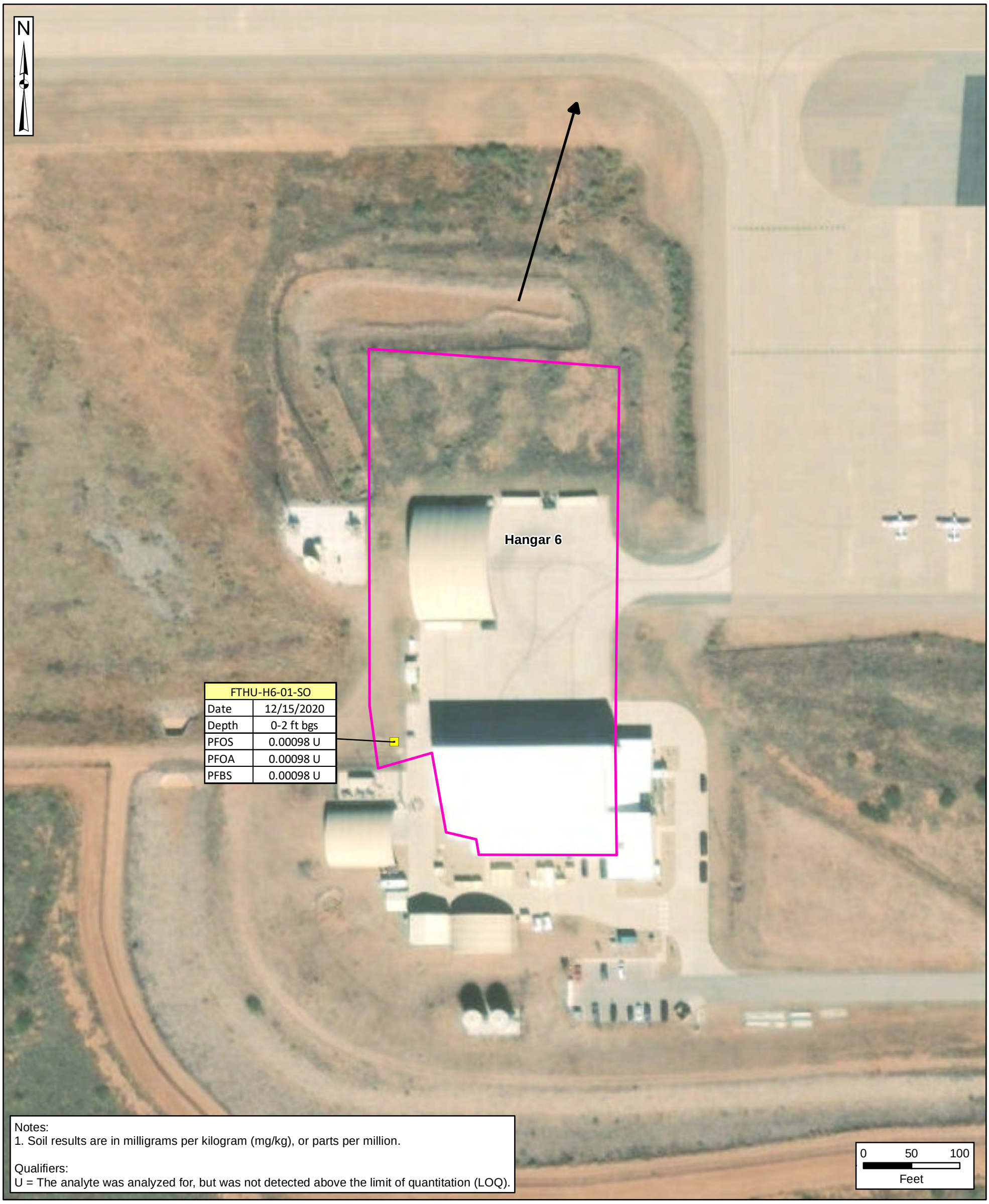


Figure 7-10
Hangar 6 AOPI
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Approximate Groundwater Flow Direction
Surface Soil Sample Location (Hand Auger)

