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

Fort Riley, Kansas

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Preliminary Assessment and Site Inspection of Per- and Polyfluoroalkyl Substances

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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. The Fort Riley (FTRI) 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.

FTRI occupies 101,733 acres in northeast Kansas and is located one mile east of Milford, three miles west of Manhattan, 50 miles west of Topeka, 130 miles northwest of Wichita, and 135 miles west of Kansas City. The FTRI PA identified 28 AOPIs for investigation during the SI phase. SI sampling results from the 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 PFBS were detected in groundwater and/or soil at 26 AOPIs; 12 of the 26 AOPIs had detections of PFOS, PFOA, or PFBS above the risk-based screening levels.

The FTRI PA/SI identified the need for further study in a CERCLA remedial investigation. **Table ES-1** 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. An off-post private well investigation was initiated following the results of the SI sampling. The operable unit (OU) number (e.g., OU 004), the Installation Restoration Program (IRP) site identifier (e.g., FTRI-018), and/or the Headquarter Army Environmental System (HQAES) number (e.g., 20605.1018) are included in parentheses following the AOPI name if the AOPI overlaps with a FTRI OU, IRP site, and/or HQAES site.

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

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
FFTA-MAAF (OU 004, FTRI-019, 20605.1019)	Yes	Yes	Further study in a remedial investigation
FFTA-Building 892 (Gate 11) (FTRI-018, 20605.1018)	Yes	No	Further study in a remedial investigation
FFTA-Old Taxiway	No	No	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
Former Fire Station #3 (Building 743)	Yes	Yes	Further study in a remedial investigation
Current Fire Station #3 (Building 706)	Yes	No	Further study in a remedial investigation
Building 817 Foam Release	No	No	No action at this time
FNTA-Gate 8	Yes	No	Further study in a remedial investigation
Building 710 Foam Storage	No	No	No action at this time
Hangar 723	No	No	No action at this time
Hangar 746	No	No	No action at this time
Hangar 837	Yes	No	Further study in a remedial investigation
Hangar 863	Yes	No	Further study in a remedial investigation
FFTA-SFL (OU 001 FTRI-028, 20605.1027)	Yes	No	Further study in a remedial investigation
FFTA-Camp Funston	No	No	No action at this time
Camp Funston Advanced WWTP	No	NS	No action at this time
Camp Funston Biosolids Application Site	No	No	No action at this time
Whitside C/D Landfill (FTRI-002, 20605.1002)	Yes	No	Further study in a remedial investigation
Campbell Hill C/D Landfill	Yes	No	Further study in a remedial investigation
Building 8313 Foam Storage (FTRI-053, CC-FTRI-001, 20605.1052)	Yes	No	Further study in a remedial investigation
Building 8100 Foam Release	No	No	No action at this time
Custer Hill WWTP and Sludge Beds (FTRI-023, 20605.1022)	No	No	No action at this time
Custer Hill Sanitary Landfill (FTRI-001, 20605.1001)	Yes	NS	Further study in a remedial investigation
Main Post WWTP and Sludge Beds (FTRI-025, 20605.1024)	No	No	No action at this time
Firebreak 1 Biosolids Application Site	No	No	No action at this time
Firebreak 9 Biosolids Application Site	No	No	No action at this time
Firebreak 10 Biosolids Application Site	No	No	No action at this time

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Yes/No/NS)		Recommendation
	GW	SO	
MPRC Biosolid Application Site	No	No	No action at this time
Camp Forsyth Biosolid Application Site	No	NS	No action at this time

Notes:

Light gray shading – detection greater than the OSD risk screening level
GW – groundwater
ng/L – nanograms per liter
NS – not sampled
SO – soil

1 INTRODUCTION

The United States (U.S.) Army (Army) is performing preliminary assessments (PAs) and site inspections (SIs) on the current or potential historical use of per- and polyfluoroalkyl substances (PFAS) with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), and perfluorobutanesulfonic acid (PFBS), at Army installations (installations) nationwide. The Army is the lead agency under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and Executive Order 12,580 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 FTRI 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 FTRI 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 (LHA) 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 groundwater (tap water) and soil, calculated using the USEPA's Regional Screening Level (RSL) calculator for residential and industrial/commercial worker receptor scenarios. 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 objective of the SI is to identify whether there has been a release of PFOS, PFOA, and PFBS to the environment from any of the AOPIs identified in the PA and to determine if further investigation is warranted.

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 FTRI, PA/SI development followed a similar process as described in **Sections 1.3.1** through **1.3.5** below. **Section 3** provides a summary of the PA activities completed, and **Section 6** provides a summary of the SI activities completed for FTRI. 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), FTRI, and Arcadis U.S., Inc. (Arcadis). The kickoff call occurred on 15 August 2019, four to six 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 research 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 FTRI. A summary of the specific pre-site visit activities for FTRI is presented in **Section 3**.

A read-ahead package was prepared and submitted to the appropriate POCs two weeks before the site visit. The read-ahead package contained 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. Additional information on those areas is then 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 05 to 07 March 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 and areas where site reconnaissance was performed during the site visit.

Personnel interviews were conducted with individuals having significant historical knowledge at FTRI. The interviews focused on confirming information discussed in historical documents, collecting information that may have not been in historical documents, 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, or 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 exit briefing was conducted on 07 March 2019 with FTRI, USAEC, and USACE to discuss preliminary findings of the PA site visit.

1.3.3 Post-Site Visit

After the 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. Map document files and associated geographic information system (GIS) data are provided as **Appendix D**. GIS data layers created for the project are included in a Spatial Data Standards for Facilities, Infrastructure, and Environment-compliant geodatabase.

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 identified and determine whether further investigation is warranted. First, an SI kickoff teleconference was held between the Army PA team and FTRI.

The objectives of the SI kickoff teleconference were to:

- discuss the AOPIs selected for sampling and the proposed sampling plan for each AOPI
- gauge regulatory involvement (Kansas Department of Health and Environment [KDHE]) requirements or preferences
- identify overlapping unexploded ordinance or cultural resource areas
- discuss the plan for investigation derived waste (IDW) handling and disposal
- identify specific installation access requirements and potential schedule conflicts
- discuss general SI deliverable and field work schedule information and logistics

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

- regulatory involvement (KDHE) requirements or preferences
- identify overlapping unexploded ordinance or cultural resource areas
- confirm the plan for IDW handling and disposal
- confirm specific installation access requirements
- 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 FTRI (Arcadis 2020a) 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 in accordance with the DoD Quality Systems Manual (QSM) 5.1.1 (DoD 2018) and 5.3 (DoD and Department of Energy 2019). Laboratory analytical results were then validated and verified by a project chemist to assess the usability of the data collected. Validated analytical results were summarized in the context of OSD risk screening levels (defined in **Section 6.5**).

