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

Sierra Army Depot, California

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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

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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 Army installations (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 Sierra Army Depot (SIAD) 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 (DoD) policy and guidance.

The Main Depot of SIAD is in the Honey Lake Valley of Lassen County, California, approximately four miles west of the California-Nevada state border and three miles north of U.S. Highway 395. SIAD is located on approximately 38,000 acres. These areas include the Main Depot (34,000 acres) and the Upper Burning Ground ([UBG]; 4,000 acres) located two miles northeast of the main boundary. The current mission at SIAD is to provide rapid expeditionary logistics support and long-term sustainment solutions to the Army and the Joint Force.

The SIAD PA identified 15 AOPIs for investigation during the SI phase. SI sampling results from the 15 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 groundwater, surface water, soil, and/or sediment at 11 AOPIs; however, six of the AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The SIAD 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 SIAD, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)				Recommendation
	GW	SO	SW	SE	
SIAD Fire Department Storage Building P-613	ND	No	NS	NS	No further action at this time
SIAD Current Fire Training Area	Yes	No	NS	NS	Further study in a remedial investigation
Equipment Yard – Building 79	No	No	NS	NS	No further 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	SW	SE	
SIAD Fire Station	Yes	Yes	NS	NS	Further study in a remedial investigation
Obstacle Course Training Area	Yes	No	NS	NS	Further study in a remedial investigation
FH # 1-05 Nozzle Testing Area	Yes	No	NS	NS	Further study in a remedial investigation
Excavated Soil Laydown Area	No	ND	NS	NS	No further action at this time
Amedee Airfield Building 627	ND	ND	NS	NS	No further action at this time
Acid Shed	No	No	NS	NS	No further action at this time
Small Aircraft Fire Training Area	ND	ND	NS	NS	No further action at this time
DRMO Storage Yard	ND	No	NS	NS	No further action at this time
AFFF Storage Area PS02	NS	ND	NS	NS	No further action at this time
AFFF Storage Area GS03	NS	ND	NS	NS	No further action at this time
Garrison Sewage Treatment Ponds	Yes	Yes	Yes	No	Further study in a remedial investigation
Mission Sewage Treatment Ponds	NS	No	Yes	ND	Further study in a remedial investigation

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

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 Sierra Army Depot (SIAD) 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 SIAD 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 some types 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 and 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 (OSD). 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 CERCLA. 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 SIAD, PA/SI development followed the process 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 SIAD. 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), United States Army Corps of Engineers (USACE), SIAD, and Arcadis U.S., Inc. (Arcadis). The kickoff call with the Army PA team and SIAD occurred on 07 March 2018, 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 SIAD.

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

- The Army Materiel Command 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 would 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 on 08 to 10 May 2018. An in-brief meeting was held to provide installation staff with the objectives of the site visit and to introduce team members. **Section 3** includes information regarding personnel interviewed.

Personnel interviews were conducted with individuals having significant historical knowledge at SIAD. 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 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 installation declined an exit briefing.

1.3.3 Post-Site Visit

Information collected before, during, and after the 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 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 served as the basis for developing the SI scope of work presented in the SIAD 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 between the Army PA team and SIAD.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- gauge regulatory involvement requirements or preferences
- identify overlapping unexploded ordnance or cultural resource areas
- discuss the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- 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 SIAD. Additional discussion topics included:

- confirm the plan for IDW handling and disposal
- confirm 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, a SIAD 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. 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 SIAD during sampling (Arcadis 2020). 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 SIAD 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 SIAD (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 SIAD 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 chromatography with tandem mass spectrometry and compliant with the DoD Quality Systems Manual (QSM) 5.3 (DoD and Department of Energy 2019a). 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 SIAD, 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

The Main Depot of SIAD is in the Honey Lake Valley of Lassen County, California, approximately 4 miles west of the California-Nevada state border and 3 miles north of U.S. Highway 395 as shown on **Figure 2-1** and **Figure 2-2**. The two largest communities around SIAD are Susanville, California, and Reno, Nevada. The two neighboring communities in California are Herlong, located near the southern entrance to the Main Depot, and Doyle, 8 miles south of SIAD's Main Depot. SIAD is situated in the high desert plain east of the Sierra Nevada Mountains at an elevation of 4,200 feet above mean sea level. It is characterized as having flat or gently rolling terrain dominated by sagebrush. The surrounding mountain ranges are the Amedee and Skedaddle Mountains to the north, the Fort Sage Mountains to the south, and the Diamond Mountains to the southwest. The mountains function as a barrier to storm systems that move eastward from the Pacific Ocean. SIAD is located on approximately 38,000 acres. These areas include the Main Depot (34,000 acres) and the Upper Burning Ground (UBG; 4,000 acres) located 2 miles northeast of the main boundary (Janus Global Corporation [Janus] 2017) (**Figure 2-1**).

2.2 Mission and Brief Site History

In 1942, the Sierra Ordnance Depot began operations as a storage depot for general supplies and inert materials belonging to the United States Treasury Department and was re-designated as SIAD in 1962. Other operations included maintenance and renovation of munitions; demilitarization of munitions; disassembly and repair of weapons; aerial bombing and gunnery practice; and maintenance of depot equipment and vehicles. In 1995, the Base Realignment and Closure office reduced SIAD’s ammunition mission, and in 2001, SIAD ceased its mission to renovate and demilitarize ammunition using the open burn/open detonation process. The current mission at SIAD is to provide rapid expeditionary logistics support and long-term sustainment solutions to the Army and the Joint Force. This includes management of war reserve assets; hospital support; and equipment maintenance, reclamation, and redistribution (USACE 2017).

2.3 Current and Projected Land Use

SIAD is located within the Wendel Planning Area, a zoning district of the town of Wendel, California, and comprises approximately one-third of its total area. The land use is mostly industrial, military training, and minor residential. SIAD is anticipated to remain an active Army facility with potential industrial-type and military training use (USACE 2017).

2.4 Climate

The Honey Lake Valley has an arid climate characterized by low relative humidity and low precipitation (Janus 2017). The average summer temperature range is approximately 47 to 90 degrees Fahrenheit and the average winter temperature range is approximately 22 to 44 degrees Fahrenheit. The annual precipitation in the SIAD area varies from as much as 20 inches in the surrounding mountains to less than 5 inches on the Honey Lake Valley floor. There may be snow during the winter months, though accumulation is low. In August 1996, the evaporation rates were 0.4 inches per day at the Honey Lake Wildlife Area (Arcadis 2012).

2.5 Topography

The Main Depot is of relatively flat terrain while the UBG, approximately 1-mile northeast of the Main Depot, consists of hillside terrain along the base of the Amedee Mountains, with some portions of relatively steep terrain. The surface elevation varies from approximately 4,000 to 4,130 feet above mean sea level, with little topographic relief, in the Main Depot. The UBG Area surface elevation varies from approximately 4,130 to 5,040 feet above mean sea level (Arcadis 2012). A topographic map is provided as **Figure 2-3**.

2.6 Geology

SIAD is located in Honey Lake Valley, a sedimentary basin surrounded by mountains and underlain by granitic rocks, Plio-Pleistocene and Pleistocene basalts, and pyroclastic deposits. The basin was formed during Tertiary block faulting, which displaced the granitic bedrock to depths of greater than 5,000 feet below ground surface (bgs). The volcanic rocks, ranging in age from Oligocene to Miocene, overlie the granitic bedrock in the mountain ranges surrounding the basin (Janus 2017).

The recent valley sediments consist of intermediate alluvium and thick alluvial fans. The alluvial fans, which have accumulated along the base of the mountain fronts, are predominantly comprised of coarse grained and very poorly sorted sediments, ranging from clays to boulders. The distal portions of these fans interfinger with the predominantly fine-grained lake deposits toward the center of the basin due to repeated expansion and contraction of Lahontan and Honey Lakes. This complex interfingering created highly variable subsoil in both the horizontal and vertical directions (Arcadis 2012).

2.7 Hydrogeology

The principal water-bearing formations in Honey Lake Valley are Pliocene Lake deposits, Plio-Pleistocene and Pleistocene lava flows (bordering the valley), Lahontan Lake and near-shore deposits, and recent valley sediments. Regionally, these formations are treated as a single aquifer, although locally, each of these deposits may be considered a separate flow system. At SIAD, the main water-bearing formations are the Lahontan Lake and near-shore deposits (Arcadis 2012). The primary sources of groundwater that recharge in Honey Lake Valley are the direct infiltration of precipitation and snowmelt in upland areas and the infiltration of water from streams in the alluvial fan areas (Janus 2017).

A 15 percent (%) specific yield has been used as the average in groundwater flow models of similar valleys and can be considered representative of primarily coarse-grained (upper-fan) deposits. A 10%

specific yield is typical for mixed course- and fine-grained deposits, and about 6% is common for fine-grained deposits. The former applies to near-shore deposits in Honey Lake Valley, while the latter correspond to off-shore deposits beneath the central valley floor (Janus 2017).

The depth to groundwater varies widely across SIAD, ranging from less than 3 feet bgs adjacent to Honey Lake to 120 feet bgs near SIAD's southern end. A groundwater divide is believed to exist near the eastern boundary of SIAD. West of the groundwater divide, the regional gradient is generally to the west toward Honey Lake; and east of the divide, the gradient is to the east (Arcadis 2012). The upper portion of the aquifer was divided into three groundwater zones (A, B, and C) that are not separated by impermeable aquitards but rather represent different depth intervals below the ground surface interfingered with discontinuous lenses of lower permeable silty materials. The A-zone extends from the water table to approximately 90 to 120 feet bgs. The B- and C- zones vary across the southern end of the Main Depot. The B-zone extends from approximately 120 to 160 feet bgs, and the C-zone extends from approximately 160 to 200 feet bgs (Janus 2017).

Localized variations in the overall regional gradient occur across SIAD. Hydrogeologic investigations indicate that groundwater hydraulic gradients are generally to the northwest in the southern portion of the Main Depot, and generally to the southwest in the northern portion of the Main Depot. In the central and western portions of SIAD, the hydraulic gradient is relatively flat, and flow appears to be to the west. Local variations in the potentiometric surface also occur in the vicinity of: (1) industrial areas where leaks in the water supply and sewage systems cause mounding; and (2) the potable supply wells located in the southern portion of SIAD. These wells cause seasonal variations in groundwater flow due to differing water usage requirements during the wet and dry seasons (USACE 2017).

2.8 Surface Water Hydrology

The surface water in the Honey Lake Valley consists primarily of Honey Lake and several smaller lakes and reservoirs. Honey Lake is a shallow lake that fluctuates in surface area and volume in response to recharge from precipitation and runoff. On average, Honey Lake has a surface area of approximately 73 square miles. However, during drought years, the lake periodically dries up (Arcadis 2012).

2.9 Relevant Utility Infrastructure

The following subsections provide general information regarding the installation's stormwater and wastewater management systems, as well as information on how the utility infrastructures may influence the fate and transport of PFAS constituents at SIAD.

2.9.1 Stormwater Management System Description

Stormwater is accommodated by natural surface drainage and open channels at SIAD. The channels flow slowly westward into Honey Lake and most stormwater infiltrates into the ground before reaching the lake. There are no significant retention basins at SIAD. Stormwater is conveyed into localized depressions for infiltration into the soil, as opposed to being collected and discharged via piping at a controlled rate. SIAD contains 2,918 linear feet of storm sewer lines and 47,710 linear feet of drainage ditches (Woolpert, Inc. 2015).

2.9.2 Sewer System Description

The sanitary sewer system at SIAD includes more than 25 miles of underground piping that directs wastewater to open-air sewage lagoon treatment systems at two locations: three garrison area lagoons and two warehouse area lagoons.

The garrison area lagoons process the majority of wastewater on SIAD and were installed in September 2002. The lagoons use a facultative process with treatment in three wetland cells to handle overflows, assist with treatment of gray water by biological activity, and improve percolation. The average flow to the garrison area lagoons is 37,000 gallons per day with a permitted throughput of as much as 160,000 gallons per day. In 2015, two of the three wetland cells required rehabilitation (Woolpert, Inc. 2015).

The smaller warehouse area lagoons primarily serve the warehouse area. The lagoons are an anaerobic system with one primary and one secondary evaporative pond, approximately 1 acre in size each. In 2009, average flow to the system was 4,000 gallons per day and it has a permitted throughput of approximately 9,000 gallons per day (Woolpert, Inc.2015).

2.10 Potable Water Supply and Drinking Water Receptors

The potable water is supplied by the Lahontan Lake aquifer and near-shore deposit groundwater aquifer systems. Historically, four potable wells (PSW-02, PSW-05, PSW-08, and PSW-12) were installed on SIAD to provide drinking water to the installation and the census designated place of Herlong, California. In 2013, the water supply mains were disconnected at the property line and the SIAD water supply system currently only serves operations within the installation boundaries. The total depths of the SIAD drinking water wells extend from 540 to 700 feet bgs and are screened across the deep regional aquifer that begins at approximately 205 feet bgs. PSW-08 was used as the primary supply well but is now off-line due to detections of PFAS constituents observed in 2017 and is scheduled to go back online once a granulated activation carbon (GAC) unit is installed to support additional potable water supply. PSW-08 previously operated for 8 hours per day with pumping rates ranging from 460 to 600 gallons per minute. PSW-05 and PSW-12 are currently considered the primary public water supply wells for providing domestic water to SIAD. SIAD has three (PSW-05, PSW-08, and PSW-12) operational wells to meet the potable water supply maximum day demand outlined in California Title 22 54665(a)(b)(c)(d). Specifically, section 54665(c) discusses the requirement of two operational wells at any given time. PSW-12 was installed in 2017 to meet the maximum day demand as PSW-02 was removed from the drinking water system to support non-potable applications such as dust suppression (Janus 2017).

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 SIAD, which along with state and county GIS provided by the installation identified several off-post public and private wells within 5 miles of SIAD's boundary (**Figure 2-4**). The EDR report documenting 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. The following information is provided for future reference should the Army decide to evaluate exposure pathways relevant to the ecological receptors.

SIAD has a variety of flora and fauna. Most of the expansive areas are dominated by shrubs and grasses typical of semi-desert regions in the intermountain western U.S. The major plant community is greasewood-sagebrush, which is characteristic of the alkaline soil and semi-arid climate of the area. The most common shrubs are greasewood, sagebrush, rabbit brush, spring hopsage, horsebrush, Mormon tea, and shadscale. The popular grasses include Great Basin wild rye, saltgrass, squirrel tail, and annual cheatgrass. The common forbs (broad leaf herbs) include poverty weed, pepperwood, and tansy mustard. There are no threatened or endangered plant species known to inhabit SIAD (USACE 2017).

The variety of wildlife species in SIAD includes four species of rabbits, 29 species of rodents, coyote, bobcat, fox, mule deer, various reptiles and amphibians, and more than 200 bird species. SIAD is located near the migratory route of the Golden Eagle, Bald Eagle, and various migratory birds such as waterfowl, horned lark, black-billed magpie, and white-crowned sparrows. The animals that inhabit SIAD fall into two classes: (1) those that reside in the area year-round and (2) those that visit the area only seasonally. The animal species most likely reside in the area year-round are all rodents, other small mammals, lizards, and snakes. In general, these animals are most active during early morning, evening, and night. The seasonal residents of the area include mostly insect and bird species. The presence of these species is primarily limited by the major influxes of water through rainfall or snowmelt. The presence of significant quantities of water in desert biomes results in the germination of ephemeral plants, which then affects the life cycles of desert insect species. Subsequently, birds that eat the ephemeral plants and/or insects may become temporarily established for local breeding. During exceptionally wet years there is potential for an increase of lowland grassland habitats on alkaline substrates, producing salt grass with a flowering nectar source. This specific habitat has the potential to support the Carson Wandering Skipper, an endangered species known to occupy areas to the west and east of the installation (USACE 2017).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relevant to SIAD performed by the Army are summarized to provide full context of available PFAS constituent data for SIAD. PFAS constituent sampling in soil and groundwater has taken place on several occasions at SIAD. In June 2016 and in June, October, November, and December of 2017, the SIAD water supply wells were sampled for PFAS constituents. Public Water Supply Well PSW-08 had a PFOA concentration greater than 100 ng/L in December 2017 and is currently offline due to this detection. Samples collected from wells PSW-05 and PSW-12 did not contain detectable PFAS constituents. Surface soil samples were collected in May of 2017 and analyzed for PFAS from four locations: the SIAD Fire Department Storage Building P-613 (two samples), Acid Shed (two samples), Equipment Yard Building 79 (four samples), and Amedee Airfield Building 627 (two samples). The highest combined PFOS/PFOA concentration measured in a soil sample was 0.00423 milligrams per kilogram (mg/kg), collected at the Acid Shed. PFBS was below detection limits in all samples. Other detections of PFOS/PFOA were a PFOA detection of 0.00012 J mg/kg in soil at P-613

Fire Department and a PFOS detection of 0.00022 J mg/kg in soil at Equipment Yard Building 79. Data collected from previous PFAS constituent investigations is found in **Table 2-1** and **Table 2-2**.

3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored, and/or disposed of at SIAD, data were 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 SIAD 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 administrative record documents, compliance documents, SIAD fire department documents, SIAD directorate of public works 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 SIAD is provided in **Appendix F**.

3.2 Personnel Interviews

Interviews were conducted 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 SIAD is presented below (affiliation is with SIAD).

- Restoration Manager
- Environmental Chief
- Garrison Manager
- Airfield Manager
- Fire Chief
- Assistant Fire Chief
- Division Captain
- Paint Supervisor
- Real Property Manager
- Water Program Manager
- Branch Foreman

- Hazardous Waste Coordinator
- Transportation Director
- Fuel Distribution Director
- Director of Risk Management
- Director/Supervisor Ammunition Operations & Quality Assurance
- General Maintenance Supervisor
- Fire Inspector
- Environmental Manager

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 SIAD during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. 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**.

Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for site inspection sampling.

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 SIAD 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

SIAD 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.

AFFF was historically used at SIAD for training activities at three areas: SIAD Current Fire Training Area, Obstacle Course Training Area, and Small Aircraft Fire Training Area. Two additional areas at SIAD were identified to have been used for nozzle testing activities during personnel interviews (**Appendix G**): FH #1-05 Nozzle Testing Area and Amedee Airfield Building 627. Each area is described below:

- The SIAD Current Fire Training Area is used for rescue response activities and training with Class A firefighting foam. Fire department personnel stated that no AFFF or Class B foams had been used during training activities, however, environmental personnel suspect AFFF was used but do not know the type.
- The Obstacle Course Training Area is believed to have used AFFF during training activities according to environmental personnel.
- The Small Aircraft Fire Training used firefighting foam, potentially AFFF, during small aircraft fire training activities conducted between 2008 and 2010.
- Fire Hydrant (FH) # 1-05 Nozzle Testing Area was used to support monthly nozzle testing with AFFF in the 1990s. Nozzle testing occurred on both sides of Texas Street in a former housing area, north of the Humboldt Street intersection. Approximately 100 to 200 gallons of AFFF mixture was used during training exercises.
- At Amedee Airfield Building 627, AFFF was historically used adjacent to the airfield parking apron during nozzle testing in support of aviation activities and training from the 1960s until the mid-

1990s. In 2017, eight PFAS were analyzed for in soil; PFOA, PFOS, and PFBS were all non-detect although other PFAS were detected.

In addition to AFFF use, AFFF is currently or was historically stored at the following known locations:

- Approximately 100 gallons of AFFF in 5-gallon containers was previously stored at P-613 SIAD Fire Department Storage Building. Based on site personnel interviews, sometime between 2015 and 2018, AFFF containers were found leaking on a shelf and had spilled onto the floor. In 2017, soil samples were analyzed for eight PFAS constituents (**Table 2-2**). PFOA was measured at 0.00012 J mg/kg. PFOS and PFBS were non-detect.
- The Acid Shed was formerly used for storage of AFFF from approximately 2006 to 2016. In 2017, soil samples were analyzed for eight PFAS constituents (**Table 2-2**). PFOA was measured at 0.0034 mg/kg, PFOS was measured at 0.00083 mg/kg, and PFBS was non-detect.
- The Defense Reutilization and Marketing Office (DRMO) Storage Yard was used for storage of surplus and scrap materials that could be reutilized or sold by the Army. Approximately 3,450 gallons of AFFF in 690, 5-gallon containers were stored in the area.
- Fuel Units GS03 and PS02 currently house approximately 142, 5-gallon containers of AFFF.

One additional area, the SIAD Fire Station, has historically used and currently stores AFFF. Currently, the fire station stores approximately 360 gallons of AFFF in 72, 5-gallon containers. Based on site interviews, fire trucks performed nozzle testing and washing in the parking lot of the station.

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

Following document research, personnel interviews, and site reconnaissance at SIAD, a pesticide storage area, WWTP sewage treatment ponds, and an excavated soil laydown area 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**.

The September 2018 Army guidance indicates the mechanisms for potential use, storage, and/or disposal of PFAS-containing materials (Army 2018). Following document research, personnel interviews, and site reconnaissance at SIAD, Equipment Yard – Building 79, Garrison Sewage Treatment Ponds, Mission Sewage Treatment Ponds, and Excavated Soil Laydown Area were identified as AOPIs. The Equipment Yard – Building 79 area was historically used for equipment and pesticide storage. In 2017, soil samples from the area were analyzed for eight PFAS constituents. PFOS was measured at 220 J ng/kg. PFOA and PFBS were non-detect. The Excavated Soil Laydown Area was a temporary laydown yard and received approximately 3,700 cubic yards (cy) of soil excavated from SIAD-007 Fire Training Area (Site 13) in the mid-1990s. The impacted soil was moved to a secondary unknown location as a base for a hardstand. The Garrison and Mission Sewage Treatment Ponds were identified as AOPIs due to the potential influence of PFAS-containing wastes being disposed of at the ponds.

Analysis of data collected from installation records review and personnel interviews indicated that no metal plating (e.g., chromium plating, electroplating, or other metal plating) operations currently or historically existed at SIAD.

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 SIAD) 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 below.

One volunteer fire department in Herlong, California was identified approximately 0.2 mile south of the southern installation boundary.

Two additional, currently off-post potential PFAS sources were identified during the PA: SIAD-007 Fire Training Area and SIAD-013 Old Firefighting Training Facility. The SIAD-007 Fire Training Area was used for firefighting training activities from 1968 to 1987. The SIAD-007 Fire Training Area was transferred to the Department of Justice and is currently located within the boundaries of a federal prison. The SIAD-013 Old Firefighting Training Facility was used for firefighting training in the 1960s. The property has been transferred to the Department of Interior and is currently owned by the Susanville Indian Rancheria. No other potential off-post sources were identified.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The preliminary locations evaluated for potential use, storage, and/or disposal of PFAS-containing materials at SIAD 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, 15 areas have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

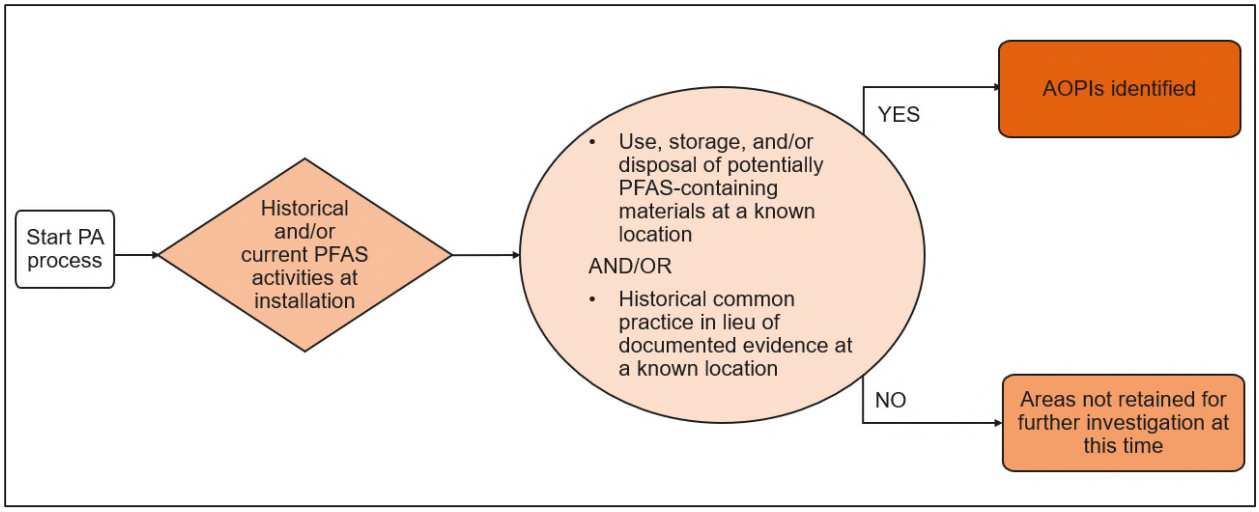

Figure 5-1: AOPI Decision Flowchart

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 SIAD are presented in **Section 8**.