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

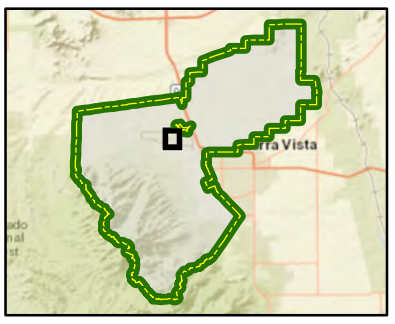


Figure 7-11a
Defuel Pad, Former Firefighting Training Area, and Current Firefighting Training Area AOPIs
PFOS, PFOA, and PFBS Analytical Results

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Results in brackets are field duplicate sample results.
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

FTHU-FFTA-01-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.00061 J** [0.0010 UJ]
PFOA	0.0010 UJ [0.0010 UJ]
PFBS	0.0010 UJ [0.0010 UJ]

FTHU-DF-03-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.12**
PFOA	**0.0016**
PFBS	**0.00057 J**

FTHU-FFTA-04-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.0044 J**
PFOA	0.0010 UJ
PFBS	0.0010 UJ

FTHU-DF-02-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.01**
PFOA	**0.00076 J**
PFBS	0.00095 U

FTHU-FFTA-03-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.0007 J**
PFOA	0.0010 UJ
PFBS	0.0010 UJ

FTHU-DF-01-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.11**
PFOA	**0.015**
PFBS	**0.0066 J-**

FTHU-FFTA-02-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.0011 J**
PFOA	0.00099 UJ
PFBS	0.00099 UJ

FTHU-DF-04-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.093**
PFOA	**0.00087 J**
PFBS	0.00099 U

FTHU-FFTA-05-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	0.0010 UJ
PFOA	0.0010 UJ
PFBS	0.0010 UJ

FTHU-CFTA-01-SO	
Date	12/17/2020
Depth	0-2 ft bgs
PFOS	**0.0067**
PFOA	0.00088 U
PFBS	0.00088 U

FTHU-CFTA-04-SO	
Date	12/17/2020
Depth	0-2 ft bgs
PFOS	**0.016**
PFOA	**0.0023**
PFBS	0.0010 U

FTHU-FFTA-06-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.031 J**
PFOA	**0.00081 J**
PFBS	**0.00064 J**

FTHU-CFTA-03-SO	
Date	12/17/2020
Depth	0-2 ft bgs
PFOS	**0.012**
PFOA	**0.001 J**
PFBS	0.0011 U

FTHU-CFTA-05-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.0051**
PFOA	**0.0057**
PFBS	**0.00053 J**

FTHU-FFTA-09-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.7 J**
PFOA	**0.0067 J**
PFBS	**0.00056 J**

FTHU-FFTA-07-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.058 J**
PFOA	**0.0093 J**
PFBS	**0.0015 J**

FTHU-CFTA-06-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.0027**
PFOA	0.00087 U
PFBS	0.00087 U

FTHU-CFTA-02-SO	
Date	12/18/2020
Depth	0-2 ft bgs
PFOS	**0.0017**
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-FFTA-10-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.1 J**
PFOA	**0.00074 J**
PFBS	0.00091 UJ

FTHU-FFTA-08-SO	
Date	12/21/2020
Depth	0-2 ft bgs
PFOS	**0.0079 J**
PFOA	0.00096 UJ
PFBS	**0.00089 J**

FTHU-FFTA-11-SO	
Date	12/22/2020
Depth	0-2 ft bgs
PFOS	**0.019 J**
PFOA	**0.0014 J**
PFBS	0.0010 UJ

FTHU-FFTA-12-SO	
Date	12/22/2020
Depth	0-2 ft bgs
PFOS	**0.14 J**
PFOA	**0.018 J**
PFBS	**0.01 J**

Defuel Pad
FTHU52
Former Firefighting Training Area
Current Firefighting Training Area
South Ramp Taxiway and Drainage Basin
Fire Station #3
Hangar 5
Eisenhower Rd
Gaskins Rd
Arizona St
Brainard Rd
0 250 500
Feet

Installation Boundary
AOPI
Inferred AFFF Use Area
River/Stream (Intermittent/Ephemeral)
Cone of Depression
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction
Surface Water Flow Direction
IRP Site Location