2 INSTALLATION OVERVIEW

The following subsections provide general information about FTRI, 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

FTRI is in northeast Kansas at the confluence of the Republican and Smoky Hill rivers, which combine to form the Kansas River. Milford Lake bounds part of the western side of the installation. FTRI occupies 101,733 acres within portions of Riley, Geary, and Clay counties with the majority of the installation within Riley and Geary counties (Fort Riley 2016a, Malcolm Pirnie 2009). FTRI is located one mile east of Milford, three miles west of Manhattan, 50 miles west of Topeka, 130 miles northwest of Wichita, and 135 miles west of Kansas City. Portions of the installation are bounded by the city limits of Riley, Junction City, and Ogden, Kansas (Malcolm Pirnie 2009). The site location is shown on **Figure 2-1** and the installation layout, including approximate groundwater and surface water flow directions is shown on **Figure 2-2**.

2.2 Mission and Brief Site History

FTRI was established in 1852 as a temporary military camp, known as Camp Center, and in 1853, it was renamed FTRI in honor of Major General Bennett Riley and became a permanent Cavalry post. The post served as Cavalry and Light Artillery schools from the 1880s to the 1940s (USACE 2012b). Activity at FTRI increased during World War II (Malcolm Pirnie 2009). FTRI has historically functioned as both a small municipality and a light industrial complex for services, and functions as a military training, equipment supply, and maintenance center for on-post activities (USACE 2012b). Approximately 15,000 active-duty service members are assigned to FTRI, and more than 18,000 family members, 29,000 veterans and retirees, and 5,600 civilian employees live in the region and/or work at the post (Army 2019).

2.3 Current and Projected Land Use

The land use on FTRI can be divided into four main categories: the cantonment areas, and three operational range areas consisting of the training and maneuver areas, the firing ranges, and the dudded impact areas (Malcolm Pirnie 2009). There are six different cantonment areas at FTRI, which total approximately 11,000 acres: Main Post, Camp Forsyth, Camp Funston, Camp Whitside, Marshall Army Airfield (MAAF), and Custer Hill. Approximately 70,000 acres are available for maneuver training with 103 training areas. The most heavily used maneuver areas are utilized between 160 and 210 days per year. Firing ranges and impact areas encompass approximately 18,200 acres and live-fire exercises occur throughout the year. Most of the land surrounding FTRI has historically been used for agricultural production, but recently agricultural land has increasingly been parceled, sold, and developed for residential use (DoD 2016).

2.4 Climate

The ecoregional province where FTRI is located is defined as Prairie Parkland (temperate) (Bailey 1995). The climate is characterized as a temperate continental climate defined by hot summers, cold and dry winters, moderate winds, low humidity, and a peak in rainfall in late spring and early summer (Fort Riley 2001a). Temperatures in the area vary widely and often fluctuate abruptly throughout the year. The 1965 through 2019 annual average maximum temperature is 65.5 degrees Fahrenheit (°F), and the annual average minimum temperature is 42.2°F. The warmest month is July, with an average temperature of 78.9°F, and the coldest is January, with an average temperature of 27.2°F (High Plains Regional Climate Center [HPRCC] 2020). The prevailing wind direction for most of the year is primarily from the south to southwest. During February and March, the prevailing winds are from the north (Fort Riley 2001a; Malcolm Pirnie 2009).

Average annual precipitation is 32.50 inches as measured at Milford Dam, Kansas, which is located approximately one mile west of the installation. The months of May and June generally receive the most rainfall, with an average of 4.63 and 4.54 inches per month, respectively. January and February receive the least amount of precipitation, with an average of 0.68 and 0.97 inches per month, respectively (HPRCC 2020). Seasonal snowfall occurs between December and March and averages 22 inches per season (United States Army Center for Health Promotion and Preventive Medicine [USACHPPM] 2007). Insufficient precipitation is one of the major limiting factors to plant growth in the region. During the summer months, evapotranspiration rates typically exceed precipitation. The evapotranspiration rate ranges from 15 to 25 inches per year (USACHPPM 2007; Malcolm Pirnie 2009).

2.5 Topography

FTRI lies within the Osage Plains section of the Central Lowlands physiographic province (Fort Riley 2001a), and is located in the Flint Hills physiographic subregion, which is a prominent upland area in Kansas characterized by rolling topography and deep stream channels with steep valley walls (United States Geological Survey [USGS] 2000). The Republican and Kansas rivers form part of the installation's southern boundary, and Milford Lake, a 15,000-acre impoundment of the Republican River, forms part of the installation's western boundary (Fort Riley 2001a; Malcolm Pirnie 2009).

Elevations at FTRI range from approximately 1,000 feet to approximately 1,400 feet above mean sea level. The terrain at the installation varies from alluvial floodplains along the Republican and Kansas rivers on the southern portion of the installation, through hilly to steep lands in the central and eastern portions, to the uplands regions in the northern and western portions (Fort Riley 2001a; Malcolm Pirnie 2009). The topography at FTRI is illustrated on **Figure 2-3**.

2.6 Geology

FTRI is comprised of three distinct physiographic areas: 1) alluvial depositional area; 2) high upland prairies; and 3) hilly transition zones (Fort Riley 2001a). The major geologic units at FTRI are shown on **Figure 2-4**. Three types of alluvial depositional areas exist at FTRI: wide meandering floodplains and terraces of major rivers, channel deposits created by smaller creeks and streams that dissect the uplands area, and glacial-fluvial deposits. The alluvium in the wide floodplains consists primarily of coarse- to fine-grained sand with interbedded layers of silt and clay. The sediment is generally poorly sorted and tends to

be coarser near the bottom, fining upward. The alluvium deposits range in thickness from less than 1 foot to about 75 feet depending on the proximity to the major rivers. The alluvium in the river valleys is bounded laterally and along the bottom by shale and limestone bedrock. The alluvial terrace sediments were deposited during a time when the Kansas River was at a higher elevation than it is currently. The terrace deposits consist of fining-upward sequences of gravel, sand, silt, and clay. The terrace deposits generally are 10 to 15 feet thick and occur near the valley walls (Kansas Geological Survey [KGS] 2008; USGS 2000).

The channel deposits of the smaller creeks and streams that transect FTRI consist of silt, sand, gravel, and cobbles (Malcom Pirnie 2009). The glacial-fluvial deposits were deposited by meltwater streams flowing from glaciers that advanced into northeastern Kansas during the Pleistocene epoch (USGS 1949). At FTRI, the glacial-fluvial deposits are located in a small area along the eastern boundary of the site (KGS 2008; Malcolm Pirnie 2009).

The high upland prairies consist of alternating layers of shallow (less than one degree) west-northwest-dipping Permian (approximately 280 million years ago) limestone and shale from the Chase Group and Council Grove Group. The hilly transition zones extend from the uplands down to the valley floor. These zones have steep angles of slope and are composed of alternating limestones and shales. The bedrock is composed of three basic rock types: limestone, flinty or cherty limestone, and shales with gray, red, green-brown, purple, and yellow shades. The Fort Riley Formation consists of limestone and is the geologic unit that forms most of the outcrops visible within the boundaries of the installation. Loess deposits, which are windblown deposits of silt, are also found at FTRI. The loess deposits range in thickness from zero to 20 feet (USGS 2000; USACHPPM 2004; USACHPPM 2007; Malcolm Pirnie 2009).