5.1 Areas Not Retained for Further Investigation

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

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

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Packing Facility Building 544	Prior to 2006	Small quantities of AFFF were removed from Building 544 in 2006 and transferred to the Acid Shed.	The site was a temporary (less than 90 days) holding facility where small amounts of AFFF have been staged. No evidence of PFOS, PFOA, or PFBS containing products used, stored for long term, and/or disposed of at this location.

5.2 AOPIs

Overviews of each AOPI identified during the PA process are presented in this section. None of the AOPIs overlap with SIAD Installation Restoration Program sites and/or Headquarters Army Environmental System sites (**Figure 5-2**).

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) are presented on **Figures 5-3** through **5-13** and include active monitoring wells in the vicinity of each AOPI. No AOPIs were identified in the UBG of the installation.

5.2.1 SIAD Fire Department Storage Building P-613

The SIAD Fire Department Storage Building P-613 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical AFFF storage. Five-gallon containers totaling approximately 100 gallons were previously stored here. An interviewee reported that AFFF containers were found (sometime from 2015 to 2018) leaking on a shelf and that liquid had spilled to the floor. PFAS constituents were detected in soil samples collected within this AOPI in 2017 (**Figure 5-3 , Table 2-2**).

5.2.2 SIAD Current Fire Training Area

The SIAD Current Fire Training Area is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current fire training activities and conflicting responses to the type of foam product used at the site. The area is used for rescue response activities and training with Class A firefighting foam. Fire department personnel stated that no AFFF or Class B foams had been used during training activities, however, environmental personnel suspect a firefighting foam was used, but do not know the type (**Figure 5-3**).

5.2.3 Equipment Yard – Building 79

The Equipment Yard – Building 79 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the storage of pesticides at this location. The site has historically been used for equipment and pesticide storage (**Figure 5-3, Table 2-2**). The main constituents of concern in this area are aldrin, chlordane, and dieldrin. Additionally, PFAS constituents were detected in soil in 2017.

5.2.4 SIAD Fire Station

The SIAD Fire Station is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to standard fire station operating activities as well as AFFF storage at the site. Approximately 360 gallons of AFFF is stored in 72, 5-gallon containers at this AOPI. Interviewees indicated fire trucks performed nozzle testing and washing in the parking lot of the station (**Figure 5-4**).

5.2.5 Obstacle Course Training Area

The Obstacle Course Training Area is identified as an AOPI following records research and personnel interviews due to training activities. Environmental personnel indicated that AFFF was used during training activities at the obstacle course (**Figure 5-5**).

5.2.6 FH # 1-05 Nozzle Testing Area

The FH # 1-05 Nozzle Testing Area is identified as an AOPI following personnel interviews and site reconnaissance due to foam nozzle testing activities. FH #1-05 was used to support monthly nozzle testing with AFFF in the 1990s. Nozzle testing occurred on both sides of Texas Street in a former housing area, likely north of the Humboldt Street intersection (**Figure 5-5**).

5.2.7 Excavated Soil Laydown Area

The Excavated Soil Laydown Area is identified as an AOPI following personnel interviews and site reconnaissance due to temporary storage of potentially PFAS-containing soil. This AOPI was a temporary laydown area for approximately 3,700 cy of soil excavated from SIAD-007 Fire Training Area (Site 13). All the impacted soil was then reportedly moved and used at an unknown location as a base for a hardstand (**Figure 5-6**).

5.2.8 Amedee Airfield Building 627

The Amedee Airfield Building 627 is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historic nozzle testing activities. AFFF was historically discharged adjacent to the airfield parking apron during nozzle testing in support of aviation activities and training. Soil samples collected in 2017 were non-detect for PFOS and PFOA, though other PFAS constituents were detected (**Figure 5-7, Table 2-2**).

5.2.9 Acid Shed

The Acid Shed is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical AFFF storage. PFAS constituents were detected in soil samples collected within this AOPI in 2017 (**Figure 5-8, Table 2-2**).

5.2.10 Small Aircraft Fire Training Area

The Small Aircraft Fire Training Area is identified as an AOPI following personnel interviews, and site reconnaissance due to fire training activities at this location. Interviewees reported small aircraft fire training using firefighting foam, possibly AFFF, was conducted between 2008 and 2010 (**Figure 5-9**).

5.2.11 DRMO Storage Yard

The DRMO Storage Yard is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical AFFF storage. This location was used for storage of surplus and scrap materials that could be reutilized or sold by the Army. Storage of 690, 5-gallon containers of AFFF totaling 3,450-gallons were stored in the area (**Figure 5-10**).

5.2.12 AFFF Storage Area PS02

The AFFF Storage Area PS02 is identified as an AOPI following the identification of 5-gallon buckets of AFFF currently stored at this location (**Figure 5-10**). Approximately 150 gallons of AFFF has been stored here for 10 to 15 years to support the Inland Petroleum Distribution System.

5.2.13 AFFF Storage Area GS03

The AFFF Storage Area GS03 is identified as an AOPI following the identification of 5-gallon buckets of AFFF currently stored at this location (**Figure 5-11**). Approximately 110 gallons of AFFF has been stored here for 10 to 15 years to support the Inland Petroleum Distribution System.

5.2.14 Garrison Sewage Treatment Ponds

The Garrison Sewage Treatment Ponds were identified as an AOPI due to the potential influence of PFAS-containing wastes being disposed of at the ponds (**Figure 5-12**). A GAC unit was constructed in 2019 at PSW-08 to remove PFOA from drinking water. However, after flushing the system of approximately 250,000 gallons of water it was discovered that PFAS-containing materials were used during GAC unit construction, and the unit had to be rebuilt. The 250,000 gallons of water was sent to the Garrison Sewage Treatment Ponds and the Mission Sewage Treatment Ponds. The ponds are lined, however, there are known leaks in the liner.

5.2.15 Mission Sewage Treatment Ponds

The Mission Sewage Treatment Ponds were identified as an AOPI due to the potential influence of PFAS-containing wastes being disposed of at the ponds (**Figure 5-13**). Water from the PSW-08 GAC system

was sent here as discussed in **Section 5.2.14**. The ponds are lined, however, there are known leaks in the liner.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at SIAD, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at SIAD at all 15 of the AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. As such, 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 SIAD AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 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 potentially complete soil, groundwater, surface water, and/or sediment exposure pathways at all 11 AOPIs identified during the PA, which guided the SI sampling at those AOPIs. An additional four AOPIs were identified after the initial SI sampling and were therefore not included in the QAPP Addendum, however the sampling event followed all procedures discussed in the QAPP Addendum. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in May, August, and November 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 SIAD QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analysis procedures for the SI phase at SIAD. 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 SIAD 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, soil, surface water, and sediment for PFOS, PFOA, and 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.

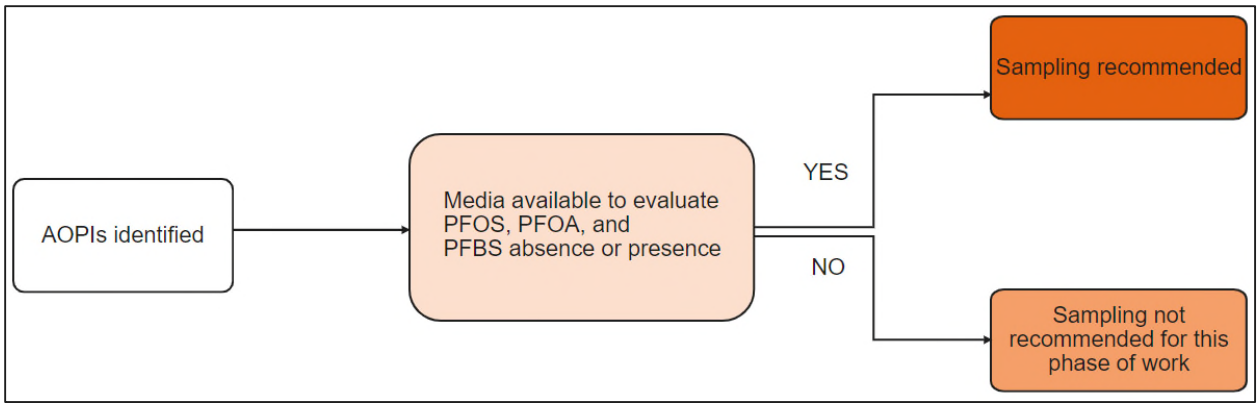

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at SIAD is detailed in Worksheet #17 of the SIAD QAPP Addendum (Arcadis 2020). Briefly, groundwater, soil, surface water, and sediment samples were collected from on-post production wells, existing monitoring wells, and soil borings at and downgradient of areas with a known or suspected AFFF use, AFFF storage areas, and areas that historically received potentially PFAS-containing materials. Soil samples were collected to inform the interpretation of PFOA, PFOS, and PFBS distribution, evaluate the potential for those areas to be sources of PFOS, PFOA and PFBS to surface water and groundwater as an influence to drinking water, and update the individual AOPI CSMs. Groundwater, surface water, soil and sediment samples were analyzed for PFOS, PFOA, and PFBS by Liquid Chromatography with tandem mass spectrometry Compliant with Table B-15 of DOD QSM 5.3, and one soil sample from each AOPI was also analyzed for total organic carbon (TOC), pH, and grain size.

Sampling depths at existing monitoring wells represent approximately the center of the saturated screened interval. Well construction details are included on **Table 6-1**.

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 SIAD QAPP Addendum (Arcadis 2020), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP included in the QAPP Addendum (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., soil boring logs,

groundwater purging logs, and tailgate health and safety 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

Groundwater samples were collected using low flow purging methods from approximately the center of the saturated screened interval at existing monitoring wells. At sampling locations where boreholes were advanced, hollow stem auger methods were employed using a top-down sampling method to minimize cross-contamination at depth. Shallow (first encountered) groundwater was sampled at each of these sampling points. Hollow stem auger boring advancement and sampling was completed in accordance with TGI P-12 in Appendix A to the PQAPP (Arcadis 2019).

Shallow soil samples (0 to 2 feet bgs) were collected via hand auger, in accordance with the TGI P-12 in Appendix A to the PQAPP (Arcadis 2019). At hollow stem auger drilling locations, boreholes were first advanced to a maximum of 5 feet bgs using hand-auguring methods; decontaminated stainless-steel trowels were used to collect soil from the borehole walls in the 0 to 2 feet bgs interval. The boreholes were backfilled with the augured cuttings upon completion of sampling, after extracting sample volumes. Depending on field conditions, groundwater samples were collected with either a check valve and hydrolift pump or with a PFAS-free disposable bailer through a screen-point sampler (Arcadis 2020).

Surface water samples were collected using direct-fill methods just below the water surface. Sediment samples were collected from the upper 10 centimeters using a stainless-steel trowel; sediment samples were decanted before bottling for laboratory analysis. Surface water and sediment samples were collected in accordance with TGI P-15 in Appendix A to the PQAPP (Arcadis 2019).

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, and TOC 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 drill casing and cutting shoes, hand augers, and water-level meters 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 7.5**.

6.3.3 Dedicated Equipment Background

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 PFOS, PFOA, and/or PFBS-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 once the field parameters stabilized.

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 SIAD SI work.

In some cases, clarifications to the established scope of work were needed but did not 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 that did not affect DQOs are documented in Field Change Reports (FCRs) included as **Appendix M** and are summarized below:

- FCR-SIAD-01: Equipment Yard Building 79 was updated to the correct building number. It was originally identified as Building 74.
- FCR-SIAD-02: The outline of the Small Aircraft Fire Training Area AOPI was extended to the west and sampling locations were adjusted accordingly after determining fire training activities had also taken place further to the west.
- FCR-SIAD-03: DEB samples were previously identified as dedicated equipment background blanks (DEBBs) in the QAPP Addendum due to programmatic changes that occurred after the development of the QAPP Addendum. In developing this PA/SI report, the word ‘blanks’ was removed from the discussion of these samples. This sample is not to be used as a blank but was used to help inform where the dedicated equipment may have influenced PFOS, PFOA, or PFBS concentrations in the associated groundwater sample.
- FCR-SIAD-04: Two locations that were identified as AFFF storage locations were not originally included in the SI sampling scope, however, these locations were sampled. The sampling procedure followed that outlined in the SIAD QAPP Addendum (Arcadis 2020). Four soil samples were collected from each location.
- FCR-SIAD-05: Twelve wastewater treatment ponds were added as AOPIs in accordance with Headquarters Department of the Army guidance due to potential PFAS-containing waste being disposed of at the ponds. Eight treatment ponds are located on the western side of the

cantonment area (the Garrison Sewage Treatment Ponds) and four ponds are located on the northeastern side of the cantonment area (the Mission Sewage Treatment Ponds). The sampling plan for the ponds and associated drying beds is included in **Appendix M**.

6.3.5 Decontamination

Non-dedicated reusable sampling equipment (e.g., stainless-steel trowels, hand augers, drill cutting shoes and casing, 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

IDW, including saturated soil cuttings, groundwater, and decontamination fluids were collected and placed in Department of Transportation-approved 55-gallon drums, labeled as non-hazardous pending analysis, segregated by medium (i.e., waters, soil, and equipment), and transported to a staging area. Equipment IDW includes personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, and high-density polyethylene and silicon tubing) that may come in contact with sampling media. Shallow soil and dry drill cuttings were returned to the ground following sample collection. Upon receiving results, the IDW waste was disposed of by the SIAD Hazardous Waste department. Analytical results for IDW samples collected during the SI are discussed in **Section 7.3**.

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 soil, sediment, and surface water 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 below:

- TOC by Solid Waste Test Method 846 9060A
- Grain size analysis by American Society for Testing and Materials D422-63

- pH by Solid Waste Test Method 846 9045D.

These data were 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 percent 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 and data generated from IDW profiling, 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 2019a). 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 O** 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 SIAD. 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 2019b) 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 SIAD 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 SIAD QAPP Addendum (Arcadis 2020). Data qualifiers applied to laboratory analytical results for samples collected during the SI at SIAD 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.

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, 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 are used to compare all groundwater and surface water data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at SIAD are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS are used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the relevant 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 8**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at SIAD (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 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 **7-4** provide a summary of the groundwater, soil, surface water, and sediment analytical results for PFOS, PFOA, and PFBS. **Table 7-5** 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 SIAD with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2** through **7-12** show the PFOS, PFOA, and PFBS analytical results in groundwater, surface water, soil, and sediment 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 6.4.4**) are presented on the analytical tables. Groundwater and surface water data collected during the SI are reported in ng/L, or parts per trillion, and soil and sediment data are reported in mg/kg, or parts per million.

Field parameters measured for groundwater during low-flow purging and sample collection are provided on the field forms in **Appendix K**. Soil and sediment 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 20 to 135 feet bgs at SIAD.

Table 7-5 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Y/N)
SIAD Fire Department Storage Building P-613	N
SIAD Current Fire Training Area	Y
Equipment Yard – Building 79	N
SIAD Fire Station	Y
Obstacle Course Training Area	Y
FH # 1-05 Nozzle Testing Area	Y
Excavated Soil Laydown Area	N
Amedee Airfield Building 627	N
Acid Shed	N
Small Aircraft Fire Training Area	N
DRMO Storage Yard	N
AFFF Storage Area PS02	N
AFFF Storage Area GS03	N

AOPI Name	OSD Exceedances (Y/N)
Garrison Sewage Treatment Ponds	Y
Mission Sewage Treatment Ponds	Y

7.1.1 SIAD Fire Department Storage Building P-613

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the SIAD Fire Department Storage Building P-613 (**Figure 7-2**).

7.1.1.1 Groundwater

One groundwater sample was collected from existing monitoring well SSA-03-MWB at downgradient from the Fire Department Storage Building P-613. PFOS, PFOA, and PFBS were not detected in the parent or duplicate sample.

7.1.1.2 Soil

Two shallow soil samples, SIAD-P613-1 and SIAD-P613-2 were collected from 0 to 2 feet bgs at the SIAD Fire Department Storage Building P-613. PFOS was detected below the OSD risk screening level in SIAD-P613-1 at a concentration of 0.0009 J mg/kg. PFOA and PFBS were not detected at SIAD-P613-1. PFOS, PFOA, and PFBS were not detected at SIAD-P613-2.

7.1.2 SIAD Current Fire Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the SIAD Current Fire Training Area (**Figure 7-2**).

7.1.2.1 Groundwater

Two groundwater samples were collected from existing monitoring wells (ALF-07-MWA and W-02-MWA) at the SIAD Current Fire Training Area. PFOS was not detected in either groundwater sample at this AOPI. PFOA was detected in both samples (38 ng/L at W-02-MWA and 74 ng/L at ALF-07-MWA), with the latter being above the OSD risk screening level of 40 ng/L. PFBS was detected below the OSD risk screening level with concentrations of 6.0 ng/L at ALF-07-MWA and 6.4 ng/L at W-02-MWA.

7.1.2.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at five locations at the SIAD Current Fire Training Area (SIAD-CFTA-1 through SIAD-CFTA-5). PFOS was detected below the OSD risk screening level in SIAD-CFTA-2 at a concentration of 0.0011 mg/kg. PFOS was not detected in the remaining four samples. PFOA was detected below the OSD risk screening level in SIAD-CFTA-2 and SIAD-CFTA-3 at concentrations of 0.0014 mg/kg and 0.0012 mg/kg, respectively. PFOS was not detected in the remaining

three samples. PFBS was not detected above the OSD risk screening level in any of the soil samples at this AOPI.

7.1.3 Equipment Yard – Building 79

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with Equipment Yard – Building 79 (**Figure 7-2**).

7.1.3.1 Groundwater

Two groundwater samples were collected at the Equipment Yard – Building 79 from existing monitoring wells EQY-01-GW and W-01-MWA: PFOS, PFOA, and PFBS were not detected above the OSD risk screening level in either sample. PFOA was detected below the OSD risk screening level in EQY-01-GW at a concentration of 12 ng/L. PFOA was not detected in W-01-MWA. PFBS was detected below the OSD risk screening level at a concentration of 3.6 ng/L at EQY-01-GW and 7.8 ng/L at W-01-MWA.

7.1.3.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at five locations at the Equipment Yard - Building 79 (SIAD-EY79-1 through SIAD-EY79-5); PFOS, PFOA, and PFBS were not detected in any samples above the OSD risk screening levels. PFOS was detected below the OSD risk screening level in two soil samples, SIAD-EY79-4 and SIAD-EY79-5, at concentration of 0.0016 mg/kg and 0.0067 mg/kg, respectively. PFOS was not detected in the remaining three samples. PFOA was detected below the OSD risk screening level at SIAD-EY79-5, at a concentration of 0.0019 mg/kg. PFOA was not detected in the remaining four samples. PFBS was not detected at any of the soil samples collected at this AOPI.

7.1.4 SIAD Fire Station

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with SIAD Fire Station (**Figure 7-3**).

7.1.4.1 Groundwater

Two groundwater samples were collected at the SIAD Fire Station; PFOA, but not PFBS or PFOS, was detected above the OSD screening level in both samples. One sample was collected via hollow stem auger drilling (SIAD-FS-1) and one was collected from existing monitoring well MPA-04-MWA. PFOS was not detected at MPA-04-MWA but was detected below the OSD risk screening level at SIAD-FS-1 with a concentration of 15 DJ ng/L. PFBS was detected below the OSD risk screening level at both wells with concentrations of 430 DJ ng/L at SIAD-FS-1 and 88 ng/L at MPA-04-MWA. PFOA was detected above the OSD risk screening level (40 ng/L) in both samples with concentrations of 17,000 DJ ng/L at SIAD-FS-1 and 950 DJ ng/L at MPA-04-MWA.

7.1.4.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at five locations at the SIAD Fire Station (SIAD-FS-1 through SIAD-FS-5); PFOS and PFOA, but not PFBS, were detected above the OSD risk screening

level in one sample each. PFOS was detected in all five soil samples and above the OSD risk screening level (0.13 mg/kg) at SIAD-FS-4, at a concentration of 0.18 mg/kg. PFOA was detected in all five soil samples and above the OSD risk screening level at SIAD-FS-1, at a concentration of 0.2 mg/kg. PFBS was detected below the OSD risk screening level in SIAD-FS-5, at a concentration of 0.00053 J mg/kg. PFBS was not detected in the remaining four samples.

7.1.5 Obstacle Course Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Obstacle Course Training Area (**Figure 7-4**).

7.1.5.1 Groundwater

Groundwater samples were collected from two hollow stem auger drilling locations, SIAD-OCTA-1 and SIAD-OCTA-2, and one existing water supply well, PSW-02, at the Obstacle Course Training Area. PFOS, PFOA and PFBS, were detected below or equal to the OSD risk screening level in groundwater. PFOS was detected below the OSD risk screening level in SIAD-OCTA-1 at a concentration of 5.1 J+ ng/L. PFOS was not detected in SIAD-OCTA-2 or PSW-02. PFOA was detected in all three groundwater samples and equal to the OSD risk screening level at SIAD-OCTA-1 at a concentration of 40 ng/L. PFOA was detected at 27 ng/L at SIAD-OCTA-2 and 33 ng/L in PSW-02. PFBS was detected below the OSD risk screening level in PSW-02 at a concentration of 2.1 J ng/L. PFBS was not detected in SIAD-OCTA-1 or SIAD-OCTA-2.

7.1.5.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at six locations at the Obstacle Course Training Area (SIAD-OCTA-1 through SIAD-OCTA-6). PFOS was detected below the OSD risk screening level in soil. PFBS and PFOA were not detected at any of the shallow soil samples at this AOPI. PFOS was detected below the OSD risk screening level at two soil samples, SIAD-OCTA-2 and SIAD-OCTA-6, with concentrations of 0.0011 mg/kg at both locations. PFOS was not detected at the remaining four soil samples.

7.1.6 FH # 1-05 Nozzle Testing Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with FH # 1-05 Nozzle Testing Area (**Figure 7-4**).

7.1.6.1 Groundwater

Two groundwater samples were collected at the FH #1-05 Nozzle Testing Area from one existing water supply well, PSW-08, and one hollow stem auger drilling location, SIAD-NTA-1. PFOS was not detected in either groundwater sample. PFOA was detected above the OSD risk screening level in both groundwater samples at concentrations of 140 ng/L at SIAD-NTA-1 and 76 ng/L at PSW-08. PFBS was detected below the OSD risk screening level at a concentration of 8.5 ng/L at SIAD-NTA-1 and 3.1 J ng/L at PSW-08.

7.1.6.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at five locations at the FH # 1-05 Nozzle Testing Area (SIAD-NTA-1 through SIAD-NTA-5). PFOA and PFOS were detected below the OSD risk screening level in soil. PFBS was not detected in any of the five soil samples collected at this AOPI. PFOS was detected below the OSD risk screening level in two soil samples, SIAD-NTA-2 and associated duplicate sample and SIAD-NTA-3, at concentrations of 0.00097 J [0.00083 J] mg/kg and 0.017 mg/kg, respectively. PFOS was not detected in the remaining three samples. PFOA was detected below the OSD risk screening level in SIAD-NTA-3 at a concentration of 0.00083 J mg/kg. PFOA was not detected in the remaining four samples.

7.1.7 Excavated Soil Laydown Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Excavated Soil Laydown Area (**Figure 7-5**).

7.1.7.1 Groundwater

Groundwater samples were collected from one existing monitoring well, B21-4R-MW, and one drilling location, SIAD-ESLA-1, at the Excavated Soil Laydown Area AOPI. PFOS was not detected in either of the groundwater samples at this AOPI. PFOA and PFBS were detected below the OSD risk screening level in groundwater. PFOA was detected below the OSD risk screening level in SIAD-ESLA-1 only at a concentration of 18 ng/L. PFOA was not detected at B21-4R-MW. PFBS was detected below the OSD risk screening level at a concentration of 3.3 J ng/L at B21-4R-MW and 8.7 ng/L at SIAD-ESLA-1.

7.1.7.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at six locations at the Excavated Soil Laydown Area (SIAD-ESLA-1 through SIAD-ESLA-6). PFOS, PFOA, and PFBS were not detected in any of the six soil samples at this AOPI.

7.1.8 Amedee Airfield Building 627

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Amedee Airfield Building 627 (**Figure 7-6**).

7.1.8.1 Groundwater

Groundwater was sampled at one drilling location, SIAD-AAF627-1, at the Amedee Airfield Building 627. PFOS, PFOA, and PFBS were not detected in the groundwater sample at this location.

