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

Dugway Proving Ground, Utah

Prepared For:
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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

Dugway Proving Ground, Utah

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CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

The United States Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS) at Army 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 Dugway Proving Ground (DPG) PA/SI was completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), National Oil and Hazardous Substances Pollution Contingency Plan, and Army/Department of Defense policy and guidance.

DPG is located in Tooele County, approximately 80 miles southwest of Salt Lake City, Utah. The installation occupies 798,214 acres and is surrounded on three sides by mountain ranges. DPG was established in 1942, and operates primarily as a chemical, conventional, and biological weapons defense test facility. There are five activity centers at DPG, often used as locational references and each with a specific purpose in support of DPG's mission: Baker Facility, Ditto Technical Center, Avery Technical Center, Carr Facility, and English Village.

The DPG PA identified 28 AOPIs for investigation during the SI phase. SI sampling results from all 28 AOPIs were compared to risk-based screening levels calculated by the Office of the Secretary of Defense (OSD) for PFOS, PFOA, and PFBS. PFOS, PFOA, and/or PFBS were detected in soil and/or groundwater at 26 AOPIs; 16 of the 28 AOPIs had PFOS, PFOA, and/or PFBS present at concentrations greater than the risk-based screening levels. The DPG PA/SI identified the need for further study in a CERCLA remedial investigation, as well as supplemental sampling. **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 Dugway Proving Ground, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Defense Test Chamber Fire	NS	No	NS	Supplemental groundwater sampling[1]
Current Carr WWTS	Yes	NS	NS	Further study in a remedial investigation
Carr Facility Septic Tank and Leachfield (HWMU-63-2)	No	No	NS	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Walled Decon Pad, Building 8033	ND	ND	NS	No action at this time
Hangar 2 Building 4065	Yes	ND	NS	Further study in a remedial investigation
Hangar Building 4066	Yes	No	NS	Further study in a remedial investigation
Hangar Building 4068	Yes	ND	NS	Further study in a remedial investigation
Hangar 1 and Apron	Yes	ND	NS	Further study in a remedial investigation
Fire Station #2	Yes	Yes	NS	Further study in a remedial investigation
Former FTA (DPG-163)	Yes	NS	NS	Further study in a remedial investigation
Light Vault Building 4023	Yes	No	NS	Further study in a remedial investigation
Fire Station #3	No	No	NS	No action at this time
SE End of Runway AFFF Training	Yes	ND	NS	Further study in a remedial investigation
Building 4357 Fire Truck Maintenance	Yes	No	NS	Further study in a remedial investigation
Building 4344 Parking Lot	Yes	ND	NS	Further study in a remedial investigation
Building 4331 Wash Rack and Adjacent Parking Lot	Yes	ND	NS	Further study in a remedial investigation
Building 4218 Parking Lot	No	ND	NS	No action at this time
Current FTA	Yes	Yes	NS	Further study in a remedial investigation
F16 AFFF Response at End of Runway	Yes	No	NS	Further study in a remedial investigation
Decon Pad at End of Short Runway	No	ND	NS	Supplemental groundwater sampling[2]
Ditto WWTS	Yes	NS	NA	Further study in a remedial investigation
Current English Village Landfill	No	NS	NS	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Old English Village Sanitary Landfill (HWMU-43)	ND	ND	NS	No action at this time
Fire Station #1	Yes	No	NS	Further study in a remedial investigation
Building 5470 Vehicle Storage	No	NS	NS	No action at this time
Former English Village WWTS	NS	No	NS	Supplemental groundwater sampling is recommended
Current English Village WWTS	No	No	NS	No action at this time
Parade Field FTA	No	Yes	NS	Further study in a remedial investigation

Notes:
1. If soil analytical data indicate PFOS, PFOA, and/or PFBS presence below OSD risk screening levels but a potentially complete pathway to groundwater exists, then supplemental groundwater sampling is recommended.
2. Sampling focused on the decontamination pad, and does not encompass other adjacent locations of potential AFFF use; therefore, supplemental groundwater sampling is recommended.
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
NA – not applicable (The OSD residential tap water risk screening levels will only be used to compare surface water data if the surface water is an expression of groundwater [i.e., springs/seeps] or if surface water is used as a drinking water source nearby)
ND – non-detect
NS – not sampled
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 Dugway Proving Ground (DPG), Utah 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 DPG and was completed in accordance with CERCLA and The National Oil and Hazardous Substances Pollution Contingency Plan.

1.1 Project Background

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

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

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

1.2 PA/SI Objectives

This PA/SI was conducted consecutively because the results of the PA yielded AOPIs that necessitated continuing onto the SI phase in accordance with 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 (NFA) 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 DPG, PA/SI development followed the process as described below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for DPG. 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), DPG, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred 23 July 2019, 3 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 DPG.

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

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

1.3.2 Preliminary Assessment Site Visit

The site visit was conducted on 13 to 15 August 2019. An in-brief meeting was held to provide installation staff with the objectives of the site visit and team introductions. **Section 3** includes information regarding personnel interviewed.

Personnel interviews were conducted with individuals having significant historical knowledge at DPG. 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 site visit was reviewed and corroborated by cross-referencing records and reviewing interview details, and observations noted during site visit

reconnaissance. A site visit trip report was completed and provided to the installation POC, applicable USAEC POCs, and USACE regional POCs following the site visit. The information collected during the pre-site visit and site visit activities was compiled to develop the installation-specific PA portion of the PA/SI report (**Section 3**). Site data obtained during the PA were used to develop preliminary conceptual site models (CSMs) for each AOPI, which serve as the basis for developing the SI scope of work presented in an installation-specific Quality Assurance Project Plan (QAPP) Addendum.

1.3.4 Site Inspection Planning and Field Work

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

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling
- gauge regulatory involvement requirements or preferences
- 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 the installation. Additional discussion topics included:

- identify overlapping unexploded ordnance or cultural resource areas
- confirm the plan for investigation-derived waste (IDW) handling and disposal
- provide an updated SI deliverable and field work schedule

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

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

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

1.3.5 Data Analysis, Validation, and Reporting

Environmental samples collected during the SI were submitted to a laboratory which is DoD Environmental Laboratory Accreditation Program (ELAP)-accredited for PFOS, PFOA, and PFBS analysis by liquid chromatography with tandem mass spectrometry and compliant with the DoD Quality Systems Manual (QSM) 5.3, Table B-15 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about DPG, 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

DPG is located in Tooele County, approximately 80 miles southwest of Salt Lake City, Utah. The current acreage of DPG is 798,214 acres. Installation personnel include military and civilian tenants and residents, temporary tenants, and contractors (DPG Natural Resource Program Office 2016). Tooele County has a population of approximately 72,000 people (U.S. Census Bureau 2019). The closest town to DPG is Terra, located approximately 9 miles east of the main gate. The largest town in Tooele County is Tooele City, population of 36,015, located approximately 38 miles northeast of DPG. With the exception of Terra, land use adjacent to the installation is characterized by sporadic camping grounds, a wildlife refuge to the south, and the Goshute Reservation to the southwest. There are no municipal fire stations, airports, or waste management facilities within a 5-mile radius of DPG. The installation is surrounded on three sides by mountain ranges (**Figure 2-1)** (DPG Natural Resource Program Office 2016).

2.2 Mission and Brief Site History

DPG is a primary defense testing (chemical and biological) center and personnel training base operated by the Army since 1942. The original mission of this site entailed developing and testing various weapons systems and munitions, and the current mission includes environmental characterization and remediation technology testing, as well as provision of training facilities.

The history of DPG is characterized by three eras: World War II, the Korean War to the late 1960s, and the Modern Era. The installation was inactive after the end of World War II and reactivated in 1950 in response to the Korean War for chemical, biological, and radiological weapon testing. In the Modern Era, outdoor testing was reduced while indoor testing capabilities increased (DPG Natural Resource Office 2016). Present day testing at DPG includes chemical and biological defensive testing, remediation technology testing, and a program for testing battlefield smokes and obscurants.

2.3 Current and Projected Land Use

DPG consists largely of sparse desert and restricted airspace (DPG 2012). The vast majority of land at DPG is undeveloped and the land that is developed is characterized by activity centers and facilities (**Figure 2-2**). There are five activity centers, which contain facilities for operations at DPG. Each has a specific purpose to support DPG's mission and all located within the eastern portion of the installation. From west to east, the activity centers are the Baker Facility, Ditto Technical Center, Avery Technical Center, Carr Facility, and English Village (also known as the town of Dugway). The cantonment area is within the English Village and approximately 1.5 square miles in size. The Baker Facility is near the center of the installation and contains an Environmental and Life Sciences division (Parsons 2004). The Ditto and Avery technical centers, as well as the Carr Facility, contain technical and logistical centers

(Parsons 2004). Active weapon test grids are located west of the Baker Facility and Ditto Technical Center (Parsons 2004). The English Village contains housing, administrative operations, and Army National Guard maneuver areas (Parsons 2004).

There are two airspaces above DPG: the airspace west of Granite Peak; and the airspace east of Granite Peak and west of Five Mile Hill. Michael Army Airfield (MAAF) is located between the Ditto and Avery technical centers and its staff support exercises and contingency operations (DPG 2012). MAAF is used for tactical air operations, testing aircraft chemical-biological decontamination (decon) survivability, transportation to and from nearby drop zones, air re-supply and logistics, and testing of unmanned aircraft systems (DPG 2012).

Ranges and impact areas designated for testing or training are located throughout DPG, and a hunting area is near the northeastern boundary of DPG (DPG Natural Resource Office 2016). Primary ranges and impact areas include the German Village Artillery Firing Range, White Sage Mortar Range, White Sage Impact Area, Wig Mountain Impact Area, Wig Range, West Granite Impact Area, Dugway Thermal Treatment Facility, and Radiological Assessment and Detection Pad.

2.4 Climate

The region is arid with moderately cold winters and hot, dry summers. There is very little rainfall, with average annual precipitation ranging from less than 6 inches on the basin floors to 20 inches in the surrounding mountains. The minimal annual precipitation coupled with high evapotranspiration rates creates elevated concentrations of salts in the shallow groundwater and soil in the area (Fitzmayer et al. 2017).

2.5 Topography

DPG is located approximately 4,350 feet above mean sea level in the eastern portion of the Great Basin, in the southeastern corner of the Great Salt Lake Desert (**Figure 2-3**). It is bordered by three mountain ranges: Cedar Mountains to the northeast; Dugway Range to the south; and Davis Mountain to the east (Fitzmayer et al. 2017). DPG consists largely of basin areas, with sand dunes in the eastern and central portions of the installation (DPG Natural Resource Office 2016), and interspersed peaks including Granite Mountain, which is approximately 7,082 feet high at the center of the installation (DPG 2012).

2.6 Geology

DPG is located in the central portion of the broader Bonneville Basin, which lies in the Basin and Range physiographic province. The Basin and Range province is characterized by predominately north-south oriented mountain ranges and broad, flat alluvial valleys attributed to regional extension and longitudinal block faulting. This province is primarily composed of Paleozoic carbonates and associated sedimentary rocks overlying older igneous and metamorphic basement rocks in the mountains, with alluvial valleys containing clastic sediments among the mountains. These sediments are predominantly unconsolidated, basin-fill deposits that are finer grained within the basin interior and coarser grained near the adjacent mountain front. Valley floors are underlain by lakebed deposits from the Pleistocene Lake Bonneville, and alluvial floodplain deposits (Fitzmayer et al. 2017).

Lithologic data collected from well construction logs at DPG indicate that sand and gravel dominate the upper 500 feet of sediment in the English Village area; lithology below this depth is comprised primarily of fine-grained clay, tuffaceous sand, and volcanic ash. In the Baker area, water supply wells also indicate predominantly sand and gravel in the upper 300 feet, and primarily clay with small amounts of gravel below this depth (DPG Natural Resource Office 2016).

In the Ditto and Carr areas, sediments consist primarily of silty sand units interbedded with clay layers. The upper interbedded sand and clay unit is the shallow water-bearing zone. Below this unit, an extensive lacustrine clay layer exists at about 90 feet below ground surface (bgs) and is between 65 and 80 feet thick. This confining-clay layer is continuous throughout Ditto and Carr, restricting any potential vertical groundwater movement. The sand unit beneath consists of interbedded gravel, sand, and silty clay deposits, and is the potable aquifer source for the Ditto and Carr areas (Fitzmayer et al. 2017).

2.7 Hydrogeology

Regional groundwater generally flows in a northwest direction with a gradient of approximately 40 feet per mile (Fitzmayer et al. 2017). There are multiple groundwater basins at DPG that dictate local groundwater flow direction.

2.7.1 Carr and Ditto Areas

The Carr and Ditto areas fall within the Government Creek Groundwater Basin and consist of a shallow water-bearing zone and a deep, potable aquifer. Several potable wells that supply drinking water for the installation are located within this groundwater basin. The shallow zone occurs in the upper interbedded sand and clay; and is encountered at 10 to 20 feet bgs in the Ditto area, and 30 to 60 feet bgs in the Carr area. The deep zone is encountered across the Government Creek Basin from approximately 150 to 290 feet bgs, and provides drinking water for the Ditto, Carr, and Baker areas (Fitzmayer et al. 2017). Locally, groundwater near the Carr Facility generally flows southwest, migrates to the southeast near Davoren Road, and then ultimately flows northwest toward the Great Salt Lake Desert Basin (**Figure 2-2**). In the Ditto area, groundwater mounds in the central area before flowing outward radially (Parsons 2006). Groundwater in the Ditto area ultimately flows northwest toward the Great Salt Lake Desert Basin.

2.7.2 English Village Area

The English Village area exists within two groundwater basins – the Fries Park Groundwater Basin and the Davis Groundwater Basin, which are separated by the Fries Park Divide. Both aquifers are unconfined and consist of coarse-grained sand and gravelly alluvium. The Fries Park Groundwater Basin depth to groundwater is typically 100 feet bgs lower than the Davis Groundwater Basin depth to water (Parsons 2007). There are no potable wells within this basin. The Fries Park Divide is an hourglass-shaped area, which contains normal faults on both the west (Fries Park) and east (Davis) edge, that separates the Fries Park and Davis basins by a mile (at the narrowest portion) or more. The Davis Groundwater Basin depth to groundwater is approximately 70 to 80 feet bgs at the north end and approximately 100 feet bgs at the south end. The Cedar Mountains bound the Davis Groundwater Basin to the north, and the basin connects to the broader Skull Valley Basin to the northeast via intermittent gaps in the bedrock outcrops of the Davis Knolls (Parsons 2007). Several potable wells that provide

drinking water for the installation are located in this basin, which generally draw from deeper groundwater in the unconfined aquifer (Parsons 2007).

Groundwater flows in several directions in the English Village area. In the Fries Park Groundwater Basin, groundwater flows north-northwest. Hydraulic gradient of groundwater at the Current English Village Landfill has also shown to slope toward the north-northwest despite the landfill's proximity to the southern flanks of the Cedar Mountains. The English Village Landfill groundwater direction may represent flat hydraulic gradient at the landfill with a generalized southwest direction. In the Davis Groundwater Basin, groundwater tends to flow from the margins of the valley toward the center of the basin. While the Davis Groundwater Basin is hydraulically connected to the larger regional Skull Valley Basin whose regional flow is north-northeast, groundwater in the English Village is likely influenced by groundwater well pumping towards the south and overall groundwater direction is not fully understood (Parsons 2007). Flow within the Davis Groundwater subbasin in the English Village is generally inferred to be towards the south and eventually to the east into Skull Valley. Groundwater gradients are steeper on the sides of the subbasin and flatter towards the center of the basin (U.S. Geological Survey 2001).

2.8 Surface Water Hydrology

There are five basins present at DPG: Davis Basin, Dugway Valley-Government Creek, Fish Springs Flat, Fries Park Basin, and the Great Salt Lake Desert (**Figure 2-2**). The surface water runoff within the Davis Basin predominantly flows to the southwest off the installation. Surface water runoff in the Dugway Valley-Government Creek area is generally to the northwest towards the Great Salt Lake Desert. In the Fish Springs Flat area, the surface water runoff is northwest towards the Great Salt Lake Desert. Surface water runoff in the Fries Park Basin flows west-northwest towards the Dugway Valley-Government Creek Basin. Surface water runoff in the portion of the Great Salt Lake Desert within the installation generally flows northwest towards the center of the Great Salt Lake Desert, where surface water either evaporates or infiltrates to groundwater. Government Creek is an ephemeral stream that flows northwestward through Ditto before ending in the Great Salt Lake Desert, where any flowing water either evaporates or infiltrates. Other natural and constructed surface water features present at DPG include springs, ponds (including natural as well as evaporation, excavated, and bermed ponds), playas, wetlands, wastewater lagoons, and roadside ditches. A notable drainage feature is Government Creek (**Figure 2-2**), an ephemeral stream that flows through DPG to the northwest (DPG Natural Resource Office 2016). Government Creek remains dry year-round except for rare, large storm events (Fitzmayer et al. 2017).

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 DPG.

2.9.1 Stormwater Management System Description

In undeveloped portions of DPG, surface water runoff occurs as overland flow or moves through natural drainages. Surface water that flows overland spreads as a thin, continuous layer over a large area rather than being concentrated into well-defined drainage channels. The surface water then dissipates via

evaporation and/or infiltrates into soil. Government Creek is one of the most well-defined natural drainages at DPG. The drainage enters DPG along the southeastern boundary and flows northwestward to the west of Carr and through Ditto. The drainage loses definition west of Ditto (DPG Natural Resources Office 2016).

In the developed portions of DPG, surface water runoff generally moves via roadside ditches. In general, these ditches are not interconnected. Storm water sewers are located in portions of Avery, Baker, and Ditto. The storm sewers discharge to drainage ditches or into Government Creek (DPG Natural Resources Office 2016).

Storm drainage in the English Village generally flows southward by open gutters and ditches draining to an open area near the main gate. This runoff does not leave the installation. In other areas, storm drainage flows to the open desert (Army 1979).

2.9.2 Sewer System Description

Industrial wastewater from the Ditto and Avery areas was treated at the former Ditto Wastewater Treatment System (WWTS) (Hazardous Waste Management Unit [HWMU]-36) until it was replaced by the current Ditto WWTS. The former WWTS consisted of an Imhoff tank, a sludge drying bed, an influent sump and pumphouse, and two unlined effluent ditches (an eastern and a western drainage ditch). The current Ditto WWTS, located immediately west of the HWMU-36 sludge drying bed, consists of three lagoons (two aeration ponds and one settling pond). Effluent is chlorinated prior to discharge into the adjacent western effluent drainage ditch. The effluent drainage ditches and Government Creek are considered ephemeral streams and end in the desert just over 2.5 miles west of the Ditto WWTS (Shaw Environmental Inc. 2004a).

Influent from Carr buildings was originally conveyed to two septic tanks, HWMU-63-1 and HWMU-63-2 (Shaw Environmental Inc. 2004b). Numerous former waste piles and landfills were used as disposal areas for Carr from as early as the 1940s (Parsons 2006); however, documents reviewed, and interviews conducted during the PA provided no additional historical information about these disposal areas. The Carr Facility Septic Tank and Leachfield operated from approximately 1942 until 1992, until the Current Carr WWTS became operational. Sanitary wastes, potentially including solvents, reportedly comprised the bulk of the wastewater received by the facility via in the sanitary sewer system (Shaw Environmental Inc. 2004b). Currently, the Carr Facility has its own wastewater and sewer systems and receives industrial wastewater from buildings in the Carr Facility.

Wastewater from Baker area buildings originally went to the former sewage lagoons (HWMU-33), which became operational in 1975. Prior to that, sewage went to the former Baker Sewage Drainfield (Solid Waste Management Unit [SWMU]-35). The outfall of HWMU-33 corresponds to the outfall of SWMU-35 (IT Corporation 2002). Currently, industrial wastewater from facilities in the Baker area go to the Baker sewage lagoons, which consist of four aerobic settling ponds. According to installation personnel, the fourth pond was constructed in 2016 but is not operational. Prior to 1964, wastewater at the English Village was processed through a sewage treatment plant (STP) located on Manookin Road (SWMU-44). This plant was constructed in 1952 and included a lagoon in English Village and a collection system in the Fries Park area. A three-cell sewage lagoon south of Fries Park was constructed prior to the construction of the STP; however, information on the exact dates of its use were not available. This older sewage lagoon was investigated as SWMU-75. Before the Current English Village WWTS became operational in

1994, the Former English Village WWTS (HWMU-47), now an abandoned, unlined lagoon located west of the current lagoon, was used from 1964 to 1994 (Parsons 2007). Solid waste generated in English Village between 1968 and late 1987 was disposed in the Old English Village Sanitary Landfill, approximately 1.5 miles south of English Village, and is now the site of HWMU-43. Information on the disposal methods for solid waste generated prior to 1968 was not available. Solid sanitary wastes from English Village and Fries Park are currently disposed in the active sanitary landfill west of Fries Park (Current English Village Landfill) (Parsons 2007).

At the English Village, non-industrial wastewater is currently pumped to the Current English WWTS south of Fries Park. Effluent is discharged to a wetland area, which was previously used by the old sewage lagoons associated with the Former English Village WWTS (HWMU-47) that have been taken out of service (Parsons 2007). This facility is located approximately 1.5 miles southwest of English Village.

HWMU-128, a 1,000-gallon septic tank and drainfield associated with the pesticide storage and preparation area at Building 5658, is located southwest of the English Village between SWMU-44 and SWMU-69. Sanitary wastewater from Building 5658 is discharged to a septic tank and drainfield on the west side of the building, rather than to the English Village sanitary sewer system (Parsons 2007).

2.10 Potable Water Supply and Drinking Water Receptors

The Carr and Ditto areas fall within the Government Creek Groundwater Basin and consist of a shallow water-bearing zone and a deep, potable aquifer. Several potable wells that supply drinking water for the installation are located within this groundwater basin, as well as the Davis Groundwater Basin, in which the wells generally draw from deeper groundwater in the unconfined aquifer (Parsons 2007).

Drinking water is supplied from the Skull Valley aquifer in the English Village area, and from the Dugway Valley Government Creek area aquifer. There are seven water supply wells (designated 3, 5, 26, 27, 28, 30, and 33) for potable water. Well WW5 (depth to water 21.66 feet bgs) and Well WW33 (well details unavailable) serve the Carr facilities, Wells WW3 and WW28 (depth to water 6.08 and 2.27 feet bgs, respectively) serve the Ditto area, and Wells 26, 27, and 30 serve the English Village (well details unavailable) (DPG Natural Resource Office 2016). There are numerous other wells at DPG that are not currently used for potable purposes, including unused or abandoned wells, or wells used for irrigation or dust and fire control (U.S Geological Survey 2001). Some of these wells could potentially be converted for potable use in the future.

There are numerous potentially potable off-post wells located within 5 miles of the DPG boundary (**Figure 2-4**). Off-post well data was obtained from the Utah Department of Natural Resource Division of Water Rights online database, accessed in January 2021, and from an Environmental Data Resources, Inc. (EDR) report (**Appendix E**) which includes search results from a variety of environmental, state, city, and other publicly available databases. The only AOPIs identified during the PA and presented in this report that are within 5 miles of the installation boundary are in the English Village area. The nearest off-post potable well to English Village is well 16-771 and is located on private property immediately east of the installation boundary and the main security gate. In 2019, DPG personnel stated during PA interviews that they believed the well was not currently in use due to contamination issues (unrelated to PFAS). According to the DPG Director of Public Works and the Utah Department of Environmental Quality, well 16-771 belongs to the Corporation of the Church of Jesus Christ of Latter-Day Saints, Dugway Ward,

which, at the time of this report, have apparently resolved the contamination issues and have no Improvement Priority System points with Utah Department of Environmental Quality. Off-post potable well 6-730 is approximately 0.85 miles east of the installation boundary, off-post potable well 16-39 is approximately 2.3 miles southeast of the installation boundary, and off-post potable well 16-37 is approximately 4.15 miles east of the installation boundary.

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.

Currently, there are no known federally listed threatened or endangered species at DPG (Dugway Proving Ground Natural Resource Office 2016).

There are 10 different vegetation communities at DPG, including open woodland, great basin arid shrubland, great basin cold desert chenopod shrubland, great basin vegetated dune, great basin unvegetated dune, exotic vegetation – ecosystem stressors, great basin cold desert perennial grassland, great basin cold desert playa, great basin cold desert lowland riparian, and great basin cold desert wetland. The major community type at DPG is the cold desert playa occupying approximately 50 percent (%) of the installation area. There are 346 species of vascular plants. There are no plant species which are federally listed as threatened or endangered. The wetlands at DPG includes swamps, marshes, bogs, and similar areas.

DPG has a variety of fauna living in the diverse habitats. There are 221 species of birds, 54 species of mammals, 16 species of reptiles/amphibians and at least 1,450 species of invertebrates. Among the mammals, mule deer and pronghorn are predominate. There are other mammals including feral horses, mountain lion, bobcat, coyote, kit fox, badger, and red fox, as well as several species of bats. These include the hoary bat, Townsend's big-eared bat, western small-footed myotis, pallid bat, and western parastrellus. Approximately 50% of the birds at DPG are migratory, including waterfowl and shorebirds. Other avian species at the installation include red-tailed hawk, ferruginous hawk, golden eagle, chukar, great horned owl, hairy woodpecker, horned lark, and black-billed magpie.

The great basin spadefoot toad is the only amphibian at DPG. The great basin whiptail lizard, side-blotched lizard, leopard lizard, Great Basin collared lizard, and short-horned lizard are the most common lizards. The bull snake, desert whip snake, and Great Basin rattlesnake are the most common snakes that have been identified on DPG.

There are 1,300 insect and 150 arachnid species at DPG per historical inventories. The tiger beetle; three fly species; and two bee species, are new species that have been discovered at the installation.

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to DPG, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for DPG. However, only data collected by the Army will be used to make recommendations for further investigation. DPG has several production wells that supply drinking water on the installation.

On-post drinking water supply wells are screened in deeper aquifers at approximately 200 feet bgs or greater. Three post-treatment locations in the English Village, Ditto, and Carr areas were sampled for PFAS, including PFOS, PFOA, and PFBS, in 2016 as part of the IMCOM PFOA/PFOS Water System Testing Program; all samples were below the OSD risk screening levels (see **Section 6.5** for more information on OSD risk screening levels). PFAS compounds were not detected in these post-treatment drinking water samples above the laboratory limit of quantitation (LOQ) under USEPA Method 537, with a quantitation limit of approximately 2.0 ng/L for the six compounds analyzed (**Table 2-1**).

Seven wells (untreated water) and three pipeline distribution systems (treated water) in the English Village, Ditto, and Carr areas were sampled for PFAS, including PFOS, PFOA, and PFBS, in 2019 as part of the Defense Occupational and Environmental Health Readiness System testing program. All samples were below the OSD risk screening levels (see **Section 6.5** for more information on OSD risk screening levels). PFAS constituents were not detected above the laboratory LOQ under USEPA Method 537 in any of the samples, with a quantitation limit of approximately 2 ng/L (or parts per trillion [ppt]) for the 14 compounds analyzed (**Table 2-1**).

3 SUMMARY OF PA ACTIVITIES

To document areas where any potential current and/or historical PFAS-containing materials were used, stored and/or disposed at DPG, data was collected from three principal sources of information and are described in the subsections below:

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

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**), site reconnaissance photos (**Appendix H**), and site reconnaissance logs (**Appendix I**) during the PA process for DPG 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**.

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, DPG fire department documents, DPG directorate of public works (DPW) documents, and geographic information system files. Internet searches were also conducted to identify publicly available and other relevant information. Additionally, an EDR report generated for DPG was reviewed to obtain off-post water supply well information (**Appendix E**). A list of the specific documents reviewed 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 DPG is presented below (affiliation is with DPG unless otherwise noted).

- Fire Chiefs
- Assistant Fire Chiefs
- Fire Captain
- Fire Inspector
- Firefighters

- IRP Manager
- Physical Scientist
- Wastewater contractors (Chenega Corporation, Inc.)
- Director (Rapid Integration and Acceptance Center [RIAC])
- Program Manager (RIAC)
- Air Traffic Control Specialist

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 DPG during the records review process, the installation in-brief meeting, and 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 SI sampling.

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

DPG 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.

Personnel interviews (**Appendix G)**, site reconnaissance (**Appendix I)**, and document research (**Appendix F)** indicated that AFFF has been stored at DPG, used during routine DPG Fire Department operations (e.g., equipment testing, training) and during fire responses.

Fire Department Stations and Equipment

Arcadis interviewed employees and contractors of the DPG Fire Department, DPW, and employees and contractors at MAAF and RIAC regarding AFFF use and storage. Additionally, information on AFFF storage was collected from historical reports and documents provided by the Army. Available historical records (**Appendix F**), including the 2016/2017 AFFF inventory provided by IMCOM, reported 1,150 gallons of Chemguard 3% AFFF in both vehicle (e.g., crash truck, foam trailer) and bulk storage (e.g., 55-gallon drums) at DPG.

During site reconnaissance (**Appendix I**), numerous 5-gallon buckets of Chemguard 3% Class B AFFF and non-PFAS-containing, Pyrene “Type 3” foam powder were observed in the fire department storage building within the Ditto area referred to as the “Light Vault” (Building 4023). Numerous 5-gallon buckets of Silv-ex Class A foam and Chemguard 3% Class B AFFF were observed in the vehicle storage building (Building 5470) in the English Village. PFAS compounds are not known to be associated with Class A foams but are primarily associated with some types of Class B foams such as AFFF and some protein foams (Interstate Technology Regulatory Council 2020).

There are three active fire stations on DPG. Fire Station #1 (Building 5212) is located in the English Village, and Fire Station #2 (Building 4026) and Fire Station #3 (Building 4015) are located in the Ditto area. According to DPG Fire Department personnel, AFFF was historically stored at both Fire Stations #2 and #3. Fire Station #2 was built in the 1960s, replacing a former fire station (since demolished) that was located further from the central area of Ditto; the former fire station likely pre-dates the use of AFFF which began in the 1960s. The DPG Fire Department also utilizes the "Light Vault" (Building 4023) and the vehicle storage building (Building 5470) for AFFF storage, as described above.

The DPG Fire Department has numerous vehicles that carry AFFF, including an Oshkosh P19 Aircraft Rescue Fire Fighting (ARFF) truck and Oshkosh Striker ARFF truck. Fire Department personnel stated that foam tanks on these trucks are typically filled at the fire stations. Fire trucks containing AFFF have been parked at all three fire stations, and an older P19 ARFF truck that leaked AFFF was parked for varying lengths of time in parking lots adjacent to Buildings 4218 Parking Lot, 4331 Wash Rack and Adjacent Parking Lot, and 4344 Parking Lot while being decommissioned. A foam trailer containing AFFF was housed in Hangar 1 (Building 4046) at the time of the PA site visit but was historically housed at Fire Station #3 in the Ditto area and the vehicle storage facility (Building 5470) in English Village. The trailer was typically filled at the location where it was being stored, and spills often occurred during filling, according to DPG Fire Department personnel.

Fire trucks containing AFFF are typically repaired at the Vehicle Maintenance Facility (Building 4357) but have also been serviced at the Small Vehicle Maintenance Facility/Battery Shop (Building 4218); both are in the Ditto area. Information was not available on whether the foam apparatus on the trucks is routinely flushed or discharged at these facilities; however, DPG Fire Department personnel reported that an accidental AFFF discharge occurred at Building 4357 (timeframe unavailable) during servicing. Personnel stated that fire trucks are often washed at the fire stations but have periodically been washed at the Ditto Vehicle Wash Rack (Building 4331). Fire truck nozzle and pump apparatus testing and flushing with AFFF has occurred at all three fire stations, typically on the fire station aprons.

Firefighting Training Areas

There were two established firefighting training areas at DPG where AFFF was utilized, and several other areas where it was used either periodically or for one-time training events. The Former Firefighting Training Area, also referred to as IRP Site DPG-163 (Headquarters Army Environmental System [HQAES] 49295.1152), was an area located adjacent to and east of Fire Station #2. The Former Firefighting Training Area consisted of a firefighting training pit, a fuel drum storage area, and a fuel storage tank site (Shaw Environmental, Inc. 2005b). Between approximately 1978 and 1986, the site was used for firefighting training exercises using an old car and staged metal drums. Fuel was poured onto the car, drums and/or into the training pit, ignited and then extinguished using AFFF and/or Purple K foam. The training pit was originally lined with plastic but was later punctured to drain fluid. The drums were removed, and the site has since been partially paved with asphalt, backfilled, and regraded with gravel.

The Current Firefighting Training Area is located on the southern end of the Ditto area, and includes Buildings/Facilities 4445, 4446, and 4447. AFFF was used at the training area by the DPG Fire Department at least quarterly from the 1990s until 2016. The site includes a fuel pit, a fire tower, and a closed-loop testing apparatus with a tank for water. DPG Fire Department personnel stated that AFFF has been sprayed over the entire area, including the fire pit and the paved and unpaved areas.

DPG Fire Department personnel mentioned other locations that have been used for firefighting training, potentially involving AFFF, either periodically or as one-time events. These include the Parade Field in the English Village, the southeast end of the runway at MAAF, and the decontamination pad at the northwest end of the short runway at MAAF.

Fire Responses

The following are instances of firefighting activities involving AFFF, according to DPG Fire Department personnel.

- In approximately 2011, AFFF was used to extinguish a fire that started at the Defense Test Chamber in the mechanical room (Building 8233). The Defense Test Chamber is located along Poleline Road south of the Carr area. Fire Department personnel estimated approximately 1,000 gallons of water and AFFF mixture was used.
- In the late 1990s, AFFF was used in response to an incident near the decontamination pad at the northwest end of the long runway at MAAF, where the wheels of an F-16 aircraft with hot brakes caught fire. AFFF was initially discharged from the firehose, but the DPG Fire Department immediately ceased spraying because the burning material contained magnesium. Information regarding the volume of AFFF used during the incident was unavailable.

Fire Suppression Systems

Discussion of permanent AFFF fire suppression systems and portable AFFF fire suppression units at DPG is provided below:

- Hangar 1 (Building 4046) within the Ditto area has a foam injection system using Ansulite 3% AFFF. The foam tank is located in the riser room in the southwest corner of the building, and DPG Fire Department personnel recalled the tank having leaked onto the floor in the past. Prior to the foam injection system installation, the hangar utilized a portable suppression system which had accidental discharges of AFFF inside the hangar at least three times (in approximately 2011, 2012, and 2013). During the accidental discharges, the hangar floor was covered with approximately 1 foot of foam. Clean up was conducted by rinsing with water into the bay drain near the hangar door. A foam trailer containing AFFF was staged in Hangar 1 (Building 4046) at the time of the PA site visit but was historically housed at Fire Station #3 in the Ditto area and the vehicle storage facility (Building 5470) in English Village. The trailer was typically filled at the location where it was being stored, and spills often occurred during filling, according to DPG Fire Department personnel.
- Hangar 2 Building 4065 within the Ditto area has a water deluge fire suppression system but was not identified to utilize AFFF. The hangar, however, has housed one or more of the mobile fire suppression systems containing AFFF. No information was available on the use of AFFF at this hangar.
- Aircraft Maintenance Hangar (Building 1070), previously occupied by the U.S. Air Force, was formerly located in the Avery area adjacent to MAAF but was demolished during construction work at the airfield in 2006. Personnel interviewed during the PA site visit indicated that the hangar did not have a fire suppression system. Information on whether a portable fire suppression unit was ever housed at this location was not available.

- Several hangars at MAAF are occupied and operated by RIAC, including Buildings 4066, 4068, 4070, 4073, 4080, and 4081. These hangars do not have AFFF fire suppression systems, but according to MAAF and RIAC personnel, and as observed during the PA site reconnaissance, Building 4066 houses the RMT 4000 unit and Building 4068 houses the One Defender unit. These are mobile fire suppression units that contain AFFF concentrate. Information was not available on whether the other hangars operated by RIAC have ever stored AFFF portable fire suppression units.
- The U.S. Air Force leases land at DPG, and according to a 2012 Environmental Assessment Report, there are fire suppression systems utilizing carbon dioxide at the Cedar Mountain main facility (Building 4146) and the Wig Launch Site in the Wig Mountain area (USACE 2012b). Information on whether AFFF has ever been utilized in these fire suppression systems or stored at these facilities was not available.
- There are several aboveground storage tanks containing fuel located southwest of the English Village area, which are constructed with a protein foam-based fire suppression system. The pump shed for the pressurized foam system is located on the south side of the tank farm in Building S-5668. During the PA DPG personnel interviews (**Appendix G**), the DPG Fire Department stated that the pump shed also stores the protein powder used in the foam system; however, the quantity and type were not confirmed during site reconnaissance (**Appendix I**) as the shed was locked. DPG Fire Department personnel were not aware of the system ever being used for fire prevention and indicated that testing was only done with water. Information was not available on the uses of the protein foam, or if the protein powder contains PFAS.

Chemical Testing Program

During personnel interviews (**Appendix G)**, site reconnaissance (**Appendix I)**, and records review (**Appendix F)**, AFFF was identified as a "battlefield contaminant" for material decontamination testing as part of DPG's chemical testing program. Available documentation indicated that AFFF may be one of the simulants used on test grids and training ranges but did not indicate locations at which associated AFFF may have been used or stored (West Desert Test Center 2012). Additionally, C8 emulsion, which likely contained PFAS, is listed as one of the decontamination agents used at DPG (Shaw Environmental, Inc. 2004c); however, no safety data sheet or information on location was available. A 2005 environmental assessment report indicates that AFFF was proposed for indoor laboratory or chamber testing at DPG but did not indicate locations (West Desert Test Center 2005).