2.7 Hydrogeology

The hydrogeology at FTRI is summarized on **Figure 2-4**. Groundwater at FTRI occurs in alluvial deposits of Quaternary age (approximately 1.8 million years ago to present) along the major streams and rivers and in the fissured, near-surface limestone of the upland areas (Fort Riley 2001b). The alluvial aquifer is unconfined and bounded on the sides and bottom by Permian age shale and limestone bedrock (USGS 2000). Where the saturated thickness of the alluvial aquifer ranges from 20 to 40 feet, well yields of 300 to 1,000 gallons per minute (gpm) are obtainable and yields in excess of 1,000 gpm can be obtained where the saturated thickness of the aquifer exceeds 40 feet (Fort Riley 2001b). Moderate quantities of groundwater occur in bedrock formations underlying the alluvial deposits, particularly the Fort Riley and Florence formations (Chase Group) and the Cottonwood Formation (Council Grove Group). Well yields of 100 gpm or more can be obtained in this bedrock aquifer (Fort Riley 2001a and 2001b; Malcolm Pirnie 2009). Groundwater is available in other bedrock units underlying the Chase and Council Grove groups; these regional groundwater sources are utilized as aquifers in other parts of Kansas. Near Fort Riley, these systems are isolated from the alluvial deposits and from most of the other bedrock aquifer systems by several shale units that act as low effective-porosity barriers (USACHPPM 2004; Malcolm Pirnie 2009).

The depth to groundwater in the alluvial aquifer is between 10 and 30 feet below ground surface (bgs); the depth to groundwater in the bedrock is approximately 60 to 100 feet bgs (Fort Riley 2001b; United States Department of Health and Human Services [USDHH] 1999). Groundwater elevations in the alluvial aquifers are affected primarily by the stage of the Kansas River and to a lesser extent by the stages of tributaries, ponds, and lakes and by infiltration from precipitation (USGS 2000; Malcolm Pirnie 2009).

Groundwater in the alluvial aquifer near the Kansas River generally flows to the southeast but can also be toward or away from the river depending on its stage. The Kansas River acts as a groundwater hydraulic boundary, even though the river does not fully penetrate the alluvial aquifer; however, a significant hydraulic stress (i.e., high-capacity water wells) can induce groundwater flow beneath the Kansas River. Additionally, the Republican River is a hydraulic boundary (USGS 2000; Malcolm Pirnie 2009).

For the majority of the installation, groundwater flows south and southeast toward the river (USDHH 1999). Topography, in conjunction with the interconnectedness of bedrock joints, fractures, and bedding planes, exerts strong influence over groundwater flow systems in the upper water-bearing bedrock formations (i.e., Fort Riley and Florence formations) (USACHPPM 2004). The deeper regional groundwater aquifer flow system underlying the Fort Riley and Florence formations may be less influenced by topography and may be primarily under the influence of the shallow regional dip to the west-northwest; thus, groundwater present in the regional groundwater aquifer is flowing to the west (USACHPPM 2004; Malcolm Pirnie 2009).

The alluvial aquifer is recharged through direct infiltration of precipitation, the Kansas and Republican rivers, and minimally from seepage from the underlying limestone bedrock. Recharge from precipitation and subsurface inflow and outflow from the underlying aquifer are approximately one to two orders of magnitude smaller than river seepage; thus, the rivers are the dominant factors in determining the direction and rate of groundwater flow in the alluvial aquifer. The majority of recharge from precipitation is directed to the local (shallow) groundwater system that discharges to Sevenmile Creek and Threemile Creek within the Upper Kansas Watershed and to Madison Creek and Milford Lake within the Lower Republican Watershed (Fort Riley 2001b; USDHH 1999; USGS 2000; Malcolm Pirnie 2009). The bedrock aquifer is recharged mainly by local precipitation and discharges to the Kansas River and along the margins of the upland through Sevenmile Creek, Wildcat Creek, and Threemile Creek within the Upper Kansas Watershed and to the Republican River and along the margins of the upland through Madison Creek and Fourmile Creek within the Lower Republican Watershed (USACHPPM 2007).

2.8 Surface Water Hydrology

The surface water hydrology at FTRI, including surface water bodies, flow directions, and watershed boundaries, is illustrated on **Figure 2-4**. The major rivers near FTRI are the Republican, Smoky Hill, Big Blue, and Kansas rivers. FTRI is located at the confluence of the Smoky Hill and Republican rivers, which combine to form the Kansas River. Downstream of the Smoky Hill River and Republican River confluence, the Kansas River flows in an easterly direction and eventually discharges into the Missouri River near Kansas City, Kansas, located approximately 120 miles to the east. The Republican River flows in a southeasterly direction and is located west of FTRI. The Republican River is impounded approximately one mile west of the installation, forming Milford Lake. The Big Blue River flows in a southeasterly direction and is located northeast of FTRI. The Big Blue River is impounded approximately five miles to the northeast of the installation's northeast boundary, forming Tuttle Creek Lake (USACHPPM 2007; Malcolm Pirnie 2009).

Approximately 145 miles of rivers and streams are on FTRI. Streams in the southern portion of FTRI drain to the south to the Republican, Smoky Hill, or Kansas rivers, which form the installation’s southern boundary. Streams in the western portion of FTRI drain to the southwest to Milford Lake on the Republican River. Streams in the northeastern portion of FTRI drain to the northeast to Wildcat Creek, a

Kansas River tributary (Fort Riley 2001a; Malcolm Pirnie 2009). Of the 14 streams that flow through portions of the installation, all are intermittent except for Wildcat, Sevenmile, and Madison creeks.

High water periods occur from late February through early June, and flooding may occur in the lowlands, along the Republican and Kansas rivers. Low water occurs from late October through January (USACHPPM 2007; Malcolm Pirnie 2009).

Based on a 1991 U.S. Fish and Wildlife Service wetlands inventory, FTRI has approximately 1,536 acres of wetlands. Approximately 972 acres are considered to be permanently inundated. The majority of the wetlands (748 acres) are riverine. Lacustrine and palustrine wetlands cover 431 and 270 acres of FTRI, respectively (Fort Riley 2001a; Malcolm Pirnie 2009). There are 29 recreational ponds located throughout FTRI and Milford Lake extends into the installation along Madison Creek (Malcolm Pirnie 2009). Milford Lake, the Republican River, the Kansas River, and many other area water bodies and rivers are used for fishing and boating (USDHH 1999).

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 at FTRI. Stormwater and wastewater discharges at FTRI are permitted under National Pollutant Discharge Elimination System Permit Kansas Permit Number F-KS97-PO02 (Federal Permit Number KS0096598), issued by the KDHE (FTRI 2016b; Kobach 2013).

2.9.1 Stormwater Management System Description

Storm and sanitary sewer systems are separate at FTRI, but minor infiltration and intrusion is possible (Pacific Northwest National Laboratory 2012). Storm drains at FTRI are not connected to any treatment system and discharge from outfalls that ultimately flow to the Kansas River. Stormwater management techniques at FTRI include, but are not limited to, diverting stormwater discharge into naturally vegetated swales in which water may infiltrate into soils and infrastructure designed to move stormwater away from source areas (FTRI 2016b).