7.1.8.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at four locations at Amedee Airfield Building 627 (SIAD-AAF627-1 through SIAD-AAF627-4). PFOS, PFOA, and PFBS were in any of the four soil samples at this AOPI.

7.1.9 Acid Shed

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Acid Shed (**Figure 7-7**).

7.1.9.1 Groundwater

Groundwater was sampled at one drilling location, SIAD-AS-1, at the Acid Shed. PFOS and PFBS were not detected. PFOA was detected below the OSD risk screening level at a concentration of 28 ng/L.

7.1.9.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at four locations at the Acid Shed (SIAD-AS-1 through SIAD-AS-4). PFOA was detected below OSD risk screening levels in soil. PFOS was not detected in soil at this AOPI. PFBS was not detected at any of the four soil samples at this AOPI. PFOA was detected below the OSD risk screening level at two locations, SIAD-AS-1 and SIAD-AS-3, at concentrations of 0.00079 J mg/kg and 0.00074 J mg/kg, respectively. PFOA was not detected at SIAD-AS-2 or SIAD-AS-4.

7.1.10 Small Aircraft Fire Training Area

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Small Aircraft Fire Training Area (**Figure 7-8**).

7.1.10.1 Groundwater

Groundwater was sampled at one drilling location, SIAD-SAFTA-1, at the Small Aircraft Fire Training Area. PFOS, PFOA, and PFBS were not detected in the groundwater sample at this location.

7.1.10.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at six locations at the Small Aircraft Fire Training Area (SIAD-SAFTA-1 through SIAD-SAFTA-6). PFOS, PFOA, and PFBS were not detected in any of the six soil samples at this AOPI.

7.1.11 DRMO Storage Yard

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the DRMO Storage Yard (**Figure 7-9**).

7.1.11.1 Groundwater

Groundwater was sampled at one existing monitoring well, DMO-12-MWA, at the DRMO Storage Yard. PFOS, PFOA, and PFBS were not detected in the groundwater sample at this location.

7.1.11.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at five locations at the DRMO Storage Yard (SIAD-DMO-01 through SIAD-DMO-05). PFOA and PFBS were not detected at any of the five soil samples at this AOPI. PFOS was detected below OSD risk screening levels. PFOS was detected at two sample locations, SIAD-DMO-01 and SIAD-DMO-05, with concentrations of 0.00087 J mg/kg and 0.00058 J mg/kg, respectively. PFOS was not detected in the remaining three samples.

7.1.12 AFFF Storage Area PS02

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with AFFF Storage Area PS02 (**Figure 7-9**). Groundwater was not sampled at this AOPI due to the lack of available wells and the lack of PFOS, PFOA, and PFBS detections in soil, as discussed below.

7.1.12.1 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at four locations at AFFF Storage Area PS02 (SIAD-PS02-01 through SIAD-PS02-04). PFOS, PFOA, and PFBS were not detected at any of the four soil samples at this AOPI.

7.1.13 AFFF Storage Area GS03

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with the AFFF Storage Area GS03 (**Figure 7-10**). Groundwater was not sampled at this AOPI due to the lack of available wells and the lack of PFOS, PFOA, and PFBS detections in soil, as discussed below.

7.1.13.1 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at four locations at AFFF Storage Area GS03 (SIAD-GS03-01 through SIAD-GS03-04). PFOS, PFOA, and PFBS were not detected at any of the four soil samples at this AOPI.

7.1.14 Garrison Sewage Treatment Ponds

The subsections below summarize the groundwater, soil, surface water, and sediment PFOS, PFOA, and PFBS analytical results associated with the Garrison Sewage Treatment Ponds (**Figure 7-11**).

7.1.14.1 Groundwater

Groundwater was sampled at two existing monitoring wells, SIAD-STP-3-PZ and SIAD-STP-5-PZ, at the Garrison Sewage Treatment Ponds. PFOS and PFBS were detected below OSD risk screening levels. PFOA was detected above OSD risk screening levels. PFOS was detected in SIAD-STP-3-PZ at 23 ng/L (22 ng/L in the duplicate) and was not detected at SIAD-STP-5-PZ. PFOA was detected in both SIAD-STP-3-PZ and SIAD-STP-5-PZ. At SIAD-STP-5-PZ, PFOA was 79 ng/L, above the OSD risk screening level of 40 ng/L. At SIAD-STP-3-PZ, PFOA was 6.7 ng/L (5.3 ng/L in the duplicate), below the OSD risk

screening level. PFBS was detected at SIAD-STP-3-PZ with a concentration of 72 ng/L (72 ng/L in duplicate) and at SIAD-STP-5-PZ with a concentration of 4.1 ng/L.

7.1.14.2 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at nine locations at the Garrison Sewage Treatment Ponds (SIAD-GSTP-01-SO through SIAD-GSTP-09-SO). PFOS was detected above the OSD risk screening levels. PFOA and PFBS were detected below OSD risk screening levels. There were two detections of PFOS above the residential OSD risk screening level of 0.13 mg/kg. SIAD-GSTP-03-SO had a PFOS detection of 0.21 DJ mg/kg and SIAD-GSTP-07-SO had a PFOS detection 0.25 DJ mg/kg (0.17 mg/kg in the duplicate). The highest detection of PFOA was 0.011 at SIAD-GSTP-03-SO, but below the OSD risk screening level. The highest detection of PFBS was 0.0031 at SIAD-GSTP-07-SO, but below the OSD risk screening level.

7.1.14.3 Sediment

Shallow sediment samples were collected from 0 to 10 centimeters at two locations at the Garrison Sewage Treatment Ponds (SIAD-GSTP-01-SE and SIAD-GSTP-02-SE). PFOS, PFOA, and PFBS were detected at this AOPI. PFOS was detected in SIAD-GSTP-01-SE and SIAD-GSTP-02-SE at concentrations of 0.0062 mg/kg and 0.11 mg/kg, respectively. PFOA was detected in SIAD-GSTP-01-SE and SIAD-GSTP-02-SE at concentrations of 0.0014 J mg/kg and 0.0066 mg/kg, respectively. PFBS was below detection limits at SIAD-GSTP-01 and detected at 0.0015 J at SIAD-GSTP-02 (below detection limits in the duplicate).

7.1.14.4 Surface Water

Surface water samples were collected from 0 to 6 inches at two locations at the Garrison Sewage Treatment Ponds (SIAD-GSTP-01-SW and SIAD-GSTP-02-SW), co-located with the sediment samples. Due to the known leaks in the liner of the sewage treatment ponds and the potential for surface water to influence groundwater, the results are compared to the OSD risk screening level for drinking water. PFOS and PFOA were detected above the OSD risk screening level. PFBS was detected below OSD risk screening levels. PFOS was detected above the OSD risk screening level at SIAD-GSTP-02-SW with a concentration of 610 DJ ng/L. SIAD-GSTP-01-SW had a detection of 16 ng/L, below the OSD risk screening level. PFOA was detected above the OSD risk screening level at SIAD-GSTP-02-SW with a concentration of 650 J- ng/L. PFOA was not detected at SIAD-GSTP-01-SW. PFBS was detected below the OSD risk screening level at SIAD-GSTP-02-SW with a concentration of 370 J- ng/L. PFOA was not detected at SIAD-GSTP-01-SW.

7.1.15 Mission Sewage Treatment Ponds

The subsections below summarize the soil, sediment, and surface water PFOS, PFOA, and PFBS analytical results associated with the Mission Sewage Treatment Ponds (**Figure 7-12**).

7.1.15.1 Soil

Shallow soil samples were collected from 0 to 2 feet bgs at four locations at the Mission Sewage Treatment Ponds (SIAD-MSTP-01 through SIAD-MSTP-04). PFBS was not detected in the samples. PFOS was detected in three of the four samples, below the OSD risk screening level. The highest PFOS detection was 0.0038 mg/kg in SIAD-MSTP-01-SO. PFOA was detected in three of the four samples, below the OSD risk screening level. The highest PFOS detection was 0.0063 mg/kg in SIAD-MSTP-03-SO.

7.1.15.2 Sediment

Shallow sediment samples were collected from 0 to 10 centimeters at two locations at the Mission Sewage Treatment Ponds (SIAD-MSTP-01-SE and SIAD-MSTP-02-SE). PFOS, PFOA, and PFBS were not detected in the sediment samples collected from the Mission Sewage Treatment Ponds.

7.1.15.3 Surface Water

Surface water samples were collected from 0 to 6 inches at two locations at the Mission Sewage Treatment Ponds (SIAD-MSTP-01-SW and SIAD-MSTP-02-SW), co-located with the sediment samples. Due to the known leaks in the liner of the sewage treatment ponds and the potential for surface water to influence groundwater, the results are compared to the OSD risk screening level for drinking water. PFOA was detected above the OSD risk screening level. PFOS and PFBS were detected below OSD risk screening levels. PFOA was detected above the OSD risk screening level at SIAD-MSTP-02-SW with a concentration of 76 ng/L (120 J- ng/L in the duplicate). PFOA was not detected at SIAD-MSTP-01-SW. PFOS was detected below the OSD risk screening level at SIAD-MSTP-02-SW with a concentration of 12 ng/L (20 J- ng/L in the duplicate). PFOS was not detected at SIAD-MSTP-01-SW. PFBS was detected below the OSD risk screening level at SIAD-MSTP-02-SW with a concentration of 6.6 ng/L (8.6 J- ng/L in the duplicate). PFBS was not detected at SIAD-MSTP-01-SW.

7.2 Dedicated Equipment Background Sample Analysis

A DEB was collected from the first monitoring well sampled in the group of wells associated with the Excavated Soil Laydown Area, DRMO Storage Yard, SIAD Current Fire Training Area, and SIAD Fire Department Storage Building P-613, all of which contained dedicated down-hole equipment (**Appendix O**). A DEB was also collected from two supply wells (PSW-02 and PSW-08), which are currently offline. A total of eight DEBs were collected. Five parent sample and DEB pairs had detections for PFOS, PFOA, and/or PFBS constituents in both the parent and DEB sample: MPA-04, PSW-02, PSW-08, W01, and W-02-MWA. PFOS, PFOA, and/or PFBS results between paired DEB and parent samples for these five wells were typically within 50% or less of one another for each analyte, suggesting minor equipment influence, if any. B21-AR-MW, DMO-12-MWA, SSA-03-MWB had no detectable PFOS, PFOA, or PFBS in the parent sample and had low (i.e., less than 5 ng/L) or no detectable PFOS, PFOA, or PFBS in the DEB, again suggesting no equipment influence on sample results. The eight DEB sample pairs collected at SIAD suggest that sampling using the dedicated downhole sampling equipment did not bias sample PFOS, PFOA, or PFBS results.

7.3 Investigation Derived Waste

Two composite samples of the purge and decontamination wastewater was collected from the onsite drums. The samples were analyzed for PFAS constituents, volatile organic compounds, and anions. The results indicated detections of PFOS, PFOA, and PFBS in both samples. PFOS detections were 57 ng/L and 33 ng/L. PFOA detections were 3,400 ng/L and 1,400 ng/L. PFBS detections were 7.5 ng/L and 12 ng/L. IDW analytical results are found in **Appendix O**. All drums of water were disposed of by SIAD. All dry soil IDW was thin spread onsite at the point of collection.

7.4 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 1,350 to 29,600 mg/kg. The 29,600 mg/kg is an outlier in this data set and is believed to contain fill material that is not representative of native soil conditions. The TOC at this installation was within range of what is typically observed in the desert: less than 5,000 mg/kg. The combined percentage of fines (i.e., silt and clay) in soils at SIAD ranged from 1.8 to 82.8% with an average of 44.71%. PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The average percent moisture of the soil (6.66%) was typical for sandy soil (0 to 10%). The pH of the soil was slightly alkaline (7 to 9 standard units). Based on these geochemical and physical soil characteristics observed underlying the installation during the SI, PFAS constituents are expected to be relatively more mobile at SIAD than in soils with greater percentages of fines and TOC.

7.5 Blank Samples

The full analytical results for blank samples collected during the SI are included in **Appendix O**. PFOS, PFOA, and PFBS were not detected in any of the blank samples collected during the SI work.

7.6 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 7-13** through **7-17** 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 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, discharge/recharge between groundwater and surface water, 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 determinations apply to all CSMs:

- There are no residents or recreational users at SIAD. Therefore, all exposure pathways for on-installation residents and recreational users are incomplete.
- The AOPIs are wholly located within the installation boundaries. Therefore, the soil exposure pathway for off-installation receptors is incomplete.

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

Figure 7-13 shows the CSM for the Small Aircraft Fire Training Area and Amedee Airfield Building 627. At Amedee Airfield Building 627, AFFF was historically discharged adjacent to the airfield parking apron. At the Small Aircraft Fire Training Area, small aircraft fire training using foam was conducted between 2008 and 2010.

- PFOS, PFOA, and/or PFBS were not detected in soil at these AOPIs, therefore the soil exposure pathway for on-installation site workers is incomplete.
- PFOS, PFOA, and/or PFBS were not detected in groundwater. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and for off-installation receptors are incomplete.
- Surface water bodies on-post are not used for drinking water and not near or in the flow path from these AOPIs. Additionally, PFOS, PFOA, and/or PFBS were not detected in soil or groundwater. Therefore, it is inferred there is no source of PFOS, PFOA, and/or PFBS at these AOPIs and the surface water and sediment exposure pathways are incomplete.

Figure 7-14 shows the CSM for Storage Area GS03, Excavated Soil Laydown Area, and AFFF Storage Area PS02. AFFF Storage Area PS02 and AFFF Storage Area GS03 are current AFFF storage areas, and the Excavated Soil Laydown Area was a temporary laydown area for potentially AFFF contaminated soil.

- PFOS, PFOA, and/or PFBS were not detected in soil at these AOPIs, therefore the soil exposure pathway for on-installation site workers is incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at the Excavated Soil Laydown Area and were not sampled in groundwater at AFFF Storage Area PS02 and AFFF Storage Area GS03. Potable water is supplied to SIAD from Lahontan Lake and near-shore deposit groundwater aquifer systems. PSW-05 and PSW-12 are located within the SIAD boundary and are the two principal wells currently providing domestic water to SIAD. Based on the presumed groundwater flow direction, the AOPIs are not likely to affect the existing on-post wells. However, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete to account for potential future use of the on-post groundwater downgradient from the AOPIs.
- Groundwater originating at these AOPIs flows off-post through the installation's eastern boundary. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- Surface water bodies on-post are not used for drinking water and not in the path of groundwater flow from these AOPIs. Therefore, the surface water and sediment exposure pathways for on-installation site workers are incomplete.
- Shallow groundwater originating at these AOPIs could discharge to downgradient, off-post surface water bodies. These surface water bodies are not used for drinking water. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Figure 7-15 shows the CSM for SIAD Fire Station, Obstacle Course Training Area, FH #1-05 Nozzle Testing Area, DRMO Storage Yard, Acid Shed, SIAD Fire Department Storage Building P-613, Equipment Yard Building 79, and SIAD Current Fire Training Area. The SIAD Fire Station, Obstacle Course Training Area, FH #1-05 Nozzle Testing Area, and SIAD Current Fire Training Area had various fire training operations which may have involved AFFF. The DRMO Storage Yard, Acid Shed, SIAD Fire Department Storage Building P-613 were AFFF storage areas. Equipment Yard – Building 79 is a former pesticide storage area which had previous detections of PFAS constituents in soil.

- 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.
- PFOS, PFOA, and/or PFBS were detected in groundwater and the AOPIs are potentially upgradient of drinking water wells used to supply potable water at SIAD. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete.

- Groundwater originating from these AOPIs flows off-post through the installation's western, eastern, and/or southern boundary. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- There are no on-installation surface water bodies associated with these AOPIs, therefore, the sediment and surface water exposure pathways for on-installation site workers are incomplete.
- Shallow groundwater originating at these AOPIs could discharge to downgradient, off-post surface water bodies. These surface water bodies are not used for drinking water. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Figure 7-16 shows the CSM for the Garrison Sewage Treatment Ponds where potentially PFAS-containing wastes were disposed of.

- 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.
- PFOS, PFOA, and/or PFBS were detected in groundwater and the AOPI is potentially upgradient of drinking water wells used to supply potable water at SIAD. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete.
- Groundwater originating at this AOPI flows off-post through the installation's eastern boundary. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- PFOS, PFOA, and/or PFBS were detected in surface water and sediment at this AOPI and on-installation site workers could contact surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation site workers are complete.
- Shallow groundwater originating at this AOPI could discharge to downgradient, off-post surface water bodies. These surface water bodies are not used for drinking water. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Figure 7-17 shows the CSM for the Mission Sewage Treatment Ponds where potentially PFAS-containing wastes were disposed of.

- 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 AOPI is potentially upgradient of drinking water wells used to supply potable water at SIAD. Groundwater samples were not collected at this AOPI. However, given the observed presence of PFOS, PFOA, and/or PFBS in soil, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-installation site workers is potentially complete.

- Groundwater originating at this AOPI flows off-post through the installation's eastern boundary. Due to the absence of land use controls preventing potable use of groundwater in this area, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for off-installation receptors is potentially complete.
- PFOS, PFOA, and/or PFBS were detected in surface water at this AOPI and on-installation site workers could contact surface water and sediment via incidental ingestion and dermal contact. Therefore, the surface water exposure pathway is complete, and the sediment exposure pathway is potentially complete, for on-installation site workers.
- Shallow groundwater originating at this AOPI could discharge to downgradient, off-post surface water bodies. These surface water bodies are not used for drinking water. However, recreational users could contact constituents in off-post surface water bodies through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation receptors are potentially complete.

Following the SI sampling, 13 out of the 15 AOPIs 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 CONCLUSIONS AND RECOMMENDATIONS

The PFAS PA/SI included two distinct efforts. The PA identified AOPIs at SIAD 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 a release of PFOS, PFOA, and PFBS to the environment occurred.

OSD provided residential risk screening levels based on the USEPA oral reference does 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 SIAD. Following the evaluation, 15 AOPIs were identified.

As discussed in **Section 2.12**, sampling for PFAS constituents in soil and groundwater had taken place on several occasions at SIAD. Most significantly, drinking water well PSW-08 had PFOA detections greater than the USEPA lifetime health advisory level and was taken offline due to the detections. PSW-05 and PSW-12 are currently considered the primary public water supply wells for providing domestic water to SIAD.

All AOPIs were sampled during the SI at SIAD to identify 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 SIAD QAPP Addendum (Arcadis 2020).

SI sampling was completed at all 15 AOPIs to evaluate presence or absence of PFOS, PFOA, and/or PFBS. During the SI, 20 groundwater samples were collected at 12 of 15 AOPIs, 75 soil samples at 15 of 15 AOPIs, four surface water samples at two of 15 AOPIs, and four sediment samples at two of 15 AOPIs. Eleven AOPIs had detections of PFOS, PFOA, and PFBS and six AOPIs exceeded OSD risk screening levels.

PFOS detected at 23 ng/L at the Garrison Sewage Treatment Ponds was the highest detection of PFOS in groundwater at the installation. PFOA detected at 17,000 DJ ng/L at SIAD Fire Station was the highest detection of PFOA in groundwater and PFBS detected at 430 DJ ng/L at SIAD Fire Station was the highest detection of PFBS in groundwater. Exceedances of the OSD risk screening level in groundwater occurred at four AOPIs.

PFOS detected at 0.25 DJ mg/kg at the Garrison Sewage Treatment Ponds was the highest detection of PFOS in soil at the installation. PFOA detected at 0.2 mg/kg at SIAD Fire Station was the highest detection of PFOA in soil and PFBS detected at 0.0031 mg/kg at Garrison Sewage Treatment Ponds was the highest detection of PFBS in soil. Exceedances of the OSD risk screening level in soil occurred at two AOPIs. PFOS detected at 610 DJ ng/L at Garrison Sewage Treatment Ponds was the highest detection of PFOS in surface water at the installation. PFOA detected at 650 J- ng/L at Garrison Sewage Treatment Ponds was the highest detection of PFOA in surface water and PFBS detected at 370 J- ng/L at Garrison Sewage Treatment Ponds was the highest detection of PFBS in surface water. Exceedances of the OSD risk screening level in surface water occurred at two AOPIs. PFOS detected at 0.11 mg/kg at the Garrison Sewage Treatment Ponds was the highest detection of PFOS in sediment at the installation. PFOA

detected at 0.0066 mg/kg at Garrison Sewage Treatment Ponds was the highest detection of PFOA in sediment. PFBS detected at 0.0015 J mg/kg at Garrison Sewage Treatment Ponds was the highest detection of PFBS in sediment.

Following the SI sampling, 13 of 15 AOPIs had potentially complete or complete exposure pathways. PFOS, PFOA, and/or PFBS was detected in soil, groundwater, surface water, and/or sediment in 13 out of the 15 AOPIs. Soil exposure pathways for on-installation site workers are complete at 10 AOPIs. Groundwater exposure pathways for on-installation site workers are potentially complete at 13 AOPIs. Due to a lack of land use controls, off-installation and downgradient of SIAD, the groundwater exposure pathways for off-installation receptors are also potentially complete for 13 AOPIs. Surface water is not used for drinking water at SIAD but there is a complete pathway for on-installation site workers who contact surface water at two AOPIs. One of these AOPIs has a complete pathway for sediment and one has a potentially complete pathway. Surface water is not used for drinking water off-installation, but off-installation recreational users could contact constituents in surface water and sediment; therefore, surface water and sediment exposure pathways are potentially complete for off-installation receptors for 13 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 8-1** below summarizes the AOPIs identified at SIAD, PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at SIAD. In accordance with CERCLA, site-specific risk will be assessed during a future phase to evaluate whether remedial actions are required.

Table 8-1 Summary of AOPIs Identified during the PA, PFOS, PFOA, and PFBS Sampling at SIAD, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)				Recommendation
	GW	SO	SW	SE	
SIAD Fire Department Storage Building P-613	ND	No	NS	NS	No further action at this time
SIAD Current Fire Training Area	Yes	No	NS	NS	Further study in a remedial investigation
Equipment Yard – Building 79	No	No	NS	NS	No further action at this time
SIAD Fire Station	Yes	Yes	NS	NS	Further study in a remedial investigation
Obstacle Course Training Area	Yes	No	NS	NS	Further study in a remedial investigation
FH # 1-05 Nozzle Testing Area	Yes	No	NS	NS	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/ND/NS)				Recommendation
	GW	SO	SW	SE	
Excavated Soil Laydown Area	No	ND	NS	NS	No further action at this time
Amedee Airfield Building 627	ND	ND	NS	NS	No further action at this time
Acid Shed	No	No	NS	NS	No further action at this time
Small Aircraft Fire Training Area	ND	ND	NS	NS	No further action at this time
DRMO Storage Yard	ND	No	NS	NS	No further action at this time
AFFF Storage Area PS02	NS	ND	NS	NS	No further action at this time
AFFF Storage Area GS03	NS	ND	NS	NS	No further action at this time
Garrison Sewage Treatment Ponds	Yes	Yes	Yes	No	Further study in a remedial investigation
Mission Sewage Treatment Ponds	NS	No	Yes	ND	Further study in a remedial investigation

Notes:
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
N – no
ND – non-detect
NS – not sampled
SE – sediment
SO – soil
SW – surface water
Y - yes

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

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 research, installation personnel interviews, and site reconnaissance.

Finally, the available PFOS, PFOA, and PFBS analytical data are limited to results from on-post groundwater (not residential wells), surface soil, surface water, and sediment samples. Available data, including PFOS, PFOA, and PFBS, are 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 and potable water wells did not delineate the extent of PFOS, PFOA, and PFBS impacts or identify the primary migration pathways for the chemicals.