Personnel interviews with DPG DPW identified locations where AFFF was used or was planned for use as part of DPG's chemical testing program. At the Walled Decon Pad (Building 8033) west of the Ditto area, AFFF (among other chemicals) was reportedly used; however, information on the frequency and quantities was not available. The IRP Manager reported, after AFFF use on the pad, water was used to rinse the AFFF from the pad. This rinsewater containing AFFF was discharged to the southwest ground surface near the Walled Decon Pad.

A National Environmental Policy Act (NEPA) Record of Environmental Consideration (REC) checklist, dated 18 July 2016 and provided by DPW, described proposed plans to install a Joint Biological Agent Decontamination System (JBADS) on a concrete pad approximately 200 feet southwest of the Defense Test Chamber Building 8223. The NEPA REC checklist listed AFFF as one of the materials to be tested

at the proposed JBADS decontamination facility. The decontamination pad would include an integrated sump system for collection of effluent waste. At the time of the site visit, neither Army personnel nor documentation indicated whether the JBADS facility had been constructed.

Other than the Walled Decon Pad AOPI and the NEPA REC checklist for the JBADS concrete pad, research and interviews conducted during the PA did not provide additional locations where AFFF may have been used, stored, or disposed as part of DPG's chemical testing program.

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

Following document research, personnel interviews, and site reconnaissance at DPG, other PFAS source types like metal plating operations, WWTSs, and landfills 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**.

During a telephonic interview with the IMCOM Pest Management Consultant, it was noted that products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. During the PA records review, the IMCOM Pest Management Consultant provided records of potentially PFAS-containing pesticides and insecticides used at and/or stored at Army installations, and did not identify DPG as an installation having used or stored PFAS-containing pesticides/insecticides.

Metal Plating Operations

Analysis of data collected from historical records review (**Appendix F**), site reconnaissance (**Appendix I**), and installation personnel interviews (**Appendix G**) indicated that no metal plating operations currently or historically existed at DPG.

WWTSs and Landfills

Common WWTSs do not typically treat PFAS, and post-treatment wastewater may contain PFAS. Certain DPG WWTSs and landfills may have received PFAS-containing materials and become secondary sources of PFAS. Industrial operations may have discharged PFAS-containing materials into the installation's wastewater systems, where the materials from various parts of DPG were collected, and may have contaminated areas where there were potential discharges of untreated waste or applications of treated waste.

The current and former Ditto WWTSs received wastewater potentially containing PFAS from the Ditto and Avery facilities, including Fire Stations #2 and #3, photo processing facilities, vehicle maintenance and wash rack facilities, and the Ditto technical laundry facility. The current and former Carr WWTS facilities received wastewater potentially containing PFAS from the Carr area buildings, including x-ray facilities, wash racks, and the Defense Test Chamber. The current and former English Village WWTS facilities received wastewater potentially containing PFAS from English Village facilities, including Fire Station #1, the former hospital and dental clinic (with x-ray capabilities), and vehicle maintenance and car wash facilities, among others.

The Old English Village Landfill historically received waste potentially containing PFAS, including biosolids from the Former English Village WWTS, sludge from the Former Ditto WWTS, and refuse from

the English Village. The Current English Village Landfill has received sludge drying bed material from the removal of the HWMU-36 Imhoff tank at the Ditto WWTS.

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 DPG) 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.

DPG is located in a remote and isolated area within the Great Salt Lake Desert. The Tekoi Landfill is over 7 miles away to the north in Skull Valley, and the Terra Volunteer Fire Department is over 7 miles to the northeast in the small community of Terra, Utah. There are no municipal fire stations, airports, or waste management facilities within a 5-mile radius of DPG. The DPG Fire Department has a mutual aid agreement with the Tooele County Fire Department; however no off-post incidents using AFFF were identified during personnel interviews.

5 SUMMARY AND DISCUSSION OF PA RESULTS

The preliminary locations evaluated for potential use, storage and/or disposal of PFAS-containing materials at DPG 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, 28 areas have been identified as AOPIs. The process used for refining these areas is presented on **Figure 5-1**, below.

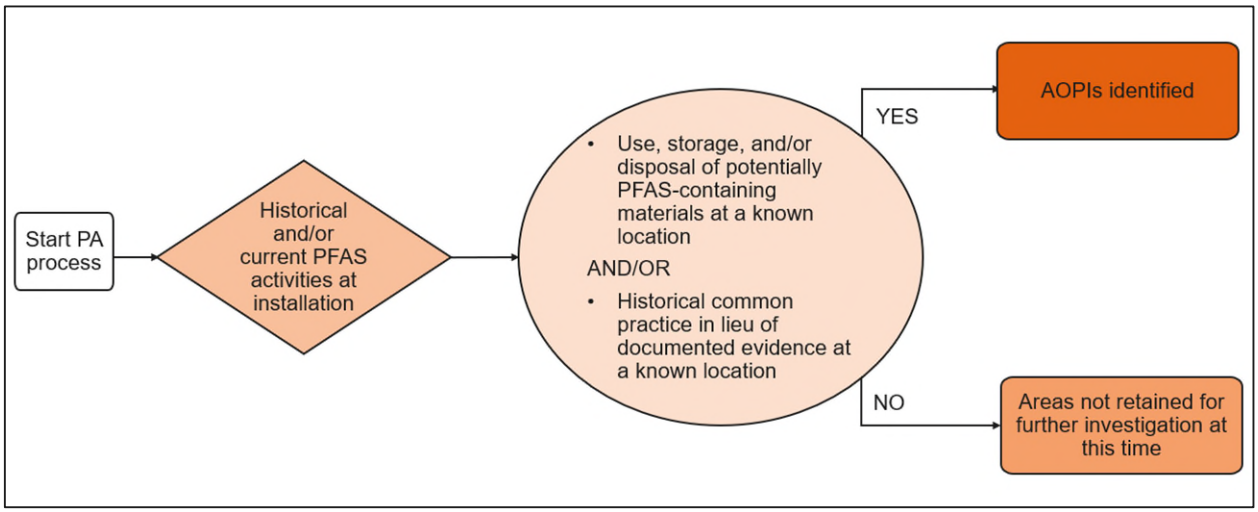

Figure 5-1: AOPI Decision Flowchart

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 DPG 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 areas described below were categorized as areas not retained for further investigation at this time.

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

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

Area Description	Dates of Operation	Relevant Site History	Rationale
Defense Test Chamber Decon Pad (southwest of Carr)	2016 to present	Request was submitted in 2016 to construct a concrete pad for the JBADS at the Defense Test Chamber building on Poleline Road for chemical detection testing, including AFFF and other chemicals. No evidence that decon pad was built or AFFF was used at site. Did not perform reconnaissance during PA site visit.	No evidence of the presence of PFAS-containing materials. Construction of the structure proposed for indoor AFFF use could not be confirmed.
DPG-168 Wash Rack/Open Transfer Shed (Carr)	Unknown	Site historically used as transfer facility for chemical agents and agent simulants. Discharges and spills cleaned using a caustic decontamination agent. Site also served as wash rack to decon vehicles using an emulsion contaminated with agent simulants. Once simulant-handling activities ceased at DPG, wash rack used water to wash uncontaminated vehicles.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Carr X-Ray Facilities (Building 3236 and 3131)	Unknown to present	Buildings 3131 and 3236 historically used for x-ray processing. No indication that PFAS-containing materials have been used or stored at either building; however, historical records indicate that chemical and solvent wastes were disposed in the sanitary system (Current Carr WWTS).	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
HWMU-161 Air Force Pad 777 LF #2 (DPG-161) (northwest of Granite Mountain)	Unknown	IRP site listed in the Fiscal Year 2014 DoD Inventory of Fire/Crash Training Area Sites Report for DPG; however, no evidence was found to suggest that this location was used as fire/crash training area or that AFFF was used there.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
HWHA-5 Photo Wastes (DPG-135)	Unknown to 1997	Site location could not be determined, and there is no indication of PFAS-containing materials use, storage, or disposal associated with the site. IRP site achieved NFA in 1997.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
DPG-169 Wash Rack (Baker)	Started in mid-1960s; ceased operations prior to 2004	Wash rack used approximately once a year to clean and maintain vehicles. Designed for washing vehicles involved in field tests or contaminated with chemical agent. There was no indication that fire trucks were washed here.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.

Area Description	Dates of Operation	Relevant Site History	Rationale
Building 1012 Photo Laboratory (Avery)	Unknown to present	Building 1012 is an active photo processing facility for DPG. No information available to indicate whether PFAS-containing photo processing fluids are used, stored, or disposed there.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Photo Laboratory, Building 4117 (Ditto)	Since at least 1979 through 1989, possibly later, but ended prior to 2004	Building described in 1979 Installation Assessment Report (USATHAMA 1979) as providing photographic support for all DPG activities. Building not identified in the current assets list and location was not available.	No indication that PFAS-containing materials have been used, stored, or disposed at this location; location was not available.
Photo Processing, Building 4258 (Ditto) (DPG-178)	Unknown to present	Building is active photo processing facility for DPG. Former IRP site that achieved NFA status in 2000. No additional information found for historical use of materials containing PFOS, PFAS, or PFBS at site.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Technical Laundry, Building 4229 (DPG-177) (Ditto)	Approximately 1951 to present	Building serves as laundry and dry-cleaning facility for Ditto area, including laundering protective gear, field gear, and laboratory clothing. Dry cleaning solvents have impacted groundwater at location. No information as to the use of PFAS-containing materials available.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Fuel Tank Suppression System, Building S-5668 (English Village)	At least mid-1990s to present	The small building contains a fire suppression system using protein foam for potential fires at the adjacent fuel tanks. Non-PFAS-containing protein foam reportedly stored inside. No reported or documented activation of the system. System testing conducted with water only.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
SWMU-44 Old English Village STP	1952 through 1964	Former STP was active from 1952 through 1964 to treat sanitary wastewater generated from English Village and Fries Park areas, potentially including the former hospital and dental clinic (with x-ray capabilities), vehicle maintenance and wash rack facilities, the pesticide storage building, and Fire Station #1, among others. Lagoon in English Village and collection system in Fries Park are associated with this former STP.	No indication that PFAS-containing materials have been used, stored, or disposed at this location; operation pre-dates Army AFFF use in firefighting foam; no evidence that the STP received other PFAS-containing materials.

Area Description	Dates of Operation	Relevant Site History	Rationale
SWMU-75 Old Sewage Lagoon (English Village)	Unknown to 1952	Former three-cell sewage lagoon constructed prior to SWMU-44 (construction date was not available; active until 1952 to treat sanitary wastewater generated from English Village facilities which potentially include but not limited to the former hospital and dental clinic [with x-ray capabilities], vehicle maintenance and wash rack facilities, the pesticide storage building, and Fire Station #1).	No indication that PFAS-containing materials have been used, stored, or disposed at this location; operation pre-dates Army AFFF use in firefighting foam; no evidence that the lagoon received other PFAS-containing materials.
Building 5116 Health Clinic (English Village)	Unknown to present	Building serves as health clinic annex. No information available on whether PFAS-containing materials are used or stored there.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
HWHA-1 Paint Shop Wastes (DPG-131) (English Village)	Unknown	Building used for painting and roll-on type paints. No information was available on whether mixing or aerated paint spraying has occurred here. No information available as to whether paints may have contained PFAS. Exact location of building in English Village is not known.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Car Wash, Building 5803 (English Village)	Unknown to present	Building serves as a vehicle car wash, and previously had a car wax feature which is no longer operational. There was no indication that fire trucks were washed here.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Building 5236 Health Clinic (English Village)	Unknown to present	Building serves as health clinic and was former hospital and dental clinic with x-ray capabilities. No information available regarding types of x-ray processing fluids, or uses at site. No indication that the processing involved PFAS-containing materials.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Pesticide Storage Buildings 5655 and 5686 (English Village)	Late 1980s to present	Building 5686 is a principal pesticide storage and mixing area for DPG. Building 5655 also used for pesticide storage. No information was available on whether PFAS-containing pesticides were identified in the Pesticide Management Plan.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
DPG-164 Avery Wash Rack #1	Approximately 1980 to 1989	SWMU-164 wash rack used to clean mud from contaminated vehicles with water. There was no indication that fire trucks were washed here.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
DPG-165 Avery Wash Rack #2	Approximately 1987 to 1989	HWMU-165 wash rack used to clean Air Force vehicles with water	No indication that PFAS-containing materials

Area Description	Dates of Operation	Relevant Site History	Rationale
		from adjacent fire hydrant. Wash rack was paved over with asphalt sometime before October 1991. There was no indication that fire trucks were washed here.	have been used, stored, or disposed at this location.
DPG-166 Avery Wash Rack #3	Approximately 1950s to 1961	SWMU-166 used to wash dolly-type railcars that held items irradiated with radioactive cobalt. Railcars decontaminated with soapy water. There was no indication that fire trucks were washed here, or any indication of PFAS-related compounds used or stored at this location.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Boy Scout Campground Fire (northern DPG border)	Approximately 2011	The Fire Department responded to wildfire near Boy Scout campground in approximately 2011. Class A foam from "Falcon" foam trailer used to extinguish the fire.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
2014 Mutual Aid Wildfire (southern DPG border)	2014	An on-post wildfire caused by a military training accident occurred in 2014, with approximately 1,000 acres burned. Dugway Fire Department and Terra/Bureau of Land Management firefighters responded. Only class A foam likely used.	No indication that PFAS-containing materials have been used, stored, or disposed at this location.
Battlefield Contaminants Testing Program	Unknown to present	Documents indicate that AFFF could be used to test chemical detector systems on test grids and training ranges, as AFFF is used to simulate a "battlefield contaminant" for material decontamination testing as part of the DPG chemical testing program.	No documents or interviews suggested that AFFF and/or other PFAS-containing materials were actually used, stored, or disposed as part of this program, nor was any information as to the locations at which they could have been used, stored, or disposed available. Additionally, C8 emulsion, which likely contained PFAS, is listed as one of the decontamination agents used at DPG; no information on location was available.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. Five of the AOPIs overlap with DPG IRP sites and/or HQAES sites (**Figure 5-2**). The AOPI, overlapping IRP site identifier, HQAES number, and current site status are discussed within each AOPI subsection presented

below. At the time of this PA, none of the installation name IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figure 5-2**. Aerial photographs of the three DPG activity areas with identified AOPIs (Carr, Ditto, and English Village areas) are shown on **Figures 5-3** through **5-5**, and aerial photographs of each AOPI are presented on **Figures 5-6** through **5-19** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 Defense Test Chamber Fire

The Defense Test Chamber Fire, which is southwest of Carr, is identified as an AOPI following records review, personnel interviews, and site reconnaissance due to use of AFFF to extinguish a fire at the Defense Test Chamber (Building 8223) on Poleline Road in 2011 (**Figure 5-6)**. The mechanical room in Building 8223 caught fire, which was exacerbated by the presence of oil rags. At least 1,000 gallons of water and AFFF were sprayed towards the north end of the building and reached soil and paved surfaces. Groundwater flows northeast and then ultimately northwest toward the Great Salt Lake Desert Basin (Parsons 2006).

5.2.2 Current Carr WWTS

The Current Carr WWTS, which is in the Carr activity area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current receipt of potentially PFAS-containing wastewater from facilities in the Carr area (**Figure 5-7**). The WWTS was constructed in the 1970s and was reconfigured in the same footprint in the 1990s, when the former Carr Facility Septic Tank and Leachfield was closed. The Current Carr WWTS is located northwest of the former Carr Facility Septic Tank and Leachfield and consists of one bentonite-lined settling pond. Installation personnel indicated that the settling pond once significantly leaked and was repaired; however, information on the timeframe was not available. The pond primarily received wastewater from the Carr sanitary sewer system; however, chemical and solvent wastes have historically been disposed in the sanitary sewer system (Shaw Environmental, Inc. 2004b). Groundwater flows southwest, migrates to the southeast near Davoren Road, and then ultimately flows northwest toward the Great Salt Lake Desert Basin (Parsons 2006). Potentially affected media include surface water, pond sediments, and groundwater.

In 1989, evidence of a new sewer pipeline coming from the Carr Facility and parallel to the pipeline leading to the former Carr Facility Septic Tank and Leachfield was observed. This pipeline extends to the current Carr Facility sewage lagoon (part of the Current Carr WWTS AOPI), which replaced the Carr Facility Septic Tank and Leachfield in 1992. During the pipeline investigation (USACE 2004), which had the overall objective of obtaining closure via investigating nature and extent of soil, it was observed that a portion of the Carr Facility Septic Tank and Leachfield influent pipeline was being used for operating the current Carr Facility sewage lagoon. The influent pipeline was grouted and abandoned at a manhole located approximately 675 feet southeast from the septic tank. From that point to the tank, the pipeline was no longer in use. The manhole and the piping upstream of the manhole appeared to be in operation during the PA site visit.

5.2.3 Carr Facility Septic Tank and Leachfield (HWMU-63-2)

The Carr Facility Septic Tank and Leachfield (HWMU-63-2, DPG-063, HQAES 49295.1060), which is in the Carr area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical disposal of wastewater potentially containing PFAS (**Figure 5-7**). The Carr Facility Septic Tank and Leachfield operated from approximately 1942 until 1992, until the Current Carr WWTS became operational. Sanitary wastes, potentially including solvents, reportedly comprised the bulk of the wastewater received by the facility via in the sanitary sewer system (Shaw Environmental, Inc. 2004b). Sludge from historical operations was removed and the septic tank was filled in with native soil, the sump was removed, and the drainage piping was abandoned in place. Waste from the sludge and tank removal was disposed as follows: the wooden tank cover was removed and disposed at the DPG Landfill in 2001; the decontamination liquids generated during sludge removal were disposed at the English Village Sewage Lagoon; and the spent personal protective equipment (PPE), the soil cuttings generated during pipeline investigations (USACE 2004), which had the overall objective of obtaining closure via investigating nature and extent of soil, and the sludge and sludge-impacted soil from the septic tank operation were disposed at the Safety Kleen Grassy Mountain Facility in Utah. Depth to groundwater is 25 to 35 feet bgs and groundwater flows southwest, migrates to the southeast near Davoren Road, and then ultimately flows northwest toward the Great Salt Lake Desert Basin (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.4 Walled Decon Pad, Building 8033

The Walled Decon Pad, Building 8033, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use and disposal of AFFF (**Figure 5-8**). Chemical decontamination teams used AFFF (among other materials) for decontamination capability testing at this location, primarily for decontamination of PPE and vehicles. Decontamination wastewater rinse went into a drain leading to a tank adjacent to the pad. Tank contents were typically drummed, tested, and sent off-post to a waste facility for disposal. However, when using AFFF, the chemical decontamination team received permission to discharge the decontamination wastewater to the ground surface approximately 200 to 300 feet west of the walled pad using an extended hose. Information about the frequency of these activities was unavailable. Groundwater likely flows west-southwest (Parsons 2006) and, according to DPG personnel interviews, depth to groundwater is approximately 3 to 6 feet bgs. Potentially affected media include soil and groundwater.

5.2.5 Hangar 2 Building 4065

The Hangar Building 4065, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF storage and potential use (**Figure 5-9**) (Note that the aerial image is from 2013 and this building was constructed in 2014; therefore, this image does not show recent site conditions). Hangar 2 has housed one or more of the AFFF-containing mobile fire suppression systems that are staged at the hangars in the Ditto area. If the mobile systems were deployed in or around the hangar, then AFFF could reach paved surfaces and/or soil; however, no such incidents have been reported. Surface water at Hangar 2 Building 4065 flows south-southeast to Government Creek. Depth to groundwater is 10 to 15 feet bgs and groundwater flows northwest (Parsons 2006). Potentially affected media include soil, surface water, sediment, and groundwater.

5.2.6 Hangar Building 4066

The Hangar Building 4066, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF storage and potential use (**Figure 5-9**). Hangar Building 4066 has housed one or more of the AFFF-containing mobile fire suppression systems that are staged at the hangars in the Ditto area. If the mobile systems were deployed in or around the hangar, then AFFF could reach paved surfaces and/or soil; however, no such incidents have been reported. Surface water at Hangar Building 4066 flows south-southeast to Government Creek. Depth to groundwater is 15 to 20 feet bgs and groundwater flows northwest (Parsons 2006). Although no information on the use of AFFF has been documented at this site, there is potential discharge of PFAS-containing material to soil and/or paved surfaces at this AOPI. Potentially affected media include soil, surface water, sediment, and groundwater.

5.2.7 Hangar Building 4068

The Hangar Building 4068, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF storage and potential use (**Figure 5-9**). Hangar Building 4068 has housed one or more of the AFFF-containing mobile fire suppression systems that are staged at the hangars in the Ditto area. If the mobile systems were deployed in or around the hangar, then AFFF could reach paved surfaces and/or soil; however, no such incidents have been reported. Surface water flows south-southeast to Government Creek. Depth to groundwater is 15 to 20 feet bgs and groundwater flows northwest (Parsons 2006). Although no information on AFFF use has been documented at this site, there is potential discharge of PFAS-containing material to soil and/or paved surfaces. Potentially affected media include soil, surface water, sediment, and groundwater.

5.2.8 Hangar 1 and Apron

The Hangar 1 and Apron, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use and storage of AFFF from an unknown time to 2013 (**Figure 5-10**). Portable AFFF fire suppression systems have been used at least three times in Hangar 1 (in 2011, 2012 and 2013). Foam partially filled up the hangar and was rinsed with water into the drain at the front of the hangar bay door. This drain empties into an open ditch west of the hangar and flows to Government Creek. During the PA site visit, one such mobile unit containing Chemguard 3% AFFF and an AFFF foam trailer were staged in the main hangar, and a tank containing Ansulite 3% AFFF was staged in the riser room. The AFFF tank for the suppression system has reportedly leaked onto the floor. Firefighting training with AFFF also occurred multiple times on the former Hangar 1 apron, which has since been replaced with new concrete. Depth to groundwater is 10 to 15 feet bgs and groundwater flows northwest (Parsons 2006). There is potential discharge of PFAS-containing material to soil and/or paved surfaces at this AOPI. Potentially affected media include soil, groundwater, surface water, and sediment.

5.2.9 Fire Station #2

The Fire Station #2, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use and storage of AFFF, and current

AFFF use beginning in approximately 1960 (**Figure 5-10**). Nozzle testing and hose flushing with AFFF has occurred on the front and back aprons. PPE with potential AFFF residue has been rinsed on the grassy area at the station, and historically laundered at this station (sanitary waste, including the bay drains inside the station, is conveyed to the English Village WWTS). Additionally, AFFF has been historically stored in the fire station in 55-gallon drums and 5-gallon buckets. The storm drain near the station discharges at the stormwater outfall near Government Creek. Depth to groundwater is 10 to 15 feet bgs and groundwater likely flows north to northeast (Parsons 2006). Potentially affected media include soil, groundwater, surface water, and sediment.

5.2.10 Former FTA (DPG-163)

The Former Fire Training Area (FTA) (DPG-163), which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF use from 1978 to 1986 (**Figure 5-10**). The FTA, also known as HWMU-163, was approximately 400 feet by 300 feet and included a firefighting training pit, a fuel drum storage area, and a fuel storage tank site. During the operating period, it was used approximately six times for fire training exercises, during which an old car and drums used to simulate an aircraft were placed in a pit and lit on fire to simulate firefighting conditions. This AOPI is associated with IRP site DPG-163 and HQAES 49295.1152. Based on observations from soil sampling and potholing activities during previous investigations, the site was paved with approximately 6 to 12 inches of asphalt. Sometime after 1986, the Former FTA (DPG-163) site was backfilled with a gravel road base material and graded, and is currently approximately 2.5 to 3 feet higher than when fire training exercises occurred (USACE 2005a). Surface water at the Former FTA flows south to Government Creek. Groundwater likely flows north to northeast (Parsons 2006). Potentially affected media at this AOPI include soil, groundwater, surface water, and sediment.

5.2.11 Light Vault Building 4023

The Light Vault Building 4023, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to AFFF storage and potential use (**Figure 5-10**). Building 4023 is used by the Fire Department for storage and contains AFFF and protein powder firefighting foams in 5-gallon buckets. Surface water at the Light Vault Building 4023 flows south to Government Creek. Depth to groundwater is 10 to 15 feet bgs and groundwater likely flows north to northeast (Parsons 2006). Potentially affected media include soil, groundwater, surface water, and sediment.

5.2.12 Fire Station #3

The Fire Station #3, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to uses of AFFF since approximately 2005 (**Figure 5-10**). Foam checks and flushing of equipment with AFFF have occurred on the front apron, spraying generally towards the soil and grassy area in the southern portion of the AOPI adjacent to Government Creek. DPG Fire Department PPE, which potentially contains AFFF residue, is currently laundered in the extraction system located here, which was acquired in 2015. Sanitary waste from inside the building is directed to the Ditto WWTS. The crash truck, which is stored at Fire Station #3, is also stored here. The foam trailer and crash truck have been filled with AFFF at this location. Surface water at Fire Station #3

flows south to Government Creek. Depth to groundwater is 10 to 15 feet bgs and groundwater likely flows north to northeast (Parsons 2006). Potentially affected media include soil, groundwater, surface water, and sediment.

5.2.13 SE End of Runway AFFF Training

The southeast (SE) End of Runway AFFF Training, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use of AFFF (**Figure 5-11**). Firefighters trained with AFFF at this location periodically, though information on the timeframe of training was not available. AFFF was sprayed from the end of the runway onto the soil, generally to the southeast. The topography in the spray area is generally flat, with no distinct surface water drainages, so water and/or AFFF sprayed onto the ground surface may have infiltrated to the subsurface. Depth to groundwater is 15 to 20 feet bgs and groundwater likely flows north to northeast (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.14 Building 4357 Fire Truck Maintenance

The Building 4357 Fire Truck Maintenance, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current AFFF storage and potential use (**Figure 5-12**). Fire trucks were maintained at this location. During servicing, the foam system, nozzles, and pumps are checked, and AFFF spills or leaks may have occurred. Fire truck hoses, which may have contained residual AFFF, were also used to clean concrete aprons. AFFF was once accidentally sprayed; information on the timeframe and precise location of this incident were not available, but DPG personnel said the incident likely occurred outside and the AFFF would have flowed to the ground surface within and near the AOPI. Depth to groundwater is 10 to 15 feet bgs and flows south to southwest (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.15 Building 4344 Parking Lot

The Building 4344 Parking Lot, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to potential leaking of AFFF from a P19 fire truck parked at multiple locations between 2009 and 2011 (**Figure 5-12**). The P19 fire truck was parked at the southeast corner of the paved parking lot west of Building 4344 for an unspecified duration, while being decommissioned, between approximately 2009 and 2011. Groundwater likely flows to the south or southwest before flowing northwest (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.16 Building 4331 Wash Rack and Adjacent Parking Lot

The Building 4331 Wash Rack and Adjacent Parking Lot, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current potential use and/or disposal of AFFF (**Figure 5-12**). Fire trucks potentially carrying AFFF are periodically washed at this location. Additionally, a P19 fire truck that leaked AFFF was parked at multiple locations, including this parking lot, for an unspecified duration while being decommissioned (sometime between approximately 2009 and 2011). Groundwater likely flows south to southwest (Parsons 2006).

Drinking water well WW03 is side gradient to the AOPI, approximately 515 feet east-northeast. Potentially affected media include soil and groundwater.

5.2.17 Building 4218 Parking Lot

The Building 4218 Parking Lot, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to potential leaking of AFFF from a fire truck between 2009 and 2011 (**Figure 5-12**). The P19 fire truck, which reportedly leaked AFFF, was parked at multiple locations, including here for an extended period while being decommissioned (sometime between approximately 2009 and 2011). Groundwater likely flows south to southeast (Parsons 2006) and supply well WW03 is side gradient to the AOPI, approximately 350 feet southwest. Potentially affected media include soil and groundwater.

5.2.18 Current FTA

The Current FTA, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use of AFFF from the 1990s to 2016 (**Figure 5-12**). AFFF use is associated with training operations in a fuel pit, a fire tower, and a closed-loop testing apparatus with an underground concrete tank for water. Firefighting training occurred at this location at least quarterly from the 1990s to 2016. AFFF was sprayed over the entire area, including the fuel pit, pavement, and the gravel and dirt areas. The fuel pit is lined with concrete but has no drainage; therefore, AFFF may have penetrated the concrete via pores or cracks to reach the underlying soil. Also, AFFF is often deployed to form a blanket covering the fuel pit and extending beyond the edges of the pit to the ground surface. Depth to groundwater is 10 to 15 feet bgs and groundwater flows south to southwest (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.19 F16 AFFF Response at End of Runway

The F16 AFFF Response at End of Runway, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical use of AFFF and disposal of waste potentially containing AFFF at the AOPI (**Figure 5-13**). The DPG Fire Department responded with AFFF when an F16 wheel caught on fire. The Fire Department began spraying AFFF, then ceased because the burning materials contained magnesium. Information about the specific location and direction of AFFF spray at the decontamination pad was not available. Depth to groundwater is 15 to 25 feet bgs and groundwater flows northwest (Parsons 2006). Potentially affected media include soil, groundwater, and former evaporation pond sediment/soil.

Two IRP sites exist within the AOPI and are associated with the decontamination pad. A former unlined evaporation pond (HWMU-158, HQAES 49295.1147) received liquid runoff from the decontamination pad (HWMU-162, HQAES 49295.1151) sumps via a storm drain and 6-inch reinforced concrete pipe that ran from the southwest corner of the decontamination pad to the northeast corner of the pond. The decontamination pad was formerly used to clean aircraft and perform chemical agent simulant testing. Bleach and caustic soda were the decontamination liquids used at HQMU-162. It was reported that the DPG Fire Department used water to wash residues of bleach and caustic soda from the pad into the collection sumps (Shaw Environmental, Inc. 2005a). The 6-inch reinforced concrete pipe was removed in 1999 and the IRP sites were closed.

5.2.20 Decon Pad at End of Short Runway

The Decon Pad at End of Short Runway, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical AFFF use from an unknown time until 2015 (**Figure 5-13**). Occasional AFFF firefighting training occurred at the concrete decontamination pad at the end of the short runway. The last time training occurred was in 2015. Depth to groundwater is 15 to 25 feet bgs and groundwater flows northwest (Parsons 2006). Potentially affected media include soil and groundwater.

5.2.21 Ditto WWTS

The Ditto WWTS, which is in the Ditto area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current disposal of waste containing PFAS (**Figure 5-14**). This AOPI consists of the current and former WWTS. HWMU-36 (DPG-36, HQAES 49295.1034) was the primary wastewater treatment facility for the Ditto and MAAF areas from 1944 until it was replaced in late 1990 by a sewage treatment facility that consists of three sewage lagoons.

The former Ditto WWTS (HWMU-36) received wastewater generated in the Ditto and Avery technical centers and treated the wastewater using an Imhoff tank. The former WWTS consisted of an Imhoff tank, a sludge drying bed, an influent sump and pumphouse, and two unlined effluent ditches (an eastern and a western drainage ditch). Sludge generated through use of the tank was removed once a year and placed in a sludge bed adjacent to the tank. Annually, two 55-gallon drums of sludge were removed from the sludge bed and buried in the English Village sanitary landfill. Facilities that discharged to HWMU-36 included an aircraft hangar, a power plant, a heavy equipment shop, a gas station, a dispensary, laundry facilities, several offices, and a cafeteria, as well as biological, chemical, and photographic laboratories (including the old Ditto Chemical Laboratory). Wastewater generated at the facilities in these areas was carried to HWMU-36 via a 10-inch diameter vitrified-clay sanitary sewer line.

The current Ditto WWTS, located immediately west of the HWMU-36 sludge drying bed, is still in service and has been receiving wastewater since 1990 from the Ditto and Avery areas, including from Fire Stations #2 and #3, vehicle maintenance and wash rack facilities, photo processing facilities, and the technical laundry facility. The current WWTS consists of two aerated lagoons and one settling pond, each with a synthetic liner. Wastewater is chlorinated and then ultimately discharged to the western effluent drainage ditch approximately 170 feet downstream (north) of the Imhoff tank effluent discharge and does not flow into the eastern effluent drainage ditch. The effluent drainage ditches and Government Creek are considered ephemeral streams and end in the desert just over 2.5 miles west of the Ditto WWTS (Shaw Environmental Inc. 2004a). Groundwater is estimated to flow southwest for the area west of the western drainage ditch, and east for the area east of the eastern drainage ditch. Potentially affected media at this AOPI include soil, groundwater, surface water, and sediment.

5.2.22 Current English Village Landfill

The Current English Village Landfill, which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current disposal of waste containing PFAS (**Figure 5-15**). The landfill accepted sludge drying bed material from the removal of the HWMU-36 Imhoff tank at the Ditto WWTS in 2000 and 2001. The Ditto WWTS received sanitary

wastewater from Ditto and Avery Technical areas, including Fire Stations #2 and #3, photo processing facilities, technical laundry facility, and vehicle maintenance and wash racks. The disposal locations within the landfill were not available. Groundwater flows north to northwest (Parsons 2007). Potentially affected media at this AOPI include subsurface soil and groundwater.

5.2.23 Old English Village Sanitary Landfill (HWMU-43)

The Old English Village Sanitary Landfill (HWMU-43), which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical disposal of waste potentially containing PFAS from the 1950s to 1987 (**Figure 5-16**). The landfill was operational from the 1950s through 1987 and received sludge from the former Ditto WWTS AOPI between 1974 and 1979. The Ditto WWTS received sanitary wastewater from the Ditto and Avery Technical areas, including Fire Station #2, photo processing facilities, technical laundry facility, and vehicle maintenance and wash racks. The landfill also received sanitary waste from all of DPG, including English Village, and reports indicate that it potentially received hazardous waste from labs, paint waste, and other sources. This AOPI is located within the Davis Groundwater Basin and groundwater flows northeast (Parsons 2007). Potentially affected media at this AOPI include subsurface soil and groundwater.

5.2.24 Fire Station #1

The Fire Station #1, which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to uses of AFFF dating to the 1980s (**Figure 5-17**). Hoses, which potentially contained residual AFFF, were flushed onto grassy areas adjacent to and across the street from the fire station. PPE with potential AFFF residue was rinsed on the grassy areas and historically laundered at the station. Sanitary waste, including the bay drains inside the station, goes to the English Village WWTS. Pumps containing AFFF were tested on the front apron spraying towards the road. A storm drain across the road from Fire Station #1 discharges at an outfall south of Stark Road. This AOPI is located within the Davis Groundwater Basin and groundwater flows southwest (Parsons 2007). Potentially affected media include soil, groundwater, surface water, and sediment.

5.2.25 Building 5470 Vehicle Storage

The Building 5470 Vehicle Storage, which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current AFFF storage and potential use dating to 2017 (**Figure 5-18**). At the time of this PA/SI, Building 5470 was still being used as a vehicle storage facility by the DPG Fire Department, which began in approximately 2017. Items frequently stored at the facility include AFFF in 5-gallon buckets, fire trucks, and foam trailers (which contain AFFF). This AOPI is located within the Davis Groundwater Basin and groundwater flows southeast (Parsons 2007). Potentially affected media include shallow and subsurface soil and groundwater.

5.2.26 Former English Village WWTS

The Former English Village WWTS, which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical disposal of waste potentially containing PFAS from 1964 to 1994 (**Figure 5-19**). The Former English Village WWTS received wastewater from the English Village and Fries Park areas, including Fire Station #1, the former hospital and dental clinic with x-ray capabilities, the vehicle maintenance and car wash facilities, and the pesticide storage building. It was operational from approximately 1964 to 1994 when the current WWTS lagoons became operational. The former WWTS consisted of two sewage lagoons (unlined), a discharge area (former lagoons discharge point is approximately 1,015 feet north of the current lagoons discharge point), and an associated flow channel. The flow channels for the former and current lagoons migrate parallel with each other to the northwest approximately 815 feet before terminating. This AOPI is located within Fries Park Groundwater Basin and groundwater flows northwest (Parsons 2007). Potentially affected media at this AOPI include sediment/soil in the former lagoons, former drainage ditch, and groundwater.

5.2.27 Current English Village WWTS

The Current English Village WWTS, which is in the English Village area, is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to disposal of waste potentially containing PFAS dating to 1994 (**Figure 5-19**). The facility has been operational since approximately 1994 and consists of two aerated lagoons and one settling pond, each with a bentonite geotextile liner, which discharge to an underground effluent channel and then into an unlined drainage ditch/depression area. The WWTS currently receives wastewater from the English Village area, including from Fire Station #1, the former hospital and dental clinic with x-ray capabilities, the vehicle maintenance and car wash facilities, and the pesticide storage building. This AOPI is located within Fries Park Groundwater Basin and groundwater flows northwest (Parsons 2007). Potentially affected media at this AOPI include surface water, lagoon and pond sediments, groundwater, and surface water and sediment/soil in the drainage ditch.

5.2.28 Parade Field FTA

The Parade Field FTA, which is in the English Village, is identified as an AOPI following personnel interviews due to the periodic use of the AOPI grounds as a training area by the DPG Fire Department up until the early 1990s (**Figure 5-17**). Firefighters did not know whether foam, including Class B AFFF, was used at this location. This AOPI is located within the Davis Groundwater Basin and groundwater flows southwest (Parsons 2007). Potentially affected media include soil and groundwater.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at DPG, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at DPG at all 28 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 installation's AOPIs in accordance with the USACE Engineer Manual on Conceptual Site Models, EM 200-1-12 (USACE 2012a). 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 28 soil, groundwater, surface water, and/or sediment pathways as potentially complete, which guided the SI sampling. The QAPP Addendum details the sampling design and rationale based on each AOPI's preliminary CSM. The SI scope of work was completed in 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 QAPP Addendum (Arcadis 2020) and PQAPP (Arcadis 2019). The subsections below summarize the DQOs, sampling design and rationale, sampling activities and methods, and data analyses procedures for the SI phase at DPG. Analytical results obtained through SI field activities are summarized in **Section 7**.