2.9.2 Sewer System Description

Since late 2017, American States Utility Services, Inc. (ASUS) has been responsible for the operation and maintenance of the water and wastewater resources at FTRI (ASUS 2020). Most wastewater generated at FTRI is treated at the Camp Funston Advanced WWTP, which discharges to the adjacent Threemile Creek, a tributary of the Kansas River. Operations at the Camp Funston Advanced WWTP began in 2011. The influent is primarily domestic wastewater but also includes vehicle and aircraft maintenance area wastewater, other industrial process wastewater, and some septage (Kobach 2013). Sludge generated at the Camp Funston Advanced WWTP has been land-applied to multiple fields at the MPRC Biosolids Application Site since 2014.

Additionally, the MPRC Wastewater Lagoons (FTRI-026) are a non-discharging wastewater stabilization lagoon system that treats sanitary sewage from units associated with the MPRC. The lagoon network is composed of two primary cells and one inactive secondary cell that have been in operation since 1987 (Kobach 2013, United States Army Environmental Hygiene Agency 1988).

Historically, sanitary sewage was treated at the Custer Hill WWTP (FTRI-023), the Main Post WWTP (FTRI-025), the Camp Forsyth WWTP (FTRI-024), and the Former WWTP at Camp Funston (FTRI-022), as follows:

- The Custer Hill WWTP (FTRI-023) treated wastewater generated from the Custer Hill maintenance and housing areas from 1955 until 2005, when it was decommissioned and an advanced WWTP went into operation. In February 2018, the advanced WWTP at Custer Hill was converted to a pumping station. Based on historical documents, sludge generated at this WWTP was land-applied to the Camp Funston Biosolids Application Site (prior to 1996); Camp Forsyth (Original and Expansion), Firebreak 1, and Firebreak 10 Biosolids Application Sites (in the mid-2000s); and the MPRC Biosolids Application Site (2008 to 2018). In addition, sludge was disposed of at the Custer Hill Sanitary Landfill (FTRI-001) prior to 1993 and the Whitside Construction and Demolition (C/D) Landfill (FTRI-002) after 1993 until the landfill was closed in 2002. As of 2018, there was approximately 476 cubic yards of sludge stored on the Custer Hill WWTP sludge drying beds. The final fate of this material is unknown.
- The Main Post WWTP (FTRI-025) treated wastewater generated from the Main Post, the MAAF, Camp Whitside, and Camp Funston from 1940 until 2005 when it was decommissioned. Based on historical documents, sludge generated at the Main Post WWTP was land-applied to the Camp Funston Biosolids Application Site prior to 1996 and the Camp Forsyth (Original), Firebreak 1, Firebreak 9, and Firebreak 10 Biosolids Application sites in the mid-2000s. In addition, sludge was disposed of at the Custer Hill Sanitary Landfill (FTRI-001) prior to 1993 and the Whitside C/D Landfill (FTRI-002) after 1993, until landfill closure in 2002.
- The Camp Forsyth WWTP (FTRI-024) operated from 1945 until 2005 when it was decommissioned. Based on historical documents, sludge generated at this WWTP was land-applied to the Camp Forsyth (Original), Firebreak 1, and Firebreak 10 Biosolids Application Sites in the mid-2000s.
- The Former WWTP at Camp Funston (FTRI-022) operated from an unknown date until 1968 when the plant was decommissioned.

Industrial sewage generated at the wash rack facilities is treated at the Industrial Wastewater System at Custer Hill (FTRI-020), also called the Central Vehicle Wash Facility (CVWF) Lagoon System. The facility is an industrial wastewater treatment system for sediment, grit, oil, and wash water generated from the CVWF and Tactical Equipment Shop wash racks. The CVWF Lagoon System consists of the ‘‘Old Wash Rack Reservoir’’ and four lagoon cells. Occasional, controlled discharge occurs from the final cell in the lagoon system (Cell #4) to surface waters at a design/average flow of 0.0098 million gallons per day and emergency overflows may also occur from Cells #2 and #3 (Kobach 2013).

2.10 Potable Water Supply and Drinking Water Receptors

FTRI and the surrounding communities rely primarily on groundwater from the alluvial aquifer along the Republican and Kansas rivers for their primary source of drinking water. The surrounding communities adjacent to the installation that rely on groundwater for drinking water are Junction City to the south, Riley to the north, Grandview Plaza to the south, and Ogden to the southeast. The public supply wells for Junction City and Grandview Plaza are screened within the alluvium of the Republican River. The City of Ogden uses public supply wells screened within the alluvial aquifer of the Kansas River. Two rural water districts near the southern boundary of FTRI also rely on groundwater for drinking water: Geary County

Rural Water District #4 obtains water from one off-post supply well southwest of FTRI and Morris County Rural Water District #1 obtains water from three off-post supply wells southeast of FTRI. In addition, groundwater is used for domestic water supply in the surrounding area as well as for crop irrigation in the river valleys, which occurs mainly during the summer months. Thirty-seven public supply wells and 1,073 private supply wells, including 1,012 domestic and 61 irrigation wells, were identified within a 5-mile radius of FTRI based on the KGS Well Completion Records (WWC5) Database. The off-installation public and private supply wells located within a 5-mile radius of FTRI are shown on **Figure 2-5**.

FTRI currently has three on-installation public water systems (PWSs) (i.e., Main Post, MPRC, and Automatic Qualification Training [AQT]). Eight on-post supply wells provide pre-treatment water for the Main Post PWS. These supply wells are screened in alluvial deposits of the Republican River. Water levels in these water supply wells range from 15 to 25 feet bgs (Malcolm Pirnie 2009). One of two available bedrock wells supplies water for the MPRC PWS that serves approximately 650 people; the second bedrock well is inactive. The supply water at the AQT PWS is treated with chlorine only and supplies water to latrines and wash basins; there is no fountain or spigot designed for consumption and any ingestion at this location is assumed to be incidental. Two additional water supply wells are not permitted drinking water wells, but serve approximately 10 and 25 people, respectively, who are considered to be potential on-installation drinking water receptors. In addition, the MAAF has one well that is screened in bedrock and is utilized as an emergency water supply for firefighting and would require modification to use as a potable well.

2.11 Ecological Receptors

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

FTRI and the surrounding grasslands of the Flint Hills communities form a core habitat area for many species of plants and animals, including state and federally threatened, endangered, and protected species. The Bald and Golden Eagle Protection Act protects Bald eagles (Haliaeetus leucocephalus) and Golden eagles (Aquila chrysaetos) from any type of harm or disturbance. These animals have been seen on FTRI (Stantec 2017). There are three federal threatened or endangered species identified on FTRI including the Topeka shiner (*Notropis topeka*), Interior Least tern (*Sterna antillarum*), and Piping plover (*Charadrius melodus*). The Topeka shiner resides on FTRI for the entire year. The Interior Least tern and the Piping plover are rarely present (Fort Riley 2004a; Malcolm Pirnie 2009; Stantec 2017). Additionally, three other federal threatened or endangered species have the potential to occur within FTRI; Whooping crane (*Grus americana*), Northern long-eared bat (*Myotis septentrionalis*), Red knot (*Calidris canutus rufa*), and Monarch butterfly (Danaus plexippus) (Stantec 2017).