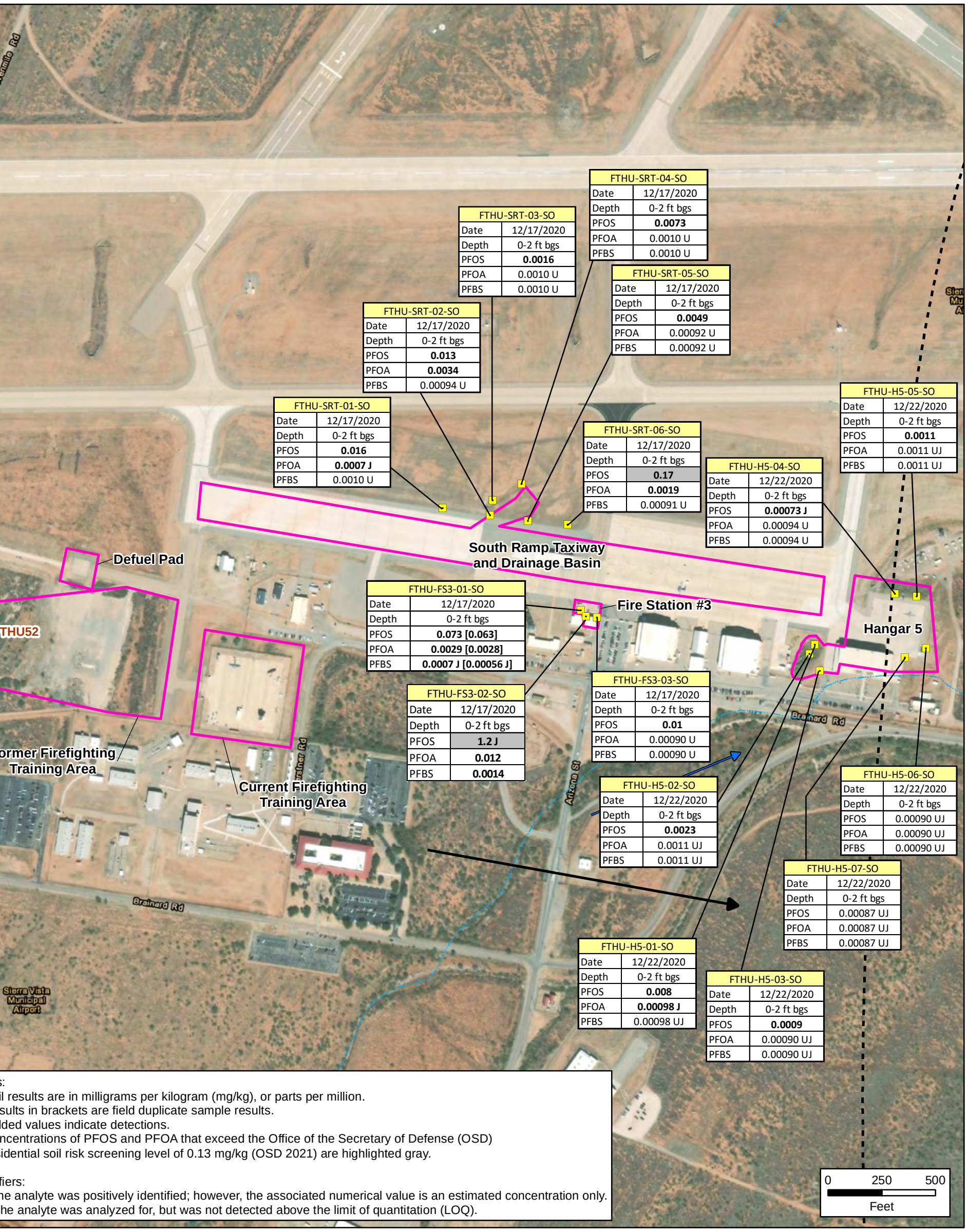
AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft bgs = feet below ground surface
FTHU = Fort Huachuca
IRP = Installation Restoration Program
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

Figure 7-11b
Fire Station #3, Hangar 5, and South Ramp Taxiway and Drainage Basin AOPIs
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Results in brackets are field duplicate sample results.
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
IRP Site Location
River/Stream (Intermittent/Ephemeral)
Cone of Depression
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction
Surface Water Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
FTHU = Fort Huachuca
IRP = Installation Restoration Program
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