6.1 Data Quality Objectives

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

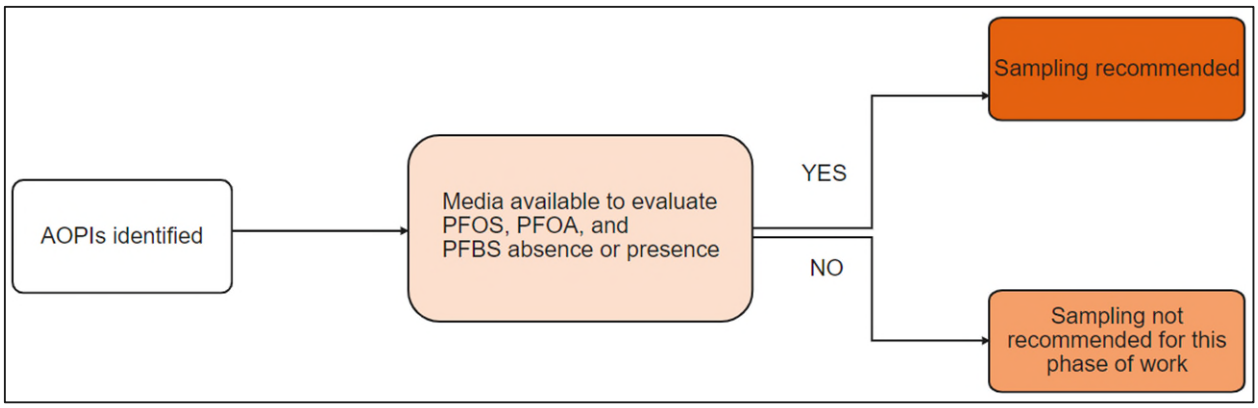

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at DPG is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020). Samples were collected at locations of known or suspected use, storage, and/or disposal of PFAS-containing materials, potential release or source areas, and downgradient locations if information on exact use, storage, or disposal location was not available. Sample locations were chosen based on site-specific historical evidence, suspected groundwater flow conditions, as well as surface runoff/surface conditions observed in the field at each sampled AOPI. Sample media types (e.g., surface soil, groundwater, surface water, sediment) collected for each sampled AOPI were based on media most likely to confirm the presence or absence of PFOS, PFOA, and PFBS directly related to the AOPI.

Groundwater samples were collected to inform the interpretation of PFAS presence or absence and update the individual AOPI CSMs. Soil samples were collected to evaluate PFAS presence or absence at potential release areas, to evaluate the potential for those areas to be sources of PFAS to surface water and groundwater as an influence to drinking water, and to update the individual AOPI CSMs. Surface water samples were collected to inform the presence or absence of PFAS at potential release areas or adjacent surface water bodies. Sediment samples were collected to evaluate PFAS presence or absence at potential release areas or adjacent surface water bodies, to evaluate the potential for those areas to be sources of PFAS to surface water and groundwater as an influence to drinking water, and to update the individual AOPI CSMs.

Existing monitoring wells were sampled, when possible. Due to depth to groundwater, groundwater samples were not collected at some AOPIs. The sampling depths at existing monitoring wells were at approximately the center of the saturated screened interval. **Table 6-1** includes the monitoring well construction details for the wells sampled during the SI, if available. In limited instances, soil samples were not collected due to previous excavation and removal of potentially impacted soil, uncertainty regarding locations of use, disposal, and/or storage, or lack of access to potentially impacted soil.

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019); the SOPs and TGIs included as Appendix A to the PQAPP; the QA/QC requirements identified in Worksheet #20 of the PQAPP; the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2020); and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2020). An additional sampling event occurred due to new information gathered during the field activities of the original sampling event. This additional event adhered to a second, approved scope but followed the same methods and procedures as the original sampling event (please see **Section 6.3.4** for more information). 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, equipment calibration forms, tailgate health and safety forms, and sample collection logs) documenting the SI sampling activities are included in **Appendices J** and **K**, respectively. Photographs of the sampling activities are included in **Appendix L**.

6.3.1 Field Methods

Soil samples were collected from 66 locations and were analyzed for select PFAS; total organic carbon (TOC), pH, and grain size were analyzed in one soil sample per AOPI (i.e., these analytes were not analyzed in every soil sample collected). Composite shallow soil samples (0 to 2 feet bgs) were collected via hand auger methods from discrete points at 23 AOPIs. Soil lithological descriptions were continuously logged and documented on field forms.

Grab groundwater samples were collected via direct push technology (DPT) from 33 discrete direct-push points, 32 of which were co-located with soil samples (drilled in the exact sample location after soil was collected via hand auger). First-encountered groundwater was sampled at each of these sampling points. DPT borings were completed in accordance with the TGI for PFAS-Specific Drilling and Monitoring Well Installation (P-12 in Appendix A to the PQAPP [Arcadis 2019]). Groundwater samples were also collected from 24 existing monitoring wells, which were collected from approximately the center of the saturated screened interval, when known. If well construction details were not available, then the total well depth and groundwater depth were collected in the field and groundwater samples were collected from approximately the center of the groundwater column.

One grab surface water sample was collected from the Ditto WWTS. The surface water sample was analyzed for select PFAS, and field parameters (temperature, pH, specific conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential) were measured during surface water sampling to potentially inform the interpretation of analytical data. Coordinates for the surface water sampling location were recorded using a handheld global positioning system.

Sediment collected during this SI came from drainage ditches that are dry; therefore, sediment was collected using the same methods and analyzed for the same components as soil. Sediment was collected from nine locations at five AOPIs. Generally, a sampling point was positioned downgradient of the suspected discharge area.

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 (FDs), matrix spike/matrix spike duplicates, equipment blanks (EBs), source blanks for water used in the initial decontamination step for drill tooling, and field blanks (FBs) for laboratory-supplied water used in the final decontamination step.

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2020), typically at a rate of 1 per 20 parent samples. Field duplicates and matrix spike/matrix spike duplicate samples were collected for media sampled for PFOS, PFOA, and PFBS only. EBs were collected for media sampled for PFOS, PFOA, and PFBS, at a frequency of one per piece of relevant equipment for

each sampling event, as specified in the QAPP Addendum (Arcadis 2020). The decontaminated reusable equipment from which EBs were collected include bladder pump/tubing, drill casing, hand augers, and water-level meters, as applicable to the sampled media. An additional EB was collected from a new, disposable bailer to confirm that the bailers used for sampling were PFAS-free. A source blank was collected from the water used to pressure-wash drill tooling. Analytical results for blank samples are discussed in **Section 7.31**.

6.3.3 Dedicated Equipment Background

Dedicated equipment background (DEB) samples were collected at a frequency of one DEB per AOPI, per equipment type (i.e., if pump types are varied across wells sampled at the AOPI) and analyzed for PFAS at AOPIs where groundwater sampling was conducted at existing monitoring wells that contained dedicated, down-hole equipment. One DEB total was collected during this SI. DPG-FS1-DEB-102920 was collected from the monitoring well DPG-EGL999WW019 at the Fire Station #1 AOPI. The DEB results are discussed in **Section 7.29**.

6.3.4 Field Change Reports

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

F16 AFFF Response at End of Runway [FCR-DPG-01]

- Sample location DPG-F16-01-GW was moved approximately 300 feet to the west of the originally planned position (downgradient of the proposed location) due to lack of accessibility for the drill rig. No shallow soil sample was collected at the new location because it is outside of the evaporation pond, though a shallow soil sample was collected from the originally scoped location. The groundwater and soil samples remained downgradient of the AOPI.

Hangar Building 4066 and Hangar Building 4068 [FCR-DPG-02]

- FD, matrix spike, and matrix spike duplicate samples were collected at location DPG-HB4068-02-SO instead of DPG-HB4066-02-SO, as outlined in Worksheet #18 in the QAPP addendum (Arcadis 2020).

All AOPIs [FCR-DPG-03]

- FB sample DPG-FB-06 was not collected, deviating from Worksheet #18 in the QAPP Addendum (Arcadis 2020). This did not prevent the SI from meeting the objectives for QA/QC samples.

All AOPIs [FCR-DPG-04]

- EB samples DPG-EB-05, DPG-EB-07, DPG-EB-08, and DPG-EB-09 were not collected, deviating from Worksheet #18 in the QAPP Addendum (Arcadis 2020). These samples were unnecessary because the equipment with which they were associated was not used. DPG-EB-04 was relabeled (originally DPG-EB-07) so that the EB labels would read in chronological order.

Parade Field [FCR-DPG-05]

- Sample DPG-PF-02-SO, instead of sample DPG-PF-01-SO, was analyzed for TOC, pH, and grain size. Sample DPG-PF-03-SO, instead of sample DPG-PF-01-SO, was used as the matrix spike/matrix spike duplicate sample.

6.3.5 Decontamination

Non-dedicated reusable sampling equipment (e.g., hand augers, drill cutting shoes and casing, screen-point samplers, water-level meters) that came into direct contact with sampling media were 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

During the first phase of SI sampling, which included sample collection from 27 AOPIs, IDW, including groundwater purged during sampling and water from decontamination of drill tooling and sampling equipment, was temporarily containerized then disposed using two different methods. Solid IDW, including excess soil cuttings, was returned to boreholes after sampling at the location generated. Liquid IDW was containerized, characterized, and disposed in coordination with the on-post waste contractor in accordance with Utah Department of Environmental Quality Rule R315-260 Hazardous Waste Management System. During the second phase of SI sampling, which included sample collection from one AOPI, IDW consisted of less than 5 gallons of groundwater and decontamination water. Possession of the IDW was transferred to DPG upon completion of field activities.

PPE and other waste that came in contact with media was containerized, categorized as non-hazardous solid, with a not otherwise specified waste profile, and disposed as regular waste.

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.), a DoD ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, and PFBS, by liquid chromatography with tandem mass spectrometry compliant with QSM 5.3, Table B-15. 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, and surface water samples using liquid chromatography with tandem mass spectrometry that is ELAP-accredited and compliant with QSM 5.3, Table B-15 (DoD and Department of Energy 2019).

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:

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

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

6.4.2 Data Validation

All analytical data generated during the SI, except grain size, were verified and validated in accordance with the data verification procedures described in Worksheets #34 through #36 of the PQAPP (Arcadis 2019). Each laboratory data package/sample delivery group underwent Stage 3 data validation in accordance with DoD QSM 5.3 (DoD and Department of Energy 2019). Additionally, 10% of the data underwent Stage 4 data validation. Copies of the data validation reports for each sample delivery group are included as attachments to the DUSR in **Appendix N**. The Level IV analytical reports are included within **Appendix N** in the final electronic deliverable only.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at DPG. 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 2005b), the Final DoD General Data Validation Guidelines (DoD 2019), and the Final DoD Data Validation Guidelines Module 3: Data Validation Procedure for 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 DPG 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 DPG QAPP Addendum (Arcadis 2020). Data qualifiers

applied to laboratory analytical results for samples collected during the SI at DPG 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, and PFBS in Tap Water and Soil Using USEPA's Regional Screening Level Calculator

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

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil and/or sediment data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet bgs), regardless of the current and projected land use of the AOPI.

mg/kg = milligram per kilogram
ng/L = nanograms per liter
ppm = parts per million
ppt = parts per trillion

The OSD residential tap water risk screening levels will be used to compare all groundwater and surface water data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at DPG are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil and sediment concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than or equal to 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 DPG (FD results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2020). The sample results discussion below focuses on the PFOS, PFOA, and PFBS analytical results because they have OSD risk screening levels. The Army will make subsequent investigation decisions based on these constituents' concentrations relative to the OSD risk screening levels.

Tables 7-1 through **7-3** provide a summary of the soil, groundwater, and surface water analytical results for PFOS, PFOA, and PFBS. **Table 7-4** 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 DPG with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2** through **7-15** show the PFOS, PFOA, and PFBS analytical results in groundwater, soil, and/or surface water 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 figures. Final qualifiers applied to the data by the laboratory and the project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. 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 and for surface water during sample collection are provided on the field forms in **Appendix K**. Soil descriptions are provided on the field forms in **Appendix K**. The results of the SI are grouped by AOPI and discussed for each medium as applicable. Groundwater was generally first encountered at depths of approximately 5 to 25 feet bgs for borings in the Ditto area; approximately 25 to 35 feet bgs for borings in the Carr area; and approximately 90 to 210 feet bgs for existing monitoring wells in the English Village area.

Table 7-4 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No/NS)
Defense Test Chamber Fire	No
Current Carr WWTS	Yes
Carr Facility Septic Tank and Leachfield (HWMU-63-2)	No
Walled Decon Pad, Building 8033	No
Hangar 2 Building 4065	Yes
Hangar Building 4066	Yes
Hangar Building 4068	Yes
Hangar 1 and Apron	Yes
Fire Station #2	Yes
Former FTA (DPG-163)	Yes
Light Vault Building 4023	Yes

AOPI Name	OSD Exceedances (Yes/No/NS)
Fire Station #3	No
SE End of Runway AFFF Training	Yes
Building 4357 Fire Truck Maintenance	Yes
Building 4344 Parking Lot	Yes
Building 4331 Wash Rack and Adjacent Parking Lot	Yes
Building 4218 Parking Lot	No
Current FTA	Yes
F16 AFFF Response at End of Runway	Yes
Decon Pad at End of Short Runway	No
Ditto WWTS	Yes
Current English Village Landfill	No
Old English Village Sanitary Landfill (HWMU-43)	No
Fire Station #1	Yes
Building 5470 Vehicle Storage	No
Former English Village WWTS	No
Current English Village WWTS	No
Parade Field FTA	Yes

7.1 Defense Test Chamber Fire

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with the Defense Test Chamber Fire AOPI. Groundwater was not sampled due to uncertain depth to groundwater.

7.1.1 Soil

Shallow soil samples were collected via hand auger from five locations at the Defense Test Chamber Fire (DPG-DTCF-01-SO, DPG-DTCF-02-SO, DPG-DTCF-03-SO, DPG-DTCF-04-SO, DPG-DTCF-05-SO; **Figure 7-2**). One FD was collected at DPG-DTCF-05-SO (DPG-FD-02-SO). Boring locations were positioned around the northern end of Building 8223, in an area of suspected AFFF discharge. Each boring included one surface soil sample from approximately 0 to 2 feet bgs. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg at DPG-DTCF-04-SO (0.002 mg/kg), DPG-DTCF-05-SO (0.015 J [the analyte was positively identified; however, the associated numerical value is an estimated concentration only] mg/kg), and DPG-FD-02-SO (0.066 J mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg at DPG-DTCF-04-SO (0.0025

mg/kg), DPG-DTCF-05-SO (0.002 mg/kg), and DPG-FD-02-SO (0.0018 mg/kg). PFBS was not detected in any of the soil samples.

7.2 Current Carr WWTS

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with the Current Carr WWTS AOPI. Soil was not sampled because potentially impacted soil was beneath the lined pond and inaccessible.

7.2.1 Groundwater

One groundwater sample was collected via DPT drilling and was positioned downgradient of the lagoon at the Current Carr WWTS (DPG-CCWWTS-01-GW; **Figure 7-3**). The groundwater sample was collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected above the OSD risk screening level of 40 ng/L in sample DPG-CCWWTS-01-GW (110 J+ [the result is an estimated quantity; the result may be biased high] ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-CCWWTS-01-GW (21 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-CCWWTS-01-GW (36 ng/L).

7.3 Carr Facility Septic Tank and Leachfield (HWMU-63-2)

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Carr Facility Septic Tank and Leachfield (HWMU-63-2) AOPI.

7.3.1 Soil

Soil samples were collected via hand auger from two locations at the Carr Facility Septic Tank and Leachfield (HWMU-63-2) (DPG-CFSTL-01-SO, DPG-CFSTL-02-SO; **Figure 7-3**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, which was co-located with a groundwater sample. Boring locations were positioned within and adjacent (downgradient) to the former septic tank and leachfield, where PFOS, PFOA, and/or PFBS may have leached to soil. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.3.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Carr Facility Septic Tank and Leachfield (HWMU-63-2) (DPG-CFSTL-01-GW, DPG-CFSTL-02-GW; **Figure 7-3**). One FD was collected at DPG-CFSTL-01-GW (DPG-FD-02-GW). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-CFSTL-01-GW (5.6 ng/L) and DPG-FD-02-GW (4.5 ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in samples DPG-CFSTL-01-GW (17 ng/L), DPG-FD-02-GW (18 ng/L), and DPG-CFSTL-02-GW (3.5 J

ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-CFSTL-01-GW (4.5 ng/L) and DPG-FD-02-GW (6.4 ng/L).

7.4 Walled Decon Pad, Building 8033

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Walled Decon Pad, Building 8033 AOPI.

7.4.1 Soil

Soil samples were collected via hand auger from two locations at the Walled Decon Pad, Building 8033 (DPG-WDP-01-SO, DPG-WDP-02-SO; **Figure 7-4**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, one of which was co-located with a groundwater sample. The boring with collocated soil and groundwater samples was located in an area of AFFF decontamination wastewater discharge. The second boring was located midway along the path of the extended hose used for decontamination wastewater discharge. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected in either soil sample.

7.4.2 Groundwater

One groundwater sample was collected via DPT drilling at the Walled Decon Pad, Building 8033 (DPG-WDP-01-GW; **Figure 7-4**). The groundwater sample was collected at the first-encountered groundwater in the boring. The boring was positioned in an area of suspected AFFF decontamination wastewater discharge. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**. PFOS, PFOA, and PFBS were not detected.

7.5 Hangar 2 Building 4065

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Hangar 2 Building 4065 AOPI.

7.5.1 Soil

Soil samples were collected via hand auger from two locations at Hangar 2 Building 4065 (DPG-HB4065-01-SO, DPG-HB4065-02-SO; **Figure 7-5**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and each was co-located with a grab groundwater sample. The borings were positioned on the south (estimated upgradient) and north (estimated downgradient) side of the hangar apron footprint. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.5.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Hangar 2 Building 4065 (DPG-HB4065-01-GW, DPG-HB4065-02-GW; **Figure 7-5**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-HB4065-01-GW (3.5 J- [The result is an estimated quantity; the result may be biased low] ng/L) and DPG-HB4065-02-GW (27 ng/L). PFOA was detected at the OSD risk screening level of 40 ng/L in sample DPG-HB4065-01-GW (40 J- ng/L), and below the OSD risk screening level at DPG-HB4065-02-GW (36 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-HB4065-01-GW (8.5 J- ng/L) and DPG-HB4065-02-GW (6.1 ng/L).

7.6 Hangar Building 4066

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Hangar Building 4066 AOPI.

7.6.1 Soil

Soil samples were collected via hand auger from two locations at Hangar Building 4066 (DPG-HB4066-01-SO, DPG-HB4066-02-SO; **Figure 7-5**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and each was co-located with a grab groundwater sample. One FD was collected at DPG-HB4066-02-SO (DPG-FD-03-SO). The borings were positioned outside of the hanger doors, where flow of AFFF from the building was most likely. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-HB4066-01-SO (0.00088 J mg/kg). PFOA and PFBS were not detected.

7.6.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Hangar Building 4066 (DPG-HB4066-01-GW, DPG-HB4066-02-GW; **Figure 7-5**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected above the OSD risk screening level of 40 ng/L in samples DPG-HB4066-01-GW (62 J- ng/L) and DPG-HB4066-02-GW (42 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-HB4066-01-GW (72 J- ng/L) and DPG-HB4066-02-GW (51 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-HB4066-01-GW (12 J- ng/L) and DPG-HB4066-02-GW (7.7 ng/L).

7.7 Hangar Building 4068

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Hangar Building 4068 AOPI.

7.7.1 Soil

Soil samples were collected via hand auger from two locations at Hangar Building 4068 (DPG-HB4068-01-SO, DPG-HB4068-02-SO; **Figure 7-5**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and each was co-located with a grab groundwater sample. The borings

were positioned outside of the hangar doors, where flow of AFFF from the building was most likely. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.7.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Hangar Building 4068 (DPG-HB4068-01-GW, DPG-HB4068-02-GW; **Figure 7-5**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-HB4068-01-GW (7.7 ng/L) and DPG-HB4068-02-GW (12 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-HB4068-01-GW (64 ng/L) and DPG-HB4068-02-GW (84 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-HB4068-01-GW (25 ng/L) and DPG-HB4068-02-GW (14 ng/L).

7.8 Hangar 1 and Apron

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Hangar 1 and Apron AOPI.

7.8.1 Soil

Soil samples were collected via hand auger from three locations at Hangar 1 and Apron (DPG-H1A-01-SO, DPG-H1A-02-SO, DPG-H1A-03-SO; **Figure 7-6**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and two of these borings included groundwater samples. The two co-located soil and groundwater sample borings were positioned on each side (east and west) side of the hangar apron in the suspected surface runoff area of an AFFF fire suppression system discharge. An additional soil sample was collected on the west side of the hangar in the suspected hangar drain discharge location where drainage flows toward Government Creek. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected in any of the samples.

7.8.2 Groundwater

One groundwater sample was collected from an existing monitoring well near the hangar drain discharge area, and two groundwater samples were collected via DPT drilling near the hanger apron (DPG-DT0133MW006, DPG-H1A-01-GW, DPG-H1A-02-GW; **Figure 7-6**). The groundwater sample from the monitoring well was collected from the approximate middle of the saturated screened interval, and the groundwater samples from the DPT borings were collected at the first-encountered groundwater. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS, PFOA, and PFBS were not detected in sample DPG-DT0133MW006 from the monitoring well. PFOS was detected below the OSD risk screening level of 40 ng/L in sample DPG-H1A-01-GW (38 ng/L) and above the OSD risk screening level in sample DPG-H1A-02-GW (140 ng/L). PFOA was detected

above the OSD risk screening level of 40 ng/L in sample DPG-H1A-01-GW (78 ng/L) and below the OSD risk screening level in sample DPG-H1A-02-GW (25 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-H1A-01-GW (5.1 ng/L) and DPG-H1A-02-GW (4.2 ng/L).

7.9 Fire Station #2

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

7.9.1 Soil

Soil samples were collected via hand auger from three locations at Fire Station #2 (DPG-FS2-01-SO, DPG-FS2-02-SO, DPG-FS2-03-SO; **Figure 7-6**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and two of these were co-located with grab groundwater samples. The two co-located soil and groundwater sample borings were positioned near the front and back aprons, where AFFF may have flowed from the concrete. An additional soil sample was collected at the stormwater outfall near Government Creek. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FS2-02-SO (0.12 mg/kg) and DPG-FS2-03-SO (0.025 mg/kg), and above the residential OSD risk screening level in sample DPG-FS2-01-SO (0.72 J mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in samples DPG-FS2-01-SO (0.016 mg/kg), DPG-FS2-02-SO (0.0021 mg/kg), and DPG-FS2-03-SO (0.014 mg/kg). PFBS was detected below the residential OSD risk screening level of 1.9 mg/kg in sample DPG-FS2-03-SO (0.0008 J mg/kg).

7.9.2 Groundwater

Two groundwater samples were collected via DPT drilling at Fire Station #2 (DPG-FS2-01-GW, DPG-FS2-02-GW; **Figure 7-6**). The groundwater samples were collected at the first-encountered groundwater in the borings. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected above the OSD risk screening level of 40 ng/L in samples DPG-FS2-01-GW (6,100 J ng/L) and DPG-FS2-02-GW (760 J ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-FS2-01-GW (4,300 J ng/L) and DPG-FS2-02-GW (2,700 J ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-FS2-02-GW (530 J ng/L) and above the OSD risk screening level in sample DPG-FS2-01-GW (680 ng/L).

7.10 Former FTA (DPG-163)

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with the Former FTA (DPG-163) AOPI. Soil was not sampled because the AOPI was backfilled and graded after operations ceased.

7.10.1 Groundwater

One groundwater sample was collected from an existing monitoring well at the Former FTA (DPG-163) (DPG-DT0163MW005; **Figure 7-6**). The groundwater sample was collected from the approximate middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected above the OSD risk screening level of 40 ng/L in sample DPG-DT0163MW005 (3,000 J ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in sample DPG-DT0163MW005 (3,300 J ng/L). PFBS was detected above the OSD risk screening level of 600 ng/L in sample DPG-DT0163MW005 (670 ng/L).

7.11 Light Vault Building 4023

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Light Vault Building 4023 AOPI.

7.11.1 Soil

One soil sample was collected via hand auger from the Light Vault Building 4023 (DPG-LVB-01-SO; **Figure 7-6**). This boring included one surface soil sample from approximately 0 to 2 feet bgs, which was co-located with a groundwater sample. The boring was positioned near the main door of the building used for AFFF storage. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-LVB-01-SO (0.0054 mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-LVB-01-SO (0.0058 mg/kg). PFBS was detected below the residential OSD risk screening level of 1.9 mg/kg in sample DPG-LVB-01-SO (0.0018 mg/kg).

7.11.2 Groundwater

One groundwater sample was collected via DPT drilling at the Light Vault Building 4023 (DPG-LVB-01-GW; **Figure 7-6**). The groundwater sample was collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was not detected. PFOA was detected above the OSD risk screening level of 40 ng/L in sample DPG-LVB-01-GW (270 J ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-LVB-01-GW (290 J ng/L).

7.12 Fire Station #3

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

7.12.1 Soil

Soil samples were collected via hand auger from three locations at Fire Station #3 (DPG-FS3-01-SO, DPG-FS3-02-SO, DPG-FS3-03-SO; **Figure 7-6**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, one of which was co-located with a groundwater sample. The borings were located on the south side of the fire station in an area of reported nozzle spraying with AFFF, and where AFFF may have flowed via runoff from the fire station. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in samples DPG-FS3-01-SO (0.028 mg/kg), DPG-FS3-02-SO (0.0048 mg/kg), and DPG-FS3-03-SO (0.066 mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in samples DPG-FS3-01-SO (0.0082 mg/kg), DPG-FS3-02-SO (0.017 mg/kg), and DPG-FS3-03-SO (0.0012 mg/kg). PFBS was detected below the residential OSD risk screening level of 1.9 mg/kg in samples DPG-FS3-02-SO (0.0008 J mg/kg) and DPG-FS3-03-SO (0.00079 J mg/kg).

7.12.2 Groundwater

One groundwater sample was collected via DPT drilling at Fire Station #3 (DPG-FS3-01-GW; **Figure 7-6**). The groundwater sample was collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in sample DPG-FS3-01-GW (3.3 J ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-FS3-01-GW (12 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-FS3-01-GW (29 ng/L).

7.13 SE End of Runway AFFF Training

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the SE End of Runway AFFF Training AOPI.

7.13.1 Soil

Soil samples were collected via hand auger from two locations at the SE End of Runway AFFF Training (DPG-SEER-01-SO, DPG-SEER-02-SO; **Figure 7-7**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, co-located with a groundwater sample. The borings were positioned in areas where AFFF was reportedly sprayed as part of firefighter training. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.13.2 Groundwater

Two groundwater samples were collected via DPT drilling at the SE End of Runway AFFF Training (DPG-SEER-01-GW, DPG-SEER-02-GW; **Figure 7-7**). One FD was collected at DPG-SEER-01-GW (DPG-FD-03-GW). The groundwater samples were collected at the first-encountered groundwater in each boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was not detected in either sample. PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-SEER-01-GW (68 ng/L), DPG-FD-03-GW (200 ng/L), and DPG-SEER-02-GW (170 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-SEER-01-GW (200 ng/L), DPG-FD-03-GW (200 ng/L), and DPG-SEER-02-GW (190 ng/L).

7.14 Building 4357 Fire Truck Maintenance

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Building 4357 Fire Truck Maintenance AOPI.

7.14.1 Soil

Soil samples were collected via hand auger from three locations at Building 4357 Fire Truck Maintenance (DPG-FTM-01-SO, DPG-FTM-02-SO, DPG-FTM-03-SO; **Figure 7-8**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. Two of the soil samples were co-located with groundwater samples. The borings were positioned in areas of suspected AFFF disposal associated with fire truck maintenance. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS and PFBS were not detected. PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FTM-02-SO (0.00078 J mg/kg).

7.14.2 Groundwater

Two groundwater samples were collected via DPT drilling at Building 4357 Fire Truck Maintenance (DPG-FTM-01-GW, DPG-FTM-02-GW; **Figure 7-8**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-FTM-01-GW (17 ng/L) and DPG-FTM-02-GW (11 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-FTM-01-GW (69 ng/L) and DPG-FTM-02-GW (53 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-FTM-01-GW (9.8 ng/L) and DPG-FTM-02-GW (9.7 ng/L).

7.15 Building 4344 Parking Lot

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Building 4344 Parking Lot AOPI.

7.15.1 Soil

Soil samples were collected via hand auger from two locations at the Building 4344 Parking Lot (DPG-4344PL-01-SO, DPG-4344PL-02-SO; **Figure 7-8**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and was co-located with a groundwater sample. The borings were positioned in areas of suspected AFFF leaks from a P19 fire truck. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.15.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Building 4344 Parking Lot (DPG-4344PL-01-GW, DPG-4344PL-02-GW; **Figure 7-8**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-4344PL-01-GW (7.2 ng/L) and DPG-4344PL-02-GW (6.6 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-4344PL-01-GW (110 ng/L) and DPG-4344PL-02-GW (68 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-4344PL-01-GW (18 ng/L) and DPG-4344PL-02-GW (20 ng/L).

7.16 Building 4331 Wash Rack and Adjacent Parking Lot

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Building 4331 Wash Rack and Adjacent Parking Lot AOPI.

7.16.1 Soil

Soil samples were collected via hand auger from two locations at the Building 4331 Wash Rack and Adjacent Parking Lot (DPG-WRPL-01-SO, DPG-WRPL-02-SO; **Figure 7-8**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, which was co-located with a groundwater sample. The borings were positioned to capture impacts from AFFF that may have flowed southward in runoff from the wash rack and the rest of the lot, and impacts from suspected AFFF leaks from a P19 fire truck. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.16.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Building 4331 Wash Rack and Adjacent Parking Lot (DPG-WPRL-01-GW, DPG-WPRL-02-GW; **Figure 7-8**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in sample DPG-WPRL-01-GW (17 ng/L) and DPG-WPRL-02-GW (12 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in sample DPG-WPRL-01-GW (41 ng/L) and DPG-WPRL-02-GW (140 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-WPRL-01-GW (7.7 ng/L) and DPG-WPRL-02-GW (9.6 ng/L).

7.17 Building 4218 Parking Lot

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Building 4218 Parking Lot AOPI.

7.17.1 Soil

Soil samples were collected via hand auger from three locations at the Building 4218 Parking Lot (DPG-4218PL-01-SO, DPG-4218PL-02-SO, DPG-4218PL-03-SO; **Figure 7-8**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, which was co-located with a groundwater sample. The borings were positioned in areas of suspected AFFF leaks from a P19 fire truck. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.17.2 Groundwater

Three groundwater samples were collected via DPT drilling at the Building 4218 Parking Lot (DPG-4218PL-01-GW, DPG-4218PL-02-GW, DPG-4218PL-03-GW; **Figure 7-8**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in sample DPG-4218PL-01-GW (7.5 ng/L), DPG-4218PL-02-GW (20 ng/L), and DPG-4218PL-03-GW (10 ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-4218PL-01-GW (6.1 ng/L), DPG-4218PL-02-GW (4.0 ng/L), and DPG-4218PL-03-GW (7.6 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-4218PL-01-GW (9.0 ng/L), DPG-4218PL-02-GW (6.0 ng/L), and DPG-4218PL-03-GW (20 ng/L).

7.18 Current FTA

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Current FTA AOPI.

7.18.1 Soil

Soil samples were collected via hand auger from three locations at the Current FTA (DPG-CFTA-01-SO, DPG-CFTA-02-SO, DPG-CFTA-03-SO; **Figure 7-8**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, and two of these borings included groundwater samples. The three borings were located along the edge of the fuel pit, to the northwest, southwest, and southeast, where AFFF was likely applied during training activities. The southwestern and southeastern borings also included grab groundwater samples. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-CFTA-01-SO (0.034 mg/kg) and DPG-CFTA-02-SO (0.0035 mg/kg), and above the residential OSD risk screening level in sample DPG-CFTA-03-SO (0.72 J mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-CFTA-01-SO (0.013 mg/kg) and DPG-CFTA-03-SO (0.011 mg/kg). PFBS was detected below the residential OSD risk screening level of 1.9 mg/kg in sample DPG-CFTA-01-SO (0.029 mg/kg) and DPG-CFTA-03-SO (0.005 mg/kg).

7.18.2 Groundwater

Two groundwater samples were collected via DPT drilling at the Current FTA (DPG-CFTA-01-GW, DPG-CFTA-02-GW; **Figure 7-8**). The groundwater samples were collected at the first-encountered groundwater in the borings. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected above the OSD risk screening level of 40 ng/L in sample DPG-CFTA-01-GW (930 J ng/L) and DPG-CFTA-02-GW (570 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in sample DPG-CFTA-01-GW (85 ng/L) and DPG-CFTA-02-GW (110 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-CFTA-01-GW (39 ng/L) and DPG-CFTA-02-GW (34 ng/L).

7.19 F16 AFFF Response at End of Runway

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the F16 AFFF Response at End of Runway AOPI.

7.19.1 Soil

Soil samples were collected via hand auger from two locations at the F16 AFFF Response at End of Runway (DPG-F16-01-SO, DPG-F16-02-SO; **Figure 7-9**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs and was located near the discharge area of the former unlined evaporation pond that received waste from the decontamination pad, including potential AFFF residue. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-F16-02-SO (0.0032 mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-F16-02-SO (0.022 mg/kg). PFBS was not detected.

7.19.2 Groundwater

One groundwater sample was collected via DPT drilling at the F16 AFFF Response at End of Runway (DPG-F16-01-GW; **Figure 7-9**). The groundwater sample was collected at the first-encountered groundwater in the boring. The boring location was placed approximately 300 feet to the west and downgradient of the originally planned sample location in the discharge area of the former evaporation pond, as outlined in the FCR in **Section 6.3.4**. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was not detected. PFOA was detected above the OSD risk screening level of 40 ng/L in sample DPG-F16-01-GW (55 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-F16-01-GW (2.9 J ng/L).

7.20 Decon Pad at End of Short Runway

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Decon Pad at End of Short Runway AOPI.

7.20.1 Soil

Soil samples were collected via hand auger from three locations at the Decon Pad at End of Short Runway (DPG-DPSR-01-SO, DPG-DPSR-02-SO, DPG-DPSR-03-SO; **Figure 7-9**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs, which was co-located with a groundwater sample. The borings were positioned along the perimeter of the decon pad in areas where AFFF may have flowed from the decon pad to soil. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.20.2 Groundwater

Three groundwater samples were collected via DPT drilling at the Decon Pad at End of Short Runway (DPG-DPSR-01-GW, DPG-DPSR-02-GW, DPG-DPSR-03-GW; **Figure 7-9**). The groundwater samples were collected at the first-encountered groundwater in the boring. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS and PFBS were not detected. PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-DPSR-03-GW (2.1 J ng/L).

7.21 Ditto WWTS

The subsections below summarize the groundwater and surface water PFOS, PFOA, and PFBS analytical results associated with the Ditto WWTS AOPI. Soil was not sampled because potentially impacted soil was beneath the lined pond and inaccessible.

7.21.1 Groundwater

Five groundwater samples were collected from existing monitoring wells at the Ditto WWTS (DPG-DTO036MW004, DPG-DTO036MW009, DPG-DTO036MW012, DPG-DTO036MW014, DPG-DTO036MW016; **Figure 7-10**). Groundwater samples were collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-DTO036MW009 (3.2 J ng/L) and DPG-DTO036MW014 (35 ng/L); and above the OSD risk screening level in samples DPG-DTO036MW004 (77 ng/L) and DPG-DTO036MW012 (66 ng/L). PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-DTO036MW004 (73 ng/L), DPG-DTO036MW012 (75 ng/L), and DPG-DTO036MW014 (67 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-DTO036MW004 (26 ng/L), DPG-DTO036MW012 (16 ng/L), and DPG-DTO036MW014 (14 ng/L).

7.21.2 Surface Water

One surface water sample was collected from the Ditto WWTS (DPG-DWWTS-01-SW; **Figure 7-10**). One FD was collected at DPG-DWWTS-01-SW (DPG-FD-01-SW). The surface water sample was collected from the middle point of the water column. The sample was collected at the discharge pond/drainage ditch adjacent to the WWTS facility to assess treated water. A summary of PFOS, PFOA, and PFBS water analytical results is provided in **Table 7-3**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-DWWTS-01-SW (3.6 ng/L) and DPG-FD-01-SW (3.3 J ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in samples DPG-DWWTS-01-SW (3.3 J ng/L) and DPG-FD-01-SW (3.5 J ng/L). PFBS was not detected.

7.22 Current English Village Landfill

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with the Current English Village Landfill AOPI. Soil was not sampled due to information on the disposal locations within the landfill being unavailable.

7.22.1 Groundwater

Five groundwater samples were collected from existing monitoring wells at the Current English Village Landfill (DPG-EGLEVLMW001, DPG-EGLEVLMW002, DPG-EGLEVLMW003, DPG-EGLEVLMW004, DPG-EGLEVLMW005; **Figure 7-11**). Groundwater samples were collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in sample DPG-EGLEVLMW002 (2.1 J ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-EGLEVLMW002 (2.0 J ng/L). PFOS and PFOA were not detected at other sampled monitoring wells; PFBS was not detected in any well.