In 2000, the Kansas Department of Wildlife and Parks established state-designated habitat for the Topeka shiner. As of 2004, Honey Creek, Wildcat Creek, Wind Creek, Little Arkansas Creek, and Sevenmile Creek were state-designated critical habitat for the Topeka shiner (Fort Riley 2004a). Wildcat Creek and Sevenmile Creek contain sections of state-designated critical habitat for the Topeka shiner that are off-range and downstream of operational range areas. The Least tern and Piping plover critical habitats have been designated as all waters within the corridor along the Kansas River's main stem. The Sturgeon chub critical habitat has been designated as the Kansas River's main stem from its confluence

with the Republican River and the Smoky Hill River to its confluence with the Missouri River. Riverine, lacustrine, and palustrine wetlands down gradient and downstream of FTRI operational range areas are also considered sensitive environments (Malcolm Pirnie 2009).

Habitats existing on FTRI may be divided into two main types: terrestrial and aquatic. Many species will use only one of these categories; others will utilize habitats in both categories. Terrestrial habitats include native prairie, cool-season grassland, croplands planted as wildlife food plots or perimeter firebreaks, savanna, shelterbelts, and woodlands. Aquatic habitats include ponds, marshes, streams, reservoir coves, rivers, and sandbars (Fort Riley 2004b).

2.12 Previous PFAS Investigations

Previous (i.e., pre-PA) PFAS investigations relative to FTRI, including both those conducted and not conducted by the Army, are summarized to provide full context of available PFAS data for FTRI. However, only data collected by the Army will be used to make recommendations for further investigation. Historical sampling for PFAS, including PFOS, PFOA, and PFBS, in the on-installation drinking water was conducted in 2013 in response to the Third Unregulated Contaminant Monitoring Rule (UCMR3; USEPA 2012) and from 2016 to 2018 per IMCOM Operations Order 16-088. In 2013 only the Main Post PWS was sampled in response to the UCMR3. The historical PFAS analytical results are shown in **Table 2-1**. No PFAS compounds, including PFOS, PFOA, and PFBS, were historically detected above the laboratory reporting limits at the AQT PWS and the two non-permitted supply wells (Range 5 and Range 18). At the Main Post PWS, no PFAS compounds were detected above the laboratory reporting limits in 2013; however, detections were observed in 2017 and 2018 due to reduced laboratory reporting limits. In 2017 and 2018, the combined PFOS and PFOA concentration at the Main Post PWS was less than the United States Environmental Protection Agency's LHA or 70 ng/L and ranged from 4.43 ng/L to 8.95 ng/L and the PFBS concentration ranged from 2.48 ng/L to 5.52 ng/L. At the MPRC PWS, PFOS was detected at a concentration greater than the reporting limit and less than the LHA during one of five sampling events with a concentration of 2.30 ng/L. PFOA was detected during all five sampling events with concentrations ranging from 2.05 ng/L to 11 ng/L. PFBS was not detected greater than the reporting limit at the MPRC PWS. Off-installation, the Junction City PWS was analyzed for PFAS in 2015 per the UCMR3 and no PFAS were detected at concentrations greater than the reporting limits. Additionally, all samples collected per UCMR3 in 2015 within a 20-mile radius of FTRI were non detect for PFAS.

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 FTRI, data was collected from three principal sources of information :

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

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

3.1 Records Review

The records reviewed for this PA included, but were not limited to, various Installation Restoration Program (IRP) administrative record documents, compliance documents, FTRI fire department documents, FTRI Directorate of Public Works (DPW) documents, and GIS files. Internet searches were also conducted to identify publicly available and other relevant information. Environmental Data Resources, Inc. (EDR) is a third-party vendor that pulls data from a variety of environmental, state, city, and other publicly available databases for a referenced property. As a component of the PA, an EDR well search report was generated for FTRI and is provided as **Appendix E.** A list of the specific documents reviewed for FTRI 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 FTRI is presented below (affiliation is with FTRI unless otherwise noted).

- Agronomist/Certified Forester
- Recycling and Soil Waste Program Coordinator
- Fire Chief/Deputy Chief
- Lieutenant Chief
- Battalion Chief
- Conservation Chief
- Water Program Manager
- Lead Compliance Inspector
- Hazardous Waste Manager

- Hazardous Materials Manager
- Pollution Prevention Chief
- Airfield Operations Officer
- Pesticide Manager
- Public Affairs Officer
- Environmental Chief
- Installation Maintenance Officer
- GIS Manager

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

3.3 Site Reconnaissance

Site reconnaissance and visual surveys were conducted at the preliminary locations identified during the records review process, the installation in-brief meeting, and/or during the installation personnel interviews. Photos were taken during the reconnaissance to assist in verification of qualitative data collected. Access to existing groundwater monitoring wells, if present, were also noted during the site reconnaissance in case the monitoring wells could be proposed for site inspection sampling.

Preliminary locations of potential PFAS use, storage, and/or disposal 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. A summary of the observations made, and data collected through records reviews (**Appendix F**), installation personnel interviews (**Appendix G**), photo log from the site reconnaissance (**Appendix H)**, and site reconnaissance logs (**Appendix I**) during the PA process for FTRI is presented in **Section 4.** Further discussion regarding areas not retained for further investigation and those identified as AOPIs is presented in **Section 5.1** and **Section 5.2,** respectively.

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

FTRI 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 at DoD facilities. As such this section is organized to summarize the AFFF usage first and then all remaining potential PFAS sources in the subsequent section.

4.1 AFFF Use, Storage, and Disposal at FTRI

AFFF was historically used at FTRI for fire training activities. At the MAAF, two historical fire training areas were identified during the PA phase of this project: FFTA-MAAF (OU 004, FTRI-019) and FFTA–Building 892 (Gate 11) (FTRI-018). Four additional areas at the MAAF were identified to have been used for training and nozzle testing activities. Details of the activities that took place at each of these areas at the MAAF is described below:

- The FFTA-MAAF (OU 004, FTRI-019) was a crushed stone pad approximately 200 by 200-feet in size with no subsurface liner. Fire training activities occurred at this location from the mid-1960s until 1984. Flammable liquids were poured onto the pad, ignited, and extinguished with AFFF during training exercises.
- The FFTA-Building 892 (Gate 11) (FTRI-018) operated from 1988 until the early 2000s and consisted of a 75 by 75-foot concrete pad with a 6-foot concrete berm. Petroleum, oil, and lubricants were ignited and extinguished with AFFF during training exercises. The facility also contained two underground storage tanks permitted by the KDHE in which training materials were stored and residual materials were collected after the training exercises were completed.
- The Old Taxiway at the MAAF operated from at least 2000 until 2007. AFFF was applied to the helicopter stored in this area during fire training and practicals, after which the AFFF was flushed to the storm drains.
- Monthly nozzle testing occurred at Gate 8 at the MAAF from at least 2000 until 2007. These tests were performed on the structure trucks with bumper turrets prior to the use of the airport crash trucks. Generally, less than one gallon of AFFF was used during these testing events, but the exact amount used is unknown.
- Daily nozzle testing occurred at the Former Fire Station #3 (Building 743) at the MAAF, in the Building 770 parking lot, from the 1950s until 2010.
- Daily and/or weekly nozzle testing occurred at the Current Fire Station #3 (Building 706) at the MAAF from 2011 until 2016. In addition, approximately 30 gallons of Chemguard BC and Purple K are currently stored at the fire station.