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

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10 ACRONYMS

%	percent
AFFF	aqueous film-forming foam
AOPI	area of potential interest
Arcadis	Arcadis U.S., Inc.
Army	United States Army
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
cy	cubic yards
DEB	dedicated equipment background
DoD	Department of Defense
DQO	data quality objective
DRMO	Defense Reutilization and Marketing Office
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FCR	Field Change Report
FH	fire hydrant
GAC	granular activated carbon
GIS	geographic information system
GW	groundwater
IDW	investigation-derived waste
installation	United States Army or Reserve installation
Janus	Janus Global Corporation
LOD	limit of detection
LOQ	limit of quantitation
mg/kg	milligrams per kilogram (parts per million)
N	no

ND	non-detect
ng/L	nanograms per liter (parts per trillion)
NS	not sampled
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
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
SE	sediment
SI	site inspection
SIAD	Sierra Army Depot
SO	soil
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
SW	surface water
TGI	technical guidance instruction
TOC	total organic carbon
UBG	Upper Burning Ground
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command

USEPA	United States Environmental Protection Agency
Y	yes

TABLES

Table 2-1 - Historical Groundwater PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Sample Location			Well 08 FW	Well 08 FW	Well 08 FW DUP	Well 05 Raw	Well 05 EPTDS	Well 08 Raw	Well 08 Raw	Well 08 Raw	Well 08 EPTDS	Well 08 EPTDS	Well 12 Raw	Well 12 EPTDS	Reservoir
Sample Date			1/1/2016	11/1/2017	11/1/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017	12/12/2017
Laboratory			Test America	Test America	Test America	Weck Labs	Weck Labs	Test America	BSK Associates	Weck Labs	Test America	Weck Labs	Weck Labs	Weck Labs	Weck Labs
PFAS	**OSD Tapwater Risk Screening Level**	**Units**													
Perfluorobutane sulfonic acid (PFBS)	40,000	ng/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorohexane sulfonic acid (PFHxS)	--	ng/L	ND	**27 J**	**26 J**	ND	ND	**47**	**38**	**48**	ND	**32**	ND	ND	ND
Perfluorooctanesulfonic acid (PFOS)	40	ng/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctanoic acid (PFOA)	40	ng/L	**36**	**98**	**98**	ND	ND	**120**	**100**	**130**	**86**	**120**	ND	ND	**40**
Perfluoroheptanoic acid (PFHpA)	--	ng/L	ND	**11**	**10**	ND	ND	**12**	ND	**14**	ND	**13**	ND	ND	ND
Perfluorononanoic acid (PFNA)	--	ng/L	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
Bold = analyte detected above the reporting limit
Grey shading = Detected over the current OSD risk screening level

Acronyms/Abbreviations:
-- = not applicable
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value
DUP = duplicate
ND = non detect above the reporting limit
ng/L = nanograms per liter (parts per trillion)
OSD = Office of the Secretary of Defense
PFAS = per-and polyflouroalkyl substances

Table 2-2- Historical Soil PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

			AOPI	Amedee Airfield Building 627	Acid Shed	SIAD Fire Department Storage Building P-613	Equipment Yard – Building 79
			Sample Location	AF 627 (Airfield - 50' w of Building 627)	AP (east side acid plant AFFF storage)	P 613 (AFFF storage)	B 74 (possible AFFF storage)
			Sample Date	5/3/2017			
			Laboratory	Test America			
PFAS	**OSD Residential Risk Screening Level**	**OSD Industrial/ Commercial Risk Screening Level**	**Units**				
Perfluorobutane Sulfonate (PFBS)	130	1,600	mg/kg	ND	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	--	--	mg/kg	ND	0.00021 J	ND	ND
Perfluorooctane Sulfonate (PFOS)	0.13	1.6	mg/kg	ND	0.00083	ND	0.00022 J
Perfluoroheptanoic acid (PFHpA)	--	--	mg/kg	ND	0.00077	ND	ND
Perfluorononanoic acid (PFNA)	--	--	mg/kg	ND	0.0031	ND	0.00015 J
Perfluorooctanoic acid (PFOA)	0.13	1.6	mg/kg	ND	0.0034	0.00012 J	ND
Perfluorobutanoic acid (PFBA)	--	--	mg/kg	0.00028 JB	0.00082 B	0.00011 JB	0.00023 B
Perfluorohexanoic acid (PFHxA)	--	--	mg/kg	0.00017 J	0.0014	ND	ND

Notes:
Bold = analyte detected above the reporting limit
Grey shading = Detected over the current OSD risk screening level

Acronyms/Abbreviations:
AFFF = aqueous film forming foam
AOPI = area of potential interest
ND = non detect above the reporting limit
mg/kg = milligrams per killogram
OSD = Office of the Secretary of Defense
PFAS = per-and polyflouroalkyl substances
SIAD = Sierra Army Depot

Area of Potential Interest	Well ID	Water Level[1] (ft btoc)	Well Depth (ft bgs)	Screened interval (ft bgs)	Well Diameter (inches)
Monitoring Wells					
P-613 SIAD Fire Department Storage Area	SSA-03-MWB	101.58	164	147.0-157.0	4
SIAD Current Fire Training Area	W-02-MWA	101.14	114	99.0-114.0	4
	ALF-07-MWA	99.81	112.5	92.112.5	4
SIAD Fire Station	MPA-04-MWA	97.64	113	93-113	4
Equipment Yard Building 79	W-01-MWA	97.14	106	91-106	2
	EQY-01-MWA	96.38	112	91-111	4
FH #1-05 Nozzle Testing	PSW-08	N/A	692	165-200	N/A
				212-223	
				246-284	
				301-331	
				352-383	
				407-426	
				462-497	
				600-620	
				643-655	
				670-690	
Obstacle Course Training Area	PSW-02	N/A	700	167.0 - 198.1	N/A
				208.8 - 243.6	
				268.3 - 278.3	
				284.1 - 294.4	
				305.2 - 322.1	
				327.6 - 337.8	
				377.8 - 401.2	
				431.2 - 446.8	
				480.9 - 495.9	
				516.2 - 526.2	
				535.5 - 555.7	
				570.7 - 585.7	
				640.0 - 655.0	
SIAD-007 Fire Training Areas	B21-4R-MW	92.41	106.5	N/A	4
DRMO Yard	DMO-12-MWA	97.92	112	91-111	5
Garrison Sewage Treatment Ponds	STP-3-PZ	46.14	56	N/A	2
	STP-5-PZ	76.78	89	N/A	2

Acronyms/Abbreviations:
DRMO = Defense Reutilization and Marketing Office
FH = fire hydrant
ft bgs = feet below ground surface
ft btoc = feet below top of casing
ID = identification
N/A = not applicable
SIAD = Sierra Army Depot

Notes:
1. Depth to groundwater was measured during the SI sampling event in March 2020.

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Associated AOPI	Location Type	Location	Sample/ Parent ID	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater Risk Screening Level	40		40		600	
					Sample Type	Result	Qual	Result	Qual	Result	Qual
Amedee Airfield Building 627	Monitoring Well	SIAD-AAF627	SIAD-AAF627-1-GW-051420	05/14/2020	N	3.6	U	3.6	U	3.6	U
SIAD Current Fire Training Area	Monitoring Well	SIAD-ALF-07-MWA	SIAD-ALF-07-MWA-051820	05/18/2020	N	3.5	U	**74**		**6.0**	
	Monitoring Well	SIAD-W-02-MWA	SIAD-W-02-MWA-051920	05/19/2020	N	3.4	U	**38**		**6.4**	
Acid Shed	Groundwater Grab	SIAD-AS-1-GW	SIAD-AS-1-GW-051420	05/14/2020	N	3.6	U	**28**		3.6	U
Excavated Soil Laydown Area	Monitoring Well	SIAD-B21-4R-MW	SIAD-B21-4R-MW-051820	05/18/2020	N	3.4	U	3.4	U	**3.3**	J
DRMO StorageYard	Monitoring Well	SIAD-DMO-12-MWA	SIAD-DMO-12-MWA-051820	05/18/2020	N	3.4	U	3.4	U	3.4	U
Equipment Yard Building 79	Monitoring Well	SIAD-EQY-01-MWA	SIAD-EQY-01-MWA-051320	05/13/2020	N	3.5	U	**12**		**3.6**	
	Monitoring Well	SIAD-W-01-MWA	SIAD-W01-MWA-051320	05/13/2020	N	3.4	U	3.4	U	**7.8**	
Excavated Soil Laydown Area	Groundwater Grab	SIAD-ESLA-1-GW	SIAD-ESLA-1-GW-051320	05/13/2020	N	3.8	U	**18**		**8.7**	
SIAD Fire Station	Groundwater Grab	SIAD-FS-1-GW	SIAD-FS-1-GW-051220	05/12/2020	N	**15**	DJ	**17000**	DJ	**430**	DJ
	Monitoring Well	SIAD-MPA-04-MWA	SIAD-MPA-04-MWA-051220	05/12/2020	N	3.4	U	**950**	DJ	**88**	
Obstacle Course Training Area	Groundwater Grab	SIAD-OCTA-1-GW	SIAD-OCTA-1-GW-051320	05/13/2020	N	**5.1**	J+	**40**		3.7	U
	Groundwater Grab	SIAD-OCTA-2-GW	SIAD-OCTA-2-GW-051220	05/12/2020	N	3.5	U	**27**		3.5	U
	Monitoring Well	SIAD-PSW-02	SIAD-PSW-02-SO-051320	05/13/2020	N	3.4	U	**33**		**2.1**	J
FH #1-05 Nozzle Testing	Monitoring Well	SIAD-PSW-08	SIAD-PSW-08-SO-051320	05/13/2020	N	3.5	U	**76**		**3.1**	J
	Groundwater Grab	SIAD-NTA-1-GW	SIAD-NTA-1-GW-051220	05/12/2020	N	3.8	U	**140**		**8.5**	
Small Aircraft Fire Training Area	Groundwater Grab	SIAD-SAFTA-1-GW	SIAD-SAFTA-1-GW-051420	05/14/2020	N	3.5	U	3.5	U	3.5	U

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Associated AOPI	Location Type	Location	Sample/ Parent ID	Sample Date	Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater Risk Screening Level	40		40		600	
P-613 SIAD Fire Department	Monitoring Well	SIAD-SSA-03-MWB	SIAD-FD-2-051920 / SIAD-SSA-03-MWB51920	05/19/2020	FD	3.5	U	3.5	U	3.5	U
			SIAD-SSA-03-MWB51920	05/19/2020	N	3.5	U	3.5	U	3.5	U
Garrison Sewage Treatment Ponds	Monitoring Well	SIAD-STP-3-PZ	SIAD-FD-01-GW-110920 / SIAD-STP-3-PZ-110920	11/09/2020	FD	**22**		**5.3**		**72**	
			SIAD-STP-3-PZ-110920	11/09/2020	N	**23**		**6.7**		**72**	
		SIAD-STP-5-PZ	SIAD-STP-5-PZ-110920	11/09/2020	N	3.5	U	**79**		**4.1**	

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
DRMO = Defense Reutilization and Marketing Office
FD = field duplicate sample
FH = fire hydrant
ID = identification
N = primary sample
NA = not applicable
ng/L = nanogram per liter
Qual = qualifier
OSD = Office of the Secretary of Defense
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SIAD = Sierra Army Depot

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2019 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.).

Qualifier	Description
DJ	The analyte was analyzed at dilution and the result is an estimated quantity
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.
U	The analyte was analyzed for but the result was not detected above the limit of quantitation (LOQ).

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
OSD Residential Risk Screening Level						0.13		0.13		1.9	
OSD Industrial/Commercial Risk Screening Level						1.6		1.6		25	
Amedee Airfield Building 627	Soil	SIAD-AAF627-3-SO	SIAD-AAF627-3-SO-051520	05/15/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-AAF627-2-SO	SIAD-AAF627-2-SO-051520	05/15/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	SIAD-AAF627-4-SO	SIAD-AAF627-4-SO-051520	05/15/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	SIAD-AAF627-1-SO	SIAD-AAF627-1-SO-051320	05/13/2020	N	0.0011	U	0.0011	U	0.0011	U
Acid Shed	Soil	SIAD-AS-1-SO	SIAD-AS-1-SO-051420	05/19/2020	N	0.0011	U	**0.00079**	J	0.0011	U
	Soil	SIAD-AS-2-SO	SIAD-AS-2-SO-051420	05/15/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-AS-3-SO	SIAD-AS-3-SO-051420	05/14/2020	N	0.001	U	**0.00074**	J	0.001	U
	Soil	SIAD-AS-4-SO	SIAD-AS-4-SO-051420	05/14/2020	N	0.001	U	0.001	U	0.001	U
SIAD Current Fire Training Area	Soil	SIAD-CFTA-1-SO	SIAD-CFTA-1-SO-051920	05/19/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-CFTA-2-SO	SIAD-CFTA-2-SO-051920	05/19/2020	N	**0.0011**		**0.0014**		0.0011	U
	Soil	SIAD-CFTA-3-SO	SIAD-CFTA-3-SO-051920	05/19/2020	N	0.00098	U	**0.0012**		0.00098	U
	Soil	SIAD-CFTA-4-SO	SIAD-CFTA-4-SO-051920	05/19/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-CFTA-5-SO	SIAD-CFTA-5-SO-051920	05/19/2020	N	0.001	U	0.001	U	0.001	U
DRMO StorageYard	Soil	SIAD-DMO-1-SO	SIAD-DMO-1-SO-051820	05/18/2020	N	**0.00087**	J	0.001	U	0.001	U
	Soil	SIAD-DMO-2-SO	SIAD-DMO-2-SO-051820	05/18/2020	N	0.00095	U	0.00095	U	0.00095	U
	Soil	SIAD-DMO-3-SO	SIAD-DMO-3-SO-051820	05/18/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-DMO-4-SO	SIAD-FD-3-051820 / SIAD-DMO-4-SO-051820	05/18/2020	FD	0.00094	U	0.00094	U	0.00094	U
			SIAD-DMO-4-SO-051820	05/18/2020	N	0.00092	U	0.00092	U	0.00092	U
	Soil	SIAD-DMO-5-SO	SIAD-DMO-5-SO-051820	05/18/2020	N	**0.00058**	J	0.001	U	0.001	U
Excavated Soil Laydown Area	Soil	SIAD-ESLA-1-SO	SIAD-ESLA-1-SO-051320	05/13/2020	N	0.00094	U	0.00094	U	0.00094	U
	Soil	SIAD-ESLA-2-SO	SIAD-ESLA-2-SO-051420	05/14/2020	N	0.00095	U	0.00095	U	0.00095	U
	Soil	SIAD-ESLA-3-SO	SIAD-ESLA-3-SO-051320	05/13/2020	N	0.00094	U	0.00094	U	0.00094	U
	Soil	SIAD-ESLA-4-SO	SIAD-ESLA-4-SO-051420	05/14/2020	N	0.00098	U	0.00098	U	0.00098	U
	Soil	SIAD-ESLA-5-SO	SIAD-ESLA-5-SO-051420	05/14/2020	N	0.00098	U	0.00098	U	0.00098	U
	Soil	SIAD-ESLA-6-SO	SIAD-ESLA-6-SO-051420	05/14/2020	N	0.00091	U	0.00091	U	0.00091	U

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
			OSD Residential Risk Screening Level			0.13		0.13		1.9	
			OSD Industrial/Commercial Risk Screening Level			1.6		1.6		25	
Equipment Yard Building 79	Soil	SIAD-EY79-1-SO	SIAD-EY79-1-SO-051320	05/13/2020	N	0.00096	U	0.00096	U	0.00096	U
	Soil	SIAD-EY79-2-SO	SIAD-EY79-2-SO-051320	05/13/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-EY79-3-SO	SIAD-EY79-3-SO-051320	05/13/2020	N	0.00098	U	0.00098	U	0.00098	U
	Soil	SIAD-EY79-4-SO	SIAD-EY79-4-SO-051320	05/13/2020	N	**0.0016**		0.001	U	0.001	U
	Soil	SIAD-EY79-5-SO	SIAD-EY79-5-SO-051320	05/13/2020	N	**0.0067**		**0.0019**		0.001	U
SIAD Fire Station	Soil	SIAD-FS-1-SO	SIAD-FS-1-SO-051120	05/11/2020	N	**0.073**		**0.2**		0.001	U
	Soil	SIAD-FS-2-SO	SIAD-FS-2-SO-051120	05/11/2020	N	**0.0079**		**0.0019**		0.00095	U
	Soil	SIAD-FS-3-SO	SIAD-FS-3-SO-051120	05/11/2020	N	**0.0073**		**0.00099**		0.00097	U
	Soil	SIAD-FS-4-SO	SIAD-FS-4-SO-051120	05/11/2020	N	**0.18**		**0.0087**		0.00098	U
		SIAD-FS-5-SO	SIAD-FS-5-SO-051120	05/11/2020	N	**0.021**		**0.0069**		**0.00053**	J
AFFF Storage Area GS03	Soil	SIAD-GS03-01-SO	SIAD-GS03-01-SO-082720	08/27/2020	N	0.00096	U	0.00096	U	0.00096	U
	Soil	SIAD-GS03-02-SO	SIAD-GS03-02-SO-082720	08/27/2020	N	0.00089	U	0.00089	U	0.00089	U
	Soil	SIAD-GS03-03-SO	SIAD-GS03-03-SO-082720	08/27/2020	N	0.00092	U	0.00092	U	0.00092	U
	Soil	SIAD-GS03-04-SO	SIAD-GS03-04-SO-082720	08/27/2020	N	0.001	U	0.001	U	0.001	U
FH #1-05 Nozzle Testing	Soil	SIAD-NTA-1-SO	SIAD-NTA-1-SO-051220	05/12/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-NTA-2-SO	SIAD-FD-4-SO-051220 / SIAD-NTA-2-SO-051220	05/12/2020	N	**0.00097**	J	0.0011	U	0.0011	U
				05/12/2020	FD	**0.00083**	J	0.001	U	0.001	U
	Soil	SIAD-NTA-3-SO	SIAD-NTA-3-SO-051220	05/12/2020	N	**0.017**		**0.00083**	J	0.00095	U
	Soil	SIAD-NTA-4-SO	SIAD-NTA-4-SO-051220	05/12/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-NTA-5-SO	SIAD-NTA-5-SO-051220	05/12/2020	N	0.00094	U	0.00094	U	0.00094	U
Obstacle Course Training Area	Soil	SIAD-OCTA-1-SO	SIAD-OCTA-1-SO-051220	05/12/2020	N	0.00095	U	0.00095	U	0.00095	U
			SIAD-OCTA-1-SO-051320	05/13/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-OCTA-2-SO	SIAD-OCTA-2-SO-051220	05/12/2020	N	**0.0011**		0.001	U	0.001	U
	Soil	SIAD-OCTA-3-SO	SIAD-OCTA-3-SO-051220	05/12/2020	N	0.00097	U	0.00097	U	0.00097	U
	Soil	SIAD-OCTA-4-SO	SIAD-OCTA-4-SO-051220	05/12/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-OCTA-5-SO	SIAD-OCTA-5-SO-051220	05/12/2020	N	0.00094	U	0.00094	U	0.00094	U
	Soil	SIAD-OCTA-6-SO	SIAD-OCTA-6-SO-051220	05/12/2020	N	**0.0011**		0.001	U	0.001	U
P-613 SIAD Fire Department Storage Building	Soil	SIAD-P613-1-SO	SIAD-P613-1-SO-051820	05/18/2020	N	**0.0009**	J	0.001	U	0.001	U
	Soil	SIAD-P613-2-SO	SIAD-P613-2-SO-051820	05/18/2020	N	0.00098	U	0.00098	U	0.00098	U
AFFF Storage Area PS02	Soil	SIAD-PS02-01-SO	SIAD-PS02-01-SO-082720	08/27/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-PS02-02-SO	SIAD-PS02-02-SO-082720	08/27/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-PS02-03-SO	SIAD-PS02-03-SO-082720	08/27/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-PS02-04-SO	SIAD-PS02-04-SO-082720	08/27/2020	N	0.00094	U	0.00094	U	0.00094	U

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
OSD Residential Risk Screening Level						0.13		0.13		1.9	
OSD Industrial/Commercial Risk Screening Level						1.6		1.6		25	
Small Aircraft Fire Training Area	Soil	SIAD-SAFTA-1-SO	SIAD-SAFTA-1-SO-051420	05/19/2020	N	0.001	U	0.001	U	0.001	U
	Soil	SIAD-SAFTA-2-SO	SIAD-FD-1-SO-051420 / SIAD-SAFTA-2-SO-051420	05/14/2020	FD	0.0011	U	0.0011	U	0.0011	U
			SIAD-SAFTA-2-SO-051420	05/14/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-SAFTA-3-SO	SIAD-SAFTA-3-SO-051420	05/14/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-SAFTA-4-SO	SIAD-SAFTA-4-SO-051520	05/15/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	SIAD-SAFTA-5-SO	SIAD-SAFTA-5-SO-051520	05/15/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	SIAD-SAFTA-6-SO	SIAD-SAFTA-6-SO-051520	05/15/2020	N	0.0012	U	0.0012	U	0.0012	U
Garrison Sewage Treatment Ponds	Soil	SIAD-GSTP-01-SO	SIAD-GSTP-01-SO-111120	11/11/2020	N	**0.0058**		0.0011	U	0.0011	U
	Soil	SIAD-GSTP-02-SO	SIAD-GSTP-02-SO-110920	11/09/2020	N	**0.0073**		**0.002**		0.00091	U
	Soil	SIAD-GSTP-03-SO	SIAD-GSTP-03-SO-111120	11/11/2020	N	**0.21**	DJ	**0.011**		**0.0019**	
	Soil	SIAD-GSTP-04-SO	SIAD-GSTP-04-SO-110920	11/09/2020	N	**0.024**		0.00099	U	0.00099	U
	Soil	SIAD-GSTP-05-SO	SIAD-GSTP-05-SO-110920	11/09/2020	N	**0.00055**	J	0.00084	U	0.00084	U
	Soil	SIAD-GSTP-06-SO	SIAD-GSTP-06-SO-110920	11/09/2020	N	**0.0032**		**0.0015**		0.00086	U
	Soil	SIAD-GSTP-07-SO	SIAD-GSTP-07-SO-111120	11/11/2020	N	**0.25**	DJ	**0.0095**		**0.0031**	
			SIAD-FD-01-SO-111120 / SIAD-GSTP-07-SO-111120	11/11/2020	FD	**0.17**		**0.01**		**0.0021**	
	Soil	SIAD-GSTP-08-SO	SIAD-GSTP-08-SO-111120	11/11/2020	N	**0.019**		**0.0014**		**0.0013**	
	Soil	SIAD-GSTP-09-SO	SIAD-GSTP-09-SO-111120	11/11/2020	N	**0.052**		**0.0021**		**0.0012**	
Mission Sewage Treatment Ponds	Soil	SIAD-MSTP-01-SO	SIAD-MSTP-01-SO-111220	11/12/2020	N	**0.0038**		**0.00052**	J	0.00099	U
	Soil	SIAD-MSTP-02-SO	SIAD-MSTP-02-SO-111220	11/12/2020	N	0.00098	U	0.00098	U	0.00098	U
	Soil	SIAD-MSTP-03-SO	SIAD-MSTP-03-SO-111220	11/12/2020	N	**0.0019**		**0.0063**		0.0016	U
	Soil	SIAD-MSTP-04-SO	SIAD-MSTP-04-SO-111220	11/12/2020	N	**0.00081**	J	**0.0023**		0.0012	U

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
					OSD Residential Risk Screening Level	0.13		0.13		1.9	
					OSD Industrial/Commercial Risk Screening Level	1.6		1.6		25	

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2019 Office of the Secretary of Defense (OSD) risk screening levels for the residential and commerical/industrial scenario (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.).
3. Grey shaded values indicate the result was detected greater than the OSD risk screening level for the residential scenario. Italicized values indicate the result was detected greater than the OSD risk screening level for the industrial/commercial and residential 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
OSD = Office of the Secretary of Defence
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
SIAD = Sierra Army Depot

Qualifier	Description
DJ	The analyte was analyzed at dilution and the result is an estimated quantity
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).

Table 7-3 - Surface Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

					Analyte	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
					OSD Tapwater RiskScreening Level	40		40		600	
Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Garrison Sewage Treatment Ponds	Surface Water	SIAD-GSTP-01-SW	SIAD-GSTP-01-SW-110920	11/09/2020	N	**16**		3.5	U	3.5	U
	Surface Water	SIAD-GSTP-02-SW	SIAD-GSTP-02-SW-111120	11/11/2020	N	**610**	DJ	**650**	J-	**370**	J-
Mission Sewage Treatment Ponds	Surface Water	SIAD-MSTP-01-SW	SIAD-MSTP-01-SW-111220	11/12/2020	N	8.1	U	8.1	U	8.1	U
	Surface Water	SIAD-MSTP-02-SW	SIAD-MSTP-02-SW-111220	11/12/2020	N	**12**		**76**		**6.6**	
	Surface Water	SIAD-MSTP-02-SW	SIAD-FD-01-SW-111220 / SIAD-MSTP-02-SW-111220	11/12/2020	FD	**20**	J-	**120**	J-	**8.6**	J-

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than the 2019 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2019. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. October.).

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
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
SIAD = Sierra Army Depot

Qualifier	Description
DJ	The analyte was analyzed at dilution and the result is an estimated quantity
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).