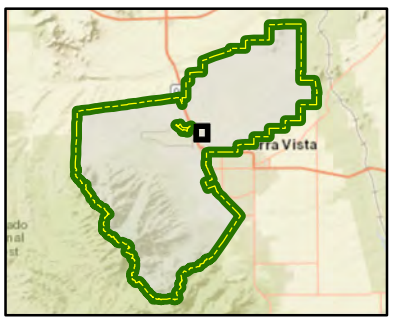


Figure 7-12
East Range Recharge Basins AOPI
PFOS, PFOA, and PFBS Analytical Results

FTHU-ERB-01-SO	
Date	12/08/2020
Depth	0-2 ft bgs
PFOS	**0.002 [0.0028]**
PFOA	0.00098 U [0.00090 U]
PFBS	0.00098 U [0.00090 U]

FTHU-ERB-02-SO	
Date	12/7/2020
Depth	0-2 ft bgs
PFOS	0.0012 U
PFOA	0.0012 U
PFBS	0.0012 U

FTHU-ERB-04-SO	
Date	12/08/2020
Depth	0-2 ft bgs
PFOS	**0.0011**
PFOA	0.00096 U
PFBS	0.00096 U

FTHU-ERB-05-SO	
Date	12/08/2020
Depth	0-2 ft bgs
PFOS	**0.0007 J**
PFOA	0.00086 U
PFBS	0.00086 U

FTHU-ERB-06-SO	
Date	12/08/2020
Depth	0-2 ft bgs
PFOS	0.00096 U
PFOA	0.00096 U
PFBS	0.00096 U

FTHU-ERB-07-SO	
Date	12/08/2020
Depth	0-2 ft bgs
PFOS	**0.01**
PFOA	**0.00083 J**
PFBS	0.00089 U

FTHU-MW-POC-2	
Date	12/8/2020
PFOS	**92**
PFOA	**32**
PFBS	**14**

FTHU-MW-POC-1	
Date	12/8/2020
PFOS	3.5 U [3.6 U]
PFOA	3.5 U [3.6 U]
PFBS	**6.2 [5.8]**

Former East Range Percolation Lagoon #1
Former East Range Percolation Lagoon #2
Former East Range Percolation Lagoon #3
Former East Range Percolation Lagoon #4
East Range Recharge Basins

0 250 500
Feet

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Groundwater results are in nanograms per liter (ng/L), or parts per trillion.
3. Field duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

- Installation Boundary
- AOPI
- Former Percolation Lagoon
- River/Stream (Intermittent/Ephemeral)
- Monitoring Well
- Surface Soil Sample Location (Hand Auger)
- Groundwater Sample Location - Existing Well
- Approximate Groundwater Flow Direction
- Surface Water Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Fort Huachuca, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, AZ

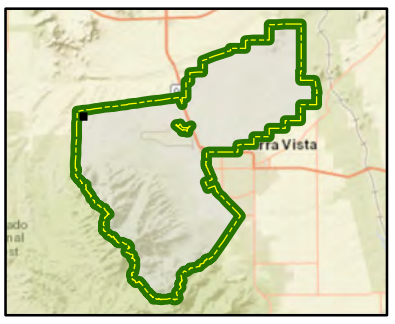


Figure 7-13
UAV Black Tower Building 11683 AOPI
PFOS, PFOA, and PFBS Analytical Results

N

FTHU-UAVBT-01-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	0.00087 U
PFOA	**0.0012**
PFBS	0.00087 U

FTHU-UAVBT-02-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	**0.068**
PFOA	0.00093 U
PFBS	0.00093 U

FTHU-UAVBT-03-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	0.0011 U
PFOA	0.0011 U
PFBS	0.0011 U

FTHU-UAVBT-04-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	0.0010 U
PFOA	0.0010 U
PFBS	0.0010 U

FTHU-UAVBT-05-SO	
Date	12/11/2020
Depth	0-2 ft bgs
PFOS	0.0010 U
PFOA	0.0010 U
PFBS	0.0010 U

UAV Black Tower Building 11683

Notes:
1. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. Bolded values indicate detections.