7.23 Old English Village Sanitary Landfill (HWMU-43)

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Old English Village Sanitary Landfill (HWMU-43) AOPI.

7.23.1 Soil

Soil samples were collected via hand auger from two locations at the Old English Village Sanitary Landfill (HWMU-43) (DPG-OEVSL-01-SO, DPG-OEVSL-02-SO; **Figure 7-12**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. The borings were positioned in areas of potential runoff, adjacent to the landfill perimeter on the north side. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**. PFOS, PFOA, and PFBS were not detected.

7.23.2 Groundwater

Six groundwater samples were collected from existing monitoring wells at the Old English Village Sanitary Landfill (HWMU-43) (DPG-EGL043MW002, DPG-EGL043MW003, DPG-EGL043MW004, DPG-EGL043MW005, DPG-EGL043MW006, DPG-EGL043MW007; **Figure 7-12**). Groundwater samples were collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**. PFOS, PFOA, and PFBS were not detected.

7.24 Fire Station #1

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

7.24.1 Soil

Soil samples were collected via hand auger from five locations at Fire Station #1 (DPG-FS1-01-SO, DPG-FS1-02-SO, DPG-FS1-03-SO, DPG-FS1-04-SO, DPG-FS1-05-SO; **Figure 7-13**). One FD was collected at DPG-FS1-05-SO (DPG-FD-01-SO). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. Four borings were positioned adjacent to and across the street of the station in areas of reported AFFF disposal or discharge. An additional boring was positioned at the storm drain outfall south of Stark Road that services the fire station. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FS1-01-SO (0.064 mg/kg), DPG-FS1-02-SO (0.086 mg/kg), DPG-FS1-03-SO (0.059 mg/kg), and DPG-FS1-04-SO (0.093 mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FS1-01-SO (0.00086 J mg/kg) and DPG-FS1-04-SO (0.001 J mg/kg). PFBS was not detected in any of the soil samples.

7.24.2 Groundwater

One groundwater sample was collected from an existing monitoring well at Fire Station #1 (DPG-EGL999WW019; **Figure 7-13**). One FD was collected at DPG-EGL999WW019 (DPG-FD-01-GW). The groundwater sample was collected from the middle of the screened interval. A DEB was collected from well DPG-EGL999WW019 at Fire Station #1 and the results are discussed in **Section 7.29**. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was not detected. PFOA was detected above the OSD risk screening level of 40 ng/L in samples DPG-EGL999WW019 (97 J- ng/L) and DPG-FD-01-GW (87 J- ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-EGL999WW019 (8.3 ng/L) and DPG-FD-01-GW (7.9 ng/L).

7.25 Building 5470 Vehicle Storage

The subsections below summarize the groundwater PFOS, PFOA, and PFBS analytical results associated with the Building 5470 Vehicle Storage AOPI. Soil was not sampled because trucks are parked inside the building and there is no drainage around the surrounding surface of the building.

7.25.1 Groundwater

One groundwater sample was collected from an existing monitoring well at the Building 5470 Vehicle Storage (DPG-EGL046MW001; **Figure 7-14**). The groundwater sample was collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS and PFOA were not detected. PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-EGL046MW001 (20 ng/L).

7.26 Former English Village WWTS

The subsections below summarize the soil PFOS, PFOA, and PFBS analytical results associated with the Former English Village WWTS AOPI. Groundwater was not sampled due to depth to groundwater, but supplemental sampling is recommended in a remedial investigation.

7.26.1 Soil

Soil samples were collected via hand auger from five locations at the Former English Village WWTS (DPG-FEVWWTS-01-SO, DPG-FEVWWTS-02-SO, DPG-FEVWWTS-03-SO, DPG-FEVWWTS-04-SO, DPG-FEVWWTS-05-SO; **Figure 7-15**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. Two borings were positioned within the footprint of the former lagoon, and three borings were positioned in the drainage ditch. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FEVWWTS-02-SO (0.0045 mg/kg), DPG-FEVWWTS-03-SO (0.0045 mg/kg), DPG-FEVWWTS-04-SO (0.002 mg/kg), and DPG-FEVWWTS-05-SO (0.0015 mg/kg). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-FEVWWTS-02-SO (0.002 mg/kg), DPG-FEVWWTS-03-SO (0.00075 J mg/kg), DPG-FEVWWTS-04-SO (0.0017 mg/kg), and DPG-FEVWWTS-05-SO (0.00062 J mg/kg). PFBS was not detected in any of the soil samples.

7.27 Current English Village WWTS

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Current English Village WWTS AOPI.

7.27.1 Soil

Soil samples were collected via hand auger from three locations at the Current English Village WWTS (DPG-CEVWWTS-01-SO, DPG-CEVWWTS-02-SO, DPG-CEVWWTS-03-SO; **Figure 7-15**). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. The borings were positioned along the WWTS discharge drainage ditch. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-CEVWWTS-02-SO (0.00052 J mg/kg) and DPG-CEVWWTS-03-SO (0.0012 mg/kg). PFOA and PFBS were not detected in any of the soil samples.

7.27.2 Groundwater

Three groundwater samples were collected from existing monitoring wells at the Current English Village WWTS (DPG-EGL047MW005, DPG-EGLEVWMW004, DPG-EGLEVWMW005; **Figure 7-15**). Monitoring well DPG-EGL047MW005 was selected for sampling as it is located near the Current WWTS discharge

area. Monitoring wells DPG-EGLEVWMW004 and DPG-EGLEVWMW005 are located side-gradient of the WWTS. Groundwater samples were collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was not detected. PFOA was detected below the OSD risk screening level of 40 ng/L in sample DPG-EGL047MW005 (25 ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in sample DPG-EGL047MW005 (8.3 ng/L).

7.28 Parade Field FTA

The subsections below summarize the soil and groundwater PFOS, PFOA, and PFBS analytical results associated with the Parade Field FTA AOPI.

7.28.1 Soil

Soil samples were collected via hand auger from six locations at the Parade Field FTA (DPG-PF-01-SO, DPG-PF-02-SO, DPG-PF-03-SO, DPG-PF-04-SO, DPG-PF-05-SO, DPG-PF-06-SO; **Figure 7-13**). One FD was collected at DPG-PF-01-SO (DPG-FD-04-SO). Each boring included one surface soil sample from approximately 0 to 2 feet bgs. The borings were positioned throughout the area where fire training was suspected to have occurred. A summary of PFOS, PFOA, and PFBS soil analytical results is provided in **Table 7-1**.

PFOS was detected below the residential OSD risk screening level of 0.13 mg/kg in all samples (0.002 to 0.053 ng/L). PFOA was detected below the residential OSD risk screening level of 0.13 mg/kg in sample DPG-PF-01-SO (0.0034 ng/L), DPG-FD-04-SO (0.0026 ng/L), and DPG-PF-04-SO (0.00071 J ng/L), and above the residential OSD risk screening level in sample DPF-PF-06 (0.18 ng/L). PFBS was not detected in any of the soil samples.

7.28.2 Groundwater

One groundwater sample was collected from an existing monitoring well near the Parade Field FTA (DPG-WW-06; **Figure 7-13**). One FD was collected at DPG-WW-06 (DPG-FD-04-GW). Monitoring well DPG-WW-06 was selected for sampling as it is downgradient of the parade field with regards to groundwater flow direction. A groundwater sample was collected from the middle of the screened interval. A summary of PFOS, PFOA, and PFBS groundwater analytical results is provided in **Table 7-2**.

PFOS was detected below the OSD risk screening level of 40 ng/L in samples DPG-WW-06 (3.0 J ng/L) and DPG-FD-04-GW (2.0 J ng/L). PFOA was detected below the OSD risk screening level of 40 ng/L in samples DPG-WW-06 (3.7 ng/L) and DPG-FD-04-GW (3.4 J ng/L). PFBS was detected below the OSD risk screening level of 600 ng/L in samples DPG-WW-06 (2.4 J ng/L) and DPG-FD-04-GW (2.3 J ng/L).

7.29 Dedicated Equipment Background Samples

One DEB sample was collected during this SI. DPG-FS1-DEB-102920 was collected from the monitoring well DPG-EGL999WW019 at the Fire Station #1 AOPI (**Table 7-2**), prior to purging any standing water from the dedicated downhole equipment. PFOS was not detected. PFOA was detected below the OSD risk screening level of 40 ng/L (26 ng/L). PFBS was detected below the OSD risk screening level of 600

ng/L (2.2 J ng/L). The detections of PFOA and PFBS in the DEB sample suggest PFOA and PFBS may leach from the dedicated downhole equipment into groundwater during purging and sampling. However, the concentrations of PFOA and PFBS in the DEB sample are less than those in the associated normal groundwater sample (DPG-EGL999WW019-102920) collected after purging (PFOS was not detected, PFOA was detected at 97 J- ng/L, and PFBS was detected at 8.3 ng/L). This indicates that groundwater in the aquifer also contains detectable levels of PFOA and PFBS in groundwater. The full analytical results (i.e., for all eighteen PFAS-related compounds analyzed) for QA/QC samples collected during the SI are included in **Appendix O**.

7.30 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS (**Table 7-1**), one soil sample per AOPI (except AOPIs where no soil samples were collected) 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 200 mg/kg to 14,200 mg/kg. The TOC at this installation was mostly within range of what is typically observed in topsoil: 5,000 to 30,000 mg/kg with some samples in the range of what is typically observed in desert soil: <5,000 mg/kg. The combined percentage of fines (i.e., silt and clay) in soils at DPG ranged from 23.4% to 99.3%, with an average of 73.9%. In general, PFAS constituents tend to be more mobile in soils with less than 20% fines (silt and clay) and lower TOC. The percent moisture of the soil averaged 17%, which is typical for clay (0 to 20%). The pH of the soil was slightly alkaline (ranging from 7 to 9) with an average of 8.3. While the high percentages of fines in soil samples from DPG AOPIs suggest relatively low PFAS mobility, the relatively low TOC concentrations in these samples may indicate the potential for increased PFAS mobility. The full analytical results (i.e., for all eighteen PFAS-related compounds analyzed) for QA/QC samples collected during the SI are included in **Appendix O**.

7.31 Blank Samples

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

7.32 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 7-16** through **7-30** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

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

Based on the use, storage, and/or disposal of PFAS-containing materials at the AOPIs, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, surface water recharge of groundwater, 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, then 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 multiple CSMs:

- The AOPIs are not residential or recreational sites and are wholly located within the installation boundaries. Therefore, on the CSM figures that include soil as a potential exposure medium, the soil exposure pathways for on-post residents and recreational users, and for off-post receptors, are incomplete.
- Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-post recreational users for all AOPIs is incomplete.
- The Fire Station #1, Parade Field FTA, Building 5470 Vehicle Storage, and Old English Village Sanitary Landfill (HWMU-43) AOPIs are within 5 miles of the nearest installation boundary in the downgradient groundwater flow direction. PFOS, PFOA, and/or PFBS were detected in groundwater at the Fire Station #1, Parade Field FTA, and Building 5470 Vehicle Storage AOPIs. Due to the absence of land use controls preventing potable use of the off-post groundwater, the groundwater exposure pathway for off-post drinking water receptors is potentially complete for these three AOPIs.
- PFOS, PFOA, and PFBS were not detected in groundwater samples from Old English Village Sanitary Landfill (HWMU-43). Therefore, the groundwater exposure pathway from that AOPI for off-post drinking water receptors is incomplete.
- All AOPIs except Fire Station #1, Parade Field FTA, Building 5470 Vehicle Storage, and Old English Village Sanitary Landfill (HWMU-43) are unlikely to affect off-post groundwater based on the distance

to the nearest installation boundary in the downgradient groundwater flow direction. Therefore, the groundwater exposure pathway for off-post drinking water receptors for all but those four AOPIs is incomplete.

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

Figure 7-16 shows the CSM for the Defense Test Chamber Fire, F16 AFFF Response at End of Runway, Building 4357 Fire Truck Maintenance, and Current FTA AOPIs. These AOPIs have the potential for presence of PFOS, PFOA, and/or PFBS due to discharges of AFFF on soil and/or paved surfaces from emergency responses, fire truck maintenance or leaks, or firefighting training activities. Additionally, a former unlined evaporation pond at the F16 AFFF Response at End of Runway AOPI received potential AFFF runoff from the F16 emergency response. The former evaporation pond was dry during the sampling event and was not sampled.

- PFOS, PFOA, and/or PFBS were detected in soil, and site workers may contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater samples collected at the AOPIs addressed by this CSM. Groundwater samples were not collected from the Defense Test Chamber Fire AOPI; however, PFOS, PFOA, and/or PFBS detected in soil could migrate to groundwater. The groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-post site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater for drinking water.

Figure 7-17 shows the CSM for the Current Carr WWTS AOPI, which receives chemical and solvent wastes from buildings in the Carr area. The settling pond at the Current Carr WWTS is lined with bentonite; however, a leak in the liner was reportedly repaired at some point during its operation.

- Surface water and sediment samples were not collected from the settling pond during the SI. While the Current Carr WWTS is fenced, a limited number of site workers (i.e., WWTS workers) have access. If PFOS, PFOA, and/or PFBS are present in the settling pond, then site workers may contact constituents in surface water and sediment via incidental ingestion or dermal contact. Therefore, the surface water and sediment exposure pathways for on-post site workers are potentially complete.
- On-post residents and recreational users and off-post receptors are not expected to contact the settling pond. Therefore, the surface water and sediment exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater. The AOPI is side-gradient of and could affect groundwater wells used to supply drinking water in the Carr area. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-post site workers is potentially complete. Residents are not currently served by drinking water wells in the Carr area. However, the groundwater exposure pathway for on-post residents is potentially complete to account for potential future residential use of the downgradient on-post groundwater for drinking water.

Figure 7-18 shows the CSM for the following six AOPIs: Carr Facility Septic Tank and Leachfield (HWMU-63-2), SE End of Runway AFFF Training, Building 4344 Parking Lot, Building 4331 Wash Rack and Adjacent Parking Lot, Building 4218 Parking Lot, and Decon Pad at End of Short Runway. Excluding the Carr Facility Septic Tank and Leachfield (HWMU-63-2), these AOPIs have the potential for PFOS,

PFOA, and/or PFBS presence due to disposal or discharges of AFFF on soil and/or paved surfaces from firefighting training activities, fire suppression systems, fire truck maintenance or leaks, or chemical decontamination activities. Historically, the Carr Facility Septic Tank and Leachfield (HWMU-63-2) potentially received wastewater containing PFOS, PFOA, and/or PFBS. Currently, the tank and leachfield are inactive. Sludge from historical operations was removed, the septic tank was filled in with native soil, and the drainage piping was abandoned in place.

- PFOS, PFOA, and PFBS were not detected in soil; therefore, the soil exposure pathway for on-post site workers is incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater. The groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-post site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater for drinking water.

Figure 7-19 shows the CSM for the Walled Decon Pad (Building 8033) AOPI. This AOPI has the potential for presence of PFOS, PFOA, and/or PFBS due to disposal of AFFF to soil and/or paved surfaces during chemical decontamination activities.

- PFOS, PFOA, and PFBS were not detected in soil; therefore, the soil exposure pathway for on-post 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-post site workers and residents are incomplete.

Figure 7-20 shows the CSM for the Hangar 2 Building 4065, Hangar Building 4068, and Hangar 1 and Apron AOPIs. These AOPIs have the potential for presence of PFOS, PFOA, and/or PFBS due to discharges of AFFF to soil and/or paved surfaces from fire suppression systems and AFFF storage. There is a nearby surface water body, Government Creek, and consequently there is a potential for runoff to surface water at these locations.

- PFOS, PFOA, and PFBS were not detected in soil; therefore, the soil exposure pathway for on-post site workers is incomplete.
- PFOS, PFOA, and PFBS were not detected in the soil sample collected at the Hangar 1 and Apron AOPI near the suspected hangar drain discharge location, where drainage flows toward Government Creek. Government Creek is not used for drinking water and does not extend downstream beyond the installation boundaries. Therefore, the surface water and sediment exposure pathways for all receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at these AOPIs, which are located potentially upgradient or in the vicinity of existing on-post drinking water wells. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-post site workers is potentially complete. Residents are not currently served by drinking water wells in the Ditto area. However, the groundwater exposure pathway for on-post residents is potentially complete to account for potential future residential use of the downgradient on-post groundwater.

Figure 7-21 shows the CSM for the Hangar Building 4066, Fire Station #2, Light Vault Building 4023, and Fire Station #3 AOPIs. The AOPIs have the potential for presence of PFOS, PFOA, and/or PFBS due to potential discharges of AFFF on soil and/or paved surfaces from fire suppression systems, firefighting

training activities, fire station activities, and AFFF storage. There is a nearby surface water body, Government Creek, and consequently there is a potential for runoff to surface water at these locations.

- PFOS, PFOA, and/or PFBS were detected in soil, and site workers may contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at these AOPIs, which are located potentially upgradient or in the vicinity of existing on-post drinking water wells. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-post site workers is potentially complete. Residents are not currently served by drinking water wells in the Ditto area. However, the groundwater exposure pathway for on-post residents is potentially complete to account for potential future residential use of the downgradient on-post groundwater.
- PFOS, PFOA, and/or PFBS were detected in a sediment/soil sample collected in the stream bed of Government Creek, which was dry at the time of sampling. Government Creek is an ephemeral surface water feature and is not used for drinking water. Site workers could contact constituents in intermittent surface water and sediment via incidental ingestion and dermal contact. Therefore, the sediment exposure pathway is complete, and the surface water pathway is potentially complete for on-post site workers. Residents are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.
- Government Creek does not flow beyond installation boundaries so cannot transport constituents off the installation. Therefore, the surface water and sediment exposure pathway for off-post receptors are incomplete.

Figure 7-22 shows the CSM for the Former FTA (DPG-163) AOPI. This AOPI has the potential for presence of PFOS, PFOA, and/or PFBS due to discharges of AFFF on soil and/or paved surfaces from firefighting training activities. There is a nearby surface water body, Government Creek, and consequently there is a potential for surface runoff to surface water.

- Soil samples were not collected at this AOPI during the SI. If PFOS, PFOA, and/or PFBS are present in soil, then site workers may contact constituents in soil via incidental ingestion, dermal contact, or inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is potentially complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at this AOPI, which is located upgradient or in the vicinity of existing on-post drinking water wells. Therefore, the groundwater exposure pathway (via drinking water ingestion and dermal contact) for on-post site workers is potentially complete. Residents are not served by drinking water wells in the Ditto area. However, the groundwater exposure pathway for on-post residents is potentially complete to account for potential future residential use of the downgradient on-post groundwater.
- PFOS, PFOA, and/or PFBS were detected in a sediment/soil sample collected in the streambed of Government Creek, which was dry at the time of sampling. Government Creek is an ephemeral surface water feature and is not used for drinking water. If PFOS, PFOA, and/or PFBS are present in soil at the AOPI, these constituents may have been carried via surface water runoff to reach Government Creek. Site workers could contact constituents in intermittent surface water and sediment via incidental ingestion and dermal contact. Therefore, the sediment exposure pathway is complete, and the surface water pathway is potentially complete for on-post site workers. Residents

are not likely to contact surface water and sediment; therefore, these exposure pathways are incomplete.
- Due to its intermittent flow, Government Creek is unlikely to be frequented by recreational users, and the creek does not flow off the installation, so constituents cannot be transported to off-post surface water bodies. Therefore, the surface water and sediment exposure pathways for on-post recreational users and off-post receptors are incomplete.

Figure 7-23 shows the CSM for the Ditto WWTS AOPI. This facility potentially received waste containing PFOS, PFOA, and/or PFBS from Fire Stations #2 and #3, a hangar, photo processing facilities, technical laundry facility, and vehicle maintenance and wash racks. The current WWTS consists of two aerated lagoons and one settling pond, each with a synthetic liner. Wastewater is chlorinated and then ultimately discharged to the western effluent drainage ditch approximately 170 feet downstream (north) of the Imhoff tank effluent discharge and does not flow into the eastern effluent drainage ditch which flows to Government Creek.

- PFOS, PFOA, and/or PFBS were detected in surface water at the Ditto WWTS AOPI. Site workers may contact constituents in surface water and sediment of the lagoons and settling pond the unlined drainage ditch via incidental ingestion or dermal contact. Therefore, the surface water exposure pathway for on-post site workers is complete, and the sediment exposure pathway for on-post site workers is potentially complete.
- On-post residents and recreational users, as well as off-post receptors, are not expected to contact the lagoons, settling pond, or drainage ditch, and water in the drainage ditch does not flow off-post. Therefore, the surface water and sediment exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at this AOPI, which is located upgradient or in the vicinity of existing on-post drinking water wells. Therefore, the groundwater exposure pathway (via drinking water ingestion or dermal contact) for on-post site workers is potentially complete. Residents are not currently served by drinking water wells in the Ditto area. However, the groundwater exposure pathway for on-post residents is potentially complete to account for potential future residential use of the downgradient on-post groundwater.

Figure 7-24 shows the CSM for the Current English Village Landfill AOPI, which received waste that potentially contained PFOS, PFOA, and/or PFBS.

- Soil samples were not collected during the SI. If PFOS, PFOA, and/or PFBS are present in soil, then site workers may contact constituents in soil via incidental ingestion, dermal contact, or inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is potentially complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at this AOPI, which is located outside the vicinity of existing on-post drinking water wells. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-post site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-25 shows the CSM for the Old English Village Sanitary Landfill (HWMU-43) AOPI, which historically received waste that potentially contained PFOS, PFOA, and/or PFBS. The landfill is capped with a geosynthetic clay liner and closed.

- PFOS, PFOA, and PFBS were not detected in soil at the Old English Village Sanitary Landfill (HWMU-43) AOPI; therefore, the soil exposure pathway for on-post site workers is incomplete.

- PFOS, PFOA, and PFBS were not detected in groundwater at this AOPI. Therefore, the groundwater exposure pathways (via drinking water ingestion or dermal contact) for on-post site workers and residents are incomplete.

Figure 7-26 shows the CSM for the Fire Station #1 AOPI. AFFF discharges to soil and/or paved surfaces may have occurred from fire station activities. A storm drain across from Fire Station #1 discharges to a wash at the stormwater outfall south of Stark Road.

- PFOS, PFOA, and/or PFBS were detected in soil, and site workers may contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater. This AOPI is located upgradient of existing on-post drinking water wells in the English Village Area. Therefore, the groundwater exposure pathways (via drinking water ingestion or dermal contact) for on-post site workers and residents are potentially complete.
- The nearby wash, to which the stormwater outfall from Fire Station #1 discharges, contains intermittent stormwater or surface water flow. On-post site workers and residents are unlikely to contact intermittent stormwater or surface water at this location. Additionally, due to its intermittent flow, the wash is unlikely to be frequented by recreational users, and it is unlikely that constituents are transported to off-post surface water bodies. Therefore, the surface water exposure pathways for all receptors are incomplete.
- PFOS, PFOA, and PFBS were not detected in a soil/sediment sample collected near this stormwater outfall. Therefore, the sediment exposure pathways for all receptors are incomplete.

Figure 7-27 shows the CSM for the Building 5470 Vehicle Storage AOPI. AFFF discharges to soil and/or paved surfaces may have occurred from firefighter training activities or incidental spills associated with AFFF storage and fire truck storage.

- Soil samples were not collected at the Building 5470 Vehicle Storage AOPI during the SI. If PFOS, PFOA, and/or PFBS are present in soil, then site workers may contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is potentially complete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at the Building 5470 Vehicle Storage. The AOPI is located upgradient of existing on-post drinking water wells in the English Village Area. Therefore, the groundwater exposure pathways (via drinking water ingestion or dermal contact) for on-post site workers and residents are potentially complete.

Figure 7-28 shows the CSM for the Parade Field FTA AOPI. AFFF discharges to soil and/or paved surfaces may have occurred from firefighter training activities or incidental spills associated with AFFF storage and fire truck storage.

- PFOS, PFOA, and/or PFBS were detected in soil, and site workers may contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathway for on-post site workers is complete.
- PFOS, PFOA, and PFBS were detected in groundwater samples at the Parade Field FTA. This AOPI is located upgradient of existing on-post drinking water wells in the English Village Area. Therefore,

the groundwater exposure pathways (via drinking water ingestion or dermal contact) for on-post site workers and residents are potentially complete.

Figure 7-29 shows the CSM for the Former English Village WWTS AOPI, which historically received wastewater from the English Village and Fries Park areas, including Fire Station #1, the former hospital and dental clinic with x-ray capabilities, the vehicle maintenance and car wash facilities, and pesticide storage building. The former WWTS consisted of two unlined sewage lagoons, a discharge area, and an associated flow channel.

- The former sewage lagoons are currently dry; therefore, the lagoon surface water exposure pathway is incomplete.
- PFOS, PFOA, and/or PFBS were detected in sediment/soil collected at the former lagoons and at the drainage ditch of the Former English Village WWTS AOPI. Site workers (i.e., WWTS workers) may contact constituents in sediment/soil of the former lagoons and intermittent surface water or sediment/soil in the drainage ditch via incidental ingestion or dermal contact. Therefore, the sediment/soil exposure pathway for on-post site workers is complete and the drainage ditch surface water exposure pathway is potentially complete.
- On-post residents and recreational users are not expected to contact the former lagoons and drainage ditch, and due to the high potential for evaporation and infiltration of standing water, the drainage ditch is unlikely to be connected to off-post surface water bodies. Therefore, the sediment/soil exposure pathways for on-post residents and recreational users and off-post receptors are incomplete.
- Groundwater samples were not collected during the SI; however, PFOS, PFOA, and/or PFBS detected in soil could migrate to groundwater. There are no existing drinking water wells in or near the Fries Groundwater Basin where this AOPI is located. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-post site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-30 shows the CSM for the Current English Village WWTS AOPI, which currently receives wastewater that may contain PFOS, PFOA, and/or PFBS. The facility consists of two aerated lagoons and one settling pond that discharges into an unlined ditch/depressional area.

- Surface water and sediment samples were not collected from the WWTS lagoons or settling pond. If PFOS, PFOA, and/or PFBS are present, then site workers (i.e., WWTS workers) may contact constituents in surface water and sediment of the lagoons and pond via incidental ingestion or dermal contact. Therefore, the lagoon and pond surface water and sediment exposure pathways for on-post site workers are potentially complete.
- Drainage ditch surface water samples were not collected; however, PFOS, PFOA, and/or PFBS were detected in soil/sediment from the drainage ditch of Current English Village WWTS AOPI. Site workers may contact constituents in surface water and soil/sediment of the drainage ditch via incidental ingestion or dermal contact. Therefore, the drainage ditch soil/sediment exposure pathway is complete, and the surface water exposure pathway is potentially complete for on-post site workers.
- On-post residents and recreational users are not expected to contact the drainage ditch or lagoons and pond, and due to the high potential for evaporation and infiltration of standing water, the drainage ditch is unlikely to be connected to off-post surface water bodies. Therefore, the surface water and

sediment exposure pathways for on-post residents and recreational users and off-post receptors are incomplete.

- PFOS, PFOA, and/or PFBS were detected in groundwater at this AOPI. There are no existing drinking water wells in or near the Fries Groundwater Basin where this AOPI is located. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-post site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Following the SI sampling, 26 of the 28 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 DPG based on the use, storage, and/or disposal of PFAS-containing materials, in accordance with the 2018 Army Guidance for Addressing Releases of Per-and Polyfluoroalkyl Substances (Army 2018). The SI included multi-media sampling at AOPIs to determine whether or not a release of PFOS, PFOA, and PFBS to the environment occurred.

OSD provided residential risk screening levels based on the USEPA oral reference dose for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels for PFOS, PFOA, and PFBS in soil (**Appendix A**). A combination of document review, internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFOS, PFOA, and PFBS use, storage, and/or disposal at DPG. Following the evaluation, 28 AOPIs were identified.

Three post-treatment water supply wells in the English Village, Ditto, and Carr areas were sampled for PFAS in 2016, and seven wells (untreated water) and three pipeline distribution systems (treated water) in the English Village, Ditto, and Carr areas were sampled for PFAS in 2019, as part of the IMCOM PFOA/PFOS Water System Testing program. All results were detected below the LOQ under USEPA Method 537, with a quantitation limit of approximately 2.0 ng/L.

All 28 AOPIs were sampled during the SI at DPG 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 DPG QAPP Addendum (Arcadis 2020).

Groundwater samples were collected at 26 AOPIs. The presence of PFOS, PFOA, and/or PFBS was identified in groundwater samples from 24 of these 26 AOPIs. Due to the lack of nearby monitoring wells and depth to groundwater, samples were not collected at two AOPIs. The highest PFOS, PFOA, and PFBS concentrations detected in groundwater samples were from the Fire Station #2 AOPI, at 6,100 J ng/L, 4,300 J ng/L, and 680 ng/L, respectively. These concentrations exceeded their respective OSD risk screening levels. In total, 15 AOPIs had concentrations of PFOS, PFOA, and/or PFBS in groundwater that exceeded OSD risk screening levels.

Soil samples were collected at 23 AOPIs. The presence of PFOS, PFOA, and/or PFBS was identified in soil samples from 13 of these 23 AOPIs. The highest PFOS concentrations in soil were in samples from the Current FTA and Fire Station #2 AOPIs, both at 0.72 J mg/kg, which exceeds the residential OSD risk screening level of 0.13 mg/kg. The highest PFOA concentration in soil was in a sample from the Parade Field FTA AOPI at 0.18 mg/kg, which exceeds the residential OSD risk screening level of 0.13 mg/kg. The highest PFBS concentration in soil was in a sample from the Current FTA AOPI at 0.029 mg/kg, which is below the residential OSD risk screening level of 1.9 mg/kg. Three AOPIs had soil samples with concentrations of PFOS and/or PFOA that exceeded residential OSD risk screening levels. PFBS did not exceed residential OSD risk screening levels in any soil samples.

One surface water sample was collected from one AOPI. PFOS and PFOA were detected in the surface water sample from the Ditto WWTS AOPI at 3.6 ng/L and 3.3 J ng/L, respectively. These surface water sample results are not compared to OSD risk screening levels, because the surface water sampled is not a drinking water source and is not considered representative of groundwater (tap water) conditions.

Following the SI sampling, 26 out of 28 AOPIs were considered to have complete and/or potentially complete exposure pathways. The following exposure pathways are complete or potentially complete.

- The soil exposure pathways for on-installation site workers are complete at 10 AOPIs where PFOS, PFOA, and/or PFBS were detected in soil samples, and potentially complete at three AOPIs where soil samples were not collected.
- The groundwater exposure pathways (via drinking water ingestion and dermal contact) are potentially complete for on-installation site workers and residents at 26 AOPIs.
- The groundwater exposure pathways are potentially complete for off-installation drinking water receptors at three AOPIs.
- The surface water exposure pathway is complete for on-installation site workers at one AOPI where PFOS and PFOA were detected in surface water, and potentially complete for on-installation site workers at eight AOPIs.
- The sediment exposure pathways are complete for on-installation site workers at seven AOPIs where PFOS, PFOA, and/or PFBS were detected in sediment/soil samples, and potentially complete for on-installation site workers at two 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**). The recommendation for supplemental sampling is based on the presence of PFOS, PFOA, and/or PFBS in soil associated with a potentially complete exposure pathway to groundwater. Supplemental sampling may also be recommended where use of AFFF potentially containing PFOS, PFOA, and/or PFBS may have extended beyond a sampled area. **Table 8-1** below summarizes the AOPIs identified at DPG PFOS, PFOA, and PFBS sampling and recommendations for each AOPI; further investigation is warranted at DPG. 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 Dugway Proving Ground, and Recommendations

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Defense Test Chamber Fire	NS	No	NS	Supplemental groundwater sampling[1]
Current Carr WWTS	Yes	NS	NS	Further study in a remedial investigation
Carr Facility Septic Tank and Leachfield (HWMU-63-2)	No	No	NS	No action at this time
Walled Decon Pad, Building 8033	ND	ND	NS	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Hangar 2 Building 4065	Yes	ND	NS	Further study in a remedial investigation
Hangar Building 4066	Yes	No	NS	Further study in a remedial investigation
Hangar Building 4068	Yes	ND	NS	Further study in a remedial investigation
Hangar 1 and Apron	Yes	ND	NS	Further study in a remedial investigation
Fire Station #2	Yes	Yes	NS	Further study in a remedial investigation
Former FTA (DPG-163)	Yes	NS	NS	Further study in a remedial investigation
Light Vault Building 4023	Yes	No	NS	Further study in a remedial investigation
Fire Station #3	No	No	NS	No action at this time
SE End of Runway AFFF Training	Yes	ND	NS	Further study in a remedial investigation
Building 4357 Fire Truck Maintenance	Yes	No	NS	Further study in a remedial investigation
Building 4344 Parking Lot	Yes	ND	NS	Further study in a remedial investigation
Building 4331 Wash Rack and Adjacent Parking Lot	Yes	ND	NS	Further study in a remedial investigation
Building 4218 Parking Lot	No	ND	NS	No action at this time
Current FTA	Yes	Yes	NS	Further study in a remedial investigation
F16 AFFF Response at End of Runway	Yes	No	NS	Further study in a remedial investigation
Decon Pad at End of Short Runway	No	ND	NS	Supplemental groundwater sampling[2]
Ditto WWTS	Yes	NS	NA	Further study in a remedial investigation
Current English Village Landfill	No	NS	NS	No action at this time
Old English Village Sanitary Landfill (HWMU-43)	ND	ND	NS	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NA/ND/NS)			Recommendation
	GW	SO	SW	
Fire Station #1	Yes	No	NS	Further study in a remedial investigation
Building 5470 Vehicle Storage	No	NS	NS	No action at this time
Former English Village WWTS	NS	No	NS	Supplemental groundwater sampling is recommended
Current English Village WWTS	No	No	NS	No action at this time
Parade Field FTA	No	Yes	NS	Further study in a remedial investigation

Notes:
1. If soil analytical data indicate PFOS, PFOA, and/or PFBS presence below OSD risk screening levels but a potentially complete pathway to groundwater exists, then supplemental groundwater sampling is recommended.
2. Sampling focused on the decontamination pad, and does not encompass other adjacent locations of potential AFFF use; therefore, supplemental groundwater sampling is recommended.
Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
NA – not applicable (The OSD residential tap water risk screening levels were only used to compare surface water data if the surface water is an expression of groundwater [i.e., springs/seeps] or if surface water is used as a drinking water source nearby)
ND – non-detect
NS – not sampled
SO – soil
SW – surface water

Data collected during the PA (**Sections 3** through **5**) and SI (**Sections 6** and **7**) were sufficient to draw conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at DPG 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 is limited to groundwater samples from 26 of 28 AOPIs, soil samples from 23 of 28 AOPIs, and on-post drinking water results from 2016 and 2019 collected as part of the IMCOM PFOA/PFOS Water System Testing program. Available data, including PFOS, PFOA, and/or PFBS, is listed in **Appendix O**, which were analyzed per the selected analytical method.