Table 7-4 - Sediment PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

					Analyte	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
Associated AOPI	**Location Type**	**Location**	**Sample ID / Parent Sample ID**	**Sample Date**	**Sample Type**	**Result**	**Qual**	**Result**	**Qual**	**Result**	**Qual**
Garrison Sewage Treatment Ponds	Sediment	SIAD-GSTP-01-SE	SIAD-GSTP-01-SE-110920	11/09/2020	N	**0.0062**		**0.0014**	J	0.0016	U
	Sediment	SIAD-GSTP-02-SE	SIAD-GSTP-02-SE-111120	11/11/2020	N	**0.11**		**0.0066**		**0.0015**	J
	Sediment	SIAD-GSTP-02-SE	SIAD-FD-01-SE-111120 / SIAD-GSTP-02-SE-111120	11/11/2020	FD	**0.086**		**0.0053**		0.0031	U
Mission Sewage Treatment Ponds	Sediment	SIAD-MSTP-01-SE	SIAD-MSTP-01-SE-111220	11/12/2020	N	0.00094	U	0.00094	U	0.00094	U
	Sediment	SIAD-MSTP-02-SE	SIAD-MSTP-02-SE-111220	11/12/2020	N	0.001	U	0.001	U	0.001	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.

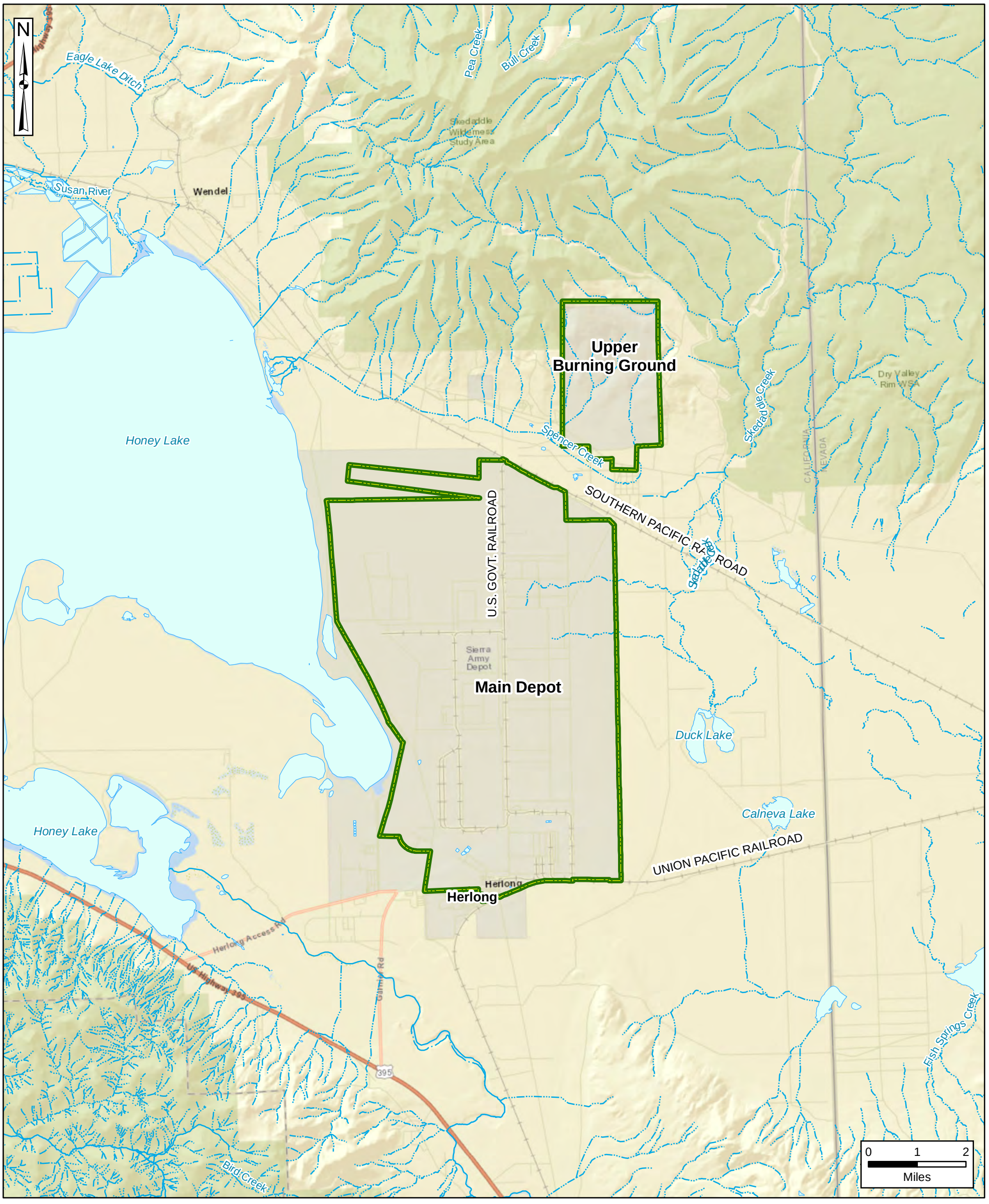
Acronyms/Abbreviations:
AOPI = Area of Potential Interest
FD = field duplicate sample
ID = identification
mg/kg = milligrams per kilogram (parts per million)
N = primary sample
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane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

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

FIGURES

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 2-1
Site Location



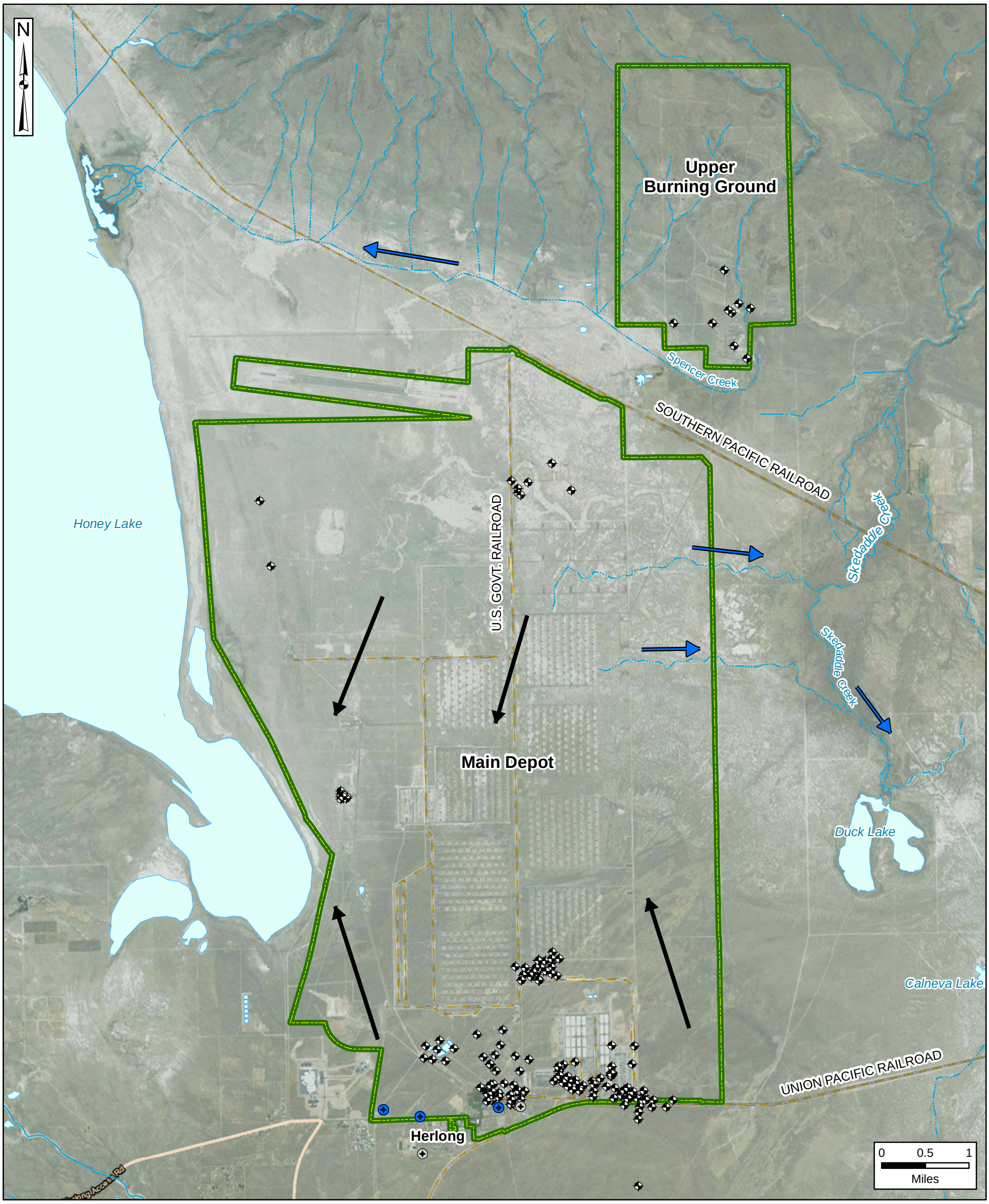
Installation Boundary
River/Stream (Perennial)
Stream (Intermittent)
Water Body (Intermittent)

Data Sources:
Sierra Army Depot, GIS Data, 2018
USGS, NHD Data, 2018
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 2-2
Site Layout

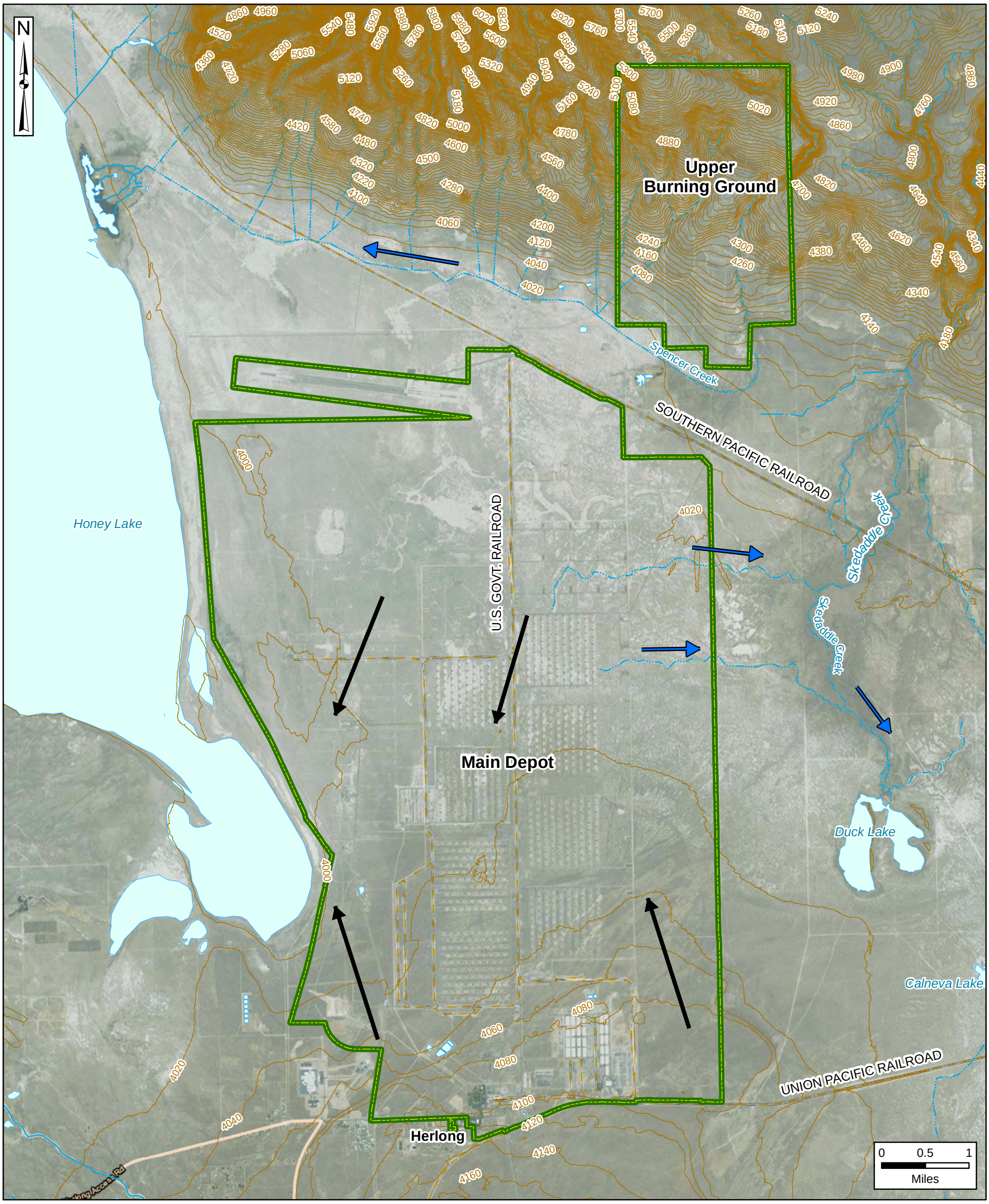


Data Sources:
Sierra Army Depot, GIS Data, 2018
USGS, NHD Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 2-3
Site Topography

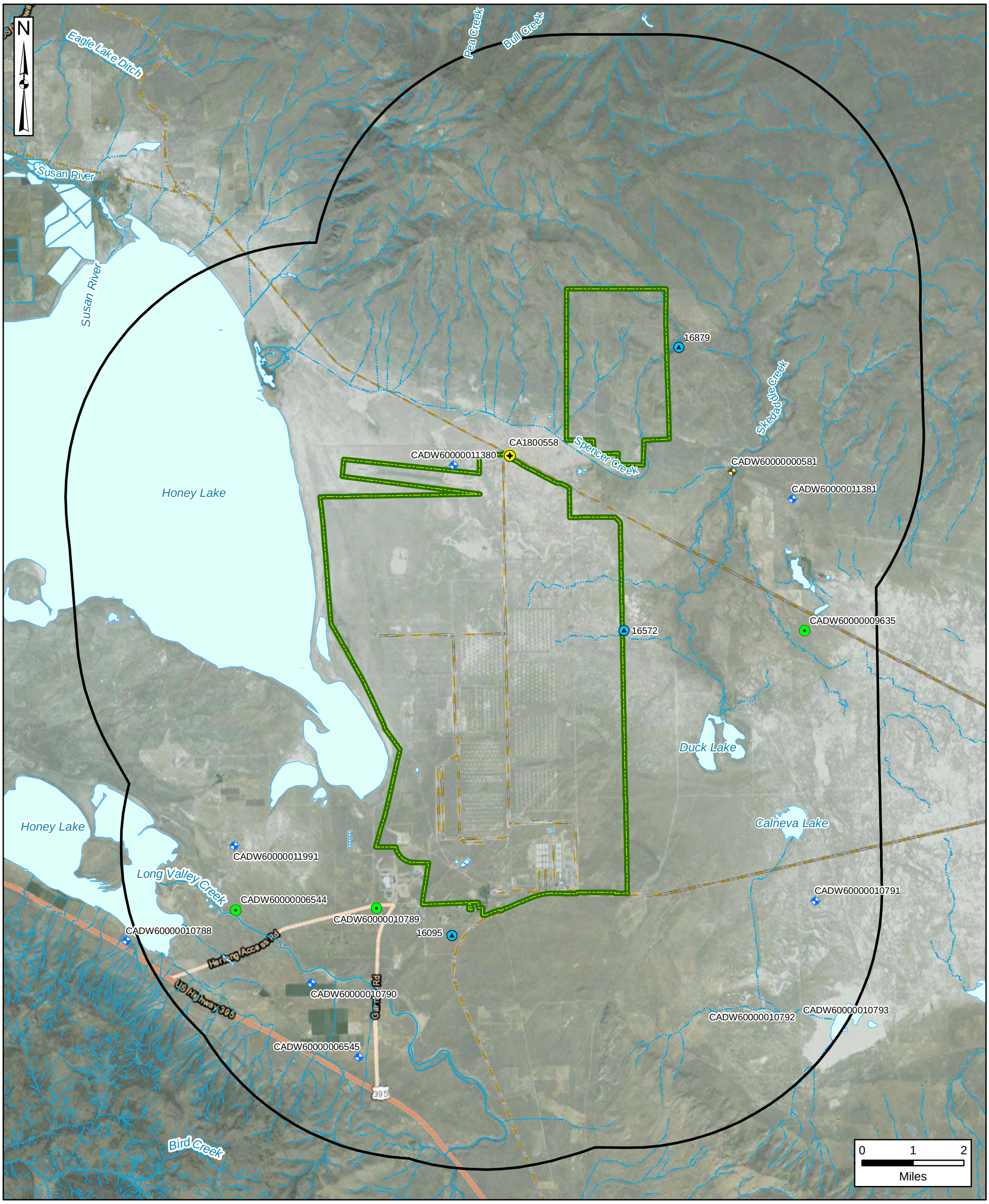


Data Sources:
Sierra Army Depot, GIS Data, 2018
USGS, NHD Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 2-4
Off-Post Potable Supply Wells

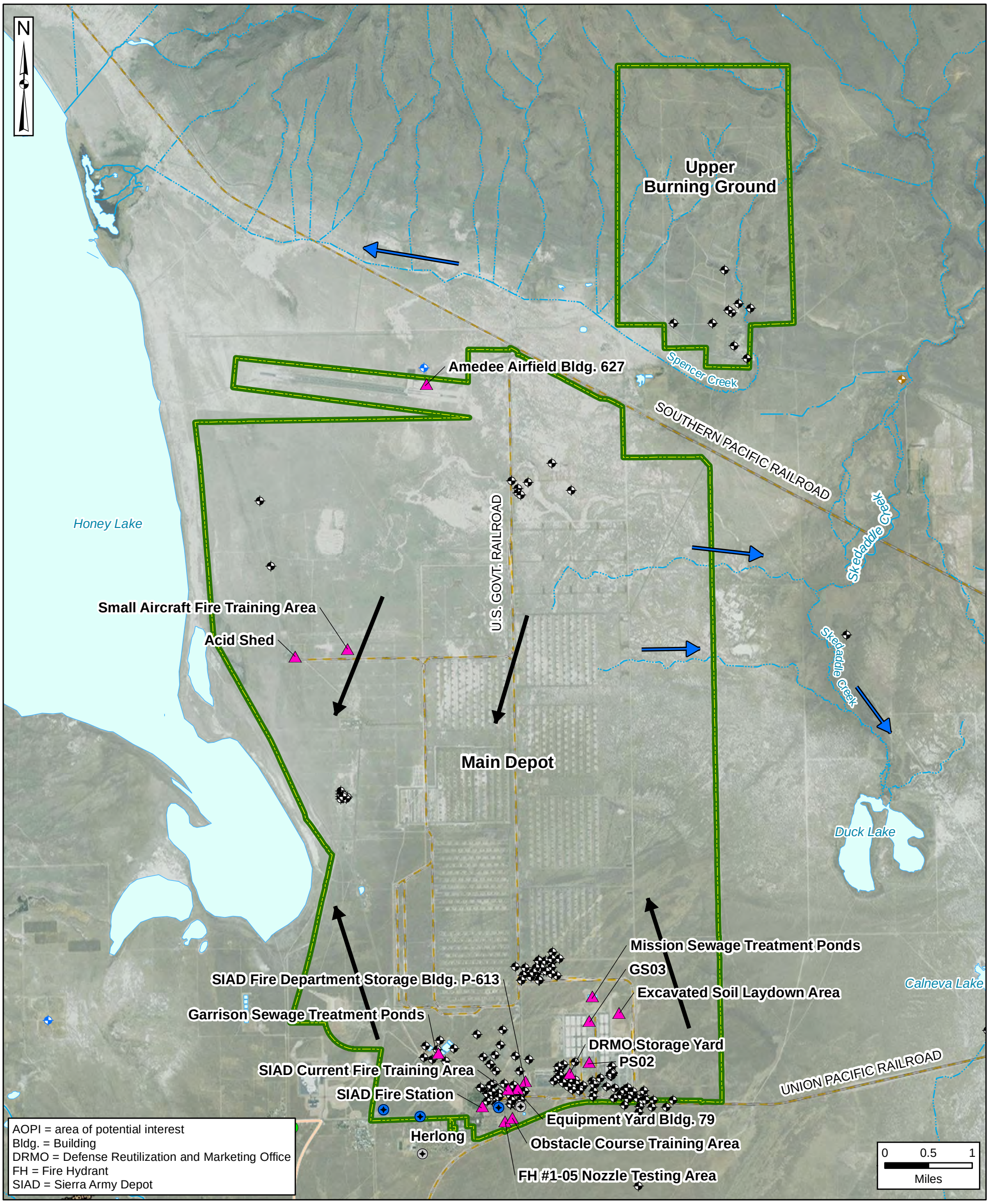


Data Sources:
Sierra Army Depot, GIS Data, 2018
EDR, Well Data, 2018
USGS, NHD Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

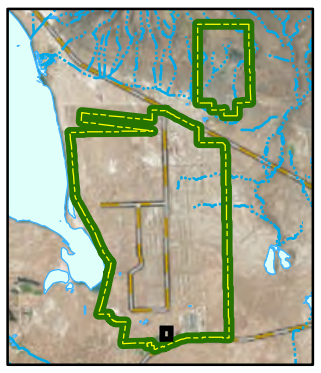
USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-2
AOPI Overview



USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-3
Aerial Photo of SIAD Current Fire Training Area, Equipment Yard - Building 79, and SIAD Fire Department Storage Building P-613



Installation Boundary

AOPI

Monitoring Well

Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest
SIAD = Sierra Army Depot

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

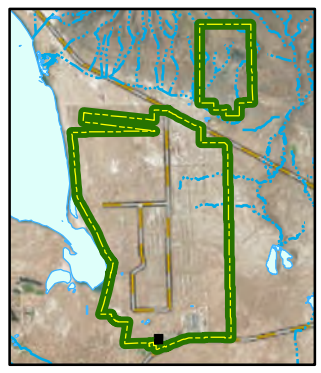


Figure 5-4
Aerial Photo of
SIAD Fire Station

Installation Boundary

AOPI

Monitoring Well

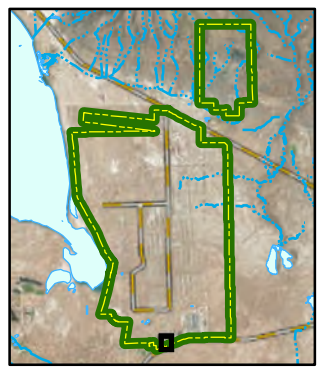
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest
SIAD = Sierra Army Depot

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-5
Aerial Photo of
Obstacle Course Training Area and
FH #1-05 Nozzle Testing Area



Installation Boundary

AOPI

Installation Drinking Water Well

Former Installation Drinking Water Well

Monitoring Well

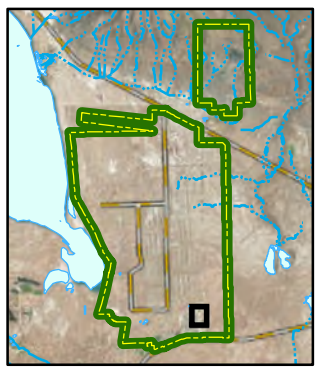
AOPI = area of potential interest
FH = Fire Hydrant