Qualifiers:
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

0 50 100
Feet

Installation Boundary
AOPI
Surface Soil Sample Location (Hand Auger)
Approximate Groundwater Flow Direction

AOPI = area of potential interest
ft bgs = feet below ground surface
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
UAV = unmanned aerial vehicle

Data Sources:
Fort Huachuca, GIS Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 12 North

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors			
						On-Installation			Off-Installation
						Site Worker	Resident	Recreational User	All Types of Receptors [1]
AFFF Releases to Soil and/or Paved Surfaces				Soil	Ingestion	●	○	○	○
					Dermal Contact	●	○	○	○
					Inhalation (dust)	●	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	◐	○	◐
					Dermal Contact	◐	◐	○	◐

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

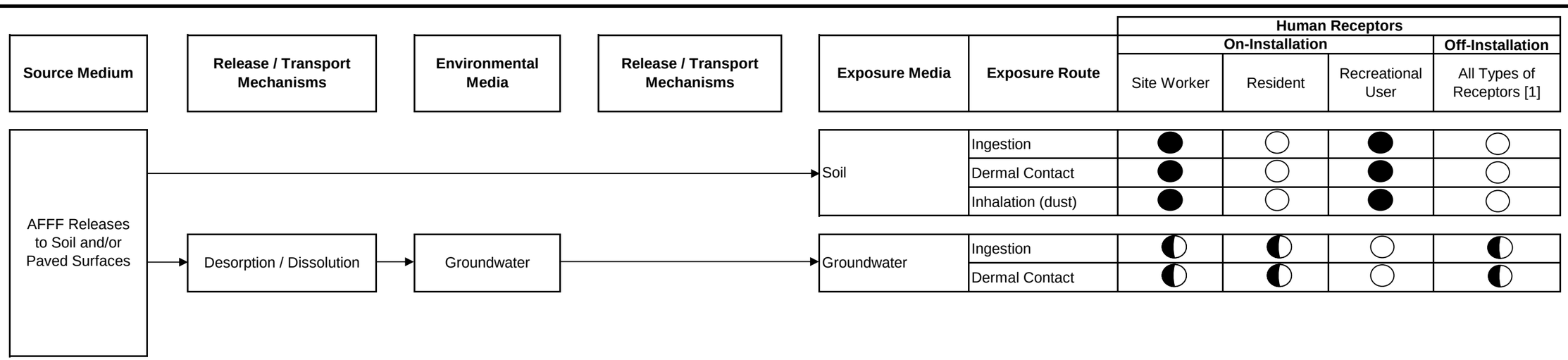
Notes:
[1] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

ARCADIS

Conceptual Site Model for Fire Station #1, Traffic Circle Car Fire and Former Fire Station #2 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-14



Legend:

- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

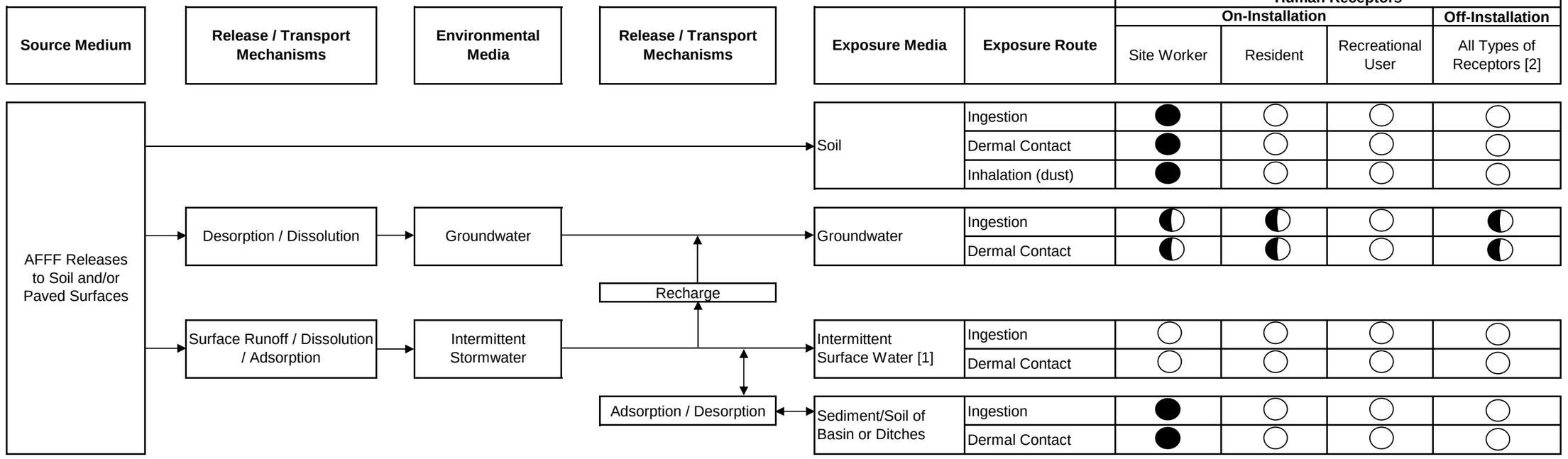
Notes:
[1] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