Firefighter training activities historically occurred at two areas at Camp Funston:

- FFTA- Southwest Funston Landfill (SFL; FTRI-028) operated from 1950 until 1982 and consisted of a 150 by 200-foot elevated, large-diameter “drum.” Flammable liquids were poured into the drum and ignited during training activities. The site is located at the end of Well House Road, east of the SFL, and within 100-feet of Threemile Creek.
    - FFTA-Camp Funston was identified during site reconnaissance in preparation for the SI sampling event. The site was identified as a former training pit with piped in propane for firefighting exercises. AFFF use was not confirmed in this area. An adjacent helicopter shell was also used for fire training activities and AFFF use was confirmed to have been used approximately five to 10 times during training activities but was not used regularly due to its corrosive nature. The exact dates of AFFF release(s) in the area is unknown.

In addition to the AFFF use during fire training activities and/or nozzle testing at the MAAF and Camp Funston, AFFF was historically used and/or stored at several areas at the installation:

- On 18 July 2012, AFFF was released for approximately three minutes on an aircraft that blew over and was leaking fuel onto the apron near Building 817 at the MAAF. All materials released during this event drained to the sanitary sewer via a French drain and to the oil/water separator.
- AFFF was stored in Building 710 at the MAAF starting in 2016 and currently houses 26, 55-gallon drums of 3% AFFF concentrate.
- Hangar 723 at the MAAF currently houses 1,455 gallons of Buckeye 3% AFFF concentrate in a suppression system. The AFFF was removed and disposed of and replaced with a different foam in August 2018. Interviewees indicated that all foam bladders associated with the suppression system have minor leaks.
- AFFF was released into the pump room at Hangar 746 at the MAAF in late 2017 or early 2018. The remaining foam was replaced with different foam in September 2018. Interviewees indicated that all foam bladders associated with the suppression system have minor leaks.
- Hangar 837 at the MAAF houses 800 gallons of Chemguard 3% AFFF concentrate in a suppression system. In May 2017, the suppression system was found empty during a routine inspection. Water was used to flush residual foam concentrate into the sanitary sewer. Approximately 750 gallons of AFFF was released and the duration of the leak is unknown.
- Hangar 863 at the MAAF houses 900 gallons of Chemguard 3% AFFF concentrate in a suppression system. A release of AFFF occurred in this hangar in 2016. In late 2018, maintenance records indicated that the suppression system was found to have a broken bladder and contained no AFFF during foam replacement. In July 2020, a release of Solberg 3% AFFF C6 liquid concentrate occurred, expelling more than 10 gallons of foam concentrate from the suppression system. An unknown amount of foam drained into the combined storm drain/sanitary sewer.
- 300 gallons of Ansulite 3% AFFF was reported in the 2016 IMCOM AFFF inventory to be stored at Building 8313 at the Petroleum, Oil, and Lubricants Tank Farm at Custer Hill.
- AFFF was released from a crash truck in 2018 at the Building 8100 vehicle maintenance facility. The release occurred in the building and drained to the sanitary sewer system. Building 8100

typically houses at least one fire department vehicle throughout the year while maintenance is performed. Small amounts of AFFF were potentially released during maintenance activities and flushed out of the bays onto nearby paved surfaces and soil.

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

It was noted during a discussion with a USAEC Pest Management Consultant that the larger group of pesticides are generally not of PFAS concern. Specifically, products containing Sulfluramid (i.e., associated with insecticides) may have contained PFAS and were phased out in 1996. The USAEC Pest Management Consultant has records of pesticides used and stored at IMCOM installations, including FTRI, and did not identify FTRI as an installation having ever used or stored PFAS-containing pesticides/insecticides. Additionally, the PA team reviewed available pesticide use inventory documentation provided by the installation and did not identify any PFAS-containing pesticide/insecticide use, storage, or disposal at FTRI.

Other PFAS use, storage or disposal areas identified following document research, personnel interviews, and site reconnaissance at FTRI, were three current or former WWTPs, six current or former biosolids application sites, and three current or former landfills were identified as potentially receiving PFAS-containing waste materials and are summarized below.

The Main Post WWTP and Sludge Beds (FTRI-025) treated wastewater generated from the Main Post, the MAAF, Camp Whitside, and Camp Funston from 1940 until 2005 when it was decommissioned. AFFF use was confirmed at the MAAF and wastewater generated during historical releases at the MAAF would have drained to the Main Post WWTP via the sanitary sewer system.

The Custer Hill WWTP and Sludge Beds (FTRI-023) treated wastewater generated from the Custer Hill maintenance and housing areas from 1955 until 2005 when it was decommissioned and an advanced WWTP went into operation. In February 2018, the advanced WWTP at Custer Hill was converted to a pump station. The wastewater from a known AFFF release that occurred at Building 8100 would have discharged to this WWTP.

The Camp Funston Advanced WWTP is the current WWTP for FTRI and is located north and upgradient of the FFTA-SFL. Operations at this WWTP began in 2011 and recent AFFF foam usage at the MAAF would have discharged to this WWTP.

The MPRC Biosolids Application Site has been active since the 2000s and contains multiple fields for spreading biosolids. MPRC Fields 1, 2, 2A, 5, 6, 7, 7A, 7B, 8, and 9 received biosolids from the Camp Funston Advanced WWTP and/or the Custer Hill WWTP that potentially included PFAS-containing materials due to AFFF releases at the MAAF and Building 8100 at Custer Hill. The MPRC PWS is located upgradient (west-northwest) of this biosolids application site and had historical detections of PFOS, PFOA, and PFBS less than the OSD risk screening levels.

Five biosolids application sites received biosolids from the Main Post WWTP that potentially contained PFOS, PFOA, and PFBS due to AFFF releases at the MAAF. These biosolids application sites include:

- Firebreak 1: Field 1.09
- Firebreak 9: limited historical application records were available for Firebreak 9 and the specific fields on which biosolids were applied is not known.

- Firebreak 10: Fields 10.01, 10.05, 10.06, 10.07, and 10.11
- Camp Funston
- Camp Forsyth Original Site

Biosolids were land applied at these sites from approximately the mid-1990s through the mid-2000s with the exception of the Camp Funston Biosolids Application Site, which received biosolids prior to 1996.

The Whitside C/D Landfill (FTRI-002) is a closed, unlined landfill that operated from 1980 to 2002. Materials disposed of at the landfill consist primarily of traditional C/D debris such as wood, concrete, and metal, as well as smaller items such as appliances, drums (nonhazardous or empty), and organic/vegetative wastes. In 1982, potentially PFOS, PFOA, and PFBS -impacted soil excavated from FFTA-SFL (FTRI-028) was disposed at this landfill.

The Campbell Hill C/D Landfill is an active, unlined landfill that has been in operation since 2000. Soil and concrete onto which AFFF was released were excavated from the MAAF during remodeling activities that occurred in 2010, including the FFTA at the Old Taxiway, and disposed at this landfill.