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

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ACRONYMS

%	percent
AFFF	aqueous film-forming foam
ARFF	Aircraft Rescue Fire Fighting
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
DEB	dedicated equipment background
decon	decontamination
DoD	Department of Defense
DPG	Dugway Proving Ground
DPT	direct push technology
DPW	directorate of public works
DQO	data quality objective
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FB	field blank
FCR	field change report
FD	field duplicate
FTA	fire training area
HWMU	hazardous waste management unit
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
IMCOM	Installation Management Command
installation	United States Army or Reserve installation

IRP	Installation Restoration Program
J	The analyte was positively identified; however, the associated numerical value is an estimated concentration only
J+	The result is an estimated quantity; the result may be biased high
J-	The result is an estimated quantity; the result may be biased low
JBADS	Joint Biological Agent Decontamination System
LOD	limit of detection
LOQ	limit of quantitation
MAAF	Michael Army Airfield
mg/kg	milligrams per kilogram (parts per million)
NA	not applicable
NEPA	National Environmental Policy Act
NFA	no further action
ng/L	nanograms per liter (parts per trillion)
OSD	Office of the Secretary of Defense
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBS	perfluorobutanesulfonic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
POC	point of contact
PPE	personal protective equipment
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
REC	Record of Environmental Consideration
RIAC	Rapid Integration and Acceptance Center

RSL	Regional Screening Level
SE	southeast
SI	site inspection
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
STP	sewage treatment plant
SWMU	solid waste management unit
TGI	technical guidance instruction
TOC	total organic carbon
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USEPA	United States Environmental Protection Agency
WWTS	wastewater treatment system

TABLES

Table 2-1 Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Location		Carr Facility Water System	Ditto TC Water System	English Village Water System	Carr Facility Water System	Carr Facility Water System	Carr Facility Water System	Ditto TC Water System	Ditto TC Water System	Ditto TC Water System	English Village Water System	English Village Water System	English Village Water System	English Village Water System
Sample ID		0000J40Y	0000J40N	0000J40H	0000QXI5	0000QXI7	0000QXHR	0000QXIF	0000QXIC	0000QXHU	0000QXHX	0000QXI0	0000QXI2	0000QXHP
Sample Date		12/20/2016	12/20/2016	12/20/2016	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019	12/18/2019
Chemical name	OSD risk screening level* in ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L	ng/L
N-ethyl perfluorooctane sulfonamidoacetic acid (NEtFOSAA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
N-methyl perfluorooctane sulfonamidoacetic acid (NMeFOSAA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorobutanesulfonic acid (PFBS)	600	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorodecanoic acid (PFDA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorododecanoic acid (PFDoA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroheptanoic acid (PFHpA)	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorohexanesulfonic acid (PFHxS)	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorohexanoic acid (PFHxA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorononanoic acid (PFNA)	N/A	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctane sulfonate (PFOS)	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorooctanoic acid (PFOA)	40	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorotetradecanoic acid (PFTeA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluorotridecanoic Acid (PFTriA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Perfluoroundecanoic acid (PFUnA)	N/A	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes and Acronyms:
1. Data from 20 December 2016 are from the Installation Management Command PFOA/PFOS Water System Testing Program
2. Data from 18 December 2019 are from the Defense Occupational and Environmental Health Readiness System testing program
3. USEPA Method 537 used with a quantitation limit of approximately 2 parts per trillion.
4. Units are provided in nanograms per liter (ng/L).
* = risk screening level for tap water. To be conservative, the OSD tap water risk screening levels will be used to compare all groundwater and potable-use surface water for this Army PFAS PA/SI program.
NA = not available/applicable
ND = not detected above the limit of detection
ng/L = nanogram per liter
NS = not sampled
OSD = Office of the Secretary of Defense

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Area of Potential Interest	Location	Well ID	Well Type	Depth to Water (ft btoc)[1]	Well Diameter (inches)	Well Placed In Service Date	Well Construction Material	Total Well Depth (ft bgs)	TOC Elevation (ft amsl)	Screened Interval (ft bgs)
Fire Station #1	English Village	WW19	Formerly potable; current use is irrigation	--	16	3/18/1951	400 ft of 16 inch casing welded, 5/16 inch thickness; casing perforations are from 85 ft to 180 ft and again at 290 ft to 385 ft, 12 holes per foot	400	--	85-180 and 290-385
Vehicle Storage Area Bldg 5470	English Village	EGL046MW001	monitoring	82.66	--	5/1/1995	--	95.5	--	80-95
Current English Village Landfill	English Village	EGLEVLMW001	monitoring	209.42	4	11/16/1998	SCH 40 PVC with 0.010 inch perforated screen size	220	--	203.5-213.5
		EGLEVLMW002	monitoring	--	4	11/16/1998	SCH 40 PVC with 0.010 inch perforated screen size	182	--	166-176
		EGLEVLMW003	monitoring	192.19	4	11/16/1998	SCH 40 PVC with 0.010 inch perforated screen size	196	--	186-196
		EGLEVLMW004	monitoring	142.27	4	11/16/1998	SCH 40 PVC with 0.010 inch perforated screen size	150	--	136-146
		EGLEVLMW005	monitoring	173.38	4	11/16/1998	SCH 40 PVC with 0.010 inch perforated screen size	182	--	168-178
Ditto WWTS	Ditto	DTO036MW004	monitoring	6.38	4	9/12/1992	SCH 40 PVC with 0.010 inch perforated screen size	22	--	7-22
		DTO036MW009	monitoring	8.14	4	3/1/1995	SCH 40 PVC with 0.010 inch perforated screen size	27.5	--	8.7-24.1
		DTO036MW012	monitoring	9.32	--	4/27/2006	SCH 40 PVC with 0.010 inch perforated screen size	24	--	17-22
		DTO036MW014	monitoring	7.78	--	4/17/2006	SCH 40 PVC with 0.010 inch perforated screen size	24.8	--	18-23
		DTO036MW016	monitoring	9.29	--	--	--	--	--	--
Old English Village Sanitary Landfill	English Village	EGL043MW002	monitoring	89.61	4	1992	PVC with 0.010 inch perforated screen size	112	--	90-105
		EGL043MW003	monitoring	95.56	4	1992	PVC with 0.010 inch perforated screen size	152	--	125-140
		EGL043MW004	monitoring	105.67	4	1992	PVC with 0.010 inch perforated screen size	132	--	111-126
		EGL043MW005	monitoring	104.06	4	1992	PVC with 0.010 inch perforated screen size	122	--	104-119
		EGL043MW006	monitoring	99.66	4	6/17/1993	PVC with 0.010 inch perforated screen size	111	--	94-109
		EGL043MW007	monitoring	112.3	4	6/20/1993	PVC with 0.010 inch perforated screen size	131	--	116-131
Former English Village WWTS	English Village	EGL047MW005	monitoring	170.33	4	8/26/1992	SCH 40 PVC with 0.020 inch perforated screen size	217.2	4814.55	201.9-216.9
Current English Village WWTS	English Village	EGLEVWMW004	monitoring	215.44	4	11/7/1998	--	145.75	4779.92	135.65-145.75
		EGLEVWMW005	monitoring	207.01	4	11/12/1998	--	178.7	4815.54	168.7-178.7

Table 6-1 - Monitoring Well Construction Details
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Area of Potential Interest	Location	Well ID	Well Type	Depth to Water (ft btoc)[1]	Well Diameter (inches)	Well Placed In Service Date	Well Construction Material	Total Well Depth (ft bgs)	TOC Elevation (ft amsl)	Screened Interval (ft bgs)
Hangar 1 & Apron	Ditto	DTO133MW006	monitoring	9.37	--	4/25/2006	SCH 40 PVC with 0.010 inch perforated screen size	42	--	36-41
Former FFTA	Ditto	DTO163MW005	monitoring	10.88	4	4/26/1995	SCH 40 PVC with 0.010 inch perforated screen size	36	--	24.5-34.5

Notes:
1. Measurement recorded during the October-November 2020 sampling event.
-- = not available or unknown
amsl = above mean sea level
bgs = below ground surface
Bldg = building
btoc = below top of casing
FFTA = former firefighting training area
ft = feet
ID = identification
PVC = polyvinyl chloride
SCH = schedule
TBD = to be determined
TOC = top of casing
WWTS = wastewater treatment system

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level for Industrial/Commercial Scenario		1.6		1.6		25	
				OSD Risk Screening Level for Residential Scenario		0.13		0.13		1.9	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Light Vault Bldg. 4023	Soil	DPG-LVB-01	DPG-LVB-01-SO-102720	10/27/2020	N	**0.0054**		**0.0058**		**0.0018**	
Hangar 2 Bldg. 4065	Soil	DPG-HB4065-01	DPG-HB4065-01-SO-102920	10/29/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	DPG-HB4065-02	DPG-HB4065-02-SO-102820	10/28/2020	N	0.0013	U	0.0013	U	0.0013	U
Hangar Bldg. 4066	Soil	DPG-HB4066-01	DPG-HB4066-01-SO-102920	10/29/2020	N	**0.00088**	J	0.0013	U	0.0013	U
	Soil	DPG-HB4066-02	DPG-FD-03-SO-102920 / DPG-HB4066-02-SO-102920	10/29/2020	FD	0.0012	U	0.0012	U	0.0012	U
			DPG-HB4066-02-SO-102920	10/29/2020	N	0.00099	U	0.00099	U	0.00099	U
Hangar Bldg. 4068	Soil	DPG-HB4068-01	DPG-HB4068-01-SO-102920	10/29/2020	N	0.0014	U	0.0014	U	0.0014	U
	Soil	DPG-HB4068-02	DPG-HB4068-02-SO-102920	10/29/2020	N	0.0011	U	0.0011	U	0.0011	U
Bldg. 4218 Parking Lot	Soil	DPG-4218PL-01	DPG-4218PL-01-SO-110420	11/04/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	DPG-4218PL-02	DPG-4218PL-02-SO-110420	11/04/2020	N	0.00090	U	0.00090	U	0.00090	U
	Soil	DPG-4218PL-03	DPG-4218PL-03-SO-110420	11/04/2020	N	0.0010	U	0.0010	U	0.0010	U
Bldg. 4331 Wash Rack and Adjacent Parking Lot	Soil	DPG-WPRL-01	DPG-WPRL-01-SO-103120	10/31/2020	N	0.0010	U	0.0010	U	0.0010	U
	Soil	DPG-WPRL-02	DPG-WRPL-02-SO-103020	10/30/2020	N	0.0013	U	0.0013	U	0.0013	U
Bldg. 4344 Parking Lot	Soil	DPG-4344PL-01	DPG-4344PL-01-SO-103120	10/31/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	DPG-4344PL-02	DPG-4344PL-02-SO-103120	10/31/2020	N	0.0015	U	0.0015	U	0.0015	U

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level for Industrial/Commercial Scenario		1.6		1.6		25	
				OSD Risk Screening Level for Residential Scenario		0.13		0.13		1.9	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Bldg. 4357 Fire Truck Maintenance	Soil	DPG-FTM-01	DPG-FTM-01-SO-110220	11/02/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	DPG-FTM-02	DPG-FTM-02-SO-110320	11/03/2020	N	0.0014	U	**0.00078**	J	0.0014	U
	Soil	DPG-FTM-03	DPG-FTM-03-SO-110320	11/03/2020	N	0.0014	U	0.0014	U	0.0014	U
Walled Decon Pad, Bldg. 8033	Soil	DPG-WDP-01	DPG-WDP-01-SO-110420	11/04/2020	N	0.00097	U	0.00097	U	0.00097	U
	Soil	DPG-WDP-02	DPG-WDP-02-SO-110420	11/04/2020	N	0.0010	U	0.0010	U	0.0010	U
Current English Village WWTS	Soil	DPG-CEVWWTS-01	DPG-CEVWWTS-01-SO-110320	11/03/2020	N	0.00081	U	0.00081	U	0.00081	U
	Soil	DPG-CEVWWTS-02	DPG-CEVWWTS-02-SO-110320	11/03/2020	N	**0.00052**	J	0.00094	U	0.00094	U
	Soil	DPG-CEVWWTS-03	DPG-CEVWWTS-03-SO-110320	11/03/2020	N	**0.0012**		0.0012	U	0.0012	U
Current FTA	Soil	DPG-CFTA-01	DPG-CFTA-01-SO-110220	11/02/2020	N	**0.034**		**0.013**		**0.029**	
	Soil	DPG-CFTA-02	DPG-CFTA-02-SO-110220	11/02/2020	N	**0.0035**		0.0016	U	0.0016	U
	Soil	DPG-CFTA-03	DPG-CFTA-03-SO-110220	11/02/2020	N	**0.72**	J	**0.011**		**0.0050**	
Decon Pad at End of Short Runway	Soil	DPG-DPSR-01	DPG-DPSR-01-SO-103020	10/30/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	DPG-DPSR-02	DPG-DPSR-02-SO-103020	10/30/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	DPG-DPSR-03	DPG-DPSR-03-SO-103020	10/30/2020	N	0.0011	U	0.0011	U	0.0011	U

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level for Industrial/Commercial Scenario		1.6		1.6		25	
				OSD Risk Screening Level for Residential Scenario		0.13		0.13		1.9	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Defense Test Chamber Fire	Soil	DPG-DTCF-01	DPG-DTCF-01-SO-110220	11/02/2020	N	0.0010	U	0.0010	U	0.0010	U
	Soil	DPG-DTCF-02	DPG-DTCF-02-SO-110220	11/02/2020	N	0.00096	U	0.00096	U	0.00096	U
	Soil	DPG-DTCF-03	DPG-DTCF-03-SO-110220	11/02/2020	N	0.0013	U	0.0013	U	0.0013	U
	Soil	DPG-DTCF-04	DPG-DTCF-04-SO-110220	11/02/2020	N	**0.0020**		**0.0025**		0.0013	U
	Soil	DPG-DTCF-05	DPG-DTCF-05-SO-110220	11/02/2020	N	**0.015**	J	**0.0020**		0.0013	U
			DPG-FD-02-SO-110220 / DPG-DTCF-05-SO-110220	11/02/2020	FD	**0.066**	J	**0.0018**		0.0012	U
F16 AFFF Response at End of Runway	Soil	DPG-F16-01	DPG-F16-01-SO-103020	10/30/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	DPG-F16-02	DPG-F16-02-SO-110520	11/05/2020	N	**0.0032**		**0.022**		0.0012	U
Former English Village WWTS	Soil	DPG-FEVWWTS-01	DPG-FEVWWTS-01-SO-110320	11/03/2020	N	0.00080	U	0.00080	U	0.00080	U
	Soil	DPG-FEVWWTS-02	DPG-FEVWWTS-02-SO-110320	11/03/2020	N	**0.0045**		**0.0020**		0.00085	U
	Soil	DPG-FEVWWTS-03	DPG-FEVWWTS-03-SO-110320	11/03/2020	N	**0.0045**		**0.00075**	J	0.0012	U
	Soil	DPG-FEVWWTS-04	DPG-FEVWWTS-04-SO-110320	11/03/2020	N	**0.0020**		**0.0017**		0.0010	U
	Soil	DPG-FEVWWTS-05	DPG-FEVWWTS-05-SO-110320	11/03/2020	N	**0.0015**		**0.00062**	J	0.00093	U

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level for Industrial/Commercial Scenario		1.6		1.6		25	
				OSD Risk Screening Level for Residential Scenario		0.13		0.13		1.9	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Fire Station # 1	Soil	DPG-FS1-01	DPG-FS1-01-SO-110520	11/05/2020	N	**0.064**		**0.00086**	J	0.0010	U
	Soil	DPG-FS1-02	DPG-FS1-02-SO-110520	11/05/2020	N	**0.086**		0.0013	U	0.0013	U
	Soil	DPG-FS1-03	DPG-FS1-03-SO-110520	11/05/2020	N	**0.059**		0.00095	U	0.00095	U
	Soil	DPG-FS1-04	DPG-FS1-04-SO-110520	11/05/2020	N	**0.093**		**0.0010**	J	0.0013	U
	Soil	DPG-FS1-05	DPG-FD-01-SO-110520 / DPG-FS1-05-SO-110520	11/05/2020	FD	0.0012	U	0.0012	U	0.0012	U
			DPG-FS1-05-SO-110520	11/05/2020	N	0.0010	U	0.0010	U	0.0010	U
Fire Station # 2	Soil	DPG-FS2-01	DPG-FS2-01-SO-102620	10/26/2020	N	**0.72**	J	**0.016**		0.0011	U
	Soil	DPG-FS2-02	DPG-FS2-02-SO-102720	10/27/2020	N	**0.12**		**0.0021**		0.0012	U
	Soil	DPG-FS2-03	DPG-FS2-03-SO-110220	11/02/2020	N	**0.025**		**0.014**		**0.00080**	J
Fire Station # 3	Soil	DPG-FS3-01	DPG-FS3-01-102720	10/27/2020	N	**0.028**		**0.0082**		0.0012	U
	Soil	DPG-FS3-02	DPG-FS3-02-SO-110220	11/02/2020	N	**0.0048**		**0.017**		**0.00080**	J
	Soil	DPG-FS3-03	DPG-FS3-03-SO-102720	10/27/2020	N	**0.066**		**0.0012**		**0.00079**	J
Hangar 1 and Apron	Soil	DPG-H1A-01	DPG-H1A-01-SO-102820	10/28/2020	N	0.0014	U	0.0014	U	0.0014	U
	Soil	DPG-H1A-02	DPG-H1A-02-SO-102820	10/28/2020	N	0.0011	U	0.0011	U	0.0011	U
	Soil	DPG-H1A-03	DPG-H1A-03-SO-110520	11/05/2020	N	0.0014	U	0.0014	U	0.0014	U
Carr Facility Septic Tank and Leachfield (HWMU-63-2)	Soil	DPG-CFSTL-01	DPG-CFSTL-01-SO-110420	11/04/2020	N	0.0012	U	0.0012	U	0.0012	U
	Soil	DPG-CFSTL-02	DPG-CFSTL-02-SO-110420	11/04/2020	N	0.0013	U	0.0013	U	0.0013	U
Old English Village Sanitary Landfill	Soil	DPG-OEVSL-01	DPG-OEVSL-01-SO-110520	11/05/2020	N	0.00089	U	0.00089	U	0.00089	U
	Soil	DPG-OEVSL-02	DPG-OEVSL-02-SO-110520	11/05/2020	N	0.0011	U	0.0011	U	0.0011	U

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
				OSD Risk Screening Level for Industrial/Commercial Scenario		1.6		1.6		25	
				OSD Risk Screening Level for Residential Scenario		0.13		0.13		1.9	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
SE End of Runway AFFF Training	Soil	DPG-SEER-01	DPG-SEER-01-SO-102820	10/28/2020	N	0.00098	U	0.00098	U	0.00098	U
	Soil	DPG-SEER-02	DPG-SEER-02-SO-102820	10/28/2020	N	0.0012	U	0.0012	U	0.0012	U
Parade Field FTA	Soil	DPG-PF-01	DPG-PF-01-SO-072021	07/20/2021	N	**0.0057**		**0.0034**		0.00087	U
			DPG-FD-04-SO-072021 / DPG-PF-01-SO-072021	07/20/2021	FD	**0.0058**		**0.0026**		0.00087	U
	Soil	DPG-PF-02	DPG-PF-02-SO-072021	07/20/2021	N	**0.053**		0.0011	U	0.0011	U
	Soil	DPG-PF-03	DPG-PF-03-SO-072021	07/20/2021	N	**0.0024**		0.00091	U	0.00091	U
	Soil	DPG-PF-04	DPG-PF-04-SO-072021	07/20/2021	N	**0.0021**		**0.00071**	J	0.0011	U
	Soil	DPG-PF-05	DPG-PF-05-SO-072021	07/20/2021	N	**0.002**		0.001	U	0.001	U
	Soil	DPG-PF-06	DPG-PF-06-SO-072021	07/20/2021	N	**0.019**		**0.18**		0.001	U

Table 7-1 - Soil PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Notes:

1. **Bolded** values indicate the result was detected greater than the limit of detection
2. Data are compared to the 2021 Office of the Secretary of Defense (OSD) risk screening levels for both the residential as well as the industrial/commercial scenarios (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
AFFF = aqueous film-forming foam
DPG = Dugway Proving Ground
FD = field duplicate sample
FTA = Fire training area
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
SO = Soil
WWTS = Wastewater teartment system

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).

Table 7-2 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
				OSD Risk Screening Level for Tap Water		40		40		600	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Light Vault Bldg. 4023	Monitoring Well	DPG-LVB-01	DPG-LVB-01-GW-102720	10/27/2020	N	20	U	**270**	J	**290**	J
Hangar 2 Bldg. 4065	Monitoring Well	DPG-HB4065-01	DPG-HB4065-01-GW-102920	10/29/2020	N	**3.5**	J-	**40**	J-	**8.5**	J-
	Monitoring Well	DPG-HB4065-02	DPG-HB4065-02-GW-102920	10/29/2020	N	**27**		**36**		**6.1**	
Hangar Bldg. 4066	Monitoring Well	DPG-HB4066-01	DPG-HB4066-01-GW-103020	10/30/2020	N	**62**	J-	**72**	J-	**12**	J-
	Monitoring Well	DPG-HB4066-02	DPG-HB4066-02-GW-103020	10/30/2020	N	**42**		**51**		**7.7**	
Hangar Bldg. 4068	Monitoring Well	DPG-HB4068-01	DPG-HB4068-01-GW-102920	10/29/2020	N	**7.7**		**64**		**25**	
	Monitoring Well	DPG-HB4068-02	DPG-HB4068-02-GW-103020	10/30/2020	N	**12**		**84**		**14**	
Bldg. 4218 Parking Lot	Monitoring Well	DPG-4218PL-01	DPG-4218PL-01-GW-110420	11/04/2020	N	**7.5**		**6.1**		**9.0**	
	Monitoring Well	DPG-4218PL-02	DPG-4218PL-02-GW-110420	11/05/2020	N	**20**		**4.0**		**6.0**	
	Monitoring Well	DPG-4218PL-03	DPG-4218PL-03-GW-110420	11/04/2020	N	**10**		**7.6**		**20**	
Bldg. 4331 Wash Rack and Adjacent Parking Lot	Monitoring Well	DPG-WPRL-01	DPG-WPRL-01-GW-103120	10/31/2020	N	**17**		**41**		**7.7**	
	Monitoring Well	DPG-WPRL-02	DPG-WPRL-02-GW-103120	10/31/2020	N	**12**		**140**		**9.6**	
Bldg. 4344 Parking Lot	Monitoring Well	DPG-4344PL-01	DPG-4434PL-01-GW-103120	10/31/2020	N	**7.2**		**110**		**18**	
	Monitoring Well	DPG-4344PL-02	DPG-4434PL-02-GW-103120	10/31/2020	N	**6.6**		**68**		**20**	
Bldg. 4357 Fire Truck Maintenance	Monitoring Well	DPG-FTM-01	DPG-FTM-01-GW-110220	11/02/2020	N	**17**		**69**		**9.8**	
	Monitoring Well	DPG-FTM-02	DPG-FTM-02-GW-110320	11/03/2020	N	**11**		**53**		**9.7**	
Bldg. 5470 Vehicle Storage	Monitoring Well	DPG-EGL046MW001	DPG-EGL046MW001-110520	11/05/2020	N	3.8	U	3.8	U	**20**	
Walled Decon Pad, Bldg. 8033	Monitoring Well	DPG-WDP-01	DPG-WDP-01-GW-110420	11/04/2020	N	4.2	UJ-	4.2	UJ-	4.2	UJ-
Current Carr WWTS	Monitoring Well	DPG-CCWWTS-01	DPG-CCWWTS-01-GW-110320	11/03/2020	N	**110**	J+	**21**		**36**	
Current English Village WWTS	Monitoring Well	DPG-EGL047MW005	DPG-EGL047MW005-110420	11/04/2020	N	3.7	U	**25**		**8.3**	
	Monitoring Well	DPG-EGLEVWMW004	DPG-EGLEVWMW004-110520	11/05/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-EGLEVWMW005	DPG-EGLEVWMW005-110520	11/05/2020	N	3.7	U	3.7	U	3.7	U
Current English Village Landfill	Monitoring Well	DPG-EGLEVLMW001	DPG-EGLEVLMW001-110520	11/05/2020	N	3.6	U	3.6	U	3.6	U
	Monitoring Well	DPG-EGLEVLMW002	DPG-EGLEVLMW002-103120	10/31/2020	N	**2.1**	J	**2.0**	J	3.8	U
	Monitoring Well	DPG-EGLEVLMW003	DPG-EGLEVLMW003-110520	11/05/2020	N	3.9	U	3.9	U	3.9	U
	Monitoring Well	DPG-EGLEVLMW004	DPG-EGLEVLMW004-110220	11/02/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-EGLEVLMW005	DPG-EGLEVLMW005-110220	11/02/2020	N	3.8	U	3.8	U	3.8	U
Current FTA	Monitoring Well	DPG-CFTA-01	DPG-CFTA-01-GW-110220	11/02/2020	N	**930**	J	**85**		**39**	
	Monitoring Well	DPG-CFTA-02	DPG-CFTA-02-GW-110220	11/02/2020	N	**570**		**110**		**34**	
Former FTA (DPG-163)	Monitoring Well	DPG-DTO163MW005	DPG-DT0163MW005-102720	10/27/2020	N	**3,000**	J	**3,300**	J	**670**	
Decon Pad at End of Short Runway	Monitoring Well	DPG-DPSR-01	DPG-DPSR-01-GW-103020	10/30/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-DPSR-02	DPG-DPSR-02-GW-103020	10/30/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-DPSR-03	DPG-DPSR-03-GW-103020	10/30/2020	N	3.7	U	**2.1**	J	3.7	U

Table 7-2 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
				OSD Risk Screening Level for Tap Water		40		40		600	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Ditto WWTS	Monitoring Well	DPG-DTO036MW004	DPG-DTO036MW004-103020	10/30/2020	N	**77**		**73**		**26**	
	Monitoring Well	DPG-DTO036MW009	DPG-DTO036MW009-103020	10/30/2020	N	**3.2**	J	3.6	U	3.6	U
	Monitoring Well	DPG-DTO036MW012	DPG-DTO036MW012-102920	10/29/2020	N	**66**		**75**		**16**	
	Monitoring Well	DPG-DTO036MW014	DPG-DTO036MW014-102920	10/29/2020	N	**35**		**67**		**14**	
	Monitoring Well	DPG-DTO036MW016	DPG-DTO036MW016-102920	10/29/2020	N	3.7	U	3.7	U	3.7	U
F16 AFFF Response at End of Runway	Monitoring Well	DPG-F16-01	DPG-F16-01-GW-103020	10/30/2020	N	3.5	U	**55**		**2.9**	J
Fire Station # 1	Monitoring Well	DPG-EGL999WW019	DPG-EGL999WW019-102920	10/29/2020	N	3.7	U	**97**	J-	**8.3**	
			DPG-FD-01-GW-102920 / DPG-EGL999WW019-102920	10/29/2020	FD	3.7	U	**87**	J-	**7.9**	
Fire Station # 2	Monitoring Well	DPG-FS2-01	DPG-FS2-01-GW-102720	10/27/2020	N	**6,100**	J	**4,300**	J	**680**	
	Monitoring Well	DPG-FS2-02	DPG-FS2-02-GW-102720	10/27/2020	N	**760**	J	**2,700**	J	**530**	J
Fire Station # 3	Monitoring Well	DPG-FS3-01	DPG-FS3-01-GW-102720	10/27/2020	N	**3.3**	J	**12**		**29**	
Hangar 1 and Apron	Monitoring Well	DPG-DTO133MW006	DPG-DT0133MW006-102820	10/28/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-H1A-01	DPG-HIA-01-GW-102820	10/28/2020	N	**38**		**78**		**5.1**	
	Monitoring Well	DPG-H1A-02	DPG-HIA-02-GW-102820	10/28/2020	N	**140**		**25**		**4.2**	
Carr Facility Septic Tank and Leachfield (HWMU-63-2)	Monitoring Well	DPG-CFSTL-01	DPG-FD-02-GW-110420 / DPG-CFSTL-01-GW-110420	11/04/2020	FD	**4.5**		**18**		**6.4**	
			DPG-CFSTL-01-GW-110420	11/04/2020	N	**5.6**		**17**		**4.5**	
	Monitoring Well	DPG-CFSTL-02	DPG-CFSTL-02-GW-110420	11/04/2020	N	4.2	U	**3.5**	J	4.2	U
Old English Village Sanitary Landfill	Monitoring Well	DPG-EGL043MW002	DPG-EGL043MW002-110320	11/03/2020	N	3.6	U	3.6	U	3.6	U
	Monitoring Well	DPG-EGL043MW003	DPG-EGL043MW003-110320	11/03/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-EGL043MW004	DPG-EGL043MW004-110320	11/03/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-EGL043MW005	DPG-EGL043MW005-110420	11/04/2020	N	3.7	U	3.7	U	3.7	U
	Monitoring Well	DPG-EGL043MW006	DPG-EGL043MW006-110320	11/03/2020	N	3.6	U	3.6	U	3.6	U
	Monitoring Well	DPG-EGL043MW007	DPG-EGL043MW007-110420	11/04/2020	N	3.6	U	3.6	U	3.6	U
SE End of Runway AFFF Training	Monitoring Well	DPG-SEER-01	DPG-SEER-01-GW-102820	10/28/2020	N	3.5	U	**68**		**200**	
			DPG-FD-03-GW-102820 / DPG-SEER-01-GW-102820	10/28/2020	FD	3.6	U	**200**		**200**	
	Monitoring Well	DPG-SEER-02	DPG-SEER-02-GW-102820	10/28/2020	N	3.6	U	**170**		**190**	
Parade Field FTA	Monitoring Well	DPG-WW-06	DPG-WW06-072021	07/20/2021	FD	**3.0**	J	**3.7**		**2.3**	J
			DPG-FD-04-GW-072021 / DPG-WW06-072021	07/20/2021	N	**2.0**	J	**3.4**	J	**2.4**	J

Table 7-2 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Notes:

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

2. Grey shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels for tap water (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
AFFF = aqueous film-forming foam
DPG = Dugway Proving Ground
FD = field duplicate sample
FTA = Fire training area
GW = Groundwater
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
WWTS = Wastewater teartment system

Qualifier	Description
J	The analyte was positively identified; however the associated numerical value is an estimated concentration only
J+	The result is an estimated quantity; the result may be biased high.
J-	The result is an estimated quantity; the result may be biased low.
U	The analyte was analyzed for but the result was not detected above thelimit of quantitation (LOQ).
UJ-	The analyte was analyzed for but was not detected. The reported limit of quantitation (LOQ) is approximate and may be inaccurate or imprecise

Table 7-3 - Surface Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Associated AOPI	Location Type	Location	Sample ID / Parent Sample ID	Analyte		PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
				Sample Date	Sample Type	Result	Qual	Result	Qual	Result	Qual
Ditto WWTS	Surface Water/Seep	DPG-DWWTS-01	DPG-DWWTS-01-SW-102920	10/29/2020	N	**3.6**		**3.3**	J	3.5	U
			DPG-FD-01-SW-102920 / DPG-DWWTS-01-SW-102920	10/29/2020	FD	**3.3**	J	**3.5**	J	3.6	U

Table 7-3 - Surface Water PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Dugway Proving Ground, Utah

Notes:

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

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
DPG = Dugway Proving Ground
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
SW = Surface water
WWTS = Wastewater teartment system

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 thelimit of quantitation (LOQ).

FIGURES

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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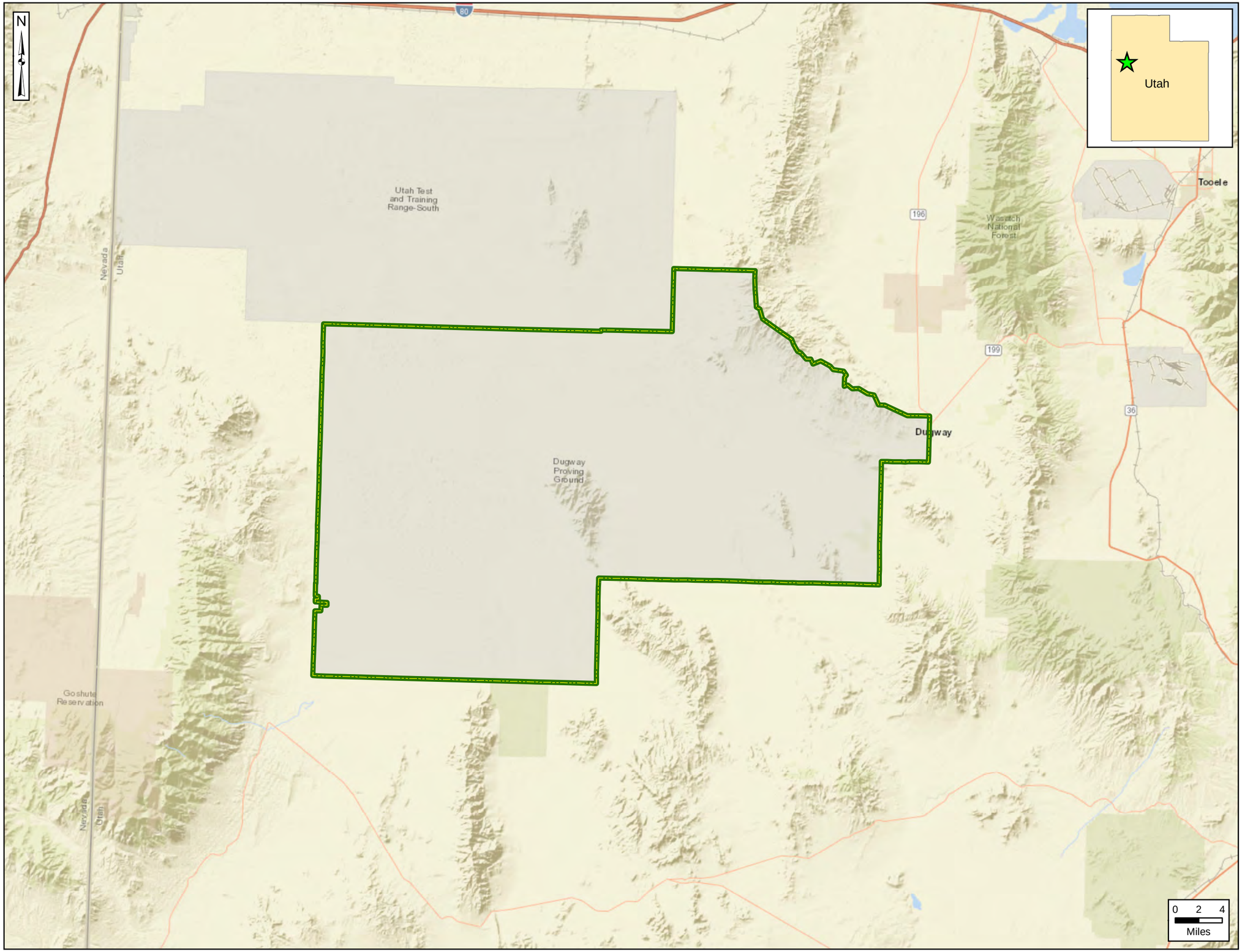
Figure 2-1
Site Location



Legend

Installation Boundary

Data Sources:
Dugway Proving Ground, GIS Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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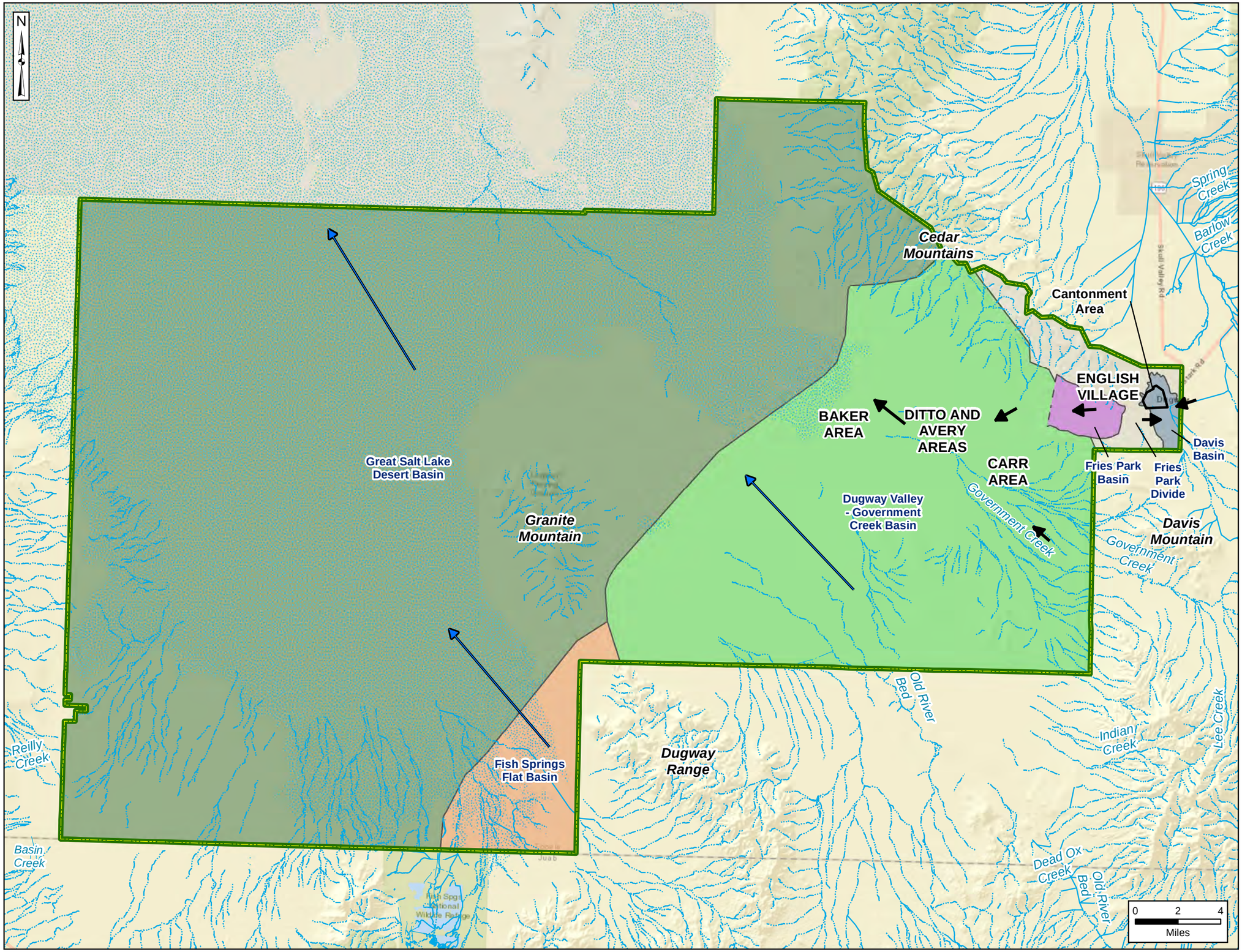
Figure 2-2 Site Layout