ARCADIS

Conceptual Site Model for Beehive on School Fence and Outdoor Sports Complex AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-15



Legend:

- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

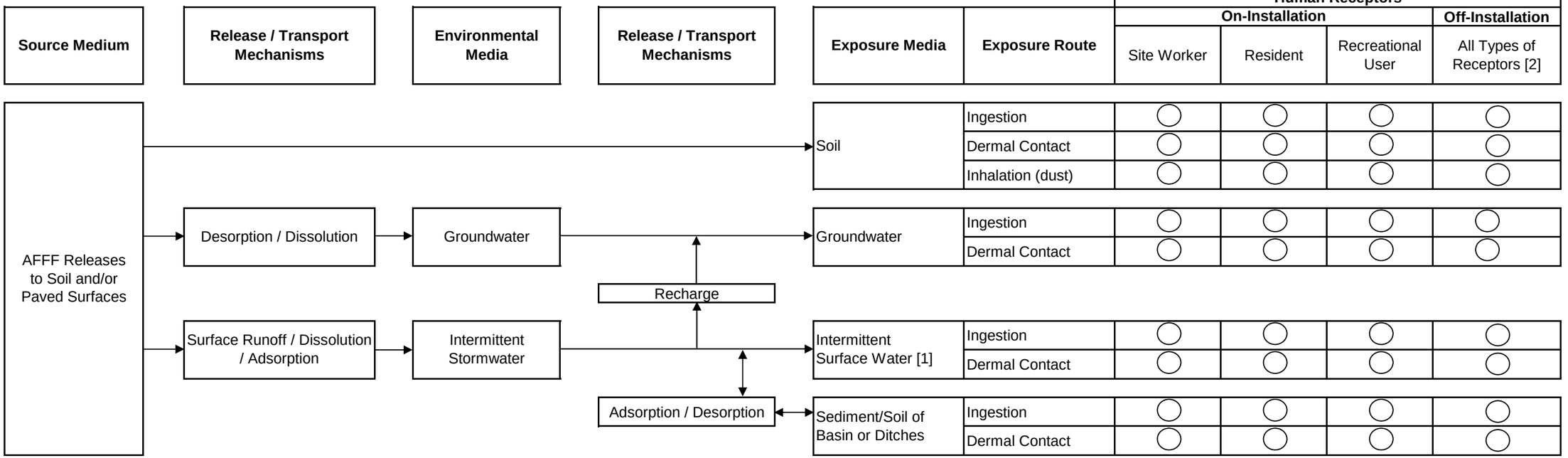
Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during work activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
LRC = Logistics Readiness Center
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

ARCADIS

Conceptual Site Model for LRC Fire Truck Maintenance, Defuel Pad, Former Firefighting Training Area, Current Firefighting Training Area, Fire Station #3, Hangar 5, and South Ramp Taxiway and Drainage Basin AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-16



Legend:

- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

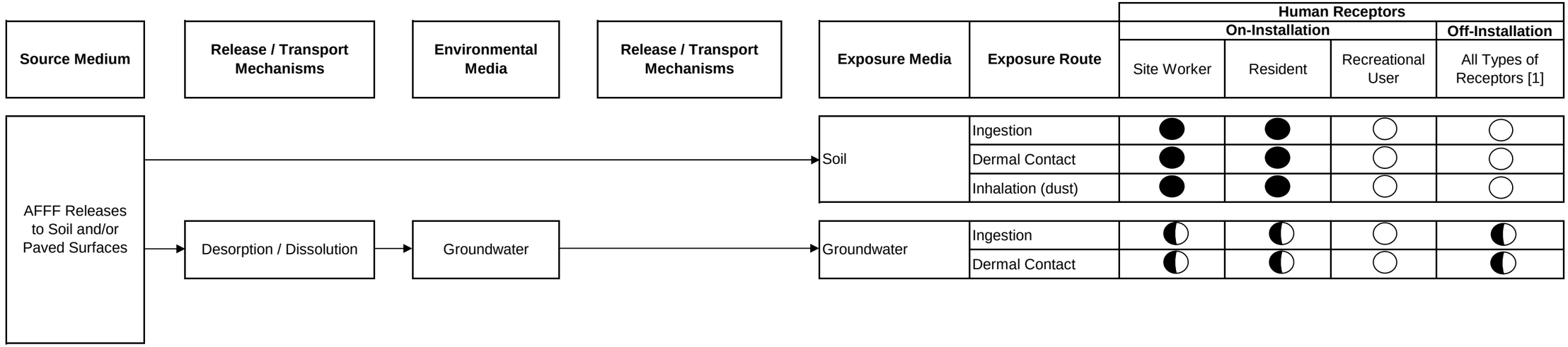
Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during work activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

ARCADIS

Conceptual Site Model for Hangar 6 AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-17



Legend:

- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
[1] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

ARCADIS

Conceptual Site Model for Prosser Village Barracks Landscaping AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-18

Source Media	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	On-Installation: Resident	On-Installation: Recreational User	Off-Installation: All Types of Receptors [2]
Releases of potentially PFAS-containing wastes to Sludge Drying Beds				Soil/Sludge	Ingestion	●	○	○	○
					Dermal Contact	●	○	○	○
					Inhalation (dust)	●	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	◐	○	◐
					Dermal Contact	◐	◐	○	◐
Releases of potentially PFAS-containing treated effluent to lined holding ponds		Treated Effluent		Surface Water [1]	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○
			Adsorption / Desorption	Sediment	Ingestion	○	○	○	○
					Dermal Contact	○	○	○	○

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

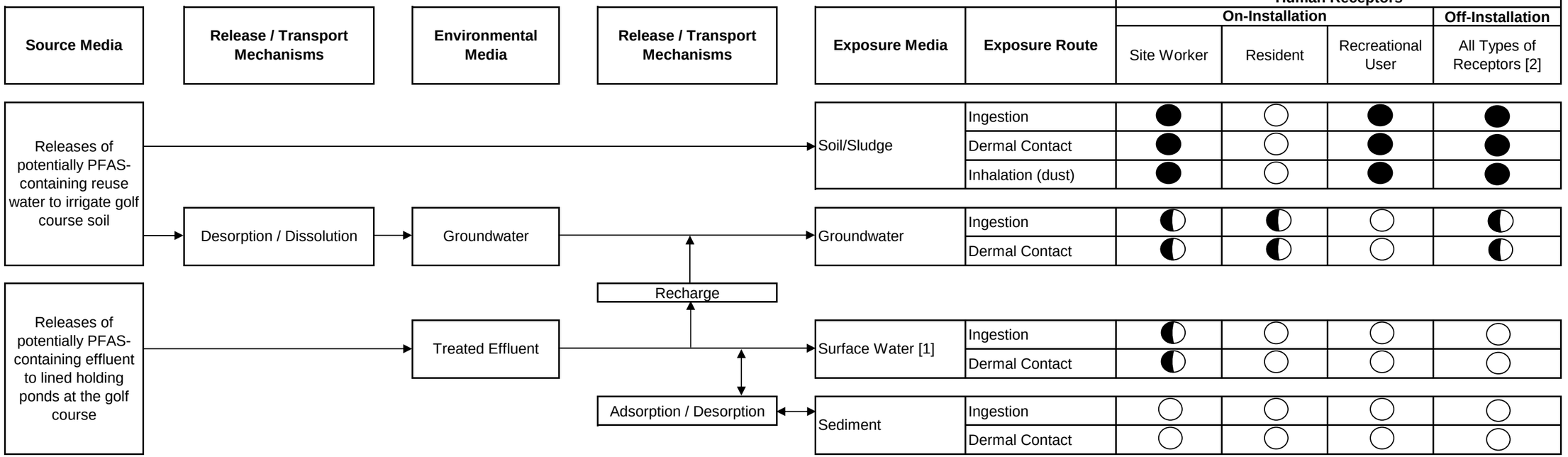
Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during work activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command
WWTP = wastewater treatment plant