The Custer Hill Sanitary Landfill (FTRI-001) is a closed, unlined landfill that received dried sludge from the Main Post WWTP (FTRI-025) between 1981 and 1994. Sludge potentially impacted by PFOS, PFOA, and PFBS from AFFF releases at the MAAF were treated at the Main Post WWTP during this timeframe and were disposed at this landfill.

Further discussion regarding areas not retained as AOPIs is presented in **Section 5.1.** Further discussion regarding areas retained as AOPIs is presented in **Section 5.2**.

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 FTRI) 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.

There are 13 fire stations within 5 miles of the installation boundary. The Junction City Fire Station and two Geary County Fire Stations are located approximately 1 mile from the southern installation boundary. The Grandview Plaza Fire Station is located approximately 1.5 miles from the southern installation boundary and west of the MAAF. The Milford Township Fire Station is located approximately 2 miles from the western installation boundary. The Wakefield Fire Station is located approximately 3 miles from the western installation boundary and the northwestern shoreline of Milford Lake. Two Riley County Fire Stations are located off the northern installation boundary, one approximately 1 mile north and one approximately 5 miles north. One Riley County Fire Station is located approximately 0.5 miles from the northeast installation boundary. Two Manhattan Fire Stations are located approximately 2.5 miles from the eastern installation boundary. One Ogden Fire Station is located approximately 1 mile east of the installation boundary. One Riley Country Fire Station is located approximately 2.5 miles from the southeastern installation boundary and the MAAF.

In 1977, a fatal military plane crash occurred near Grandview Plaza, Kansas, about a mile from FTRI, after taking off from the MAAF. The plane crashed into an oil refinery and firefighters poured thousands of gallons of foam and water on the plane and tank according to news reports.

Annual state-wide and regional fire training events occur at the Manhattan Regional Airport, located southeast of the installation boundary. There is no information regarding the historical occurrence of these trainings or materials used during training exercises.

Prescribed burns are common in the area, but historical research showed three grass fires that required emergency response. Two large grass fires occurred to the northwest of the installation boundary in 2012 and 2014. One large grass fire occurred in 2018 south of the installation. It is unlikely that foam was used to extinguish these historical fires, but it has not been confirmed.

There have been multiple historical fires at Kansas State University, located in Manhattan, Kansas and approximately 5 miles east of the installation boundary. The auditorium burned down in 1965 and required firefighter response. Nichols Hall burned down in 1968. A fire occurred in Anderson Hall in 1993 and was responded to by the Manhattan Fire Department. In 1993, a fire occurred at Wefald Hall, setting off an internal suppression system. Most recently, the roof of Hale Library caught fire in 2018, requiring firefighter response. It is unlikely that foam was used to extinguish these historical fires, but it has not been confirmed.

5 SUMMARY AND DISCUSSION OF PA RESULTS

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

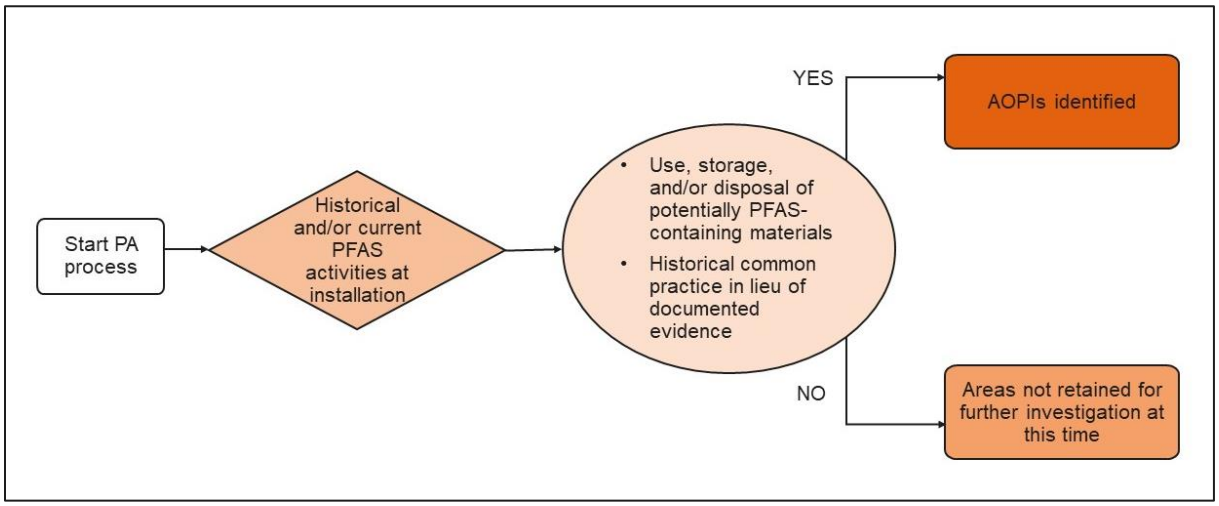

Figure 5-1: AOPI Decision Flowchart

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 FTRI are presented in **Section 10**.

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. If additional information is identified regarding PFAS use, storage, or disposal at FTRI, the Army may re-evaluate potential source areas in the future.

A brief site history and rationale for areas not retained for further investigation is 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
Incinerators (four areas)	1910 to present	The former and current incinerators on-installation include the Hospital Incinerator-Irwin ACH (FTRI-014), Old Incinerator Site SE-Camp Funston (FTRI-029), Old Whitside Incinerator Area (FTRI-037), and WWI Incineration NW Camp Funston (FTRI-074). There is no recorded use of AFFF at these locations or information pertaining to PFAS-containing materials being burned at these locations.	No documented use, storage, or disposal of PFAS-containing materials.
Former Pesticide Storage and Mixing Facilities (three areas)	1950 to 1980s	Former pesticide storage and mixing facilities on-installation include the Pesticide Storage Facility (FTRI-030 / OU-002: Former Building 348), Former Pesticide Facilities (FTRI-048: Buildings 292 and 6426), and Pesticide Underground Storage Tank at Camp Funston (FTRI-010). There are no records or pesticide release at these locations.	No documented use, storage, or disposal of PFAS-containing materials. Additionally, 1983 pesticide inventory did not have PFAS-containing pesticides.
Current Pesticide Storage and Mixing Facility (one area)	1980s to present	Building 349 is the current pesticide storage and mixing facility. It is well-kept with a retrieve and repump system, secondary containment, and sealed floors with no cracks or staining. Early versions of Round-Up® are used at FTRI and were identified as containing PFAS; however, there is no record of pesticide release.	No documented use, storage, or disposal of PFAS-containing materials. Building has a retrieve and repump system and secondary containment.
Photo and Print Plants (FTRI-045) (three areas)	Early 1940s to unknown	Print and Publications Shop was Building 263 on Main Post. Buildings 54 and 196 were also identified as print shops/photo labs. During use the photo and print plants produced waste associated with printing, there is no record of any releases of PFAS-containing material.	It is unlikely any PFOS, PFOA, and/or PFBS containing products were used, stored, or disposed of at this location.
Dry-Cleaning Facilities Area (FTRI-027 / OU 003) (one area)	1915 to 2002	The former Dry-Cleaning Facilities Area used tetrachloroethene as a dry-cleaning solvent which leaked into groundwater through leaky sewer lines. No indication of waterproofing activities.	No indication of waterproofing. No documented use, storage, or disposal of PFAS-containing materials.