Legend

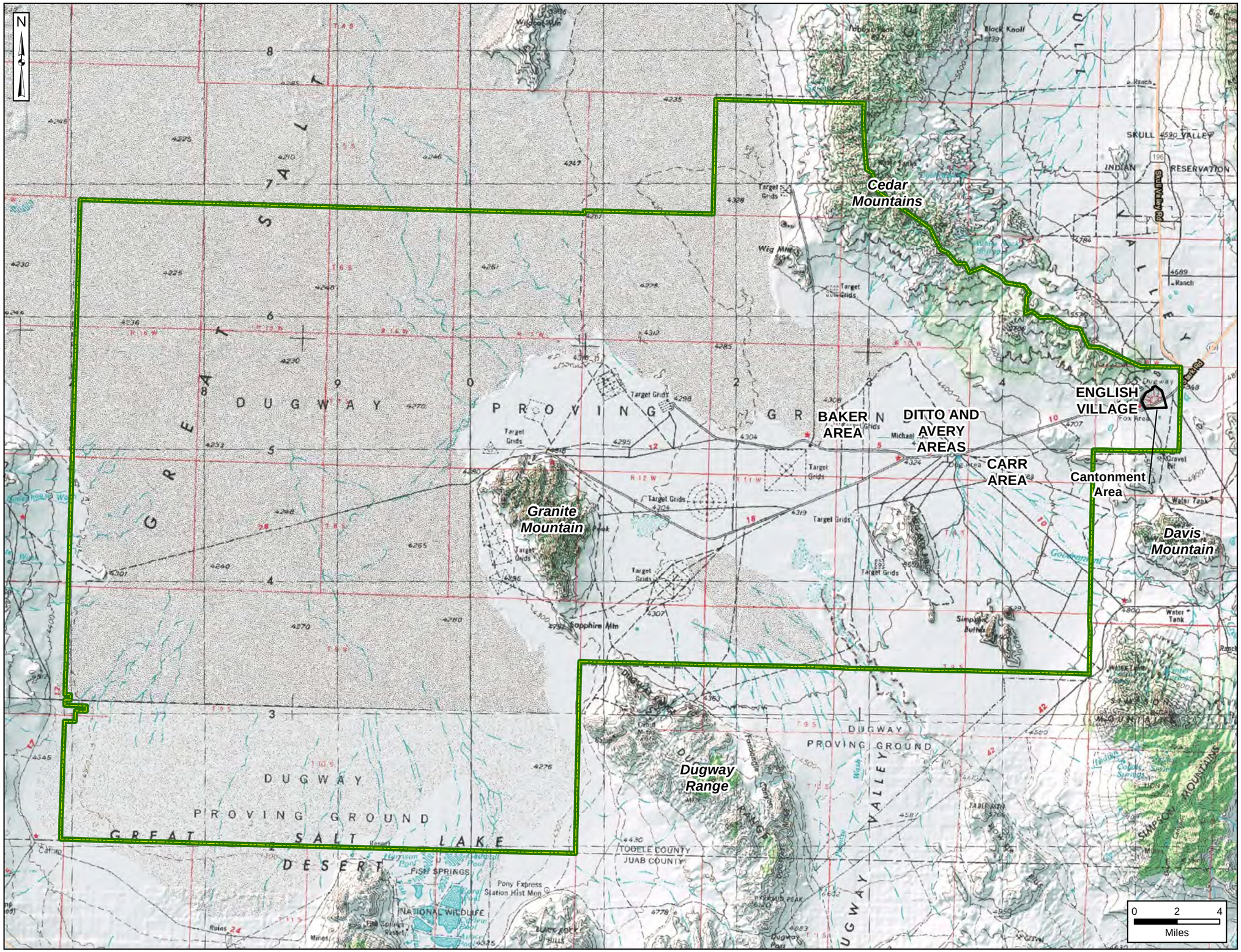
- Installation Boundary
- Cantonment Area
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Inundation Area (Great Salt Lake Desert)
- Regional Surface Water Flow Direction
- Regional Groundwater Flow Direction

Groundwater Basins

- Davis
- Dugway Valley - Government Creek
- Fish Springs Flat
- Fries Park
- Great Salt Lake Desert

Data Sources:
Dugway Proving Ground, GIS Data, 2019;
USGS and State of UT Dept. of Natural Resources, Drainage Areas, 1978;
USGS, NHD Data, 2019;
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



USAEC PFAS
Preliminary Assessment / Site Inspection
Dugway Proving Ground, Utah

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Figure 2-3
Topographic Map

Legend

Installation Boundary

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, USA Topo Maps

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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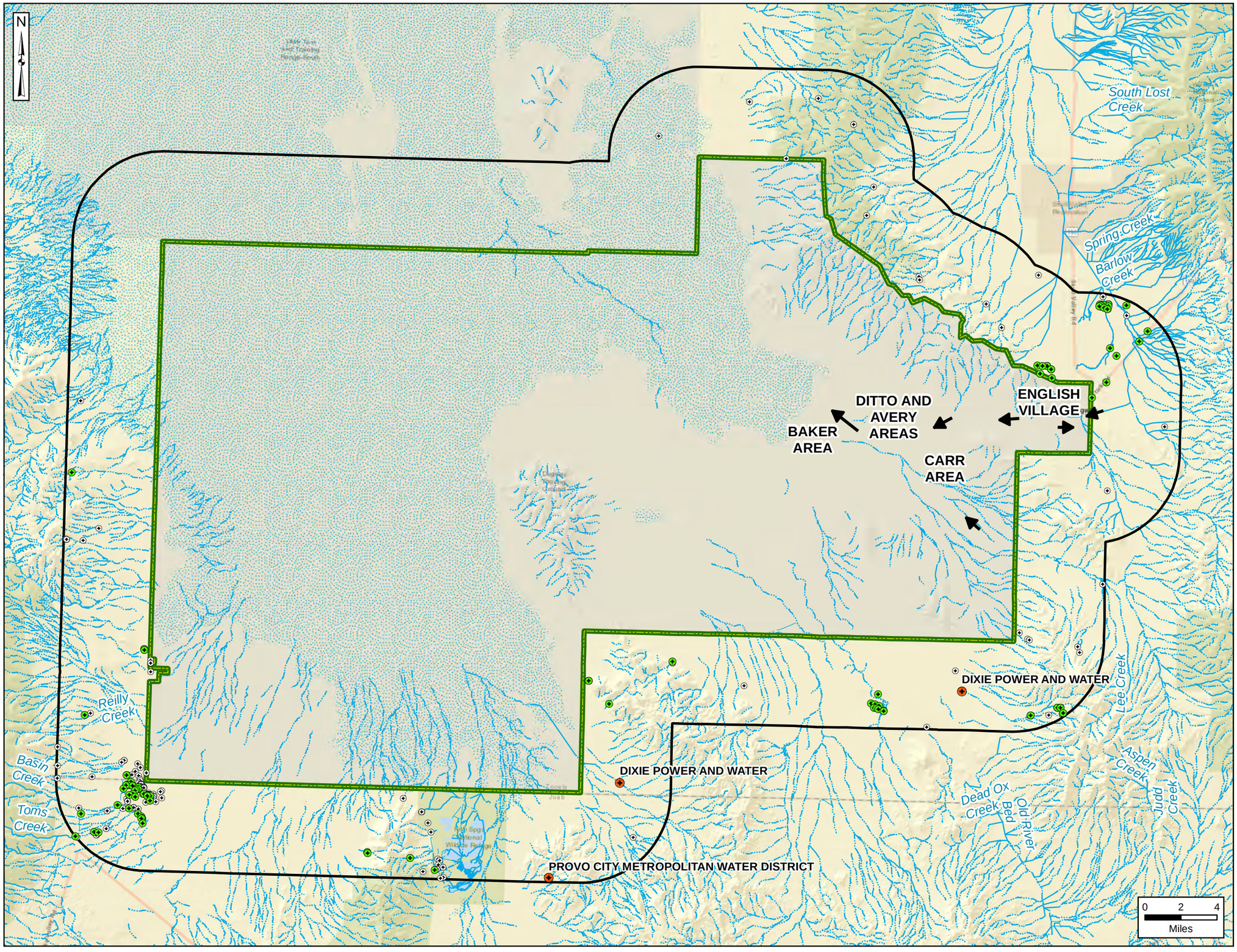
Figure 2-4
Off-Post Potable Supply Wells



Legend

- Installation Boundary
- 5-Mile Radius
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Inundation Area (Great Salt Lake Desert)
- Regional Groundwater Flow Direction
- Public Supply Well
- Domestic Well
- Other Designated Use Water Well

Note: Other designated use water wells includes irrigation and stockwatering wells.

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
EDR, Well Data, 2018
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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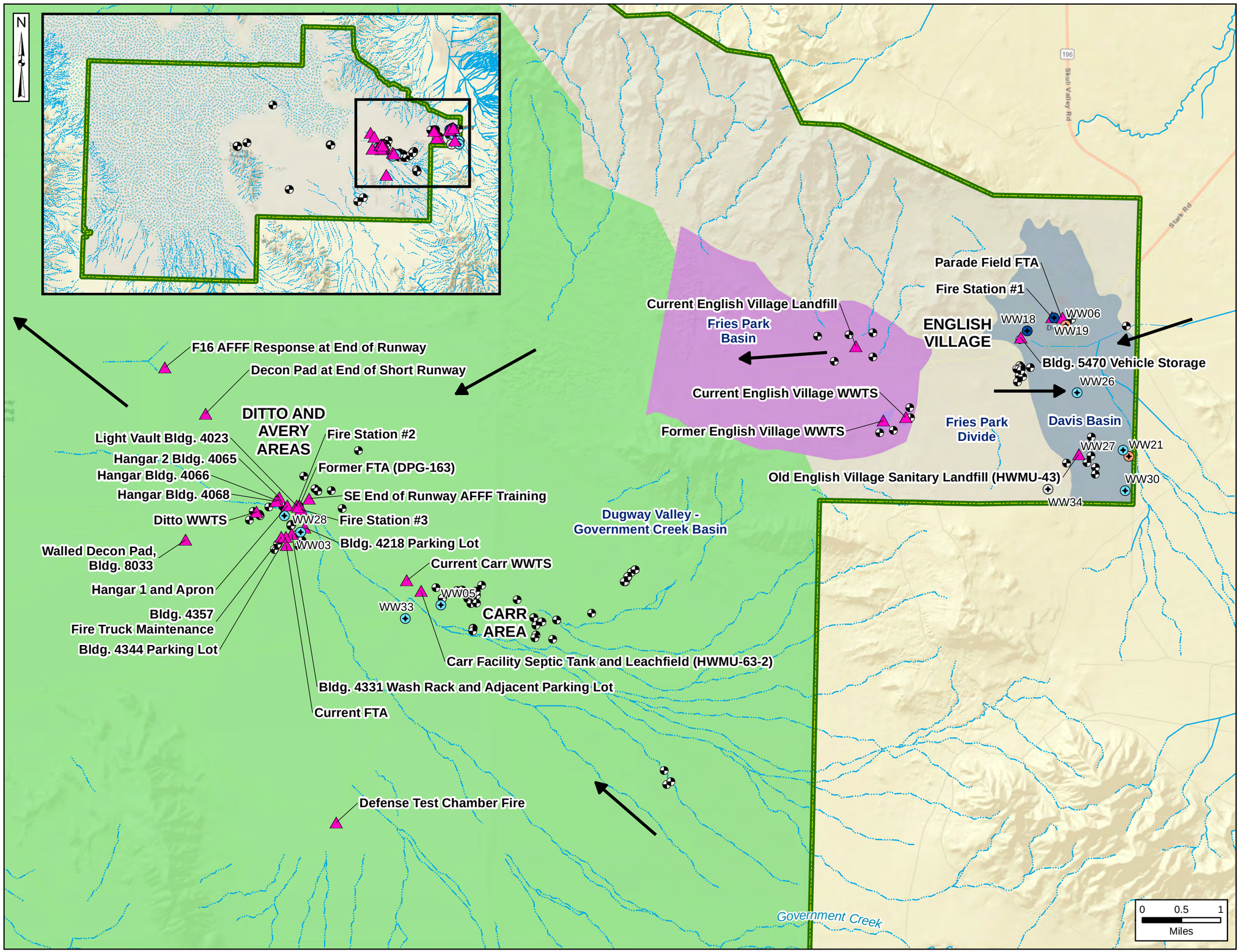
Figure 5-2
AOPI Locations



Legend

- Installation Boundary
- AOPI Location
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Inundation Area (Great Salt Lake Desert)
- Regional Groundwater Flow Direction
- Installation Water Supply Well
- Inactive Installation Water Supply Well
- Irrigation Well
- Test Well
- Monitoring Well

Groundwater Basins

- Davis
- Dugway Valley - Government Creek
- Fries Park

AFFF = aqueous film-forming foam
AOPI = area of potential interest
Bldg. = Building
Decon = Decontamination
FTA = Firefighting Training Area
HWMU = Hazardous Waste Management Unit
SE = Southeast
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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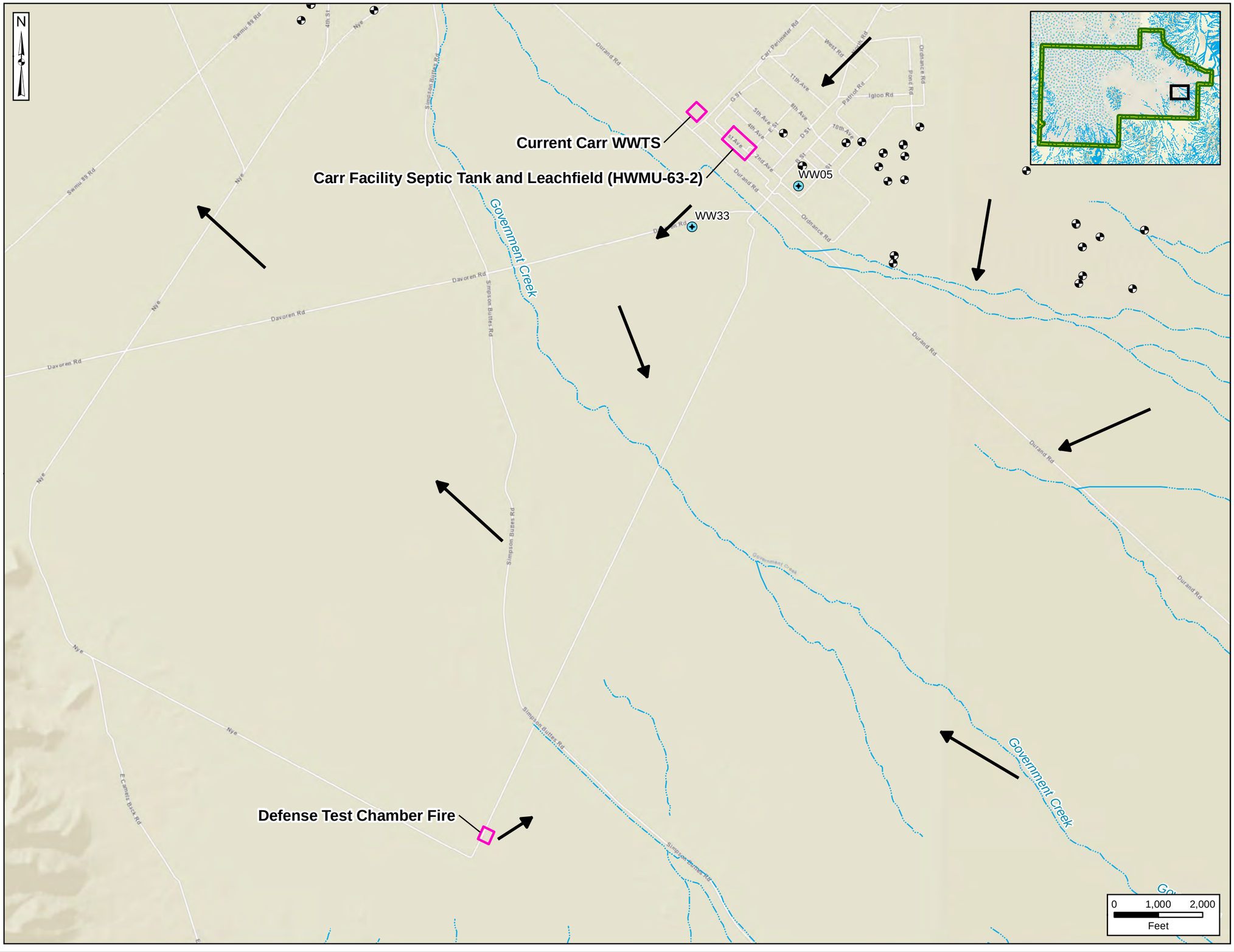

Figure 5-3
Carr Area AOPIs

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Groundwater Flow Direction
- Installation Water Supply Well
- Monitoring Well

AOPI = area of potential interest
HWMU = Hazardous Waste Management Unit
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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Figure 5-4
Ditto Area AOPIs

F16 AFFF Response at End of Runway

Decon Pad at End of Short Runway

SE End of Runway AFFF Training

Former FTA (DPG-163)

Fire Station #2

Hangar 1 and Apron

Hangar 2 Bldg. 4065

Hangar Bldg. 4066

Hangar Bldg. 4068

Ditto WWTS

Fire Station #3

Light Vault Bldg. 4023

Bldg. 4218 Parking Lot

Bldg. 4331 Wash Rack and Adjacent Parking Lot

Bldg. 4357 Fire Truck Maintenance

Bldg. 4344 Parking Lot

Walled Decon Pad, Bldg. 8033

Current FTA

WW28

WW03

Prime Rd

Government Creek

Burns Rd

Stark Rd

Ditto Bypass Rd

Tunner St

C St

D St

2nd St

3rd St

4th St

Durand Rd

0 500 1,000
Feet

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Groundwater Flow Direction
- Installation Water Supply Well
- Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
Bldg. = Building
Decon = Decontamination
DPG = Dugway Proving Ground
FTA = Firefighting Training Area
SE = Southeast
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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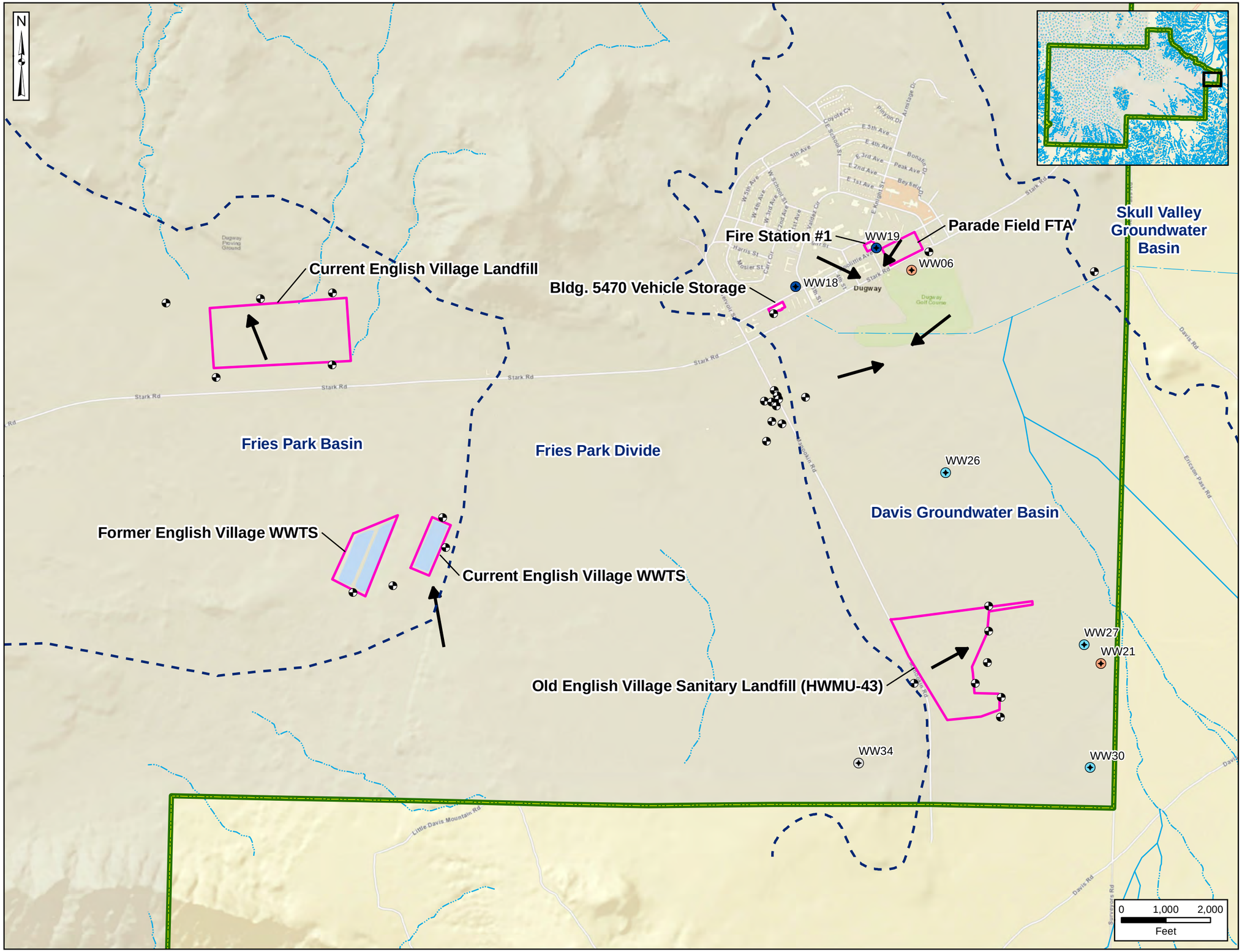
Figure 5-5
English Village AOPIs



Legend

- AOPI
- Installation Boundary
- Stream/Connector (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Inundation Area (Great Salt Lake Desert)
- Groundwater Basin Boundary
- Groundwater Flow Direction
- Installation Water Supply Well
- Inactive Installation Water Supply Well
- Irrigation Well
- Test Well
- Monitoring Well

AOPI = area of potential interest
Bldg. = Building
FTA = Firefighting Training Area
HWMU = Hazardous Waste Management Unit
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

N

Defense Test
Chamber Fire

0 50 100
Feet

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Figure 5-6
Defense Test Chamber Fire

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction

AOPI = area of potential interest

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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Dugway Proving Ground, Utah

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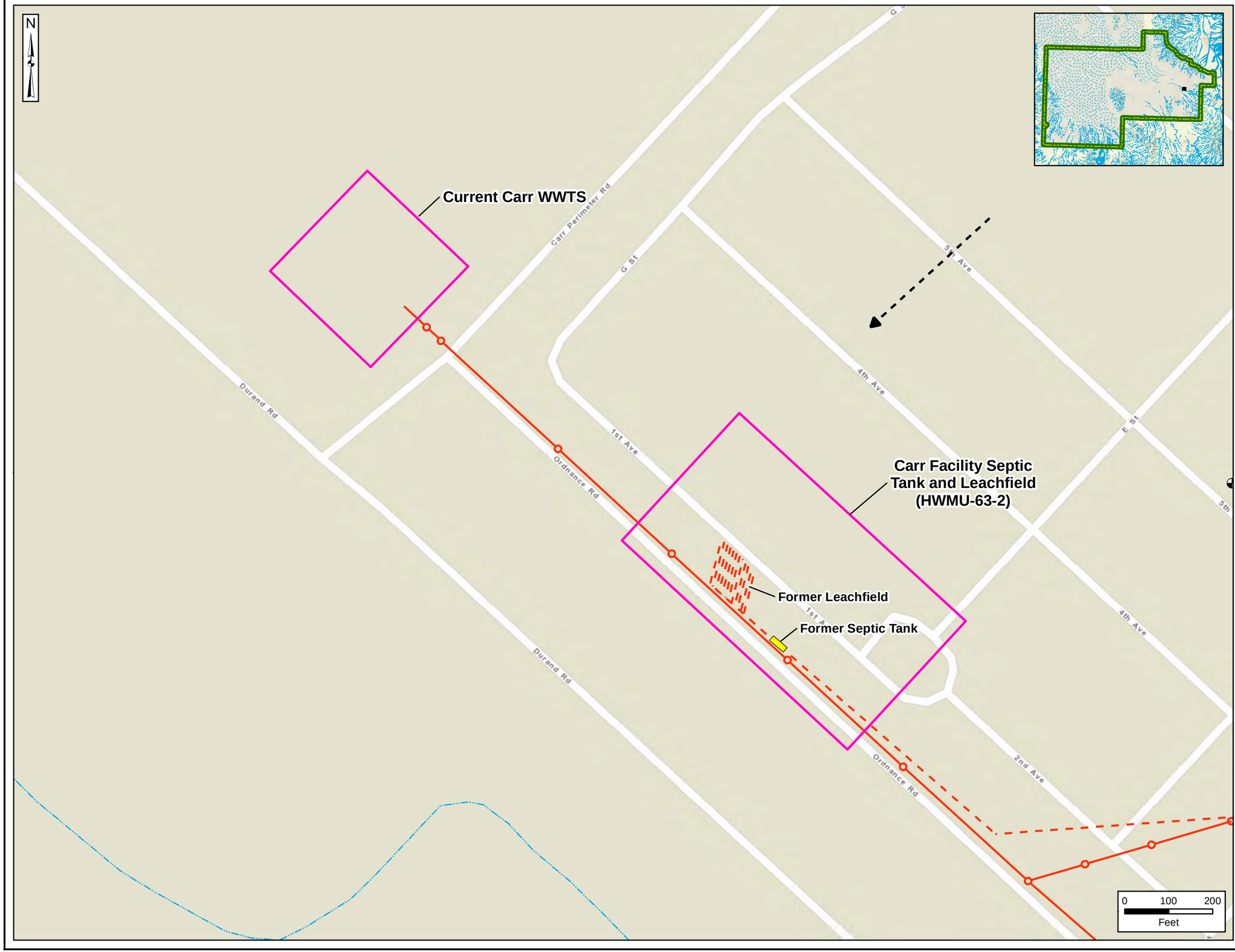
Figure 5-7
Current Carr WWTS and Carr Facility Septic Tank and Leachfield (HWMU-63-2)



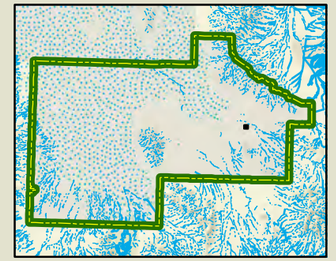
Legend

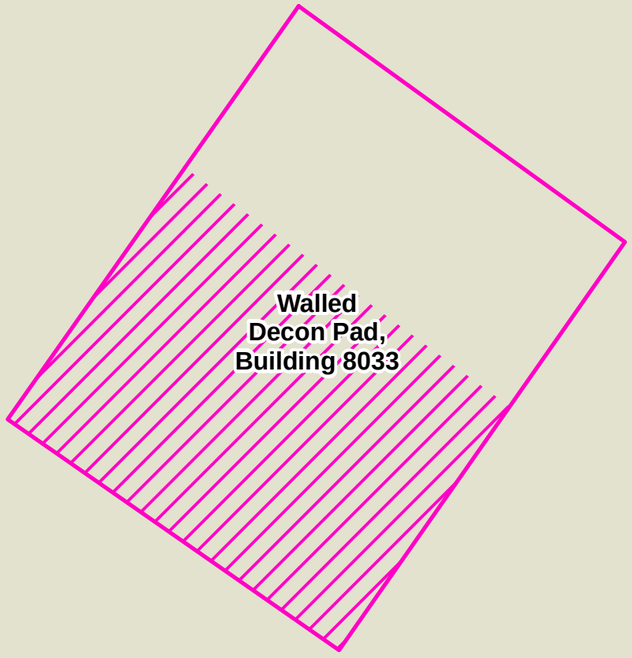
- AOPI
- Installation Boundary
- Wastewater Line
- Wastewater Line (Abandoned)
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction

AOPI = area of potential interest
HWMU = Hazardous Waste Management Unit
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North





0 50 100
Feet

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Figure 5-8 Walled Decon Pad, Building 8033

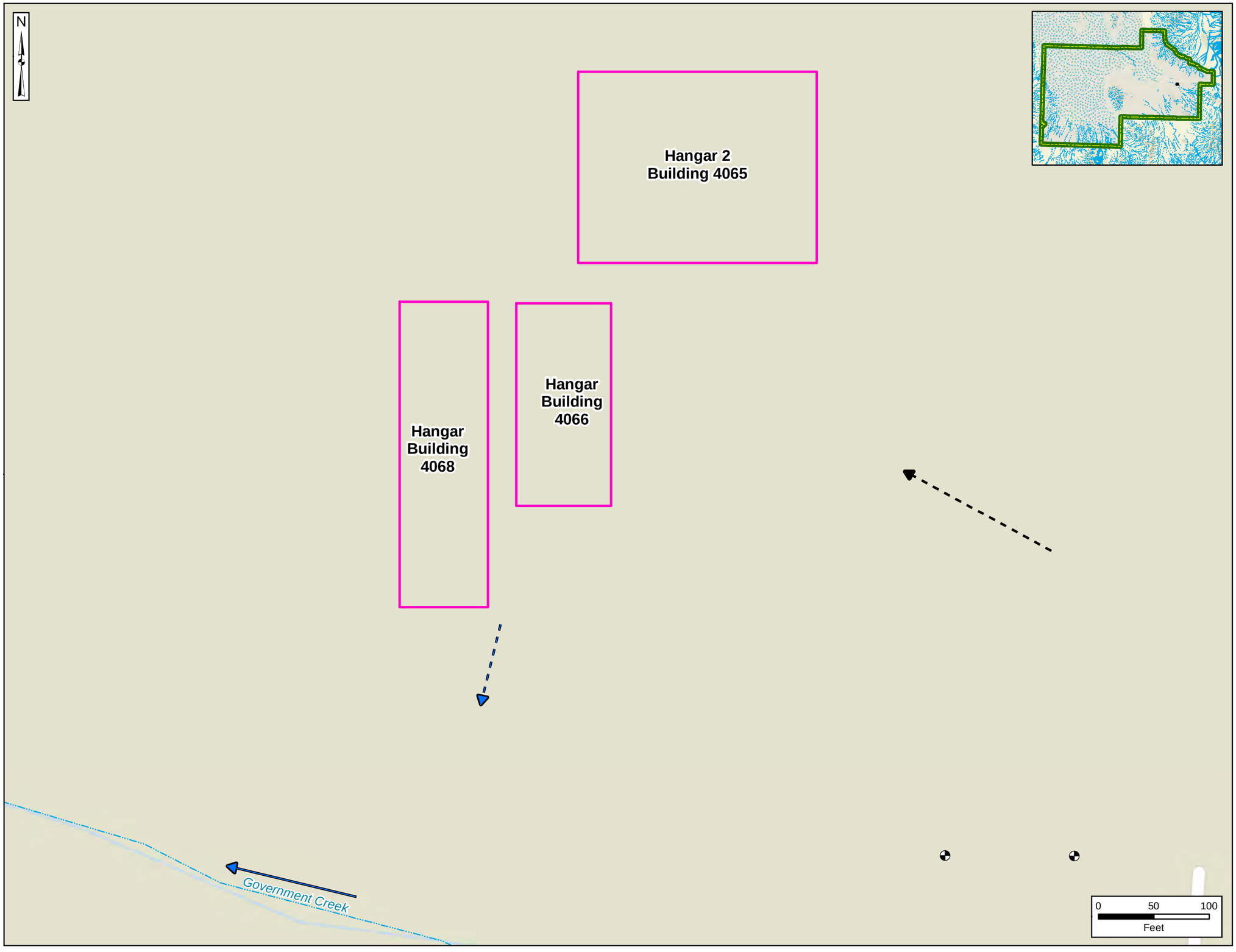
Legend

- AOPI
- Suspected AFFF Release Area
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction

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

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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Dugway Proving Ground, Utah

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Figure 5-9
Hangar 2 Building 4065, Hangar Building 4066, and Hangar Building 4068

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Monitoring Well
- Surface Water Flow Direction
- Surface Runoff Flow Direction
- Estimated Groundwater Flow Direction

AOPI = area of potential interest

Note:
Government Creek is an ephemeral stream.

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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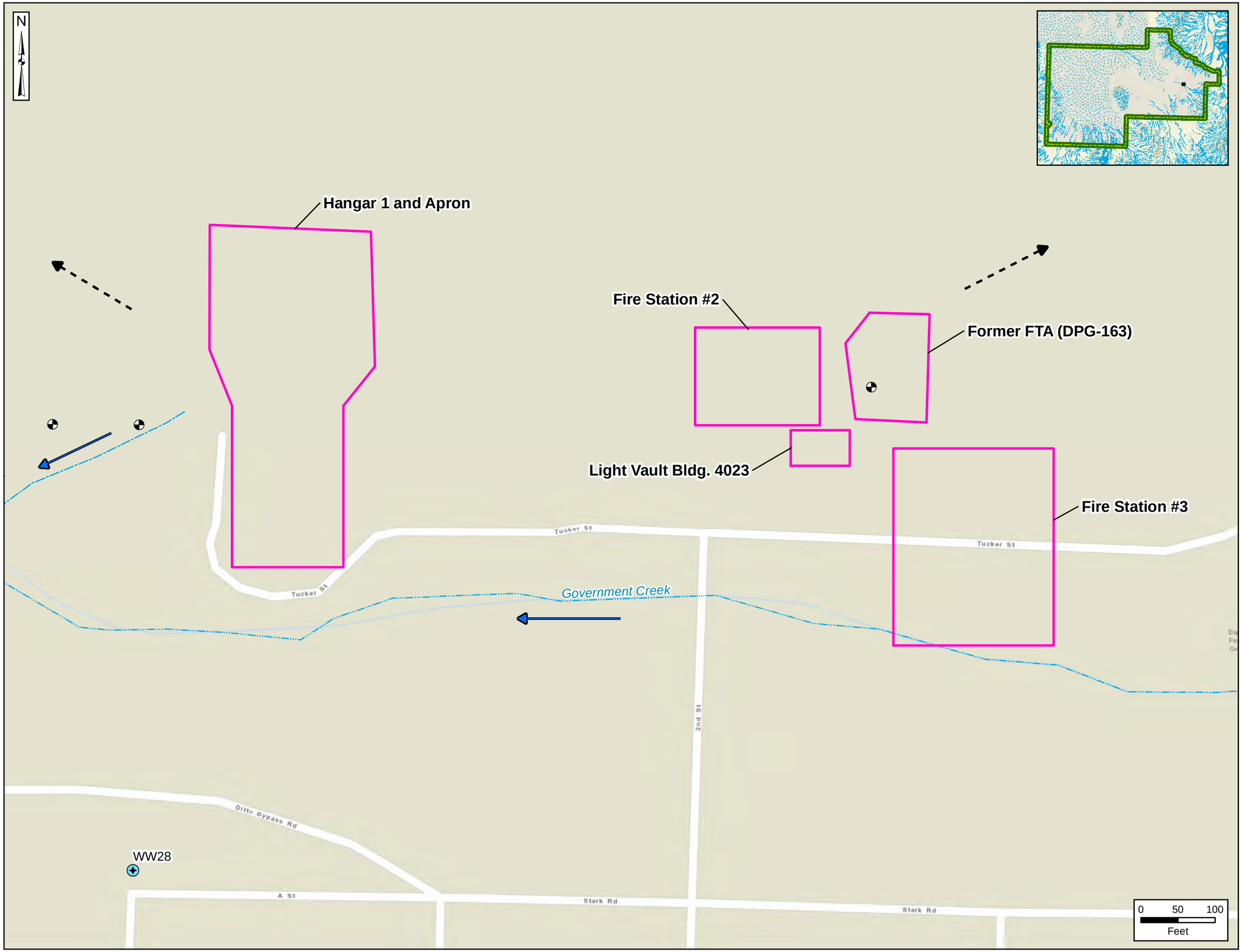
Figure 5-10
Hangar 1 and Apron, Fire Station #2, Former FTA (DPG-163), Fire Station #3, and Light Vault Building 4023



Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Drainage Ditch
- Inundation Area (Great Salt Lake Desert)
- Surface Water Flow Direction
- Estimated Groundwater Flow Direction
- Water Supply Well
- Monitoring Well

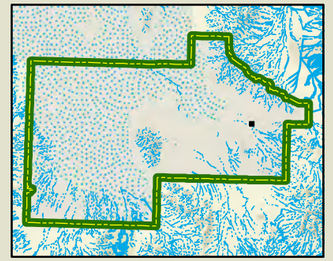
AOPI = area of potential interest
Bldg. = Building
FTA = Firefighting Training Area

Note:
Government Creek is an ephemeral stream.