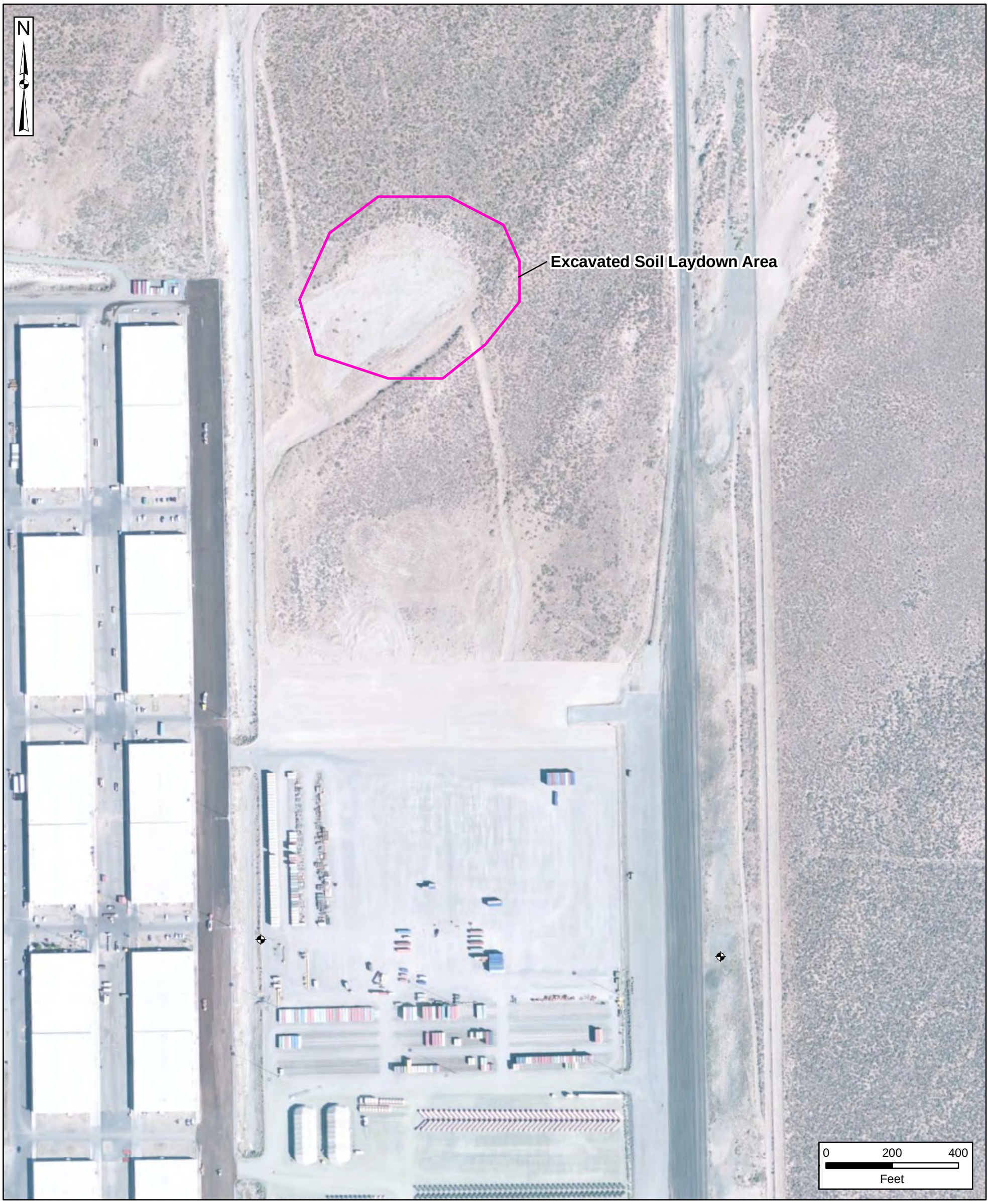
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-6
Aerial Photo of
Excavated Soil Laydown Area





Installation Boundary

AOPI

Monitoring Well

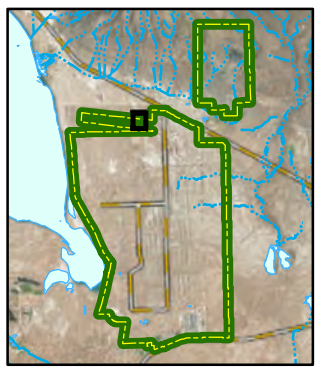
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-7
Aerial Photo of
Amedee Airfield Building 627



Installation Boundary

AOPI

Irrigation Well

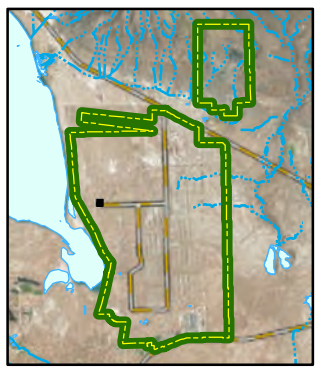
AOPI = area of potential interest

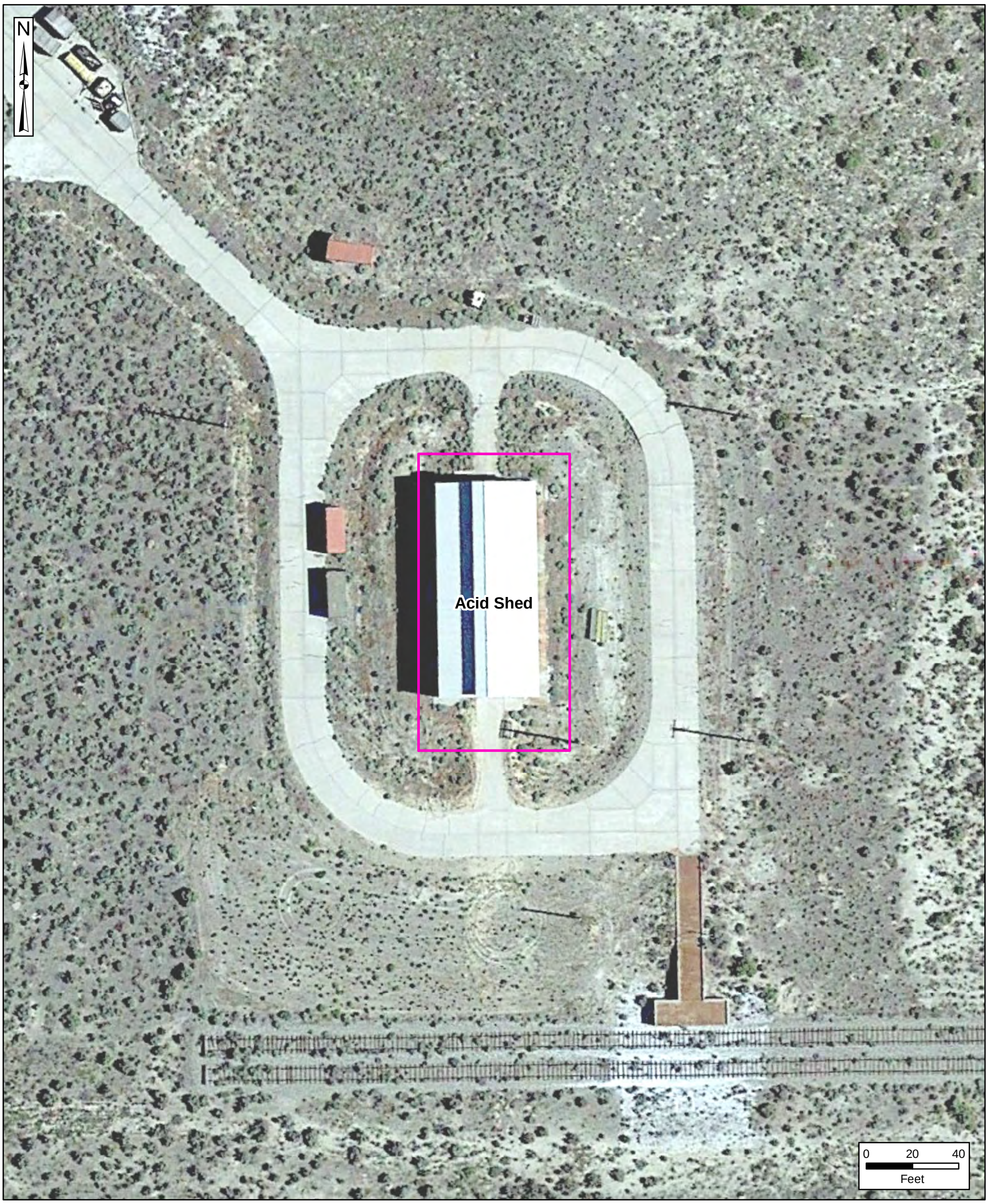
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-8
Aerial Photo of
Acid Shed





Installation Boundary

AOPI

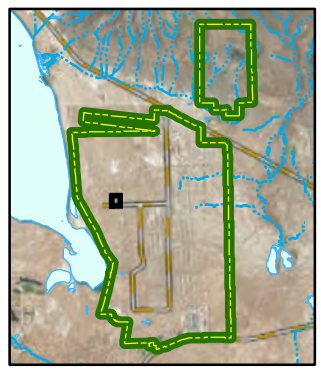
AOPI = area of potential interest

Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-9
Aerial Photo of
Small Aircraft Fire Training Area



Installation Boundary

AOPI

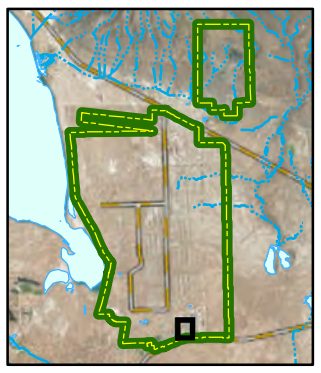
AOPI = area of potential interest

Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-10
Aerial Photo of
DRMO Storage Yard and PS02



Installation Boundary

AOPI

Monitoring Well

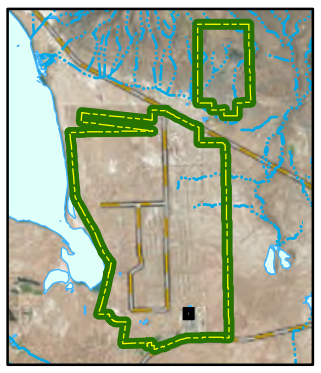
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

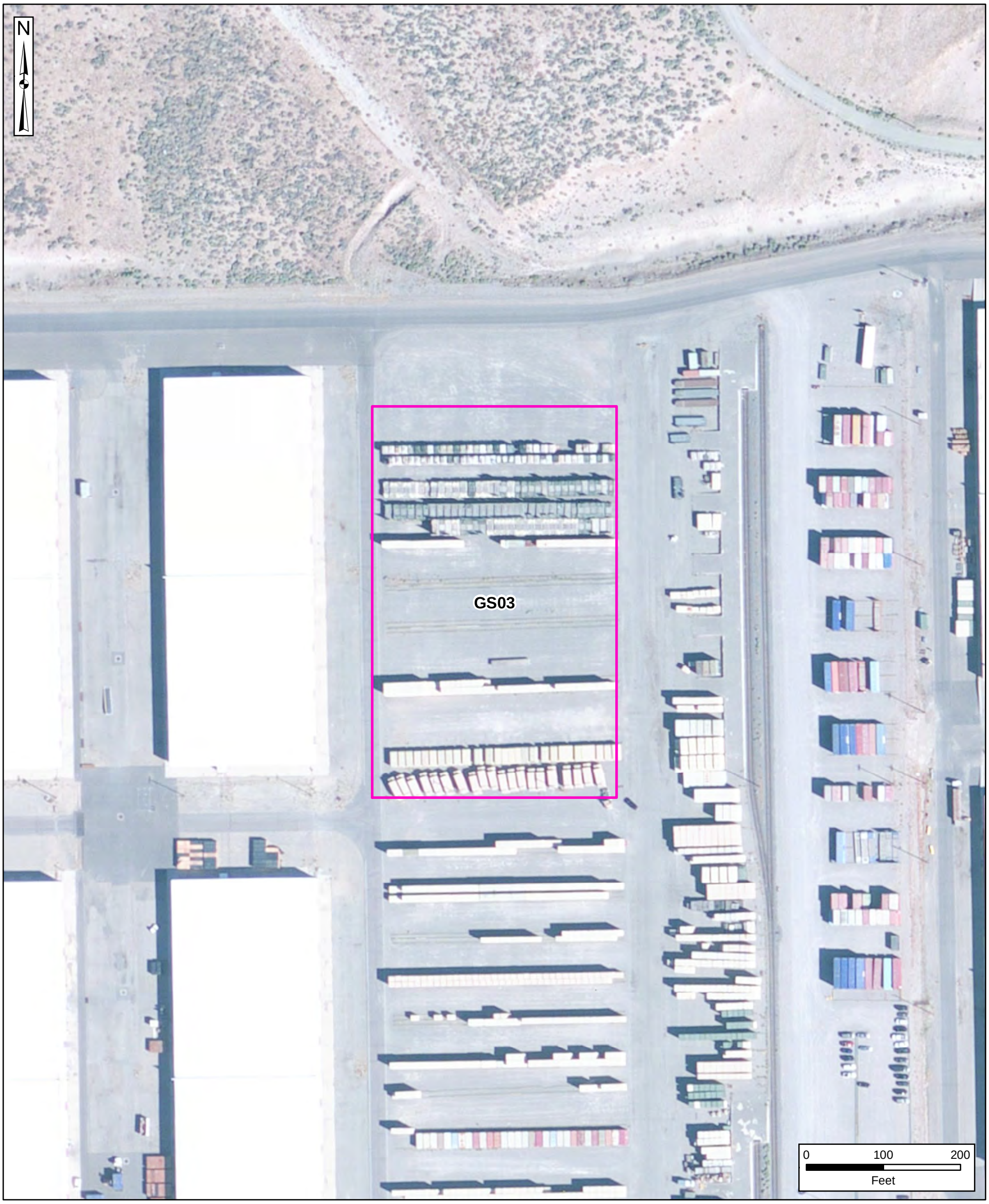
Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest
DRMO = Defense Reutilization and Marketing Office

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-11
Aerial Photo of
GS03





Installation Boundary

AOPI

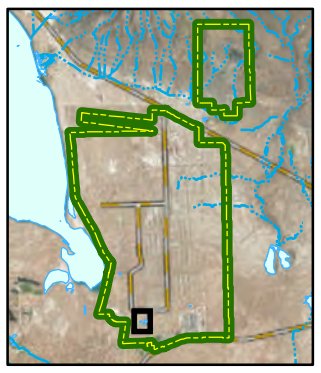
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-12
Aerial Photo of
Garrison Sewage Treatment Ponds



Installation Boundary
AOPI
Monitoring Well
Sanitary Sewer Line

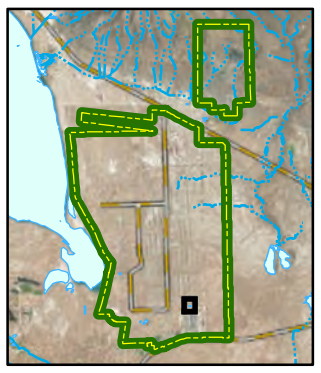
AOPI = area of potential interest

Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 5-13
Aerial Photo of
Mission Sewage Treatment Ponds



Installation Boundary

AOPI

Sanitary Sewer Line

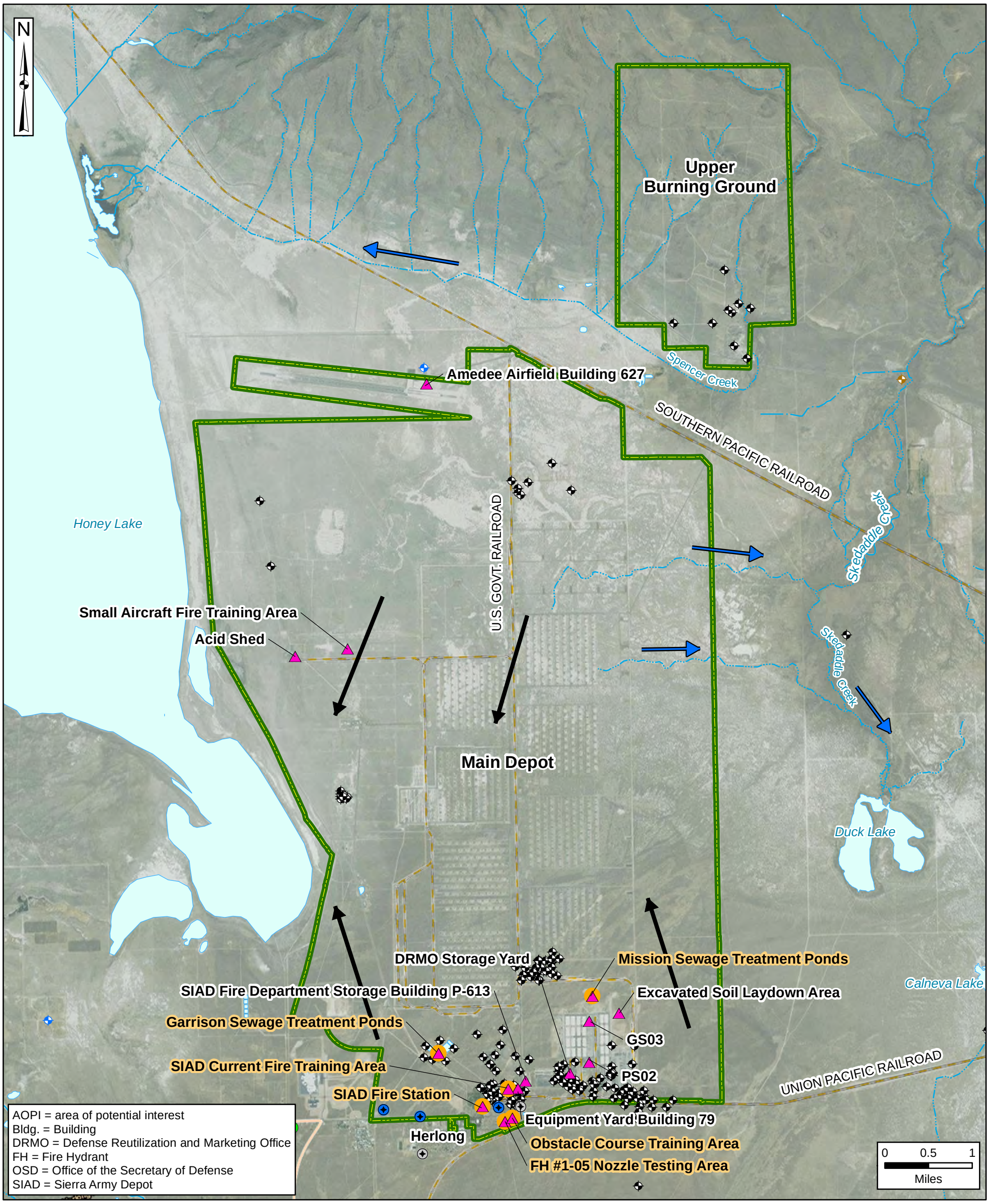
Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North

AOPI = area of potential interest

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

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

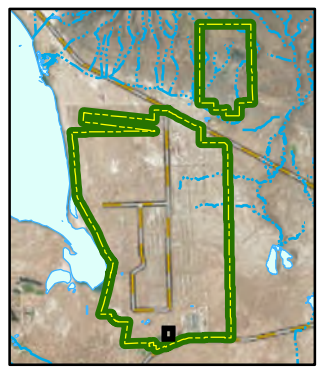


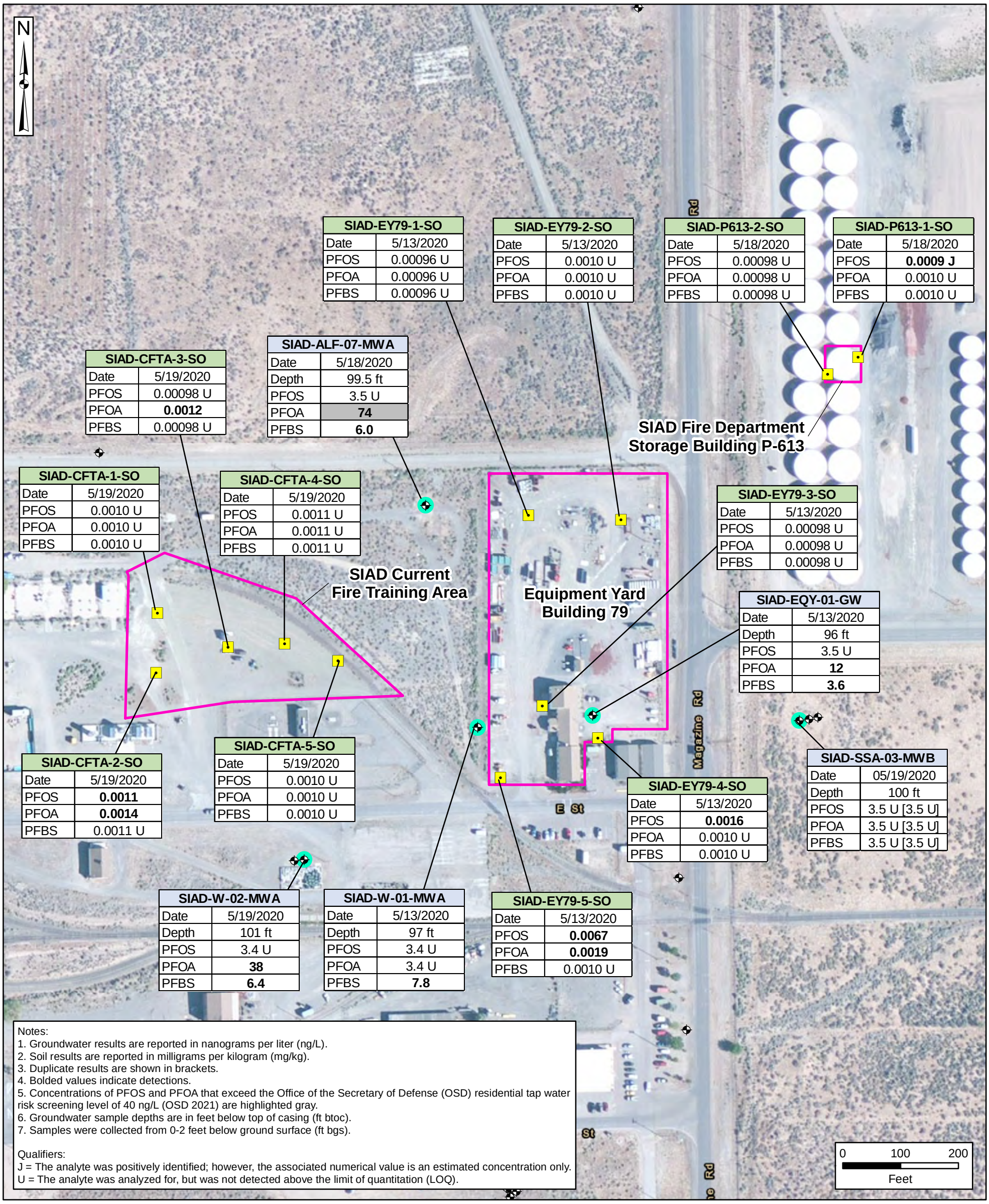
Data Sources:
Sierra Army Depot, GIS Data, 2018
EDR, Well Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-2
SIAD Current Fire Training Area,
Equipment Yard - Building 79, and
SIAD Fire Department Storage Building P-613
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Duplicate 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.
6. Groundwater sample depths are in feet below top of casing (ft btoc).
7. Samples were collected from 0-2 feet below ground surface (ft bgs).

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
Monitoring Well
Shallow Soil Sample Location
Groundwater Sample Location - Existing Well

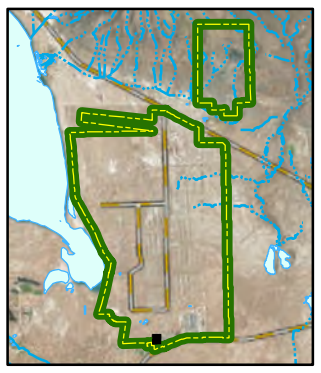
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SIAD = Sierra Army Depot
SO = soil

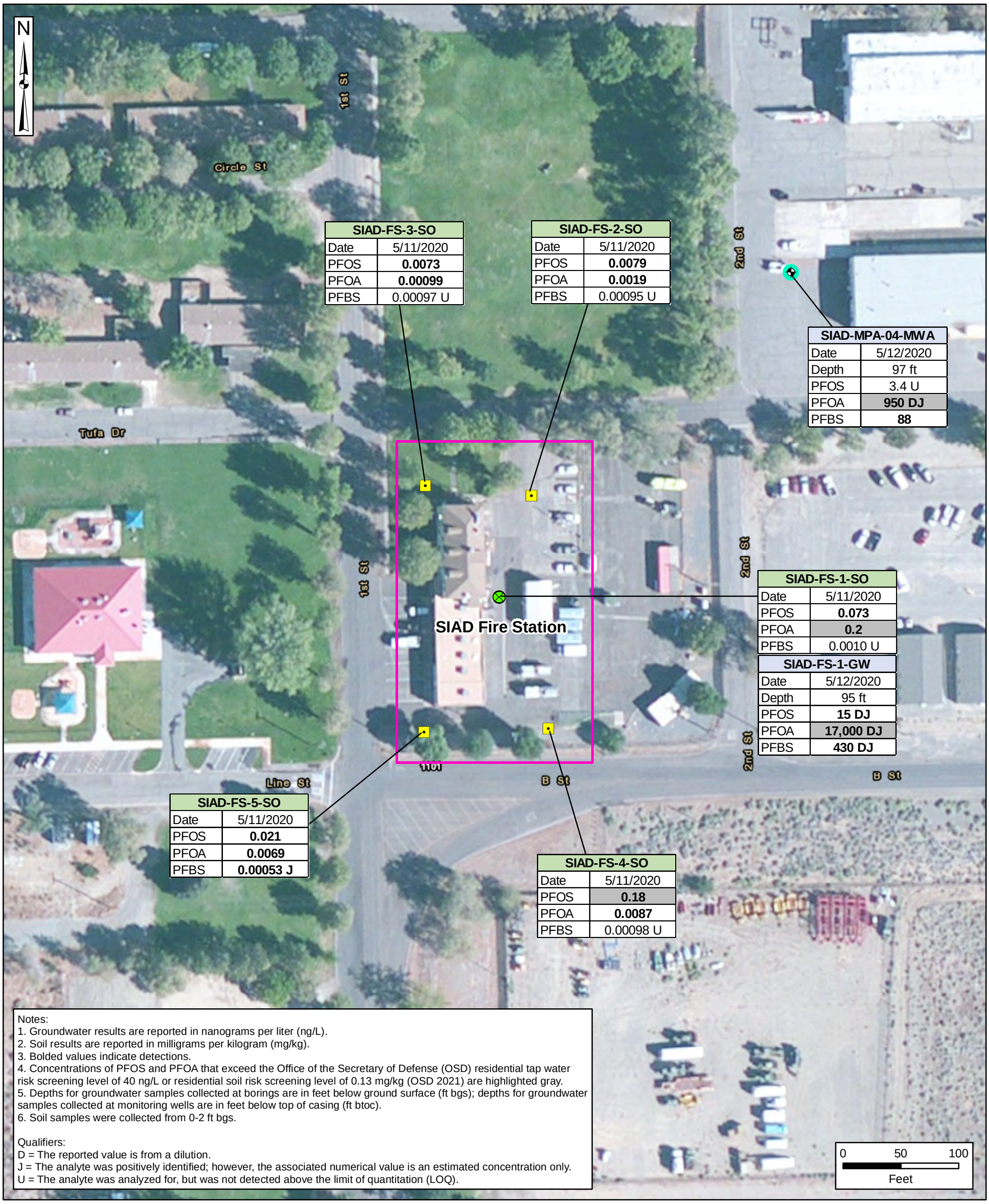
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-3
SIAD Fire Station
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. 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 or residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.
5. Depths for groundwater samples collected at borings are in feet below ground surface (ft bgs); depths for groundwater samples collected at monitoring wells are in feet below top of casing (ft btoc).
6. Soil samples were collected from 0-2 ft bgs.