ARCADIS

Conceptual Site Model for WWTP #1 and WWTP #2 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-19



Legend:

- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during irrigation activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
USAEC = United States Army Environmental Command

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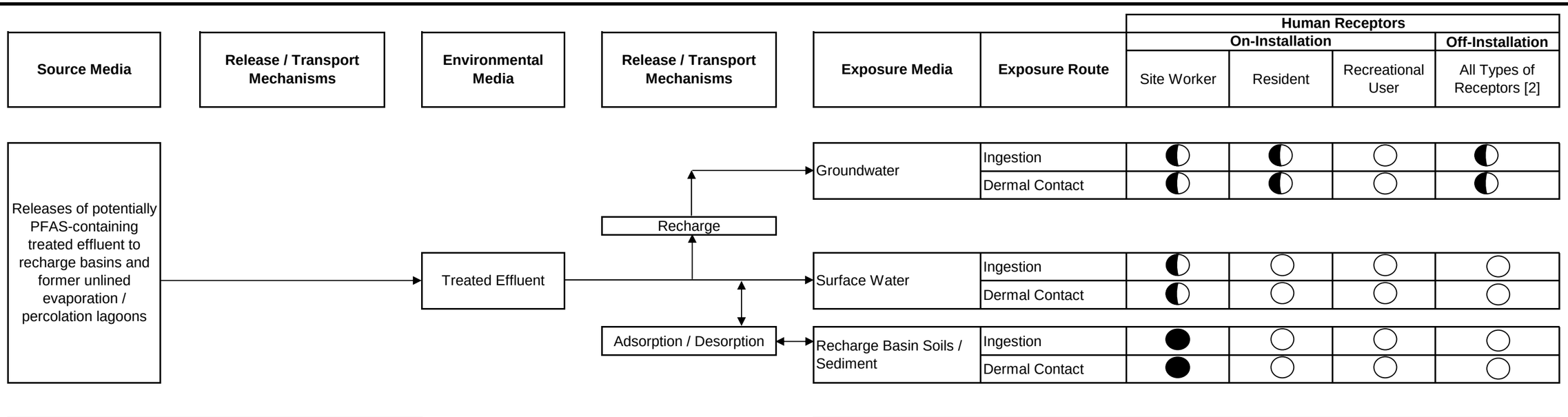
Conceptual Site Model for Mountain View Golf Course AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-20



Legend:

- ● = Complete Exposure Pathway
- ◐ = Potentially Complete Exposure Pathway
- ○ = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers describes incidental ingestion and dermal contact during work activities.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
AOPI = area of potential interest
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Conceptual Site Model for East Range Recharge Basins AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-21

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors			
						On-Installation			Off-Installation
						Site Worker	Resident	Recreational User	All Types of Receptors [1]
AFFF Releases to Soil and/or Paved Surfaces				Soil	Ingestion	●	○	○	○
					Dermal Contact	●	○	○	○
					Inhalation (dust)	●	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	◐	○	◐
					Dermal Contact	◐	◐	○	◐

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

Notes:
[1] All types of off-installation human receptors include drinking water receptors and recreational users.

Acronyms:
Acronyms:
AFFF = aqueous film-forming foam
AOPI = area of potential interest
PFAS = per- and polyfluoroalkyl substances
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Conceptual Site Model for UAV Black Tower Building 11683 AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Huachuca, Arizona

Figure 7-22

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