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

N



SE End of Runway AFFF Training

0 50 100
Feet

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 5-11
SE End of Runway AFFF Training

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction

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

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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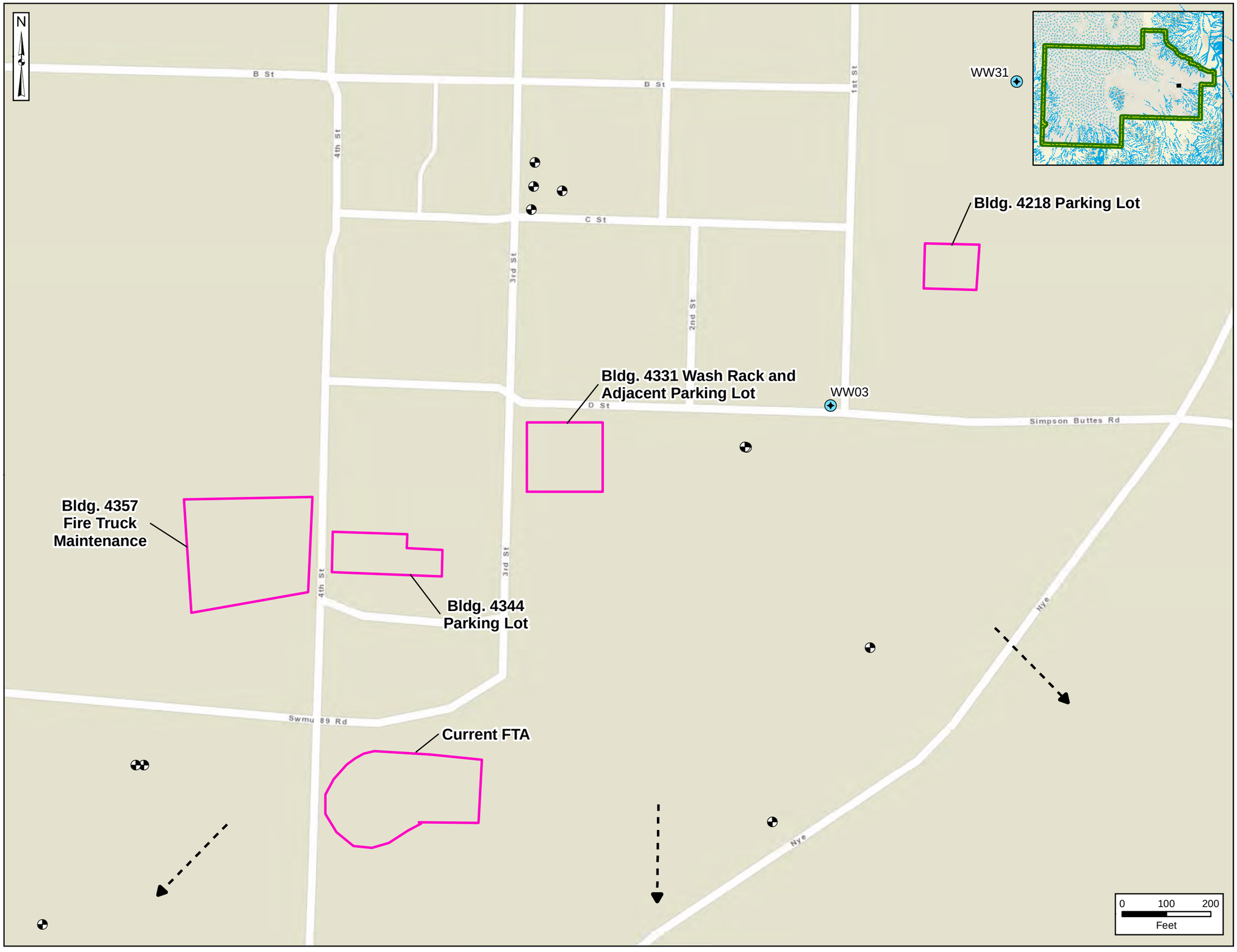
Figure 5-12
Building 4357 Fire Truck Maintenance, Building 4344 Parking Lot, Current FTA, Building 4331 Wash Rack and Adjacent Parking Lot, and Building 4218 Parking Lot



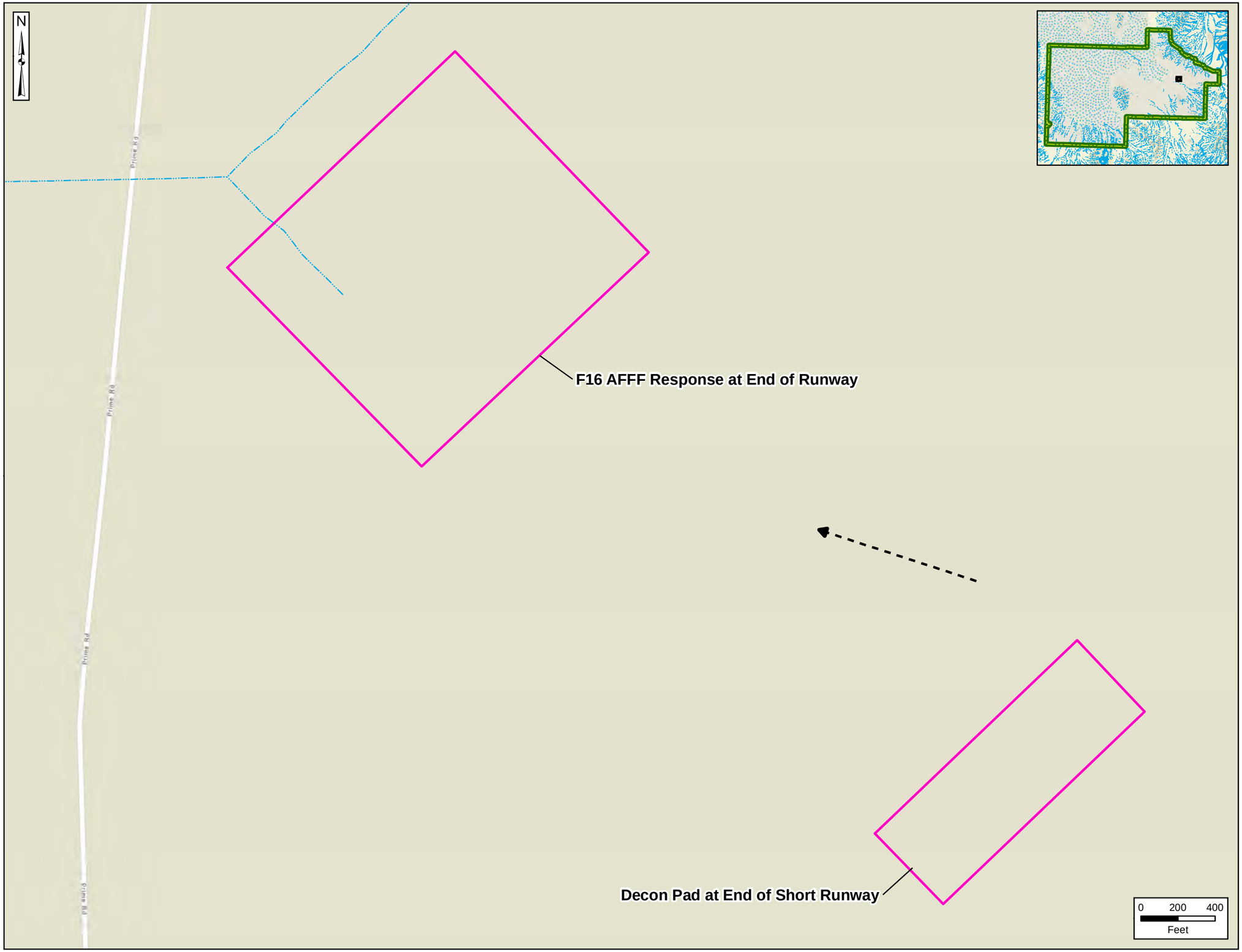
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Water Supply Well
- Monitoring Well

AOPI = area of potential interest
Bldg. = Building
FTA = Firefighting Training Area

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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Preliminary Assessment /
Site Inspection
Dugway Proving Ground, Utah

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Figure 5-13
Decon Pad at End of Short Runway and F16 AFFF Response at End of Runway

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction

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

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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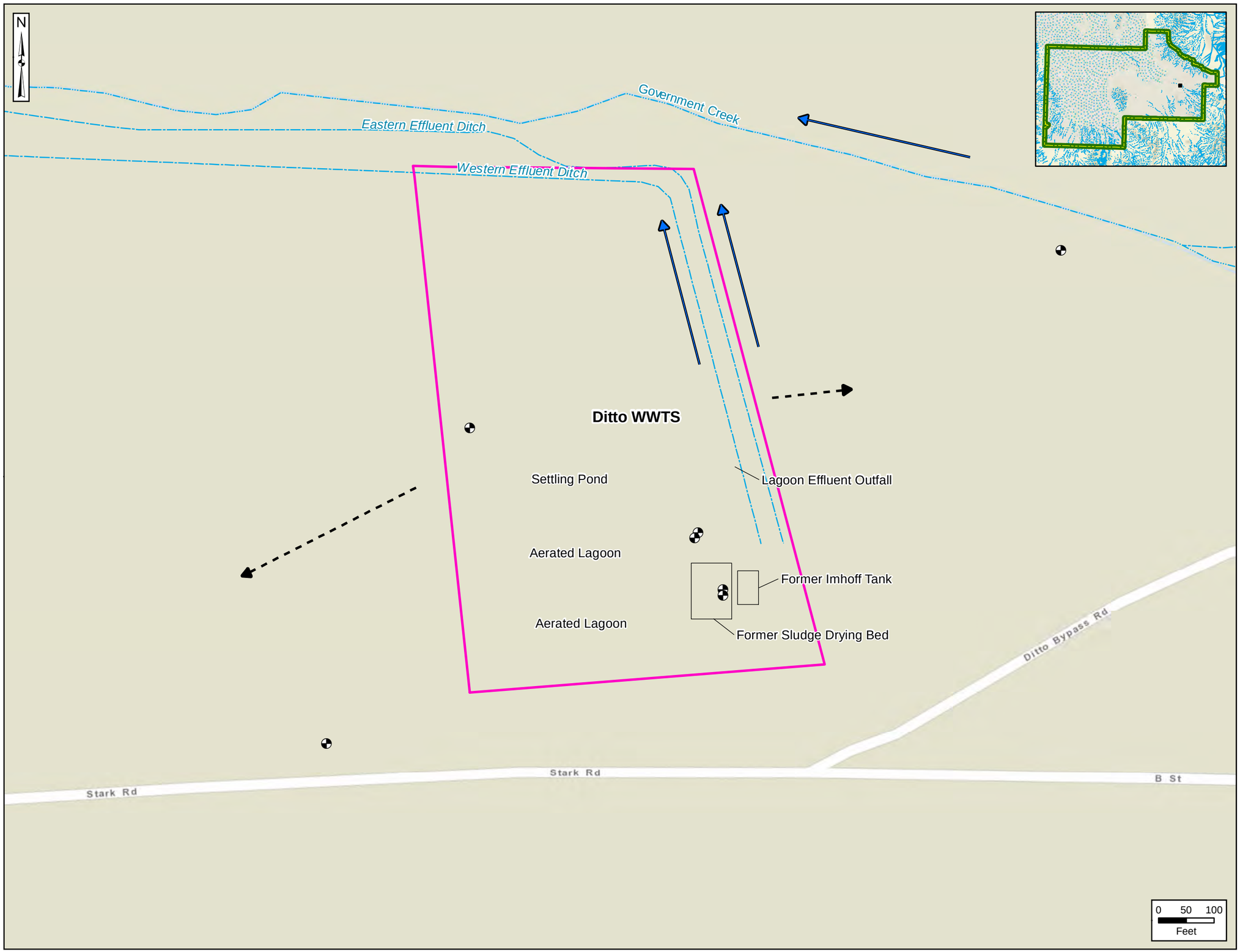
Figure 5-14
Ditto WWTS



Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Drainage Ditch
- Inundation Area (Great Salt Lake Desert)
- Surface Water Flow Direction
- Estimated Groundwater Flow Direction
- Monitoring Well

AOPI = area of potential interest
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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Preliminary Assessment / Site Inspection
Dugway Proving Ground, Utah

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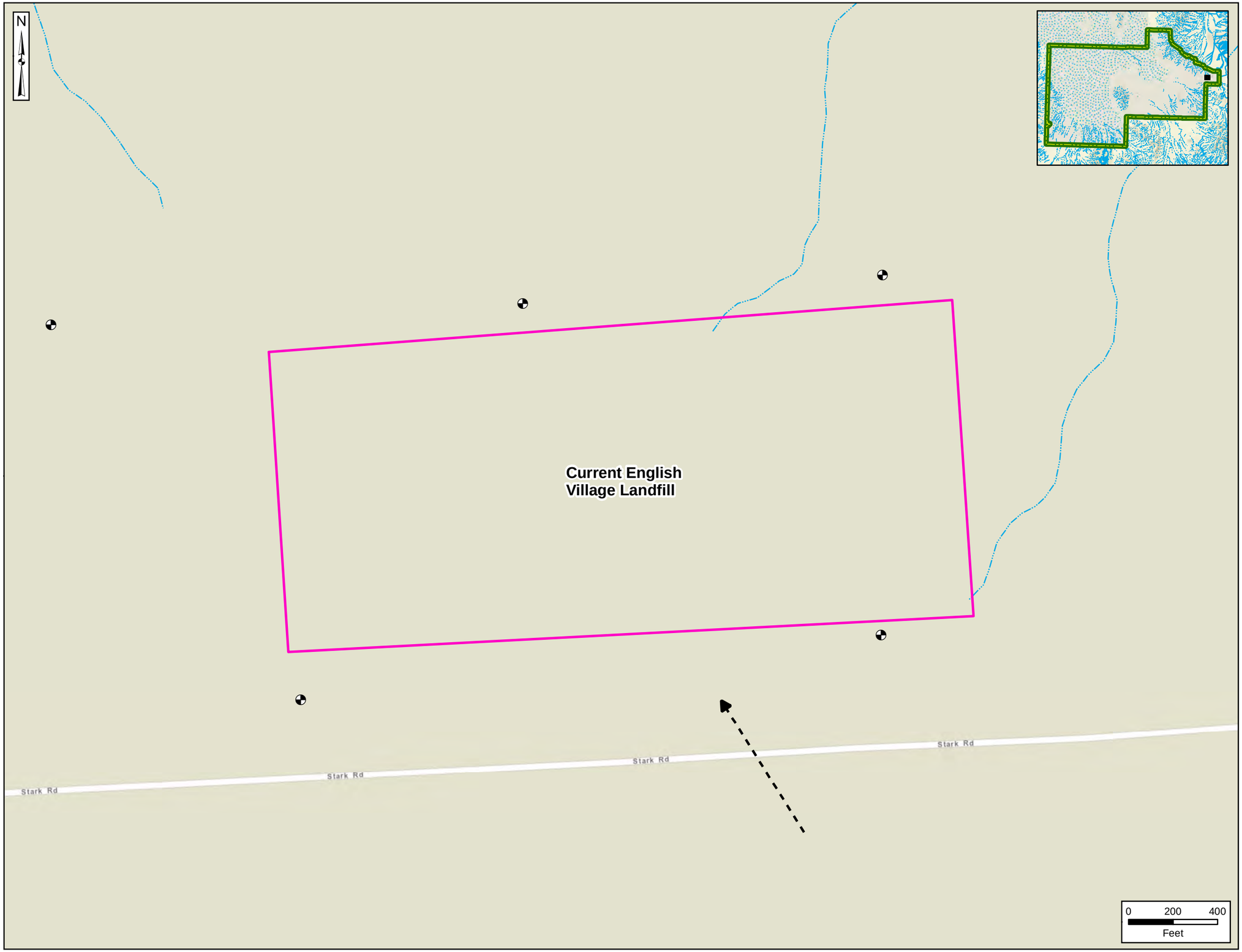
Figure 5-15
Current English Village Landfill



Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well

AOPI = area of potential interest

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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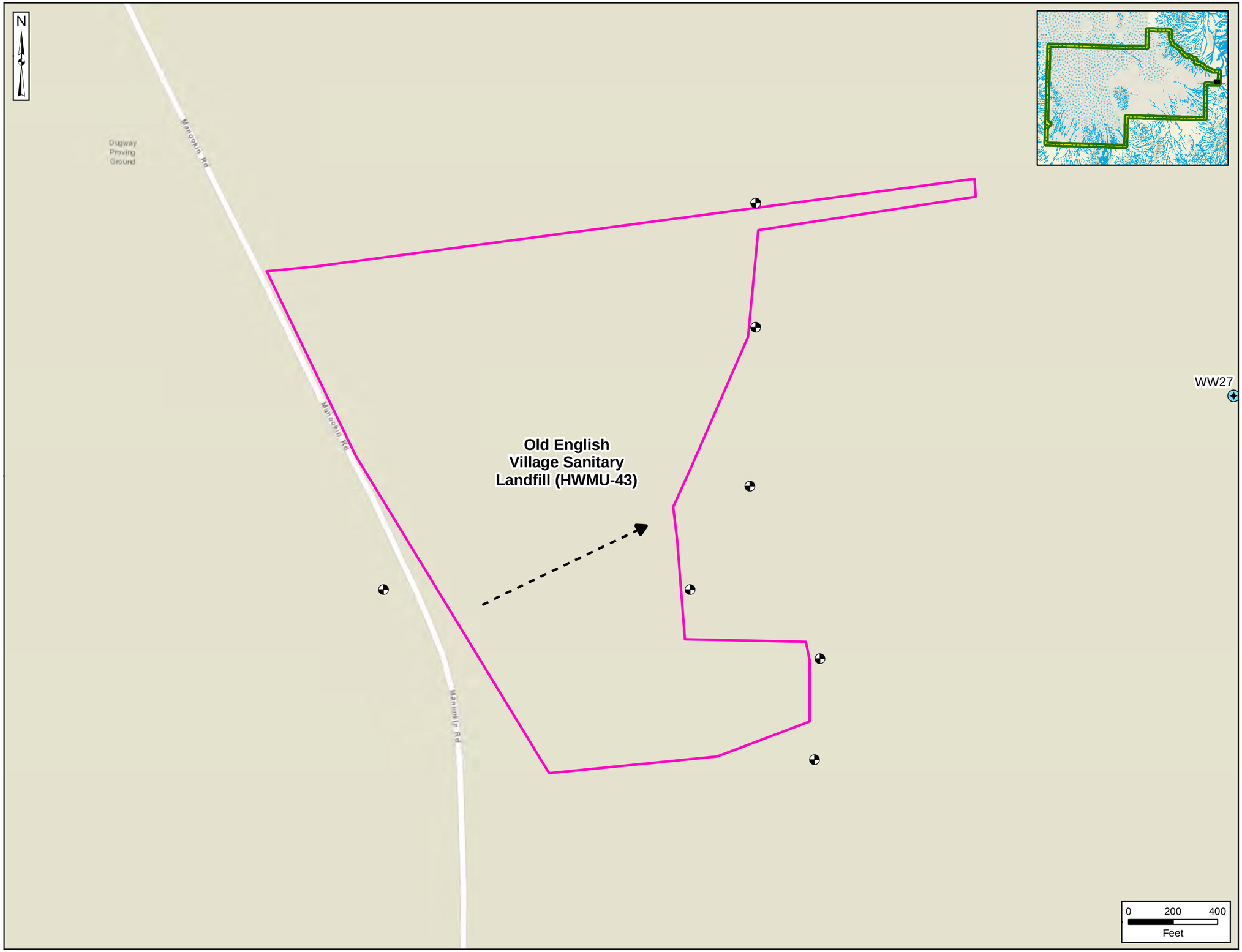
Figure 5-16
Old English Village Sanitary Landfill (HWMU-43)



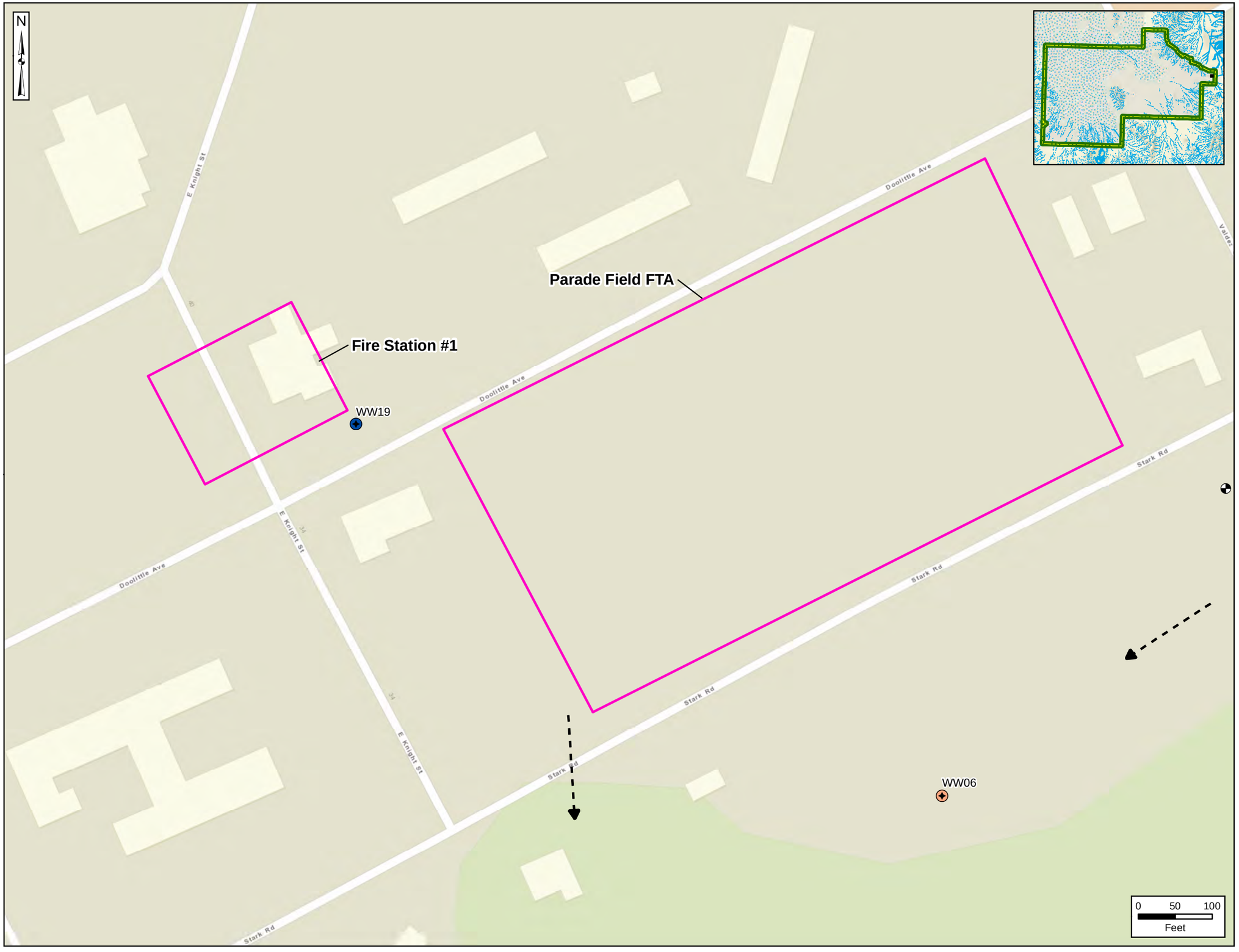
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Potable Well
- Monitoring Well

AOPI = area of potential interest
HWMU = Hazardous Waste Management Unit

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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Dugway Proving Ground, Utah

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Figure 5-17
Fire Station #1 and Parade Field FTA

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Irrigation Well
- Test Well

AOPI = area of potential interest
FTA = Firefighting Training Area

Data Sources:
Dugway Proving Ground, GIS Data, 2019;
Dugway Proving Ground, Water Well Information, 2020;
USGS, NHD Data, 2019;
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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Site Inspection
Dugway Proving Ground, Utah

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Figure 5-18
Building 5470 Vehicle Storage

Legend

- AOPI
- Installation Boundary
- Stream/Connector (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well

AOPI = area of potential interest

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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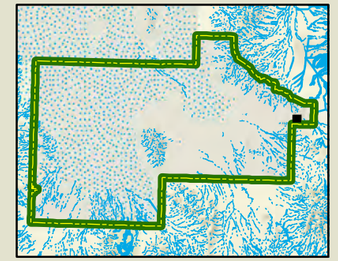
Dugway Proving Ground, Utah



Discharge point for Former English Village WWTS

Discharge point for Current English Village WWTS

Aerated Lagoon

Aerated Lagoon

Settling Pond

Current English Village WWTS

Former English Village WWTS

Dugway Proving Ground

0 200 400
Feet

Figure 5-19
Current English Village WWTS and Former English Village WWTS

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Underground Effluent Channel (approximate location)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Discharge Point

AOPI = area of potential interest
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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

N

F16 AFFF Response at End of Runway
Decon Pad at End of Short Runway
DITTO AND AVERY AREAS
Light Vault Bldg. 4023
Hangar 2 Bldg. 4065
Hangar Bldg. 4066
Hangar Bldg. 4068
Ditto WWTS
Walled Decon Pad, Bldg. 8033
Hangar 1 and Apron
Bldg. 4357 Fire Truck Maintenance
Bldg. 4344 Parking Lot
Fire Station #2
Former FTA (DPG-163)
SE End of Runway AFFF Training
Fire Station #3
Bldg. 4218 Parking Lot
Current FTA
Current Carr WWTS
Carr Facility Septic Tank and Leachfield (HWMU-63-2)
Bldg. 4331 Wash Rack and Adjacent Parking Lot
Defense Test Chamber Fire
WW33
WW05
CARR AREA
Current English Village Landfill
Current English Village WWTS
Former English Village WWTS
Fire Station #1
Parade Field FTA
ENGLISH VILLAGE
WW18
WW06
Bldg. 5470 Vehicle Storage
WW26
WW27
WW21
WW30
Old English Village Sanitary Landfill (HWMU-43)
WW34
16-730
16-771
16-37
16-39
Stark Rd
196
199

Legend

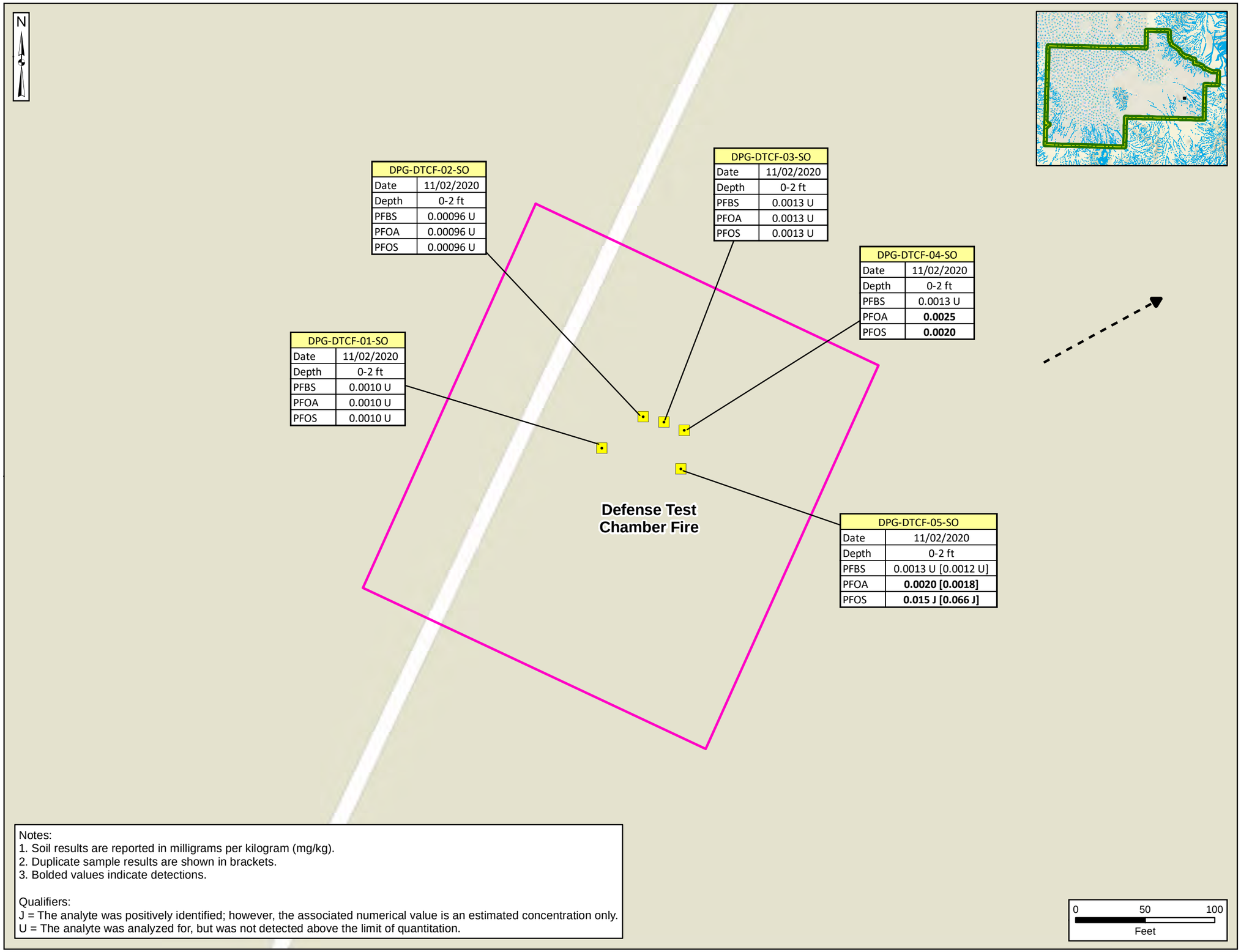
- Installation Boundary
- AOPI Location
- AOPI with OSD Risk Screening Level Exceedance
- River/Stream (Perennial)
- Stream (Intermittent)
- Canal/Ditch
- Inundation Area (Great Salt Lake Desert)
- Installation Water Supply Well
- Inactive Installation Water Supply Well
- Irrigation Well
- Test Well
- Off-Post Potable Well
- Monitoring Well

AFFF = aqueous film-forming foam
AOPI = area of potential interest
Bldg. = Building
Decon = Decontamination
FTA = Firefighting Training Area
HWMU = Hazardous Waste Management Unit
OSD = Office of the Secretary of Defense
SE = Southeast
WWTS = Wastewater Treatment System

0 0.5 1 Miles

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



Notes:
1. Soil results are reported in milligrams per kilogram (mg/kg).
2. Duplicate sample results are shown in brackets.
3. Bolded values indicate detections.

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

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-2
Defense Test Chamber Fire PFOS, PFOA, and PFBS Analytical Results

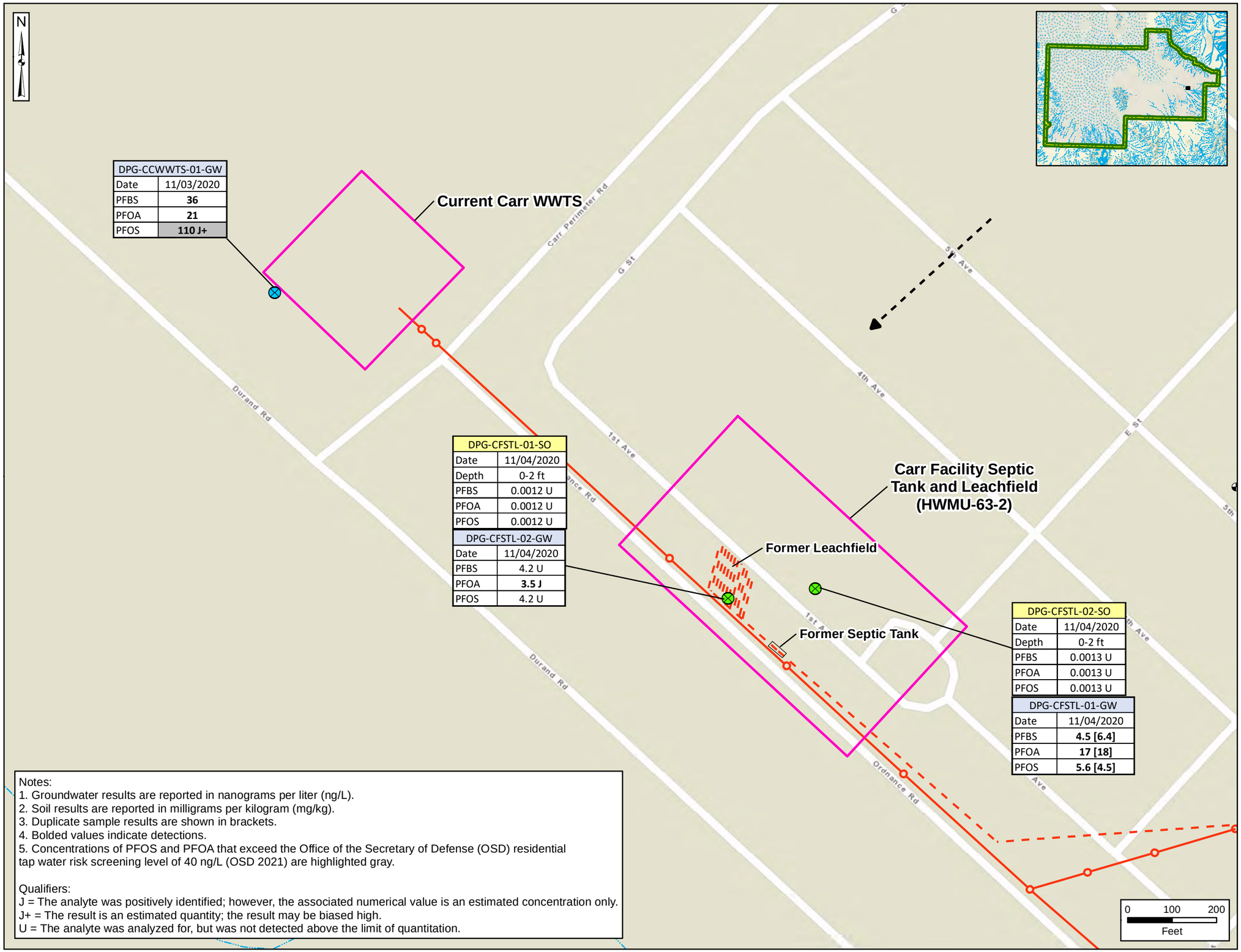
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Shallow Soil Sampling Location (Hand Auger)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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.

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 high.
U = The analyte was analyzed for, but was not detected above the limit of quantitation.

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Figure 7-3
Current Carr WWTS and Carr Facility Septic Tank and Leachfield (HWMU-63-2) PFOS, PFOA, and PFBS Analytical Results

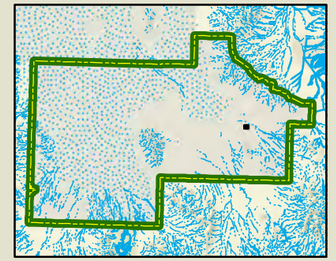
Legend

- AOPI
- Installation Boundary
- Wastewater Line
- Wastewater Line (Abandoned)
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Groundwater Sampling Location (Boring)
- Soil and Groundwater Sampling Location (Boring)

AOPI = area of potential interest
ft = feet
GW = groundwater
HWMU = Hazardous Waste Management Unit
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



DPG-WDP-02-SO	
Date	11/04/2020
Depth	0-2 ft
PFBS	0.0010 U
PFOA	0.0010 U
PFOS	0.0010 U

Walled Decon Pad,
Building 8033

DPG-WDP-01-SO	
Date	11/04/2020
Depth	0-2 ft
PFBS	0.00097 U
PFOA	0.00097 U
PFOS	0.00097 U

DPG-WDP-01-GW	
Date	11/04/2020
PFBS	4.2 UJ-
PFOA	4.2 UJ-
PFOS	4.2 UJ-

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).

Qualifiers:
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.

0 50 100
Feet

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-4
Walled Decon Pad, Building 8033
PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Suspected AFFF Release Area
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Shallow Soil Sampling Location (Hand Auger)
- Soil and Groundwater Sampling Location (Boring)

AFFF = aqueous film-forming foam
AOPI = area of potential interest
Decon = Decontamination
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

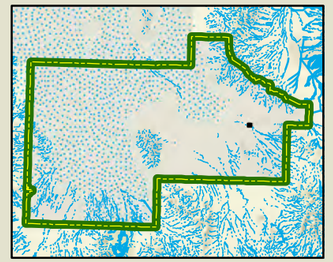


Figure 7-5
Hangar 2 Building 4065, Hangar Building 4066, and Hangar Building 4068 PFOS, PFOA, and PFBS Analytical Results

DPG-HB4068-01-SO	
Date	10/29/2020
Depth	0-2 ft
PFBS	0.0014 U
PFOA	0.0014 U
PFOS	0.0014 U

DPG-HB4068-01-GW	
Date	10/29/2020
PFBS	**25**
PFOA	**64**
PFOS	**7.7**

DPG-HB4068-02-SO	
Date	10/29/2020
Depth	0-2 ft
PFBS	0.0011 U
PFOA	0.0011 U
PFOS	0.0011 U

DPG-HB4068-02-GW	
Date	10/30/2020
PFBS	**14**
PFOA	**84**
PFOS	**12**

DPG-HB4065-01-SO	
Date	10/29/2020
Depth	0-2 ft
PFBS	0.0012 U
PFOA	0.0012 U
PFOS	0.0012 U

DPG-HB4065-01-GW	
Date	10/29/2020
PFBS	**8.5 J-**
PFOA	**40 J-**
PFOS	**3.5 J-**

DPG-HB4065-02-SO	
Date	10/28/2020
Depth	0-2 ft
PFBS	0.0013 U
PFOA	0.0013 U
PFOS	0.0013 U

DPG-HB4065-02-GW	
Date	10/29/2020
PFBS	**6.1**
PFOA	**36**
PFOS	**27**

DPG-HB4066-01-SO	
Date	10/29/2020
Depth	0-2 ft
PFBS	0.0013 U
PFOA	0.0013 U
PFOS	**0.00088 J**

DPG-HB4066-01-GW	
Date	10/30/2020
PFBS	**12 J-**
PFOA	**72 J-**
PFOS	**62 J-**

DPG-HB4066-02-SO	
Date	10/29/2020
Depth	0-2 ft
PFBS	0.00099 U [0.0012 U]
PFOA	0.00099 U [0.0012 U]
PFOS	0.00099 U [0.0012 U]

DPG-HB4066-02-GW	
Date	10/30/2020
PFBS	**7.7**
PFOA	**51**
PFOS	**42**

Hangar 2 Building 4065

Hangar Building 4066

Hangar Building 4068

Government Creek

0 50 100
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. Duplicate sample results are shown in brackets.
4. Bolded values indicate the result was detected greater than the limit of detection.
5. Concentrations of PFOS and PFOA that match or 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. Government Creek is an ephemeral stream.

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.