Qualifiers:
D = The reported value is from a dilution.
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
Monitoring Well
Shallow Soil Sample Location
Soil and Groundwater Sampling Location (Boring)
Groundwater Sample Location - Existing Well

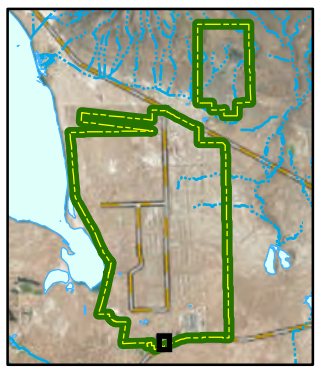
AOPI = area of potential interest
ft = feet
GW = groundwater
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SIAD = Sierra Army Depot
SO = soil

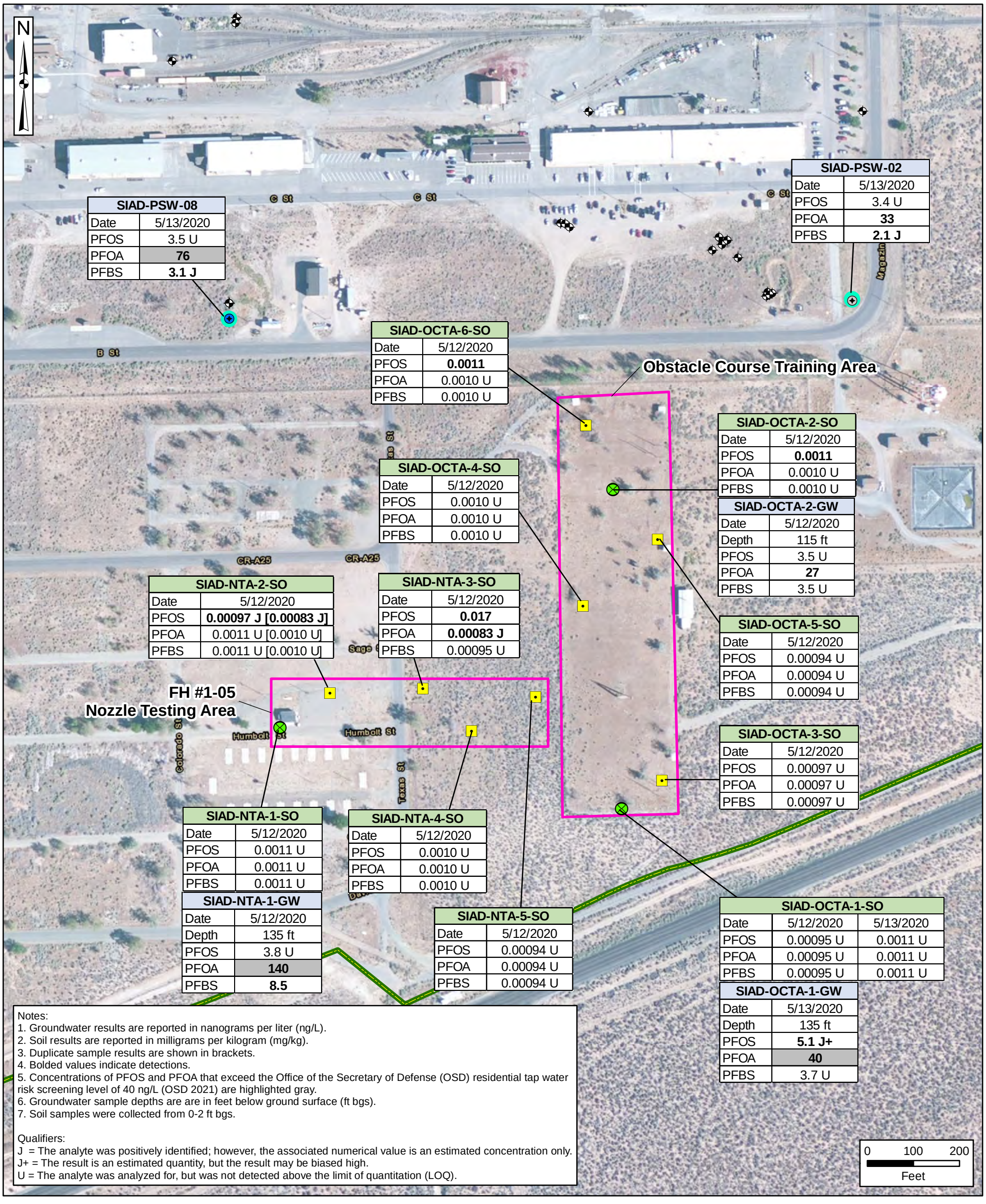
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-4
Obstacle Course Training Area and FH #1-05 Nozzle Testing Area PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. 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.
6. Groundwater sample depths are are in feet below ground surface (ft bgs).
7. Soil samples were collected from 0-2 ft bgs.

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

- Installation Boundary
- AOPI
- Installation Drinking Water Well
- Former Installation Drinking Water Well
- Monitoring Well
- Shallow Soil Sample Location
- Soil and Groundwater Sampling Location (Boring)
- Groundwater Sample Location - Existing Well

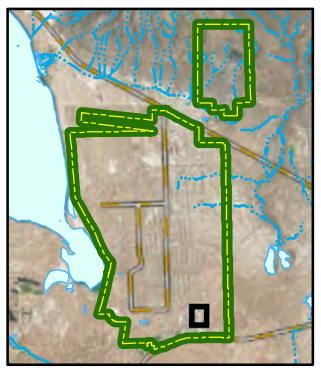
AOPI = area of potential interest
FH = Fire Hydrant
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-5
Excavated Soil Laydown Area
PFOS, PFOA, and PFBS Analytical Results



SIAD-ESLA-5-SO	
Date	5/14/2020
PFOS	0.00098 U
PFOA	0.00098 U
PFBS	0.00098 U

SIAD-ESLA-4-SO	
Date	5/14/2020
PFOS	0.00098 U
PFOA	0.00098 U
PFBS	0.00098 U

SIAD-ESLA-3-SO	
Date	5/13/2020
PFOS	0.00094 U
PFOA	0.00094 U
PFBS	0.00094 U

Excavated Soil Laydown Area

SIAD-ESLA-2-SO	
Date	5/14/2020
PFOS	0.00095 U
PFOA	0.00095 U
PFBS	0.00095 U

SIAD-ESLA-6-SO	
Date	5/14/2020
PFOS	0.00091 U
PFOA	0.00091 U
PFBS	0.00091 U

SIAD-ESLA-1-SO	
Date	5/13/2020
PFOS	0.00094 U
PFOA	0.00094 U
PFBS	0.00094 U

SIAD-ESLA-1-GW	
Date	5/13/2020
Depth	90 ft
PFOS	3.8 U
PFOA	**18**
PFBS	**8.7**

SIAD-B21-4R-MW

SIAD-B21-4R-MW	
Date	5/18/2020
Depth	92 ft
PFOS	3.4 U
PFOA	3.4 U
PFBS	**3.3 J**

0 200 400
Feet

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Depths for groundwater samples collected at borings are in feet below ground surface (ft bgs); depths for groundwater samples collected at monitoring wells are in feet below top of casing (ft btoc).
5. Soil samples were collected from 0-2 ft bgs.

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
Monitoring Well
Shallow Soil Sample Location
Soil and Groundwater Sampling Location (Boring)
Groundwater Sample Location - Existing Well

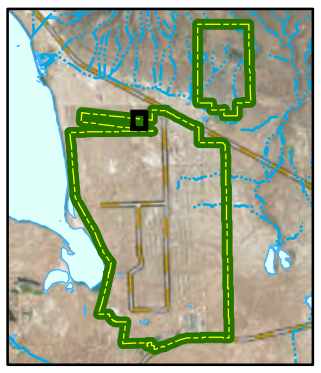
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-6
Amedee Airfield Building 627
PFOS, PFOA, and PFBS Analytical Results



SIAD-AAF627-3-SO	
Date	5/15/2020
PFOS	0.0011 U
PFOA	0.0011 U
PFBS	0.0011 U

SIAD-AAF627-1-SO	
Date	5/13/2020
PFOS	0.0011 U
PFOA	0.0011 U
PFBS	0.0011 U

SIAD-AAF627-1-GW	
Date	5/14/2020
Depth	21 ft
PFOS	3.6 U
PFOA	3.6 U
PFBS	3.6 U

Amedee Airfield Building 627

SIAD-AAF627-4-SO	
Date	5/15/2020
PFOS	0.0012 U
PFOA	0.0012 U
PFBS	0.0012 U

SIAD-AAF627-2-SO	
Date	5/15/2020
PFOS	0.0012 U
PFOA	0.0012 U
PFBS	0.0012 U

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. Depths for groundwater samples collected at borings are in ft bgs.

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

0 100 200
Feet

Installation Boundary
AOPI
Irrigation Well
Shallow Soil Sample Location
Soil and Groundwater Sampling Location (Boring)

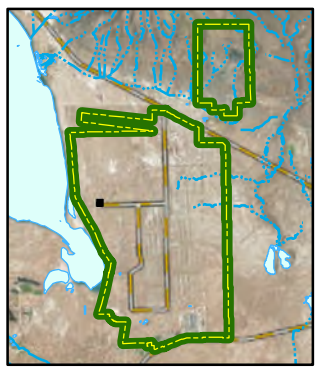
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

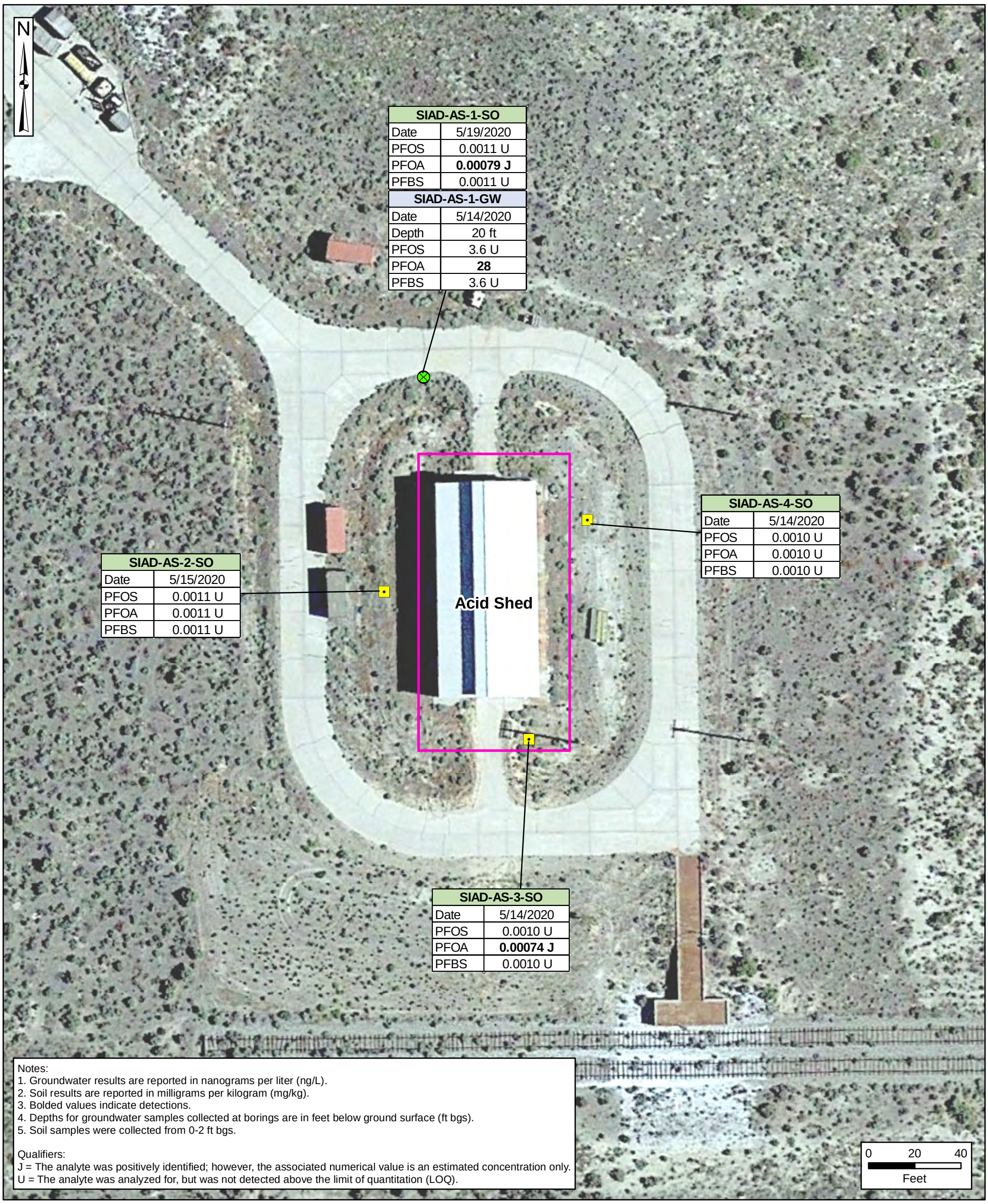
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-7
Acid Shed
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Bolded values indicate detections.
4. Depths for groundwater samples collected at borings are in feet below ground surface (ft bgs).
5. Soil samples were collected from 0-2 ft bgs.

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
Shallow Soil Sample Location
Soil and Groundwater Sampling Location (Boring)

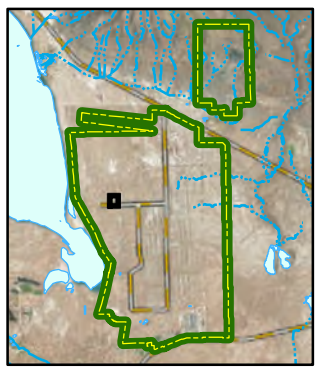
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

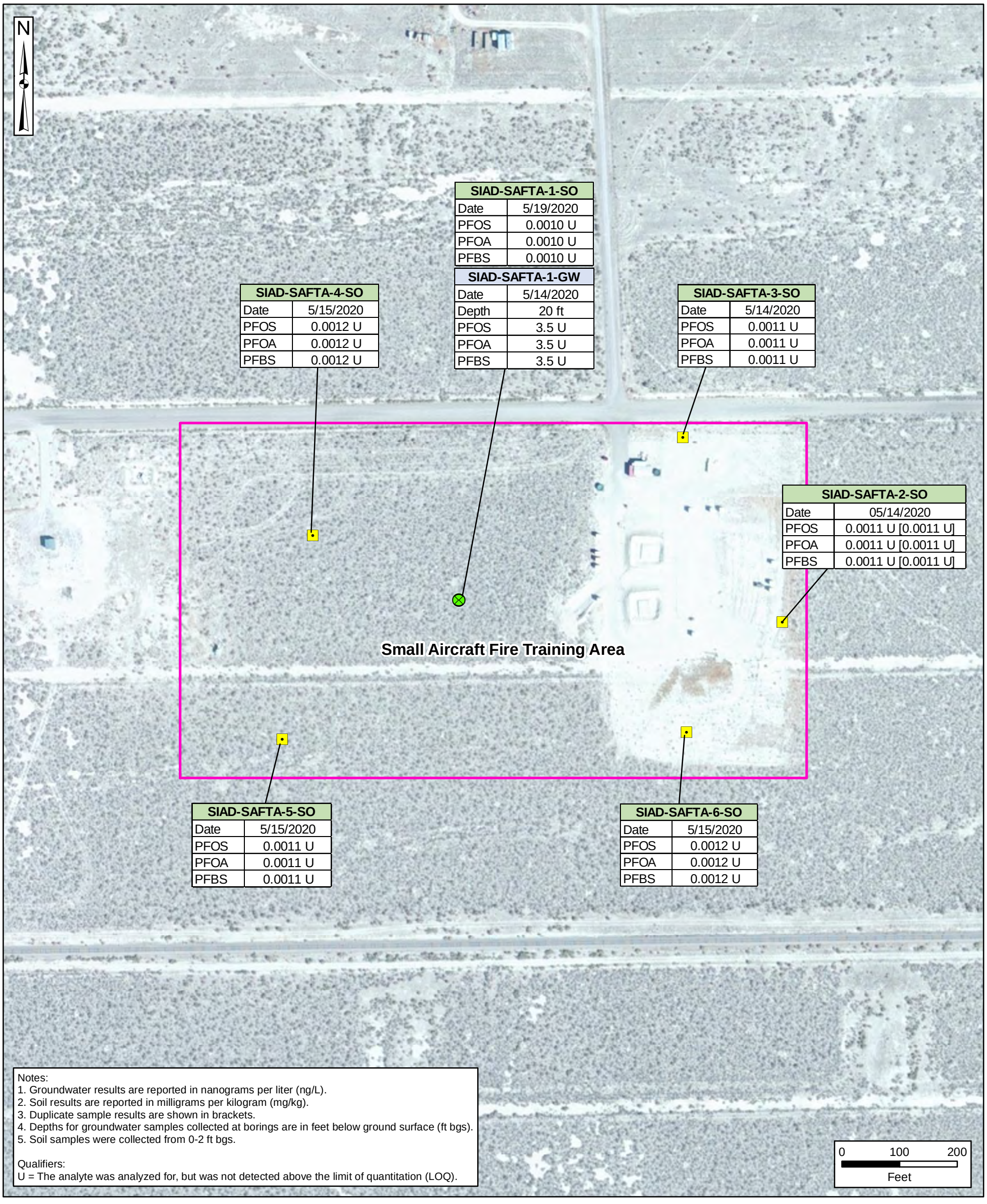
Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-8
Small Aircraft Fire Training Area
PFOS, PFOA, and PFBS Analytical Results





Installation Boundary

AOPI

Shallow Soil Sample Location

Soil and Groundwater Sampling Location (Boring)

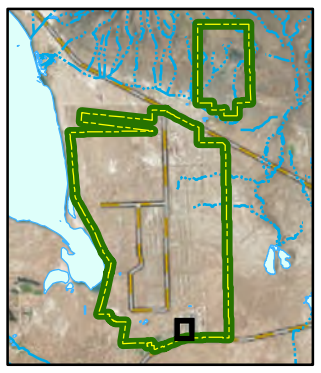
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

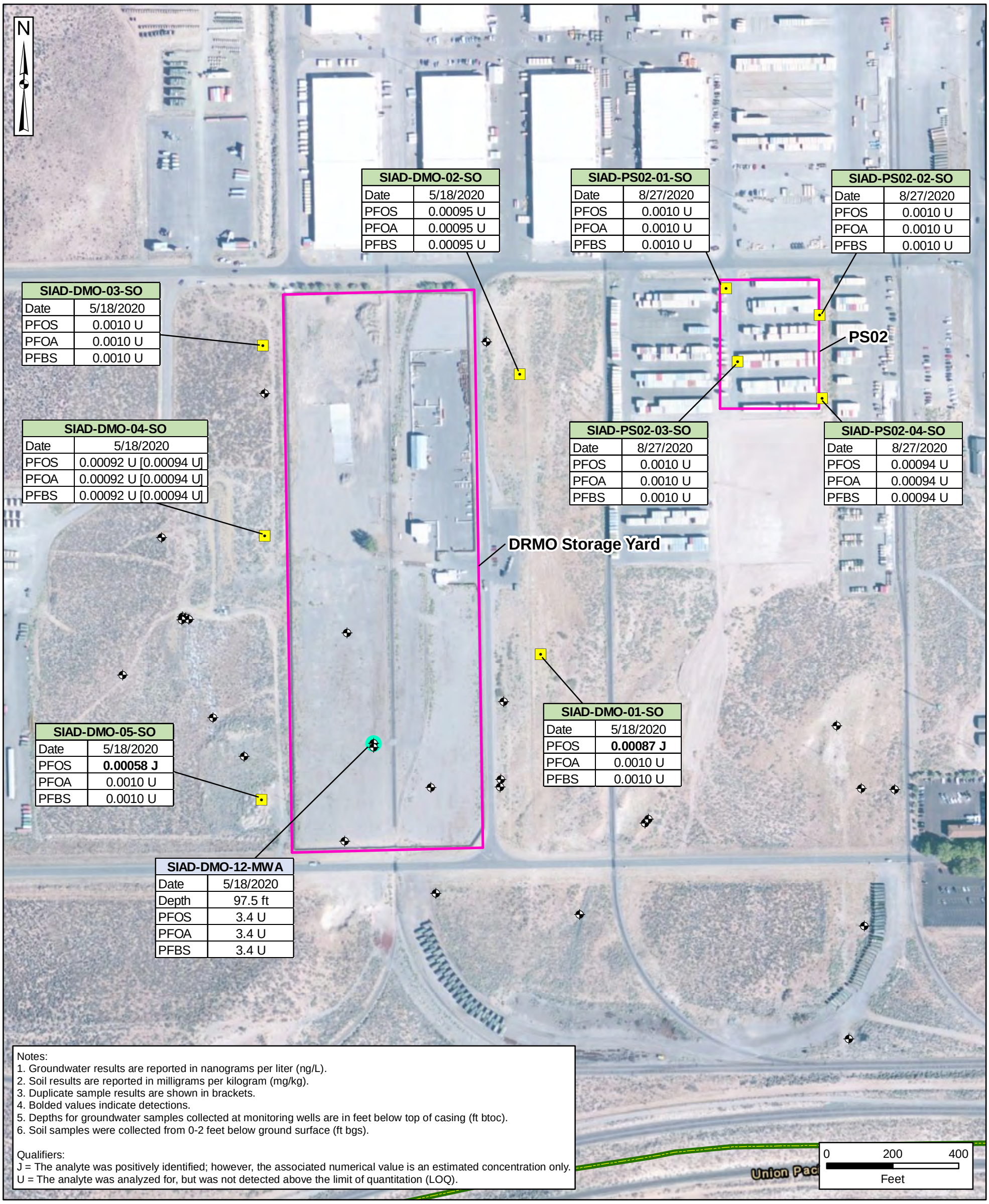
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-9
DRMO Storage Yard and PS02
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).
3. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Depths for groundwater samples collected at monitoring wells are in feet below top of casing (ft btoc).
6. Soil samples were collected from 0-2 feet below ground surface (ft bgs).

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
Monitoring Well
Shallow Soil Sample Location
Groundwater Sample Location - Existing Well

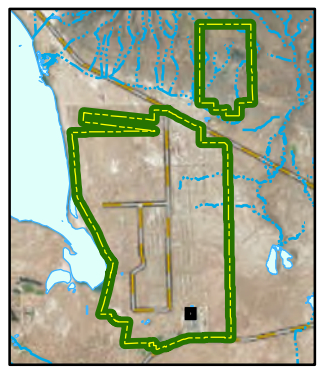
AOPI = area of potential interest
DRMO = Defense Reutilization and Marketing Office
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

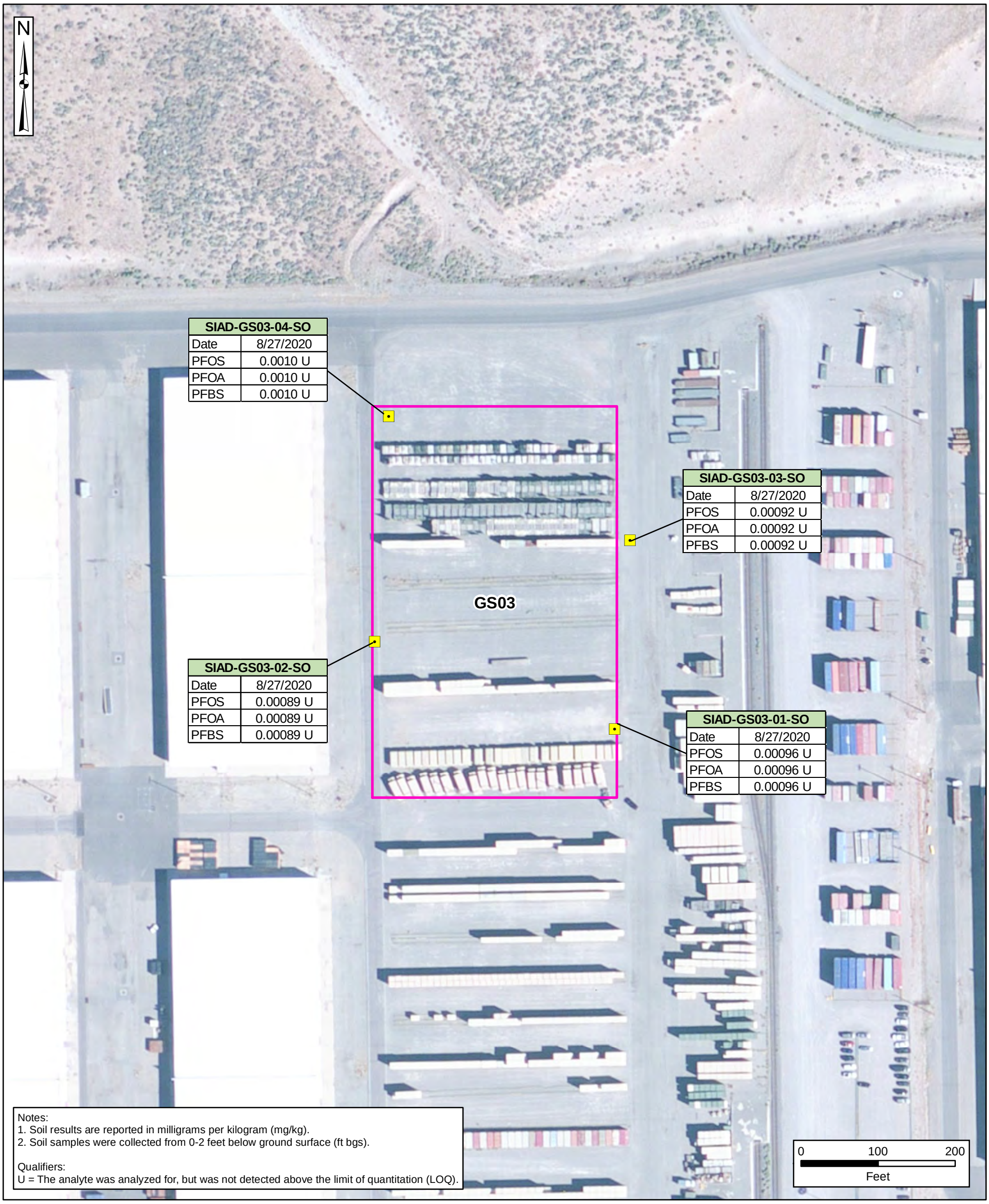
Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-10
GS03
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Soil samples were collected from 0-2 feet below ground surface (ft bgs).

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

Installation Boundary

AOPI

Shallow Soil Sample Location

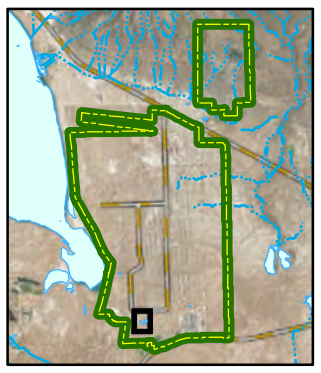
AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SO = soil

Data Sources:
Sierra Army Depot, GIS Data, 2018
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-11
Garrison Sewage Treatment Ponds
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater and surface water results are reported in nanograms per liter (ng/L).
2. Soil and sediment results are reported in milligrams per kilogram (mg/kg).
3. Soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. Duplicate sample results are shown in brackets.
5. Bolded values indicate detections.
6. 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.
7. Depths for groundwater samples collected at monitoring wells are in feet below top of casing (ft btoc).

Qualifiers:
D = The reported value is from a dilution.
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).

SIAD-GSTP-08-SO	
Date	11/11/2020
PFOS	**0.019**
PFOA	**0.0014**
PFBS	**0.0013**

SIAD-GSTP-01-SO	
Date	11/11/2020
PFOS	**0.0058**
PFOA	0.0011 U
PFBS	0.0011 U

SIAD-GSTP-03-SO	
Date	11/11/2020
PFOS	**0.21 DJ**
PFOA	**0.011**
PFBS	**0.0019**

SIAD-GSTP-09-SO	
Date	11/11/2020
PFOS	**0.052**
PFOA	**0.0021**
PFBS	**0.0012**

SIAD-STP-3-PZ	
Date	11/9/2020
Depth	46.14 ft
PFOS	**23 [22]**
PFOA	**6.7 [5.3]**
PFBS	**72 [72]**

SIAD-GSTP-05-SO	
Date	11/9/2020
PFOS	**0.00055 J**
PFOA	0.00084 U
PFBS	0.00084 U

SIAD-GSTP-04-SO	
Date	11/9/2020
PFOS	**0.024**
PFOA	0.00099 U
PFBS	0.00099 U

SIAD-GSTP-02-SO	
Date	11/9/2020
PFOS	**0.0073**
PFOA	**0.002**
PFBS	0.00091 U

SIAD-GSTP-07-SO	
Date	11/11/2020
PFOS	**0.25 DJ [0.17]**
PFOA	**0.0095 [0.01]**
PFBS	**0.0031 [0.0021]**

Garrison Sewage Treatment Ponds

SIAD-GSTP-06-SO	
Date	11/9/2020
PFOS	**0.0032**
PFOA	**0.0015**
PFBS	0.00086 U

SIAD-GSTP-01-SW	
Date	11/9/2020
PFOS	**16**
PFOA	3.5 U
PFBS	3.5 U

SIAD-GSTP-02-SW	
Date	11/11/2020
PFOS	**610 DJ**
PFOA	**650 J-**
PFBS	**370 J-**

SIAD-STP-5-PZ	
Date	11/9/2020
Depth	76.78 ft
PFOS	3.5 U
PFOA	**79**
PFBS	**4.1**

SIAD-GSTP-01-SE	
Date	11/9/2020
PFOS	**0.0062**
PFOA	**0.0014 J**
PFBS	0.0016 U

SIAD-GSTP-02-SE	
Date	11/11/2020
PFOS	**0.11 [0.086]**
PFOA	**0.0066 [0.0053]**
PFBS	**0.0015 J** [0.0031 U]

0 200 400
Feet

Installation Boundary
AOPI
Monitoring Well
Sanitary Sewer Line
Shallow Soil Sampling Location
Surface Water / Sediment Sampling Location
Groundwater Sampling Location - Existing Well

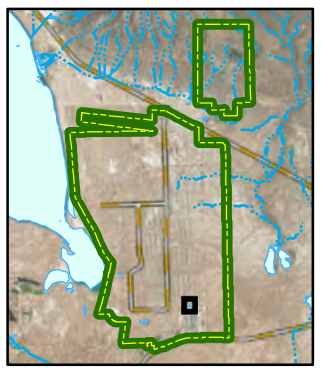
AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SO = soil
SW = surface water

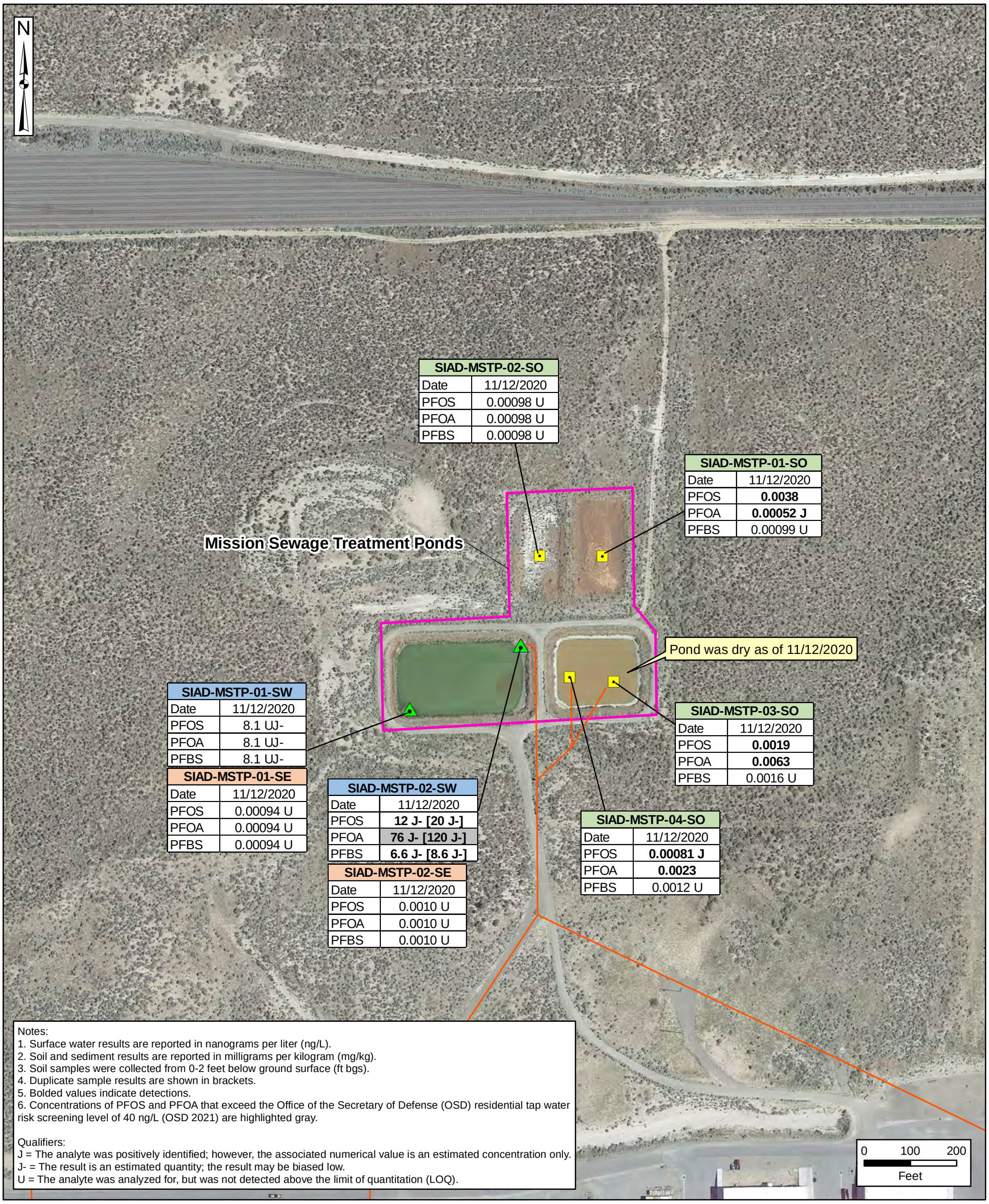
Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North

USAEC PFAS Preliminary Assessment/Site Inspection
Sierra Army Depot, California

Figure 7-12
Mission Sewage Treatment Ponds
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Surface water results are reported in nanograms per liter (ng/L).
2. Soil and sediment results are reported in milligrams per kilogram (mg/kg).
3. Soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. Duplicate sample results are shown in brackets.
5. Bolded values indicate detections.
6. 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.

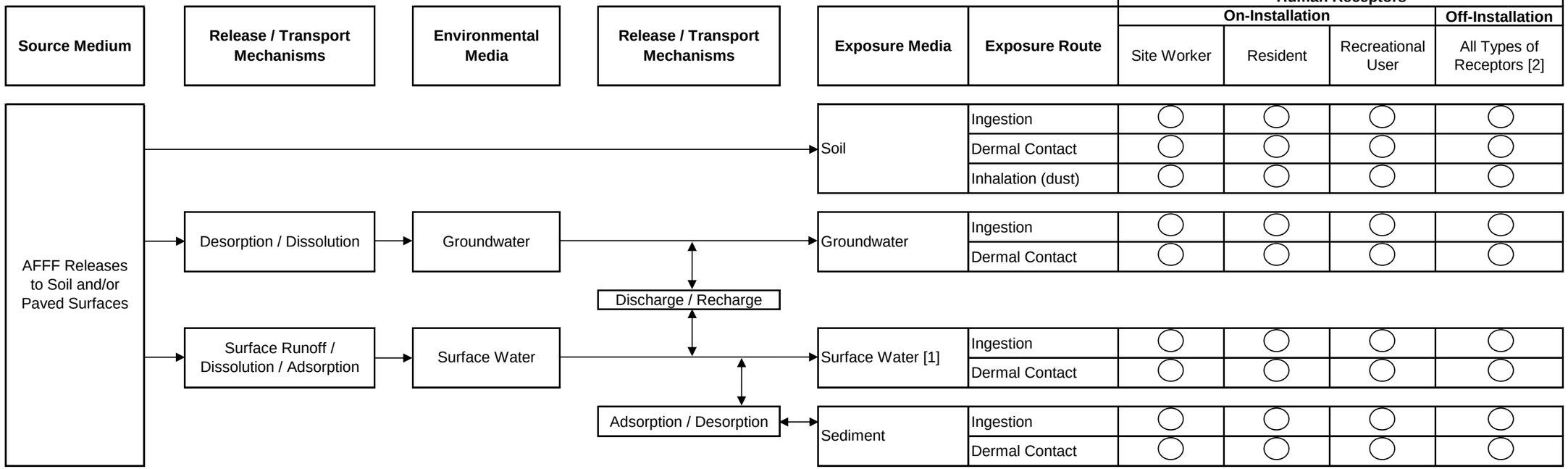
Qualifiers:
J = The analyte was positively identified; however, the associated numerical value is an estimated concentration only.
J- = The result is an estimated quantity; the result may be biased low.
U = The analyte was analyzed for, but was not detected above the limit of quantitation (LOQ).

Installation Boundary
AOPI
Sanitary Sewer Line
Shallow Soil Sampling Location
Surface Water / Sediment Sampling Location

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SE = sediment
SO = soil
SW = surface water

Data Sources:
Sierra Army Depot, GIS Data, 2018
Google Earth, Aerial Imagery, 2019

Coordinate System:
WGS 1984, UTM Zone 10 North



Legend:

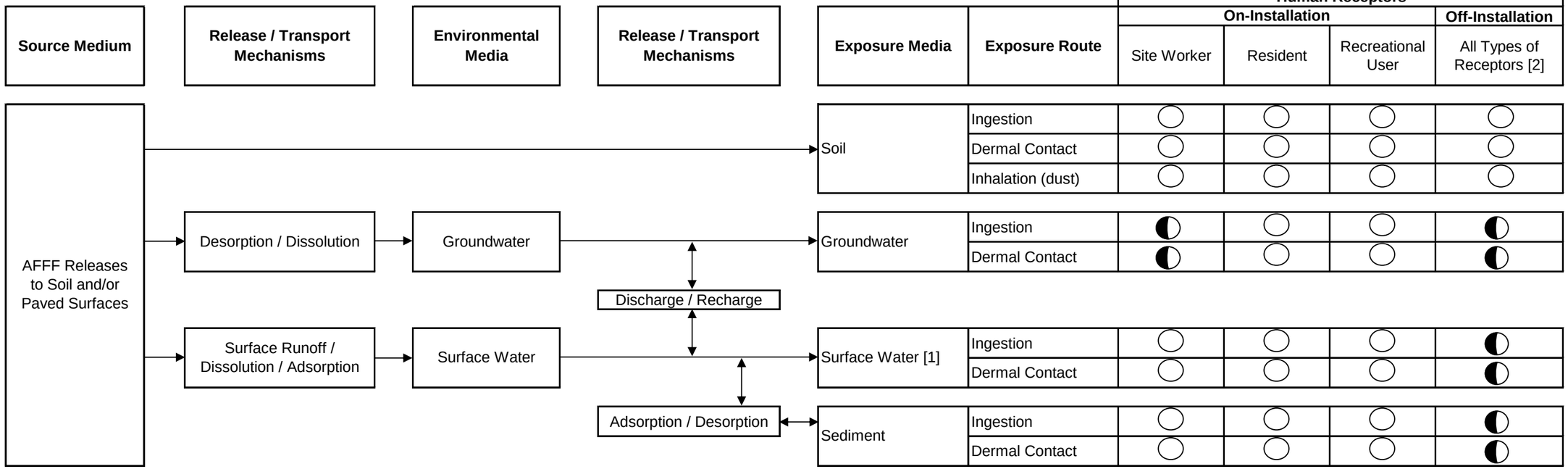
- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

ARCADIS

Conceptual Site Model for Small Aircraft Fire Training Area and Amedee Airfield Building 627 AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Sierra Army Depot, California

Figure 7-13



Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

ARCADIS

Conceptual Site Model for AFFF Storage Area GS03, Excavated Soil Laydown Area, and AFFF Storage Area PS02 AOPIs USAEC
PFAS Preliminary Assessment / Site Inspection
Sierra Army Depot, California

Figure 7-14

Source Medium	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]
AFFF Releases to Soil and/or Paved Surfaces				Soil	Ingestion	●	○	○	○
					Dermal Contact	●	○	○	○
					Inhalation (dust)	●	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	○	○	◐
					Dermal Contact	◐	○	○	◐
			Discharge / Recharge						
	Surface Runoff / Dissolution / Adsorption	Surface Water		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 and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.

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

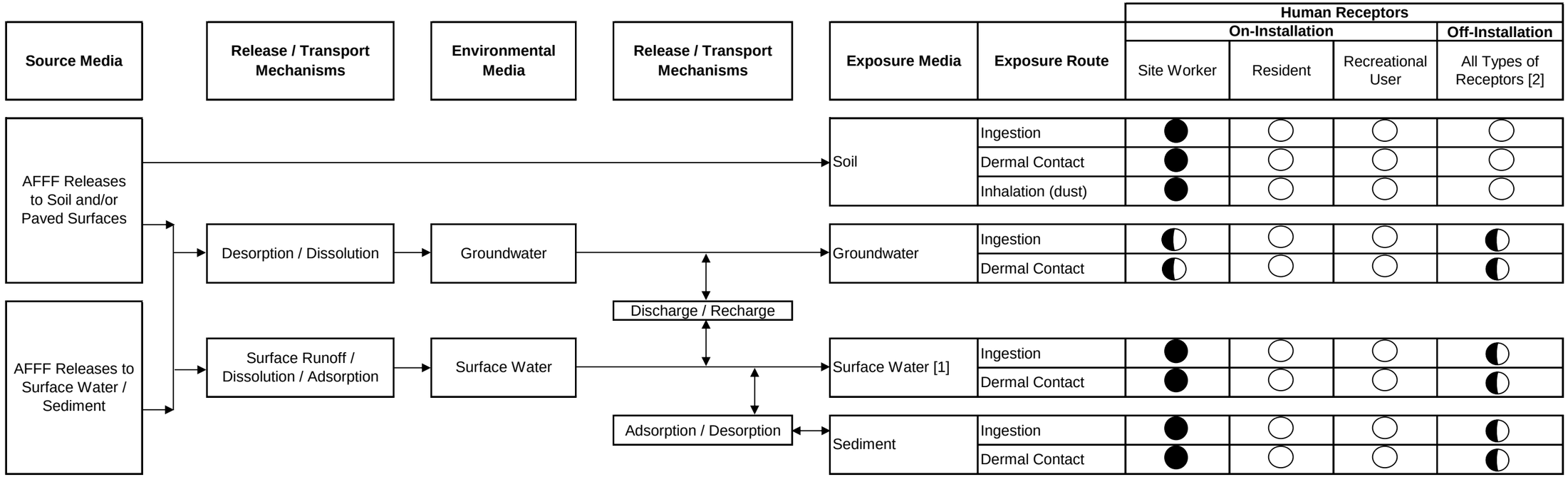
ARCADIS

Conceptual Site Model for SIAD Fire Station, Obstacle Course Training Area, FH #1-05 Nozzle Testing Area, DRMO Storage Yard, Acid Shed, SIAD Fire Department Storage Building P-613, Equipment Yard Building 79, and SIAD Current Fire Training Area AOPIs

USAEC PFAS Preliminary Assessment / Site Inspection

Sierra Army Depot, California

Figure 7-15



Legend:

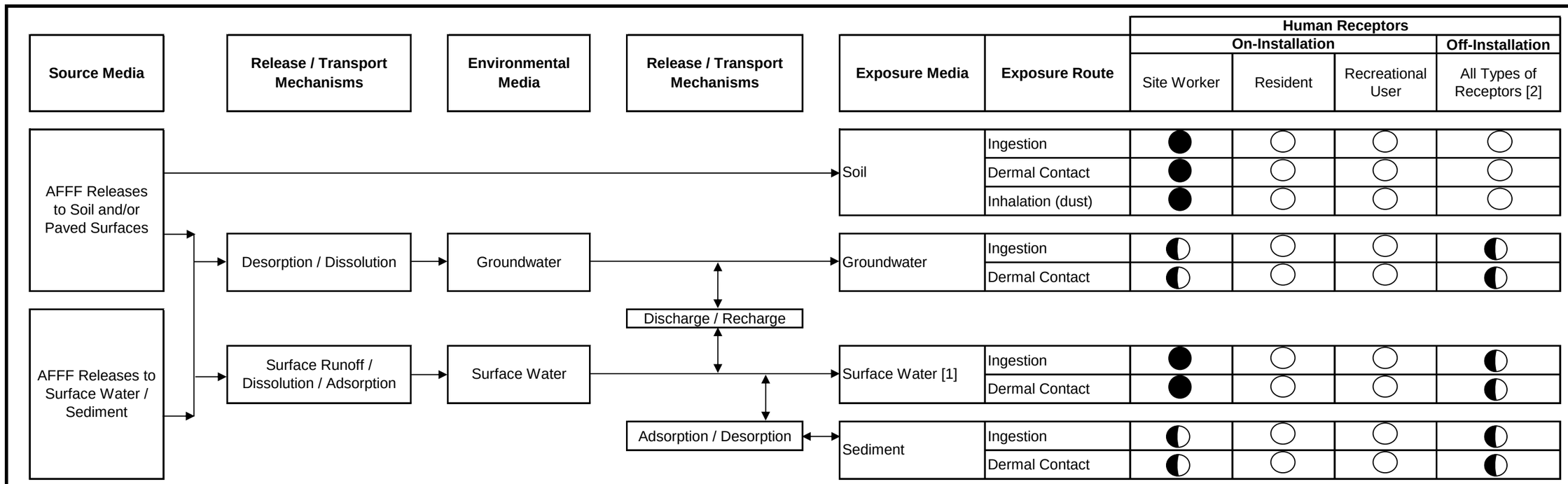
- = Complete Exposure Pathway
- = Potentially Complete Exposure Pathway
- = Incomplete Exposure Pathway

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

ARCADIS

Conceptual Site Model for Garrison Sewage Treatment Ponds AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Sierra Army Depot, California

Figure 7-16



Legend:

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

Notes:
[1] Surface water exposure pathway for Site Workers and Residents describes a drinking water scenario, and for Recreational Users describes incidental ingestion and dermal contact during an outdoor recreational scenario.
[2] All types of off-installation human receptors include drinking water receptors and recreational users.

ARCADIS

Conceptual Site Model for Mission Sewage Treatment Ponds AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Sierra Army Depot, California

Figure 7-17

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