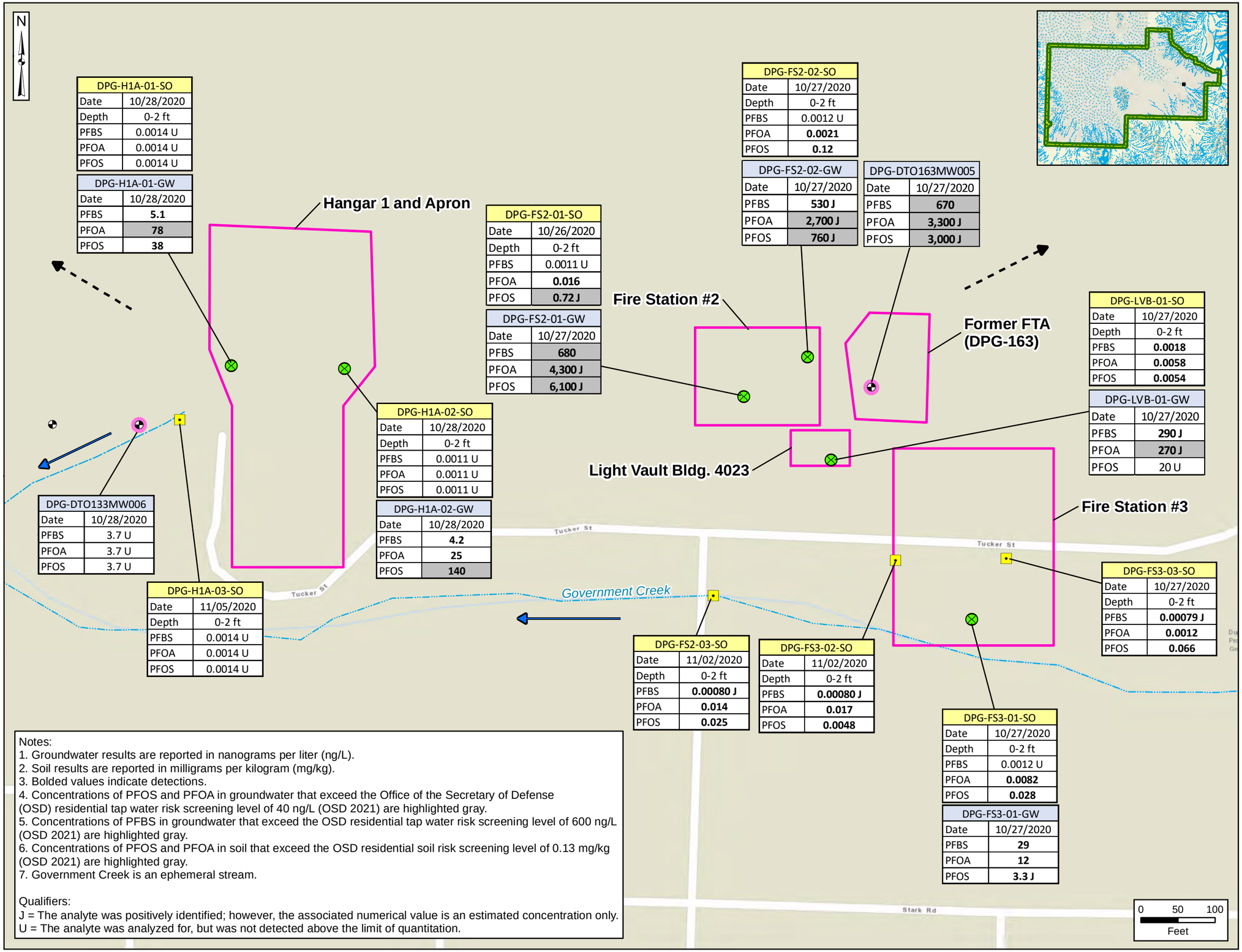
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Surface Water Flow Direction
- Surface Runoff Flow Direction
- Estimated Groundwater Flow Direction
- Monitoring Well
- Soil and Groundwater Sampling Location (Boring)

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

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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 in groundwater 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.
5. Concentrations of PFBS in groundwater that exceed the OSD residential tap water risk screening level of 600 ng/L (OSD 2021) are highlighted gray.
6. Concentrations of PFOS and PFOA in soil that exceed the OSD residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.
7. Government Creek is an ephemeral stream.

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.

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-6
Hangar 1 and Apron, Fire Station #2, Former FTA (DPG-163), Fire Station #3, and Light Vault Building 4023 PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Drainage Ditch
- Inundation Area (Great Salt Lake Desert)
- Surface Water Flow Direction
- Estimated Groundwater Flow Direction
- Water Supply Well
- Monitoring Well
- Shallow Soil Sampling Location (Hand Auger)
- Soil and Groundwater Sampling Location (Boring)
- Groundwater Sampling Location (Existing Well)

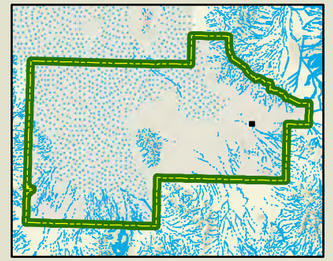
AOPI = area of potential interest
Bldg. = Building
ft = feet
FTA = Firefighting Training Area
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil
USEPA = United States Environmental Protection Agency

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

Figure 7-7 SE End of Runway AFFF Training PFOS, PFOA, and PFBS Analytical Results



SE End of Runway AFFF Training

DPG-SEER-02-SO	
Date	10/28/2020
Depth	0-2 ft
PFBS	0.0012 U
PFOA	0.0012 U
PFOS	0.0012 U

DPG-SEER-02-GW	
Date	10/28/2020
PFBS	**190**
PFOA	**170**
PFOS	3.6 U

DPG-SEER-01-SO	
Date	10/28/2020
Depth	0-2 ft
PFBS	0.00098 U
PFOA	0.00098 U
PFOS	0.00098 U

DPG-SEER-01-GW	
Date	10/28/2020
PFBS	**200 [200]**
PFOA	**68 [200]**
PFOS	3.5 U [3.6 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. Duplicate sample results are shown in brackets.
4. Bolded values indicate detections.
5. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

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

0 50 100
Feet

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Soil and Groundwater Sampling Location (Boring)

AFFF = aqueous film-forming foam
AOPI = area of potential interest
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SE = Southeast
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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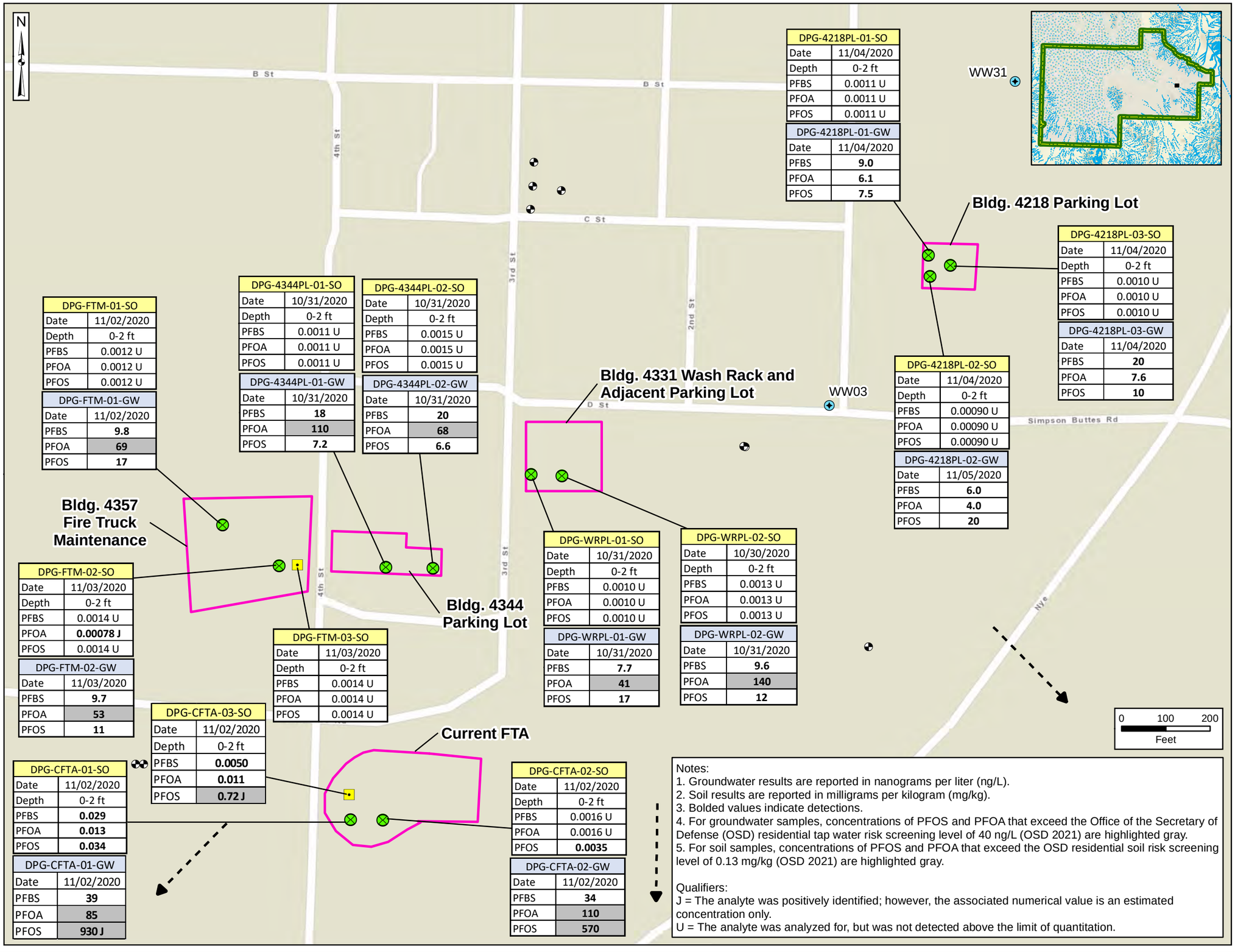
Figure 7-8
Building 4357 Fire Truck Maintenance, Building 4344 Parking Lot, Current FTA, Building 4331 Wash Rack and Adjacent Parking Lot, and Building 4218 Parking Lot PFOS, PFOA, and PFBS Analytical Results



DPG-4218PL-01-SO	
Date	11/04/2020
Depth	0-2 ft
PFBS	0.0011 U
PFOA	0.0011 U
PFOS	0.0011 U

DPG-4218PL-01-GW	
Date	11/04/2020
PFBS	**9.0**
PFOA	**6.1**
PFOS	**7.5**

DPG-4218PL-03-SO	
Date	11/04/2020
Depth	0-2 ft
PFBS	0.0010 U
PFOA	0.0010 U
PFOS	0.0010 U

DPG-4218PL-03-GW	
Date	11/04/2020
PFBS	**20**
PFOA	**7.6**
PFOS	**10**

DPG-4218PL-02-SO	
Date	11/04/2020
Depth	0-2 ft
PFBS	0.00090 U
PFOA	0.00090 U
PFOS	0.00090 U

DPG-4218PL-02-GW	
Date	11/05/2020
PFBS	**6.0**
PFOA	**4.0**
PFOS	**20**

DPG-FTM-01-SO	
Date	11/02/2020
Depth	0-2 ft
PFBS	0.0012 U
PFOA	0.0012 U
PFOS	0.0012 U

DPG-FTM-01-GW	
Date	11/02/2020
PFBS	**9.8**
PFOA	**69**
PFOS	**17**

DPG-4344PL-01-SO	
Date	10/31/2020
Depth	0-2 ft
PFBS	0.0011 U
PFOA	0.0011 U
PFOS	0.0011 U

DPG-4344PL-01-GW	
Date	10/31/2020
PFBS	**18**
PFOA	**110**
PFOS	**7.2**

DPG-4344PL-02-SO	
Date	10/31/2020
Depth	0-2 ft
PFBS	0.0015 U
PFOA	0.0015 U
PFOS	0.0015 U

DPG-4344PL-02-GW	
Date	10/31/2020
PFBS	**20**
PFOA	**68**
PFOS	**6.6**

DPG-FTM-02-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.0014 U
PFOA	**0.00078 J**
PFOS	0.0014 U

DPG-FTM-02-GW	
Date	11/03/2020
PFBS	**9.7**
PFOA	**53**
PFOS	**11**

DPG-FTM-03-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.0014 U
PFOA	0.0014 U
PFOS	0.0014 U

DPG-WRPL-01-SO	
Date	10/31/2020
Depth	0-2 ft
PFBS	0.0010 U
PFOA	0.0010 U
PFOS	0.0010 U

DPG-WRPL-01-GW	
Date	10/31/2020
PFBS	**7.7**
PFOA	**41**
PFOS	**17**

DPG-WRPL-02-SO	
Date	10/30/2020
Depth	0-2 ft
PFBS	0.0013 U
PFOA	0.0013 U
PFOS	0.0013 U

DPG-WRPL-02-GW	
Date	10/31/2020
PFBS	**9.6**
PFOA	**140**
PFOS	**12**

DPG-CFTA-03-SO	
Date	11/02/2020
Depth	0-2 ft
PFBS	**0.0050**
PFOA	**0.011**
PFOS	**0.72 J**

DPG-CFTA-01-SO	
Date	11/02/2020
Depth	0-2 ft
PFBS	**0.029**
PFOA	**0.013**
PFOS	**0.034**

DPG-CFTA-01-GW	
Date	11/02/2020
PFBS	**39**
PFOA	**85**
PFOS	**930 J**

DPG-CFTA-02-SO	
Date	11/02/2020
Depth	0-2 ft
PFBS	0.0016 U
PFOA	0.0016 U
PFOS	**0.0035**

DPG-CFTA-02-GW	
Date	11/02/2020
PFBS	**34**
PFOA	**110**
PFOS	**570**

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. For groundwater samples, 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.
5. For soil samples, concentrations of PFOS and PFOA that exceed the OSD residential soil risk screening level of 0.13 mg/kg (OSD 2021) are highlighted gray.

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

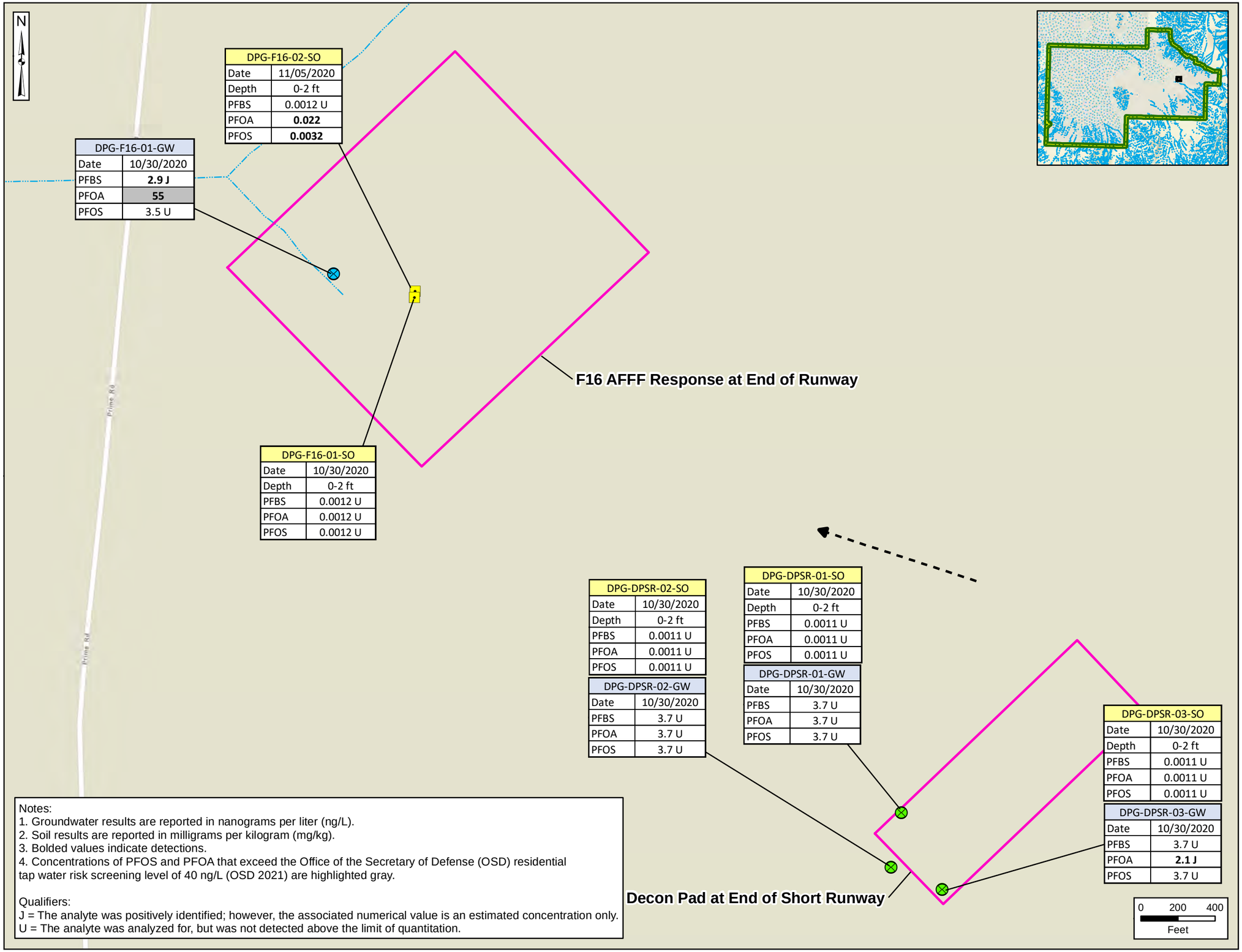
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Water Supply Well
- Monitoring Well
- Shallow Soil Sampling Location (Hand Auger)
- Soil and Groundwater Sampling Location (Boring)

AOPI = area of potential interest
Bldg. = Building
ft = feet
FTA = Firefighting Training Area
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



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 (OSD 2021) are highlighted gray.

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

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-9
Decon Pad at End of Short Runway and F16 AFFF Response at End of Runway PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Groundwater Sampling Location (Boring)
- Shallow Soil Sampling Location (Hand Auger)
- Soil and Groundwater Sampling Location (Boring)

AFFF = aqueous film-forming foam
AOPI = area of potential interest
Decon = Decontamination
ft = feet
GW = groundwater
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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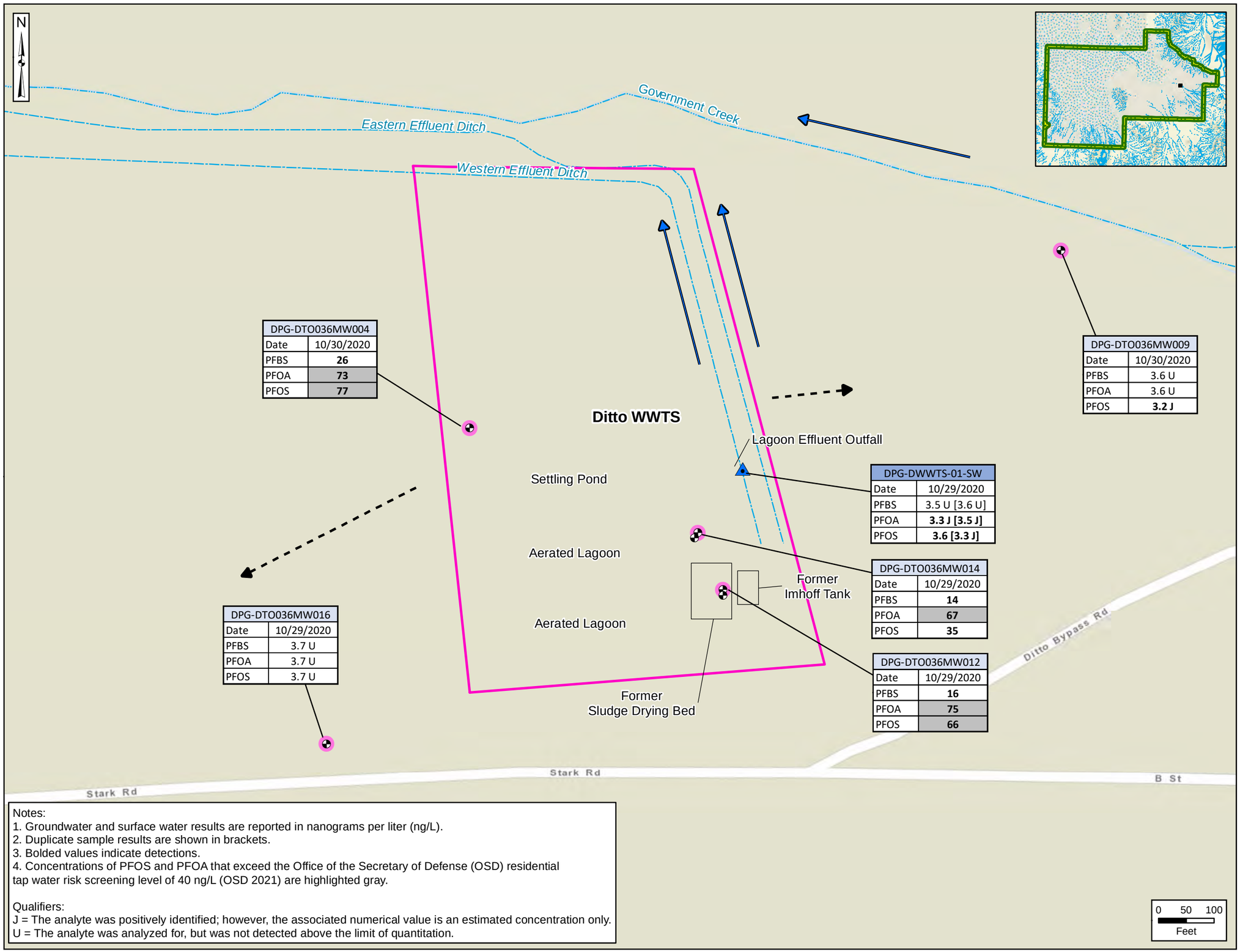
Figure 7-10
Ditto WWTS
PFOS, PFOA, and PFBS Analytical Results



DPG-DTO036MW004	
Date	10/30/2020
PFBS	**26**
PFOA	**73**
PFOS	**77**

DPG-DTO036MW009	
Date	10/30/2020
PFBS	3.6 U
PFOA	3.6 U
PFOS	**3.2 J**

DPG-DWWTS-01-SW	
Date	10/29/2020
PFBS	3.5 U [3.6 U]
PFOA	**3.3 J [3.5 J]**
PFOS	**3.6 [3.3 J]**

DPG-DTO036MW014	
Date	10/29/2020
PFBS	**14**
PFOA	**67**
PFOS	**35**

DPG-DTO036MW012	
Date	10/29/2020
PFBS	**16**
PFOA	**75**
PFOS	**66**

DPG-DTO036MW016	
Date	10/29/2020
PFBS	3.7 U
PFOA	3.7 U
PFOS	3.7 U

Notes:
1. Groundwater and surface water results are reported in nanograms per liter (ng/L).
2. Duplicate sample results are shown in brackets.
3. Bolded values indicate detections.
4. Concentrations of PFOS and PFOA that exceed the Office of the Secretary of Defense (OSD) residential tap water risk screening level of 40 ng/L (OSD 2021) are highlighted gray.

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

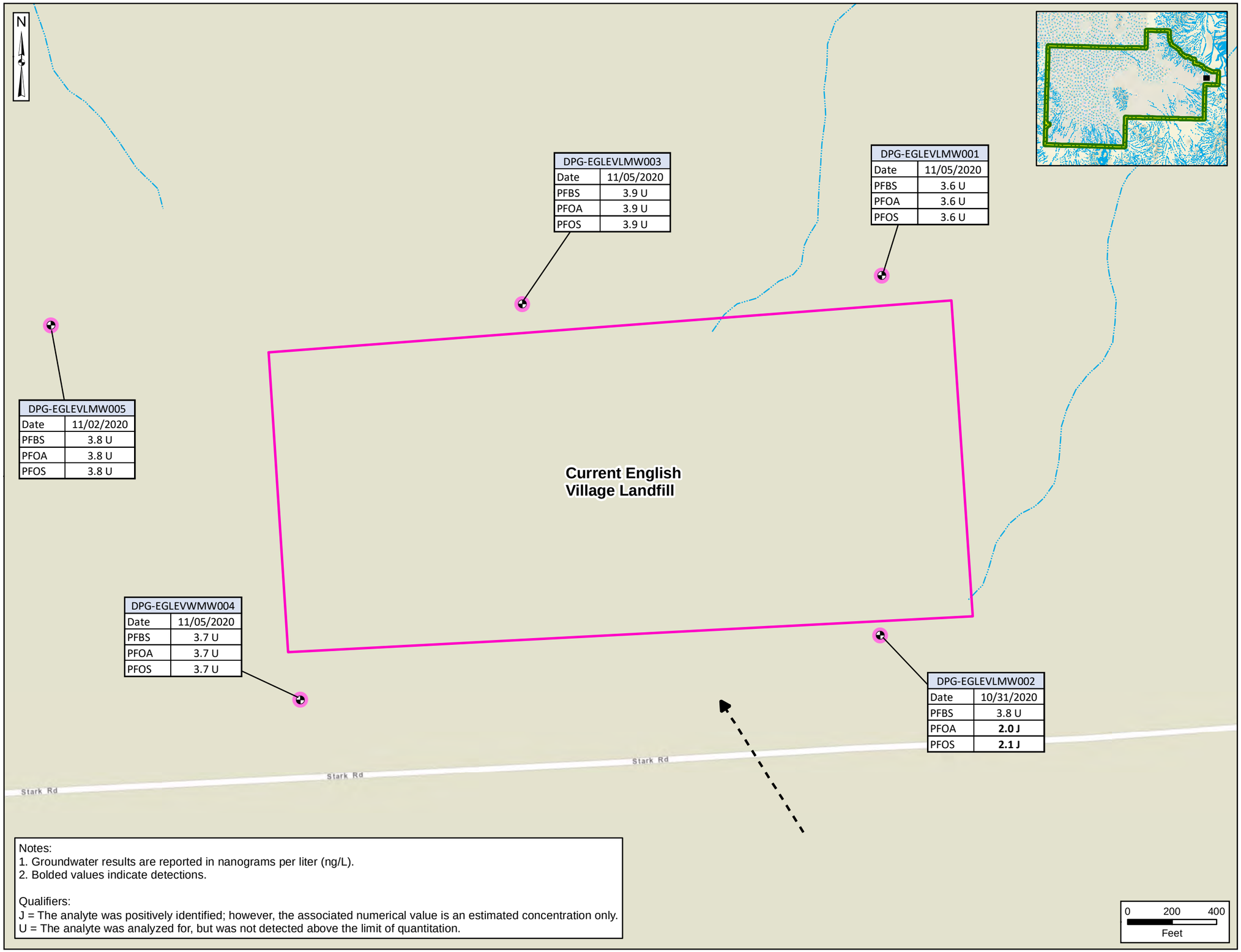
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Drainage Ditch
- Inundation Area (Great Salt Lake Desert)
- Surface Water Flow Direction
- Estimated Groundwater Flow Direction
- Monitoring Well
- Surface Water Sampling Location
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SW = surface water
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.

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

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-11
Current English Village Landfill PFOS, PFOA, and PFBS Analytical Results

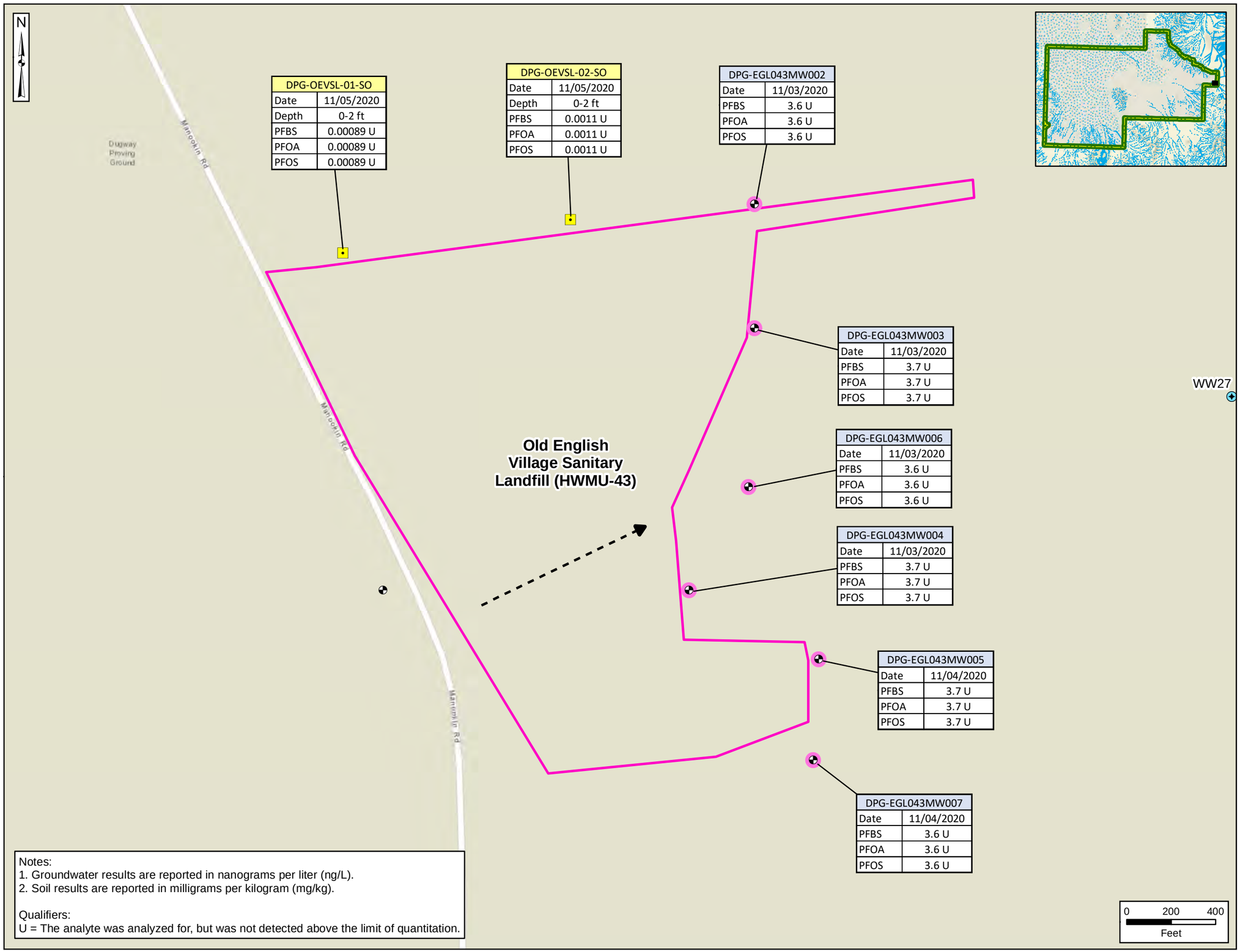
Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North



Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Soil results are reported in milligrams per kilogram (mg/kg).

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

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-12 Old English Village Sanitary Landfill (HWMU-43) PFOS, PFOA, and PFBS Analytical Results

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Potable Well
- Monitoring Well
- Shallow Soil Sampling Location (Hand Auger)
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
ft = feet
HWMU = Hazardous Waste Management Unit
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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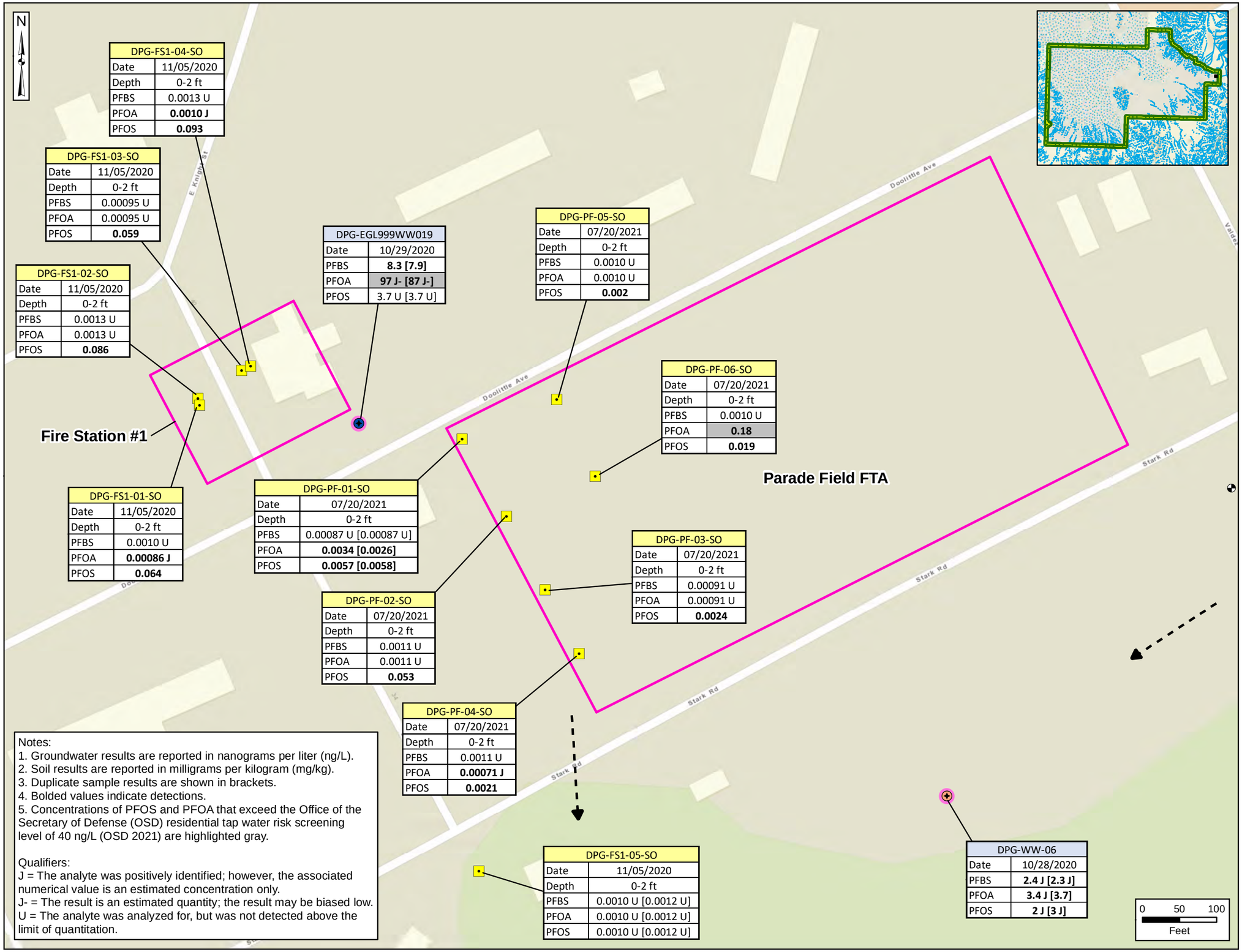
Figure 7-13
Fire Station #1 and Parade Field FTA
PFOS, PFOA, and PFBS Analytical Results



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.

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.

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Irrigation Well
- Shallow Soil Sampling Location (Hand Auger)
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
ft = feet
FTA = Firefighting Training Area
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil

Data Sources:
Dugway Proving Ground, GIS Data, 2019;
Dugway Proving Ground, Water Well Information, 2020;
USGS, NHD Data, 2019;
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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Figure 7-14
Building 5470 Vehicle Storage
PFOS, PFOA, and PFBS
Analytical Results

Legend

- AOPI
- Installation Boundary
- Stream/Connector (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid

Notes:
1. Groundwater results are reported in nanograms per liter (ng/L).
2. Bolded values indicate detections.

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

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

USAEC PFAS Preliminary Assessment / Site Inspection Dugway Proving Ground, Utah

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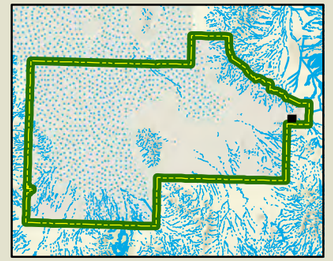
Figure 7-15
Current English Village WWTS and Former English Village WWTS PFOS, PFOA, and PFBS Analytical Results



DPG-FEVWWTS-05-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.00093 U
PFOA	**0.00062 J**
PFOS	**0.0015**

DPG-FEVWWTS-04-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.001 U
PFOA	**0.0017**
PFOS	**0.0020**

DPG-FEVWWTS-03-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.0012 U
PFOA	**0.00075 J**
PFOS	**0.0045**

DPG-EGLEVWMW005	
Date	11/05/2020
PFBS	3.7 U
PFOA	3.7 U
PFOS	3.7 U

DPG-FEVWWTS-02-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.00085 U
PFOA	**0.0020**
PFOS	**0.0045**

DPG-CEVWWTS-03-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.0012 U
PFOA	0.0012 U
PFOS	**0.0012**

DPG-CEVWWTS-02-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.00094 U
PFOA	0.00094 U
PFOS	**0.00052 J**

DPG-EGLEVWMW004	
Date	11/05/2020
PFBS	3.7 U
PFOA	3.7 U
PFOS	3.7 U

DPG-FEVWWTS-01-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.00080 U
PFOA	0.00080 U
PFOS	0.00080 U

DPG-CEVWWTS-01-SO	
Date	11/03/2020
Depth	0-2 ft
PFBS	0.00081 U
PFOA	0.00081 U
PFOS	0.00081 U

DPG-EGL047MW005	
Date	11/04/2020
PFBS	**8.3**
PFOA	**25**
PFOS	3.7 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. Bolded values indicate detections.

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

Legend

- AOPI
- Installation Boundary
- River/Stream (Perennial)
- Stream (Intermittent)
- Inundation Area (Great Salt Lake Desert)
- Underground Effluent Channel (approximate location)
- Estimated Groundwater Flow Direction
- Monitoring Well
- Shallow Soil Sampling Location (Hand Auger)
- Groundwater Sampling Location (Existing Well)

AOPI = area of potential interest
ft = feet
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctanesulfonic acid
SO = soil
WWTS = Wastewater Treatment System

Data Sources:
Dugway Proving Ground, GIS Data, 2019
USGS, NHD Data, 2019
ESRI ArcGIS Online, StreetMap Data

Coordinate System:
WGS 1984, UTM Zone 12 North

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