Area Description	Dates of Operation	Relevant Site History	Rationale
Fire Locations (two areas)	1981 and 1988	One fire at the Normandy Chapel in 1981 and one at former furniture repair shop Building 1605 in 1988 caused serious damage to both buildings. No indication from either interviews or documentation that foam was used on either fire.	No documented use, storage, or disposal of PFAS-containing materials.
Abandoned Gasoline Line (FTRI-056) (one area)	1937 to 1951	1.1-mile steel pipeline used to transfer aviation gasoline from the railroad siding at the Main Post to the MAAF. Benzene and petroleum related constituents of concern. No record of PFAS-containing material or suppression system.	No documented use, storage, or disposal of PFAS-containing materials.
MAAF Vehicle Maintenance Shop (Building 866) (one area)	1984 to present	The shop provides maintenance for helicopters and small fixed-wing aircraft operating out of the MAAF. Bulk of the activities conducted at the shop are routine maintenance activities.	It is unlikely any PFAS-containing products were used, stored, or disposed. It is unknown if Teflon-containing high-performance engine lubricants were/are used here.
Vehicle Maintenance Shop, Former Artillery Gun Shed (Building 367) (one area)	2006 to present	Began serving as vehicle maintenance shop in 2006, with no documented AFFF being stored or used. Location known to have solvents.	It is unlikely any PFAS-containing products were used, stored, or disposed. It is unknown if Teflon-containing high-performance engine lubricants were/are used here.
Maintenance Hangar (Building 727) (one area)	1970s	Aviation Maintenance Hangar at the MAAF constructed over a wash rack facility.	No documented use, storage, or disposal of PFAS-containing materials.
Wash Rack Facilities (87 areas)	1984 to present	Eighty-seven wash rack facilities reported. No known chemical usage of concern.	Citrol II is the only permitted cleaner used at wash racks on post and is not a source of PFOS, PFOA, or PFBS.
354 Area Solvent Detections Site (one area)	1935 to 1990s	This site consists of a group of chlorinated solvent detections that were initially encountered around Building 354, which is no longer standing. There were solvents stored at the site, but it is unclear whether they were held in drums, underground or above ground storage tanks.	No documented use, storage, or disposal of PFAS-containing materials.

Area Description	Dates of Operation	Relevant Site History	Rationale
Fire Stations #1, #2, #4, #5 **(four areas)**	Fire Station #1, Fire Station #2, Fire Station #5: Unknown to present Fire Station #4: 1932 to present	Fire Station #1: Building 5000, Fire Station #2: Building 430, Fire Station #4: Building 1026A, Fire Station #5: Building 2620. Class A foam storage only. No Class B use or storage.	No documented use, storage, or disposal of PFAS-containing materials.
OB/OD Ground (Range 16; FTRI-009) **(one area)**	1941 to present	Used for emergency and training ordnance disposal. Open burn/open detonation (OB/OD) pits located on the range.	No documented use, storage, or disposal of PFAS-containing materials. It is unknown whether flares or other Teflon components were burned here.
Closed Landfills **(five areas)**	1880s to 1920s; mid-1950s to 1981; 1993 to 2000	Closed disposal areas for on-site debris: Southwest Funston Landfill (FTRI-003 / OU-001), Main Post Landfill (FTRI-004), Custer Hill Road Rubble Dump (FTRI-005), Forsyth Landfills (FTRI-038), Ellis Heights C/D Landfill. No documented disposal of known PFAS source debris placed in these landfills.	No documented use, storage, or disposal of PFAS-containing materials.
Waste Storage Defense Reutilization and Marketing Office Secondary Area (FTRI-006) **(one area)**	Approximately 1988	Concrete pad at Camp Funston used for storage of 55-gallon drums of waste fuels and oils.	No documented use, storage, or disposal of PFAS-containing materials.
Industrial Wastewater System (Custer Hill) (FTRI-020) **(one area)**	1986 to unknown	Wastewater treatment for facility wash racks. No chemicals of concern used at wash rack facilities to have impacted wastewater.	Citrol II™ is the only permitted cleaner used at wash racks and is not a PFAS-containing material.
Various WWTPs and Sludge Beds **(three areas)**	1955 to present	Wastewater treatment facilities that include Former WWTP and Sludge Beds (Anchor; FTRI-022), Forsyth WWTP and Sludge Beds (FTRI-024), and MPRC Wastewater Lagoons (FTRI-026). No documentation that PFAS-containing wastewater from proposed AOPIs went/goes to these facilities.	No documented use, storage, or disposal of PFAS-containing materials.

Area Description	Dates of Operation	Relevant Site History	Rationale
Historical Helicopter Crash Locations (two areas)	1958; 1963	FTRI crash trucks responded to the crash of a helicopter off-installation, in 1958, just east of the MAAF. Crash of helicopter in 1963 at the MAAF.	No documented use, storage, or disposal of PFAS-containing materials.

5.2 AOPIs

Overviews for each AOPI identified during the PA process are presented in this section. Eight of the AOPIs overlap with FTRI IRP sites and/or Headquarters Army Environmental System (HQAES) sites (**Figures 5-2a** and **5-2b**). 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 FTRI IRP sites have historically been investigated or are currently being investigated for the possible presence of PFAS.

The AOPI locations are shown on **Figures 5-2a** and **5-2b**. Aerial photographs of each AOPI that also show the approximate extent of AFFF use (if applicable) are presented on **Figures 5-3** through **5-13** and include active monitoring wells in the vicinity of each AOPI.

5.2.1 FFTA-MAAF (OU 004, FTRI-019, 20605.1019)

The FFTA-MAAF (OU 004, FTRI-019, 20605.1019) at the MAAF is identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical fire training activities (**Figure 5-3**). The area consisted of a bermed crushed stone pad approximately 200 by 200-feet with no subsurface liner. Flammable liquids (JP-4, diesel, motor gasoline [MOGAS], and gasoline) were poured into the pit, ignited, and then extinguished during training exercises with AFFF. There is a wet, low area to the east of the pit; runoff from the former pit was observed flowing into this low area into the environment by airfield personnel during pit operation. After 1984, a road and drainage ditch were constructed along the northern edge of the airfield and the grass-lined drainage ditch transects the former burn pit. Surface soil was excavated from portions of the FFTA-MAAF during road construction and was spread in nearby areas.

FFTA-MAAF was identified as an IRP site due to the likely release of hazardous substances to the environment. The primary materials used for fire training activities were petroleum hydrocarbons, including JP-4 diesel, and MOGAS. One release of tetrachloroethene is also documented. The primary constituents of concern in the area were petroleum and chlorinated organics such as benzene, toluene, ethylbenzene, xylenes, naphthalene, tetrachloroethene, trichloroethene, and 1,1-dichloroethylene. The site was closed in 2010 under a Remedial Action Completion Report. The current and anticipated future land use is industrial/commercial at the FFTA-MAAF.

5.2.2 FFTA-Building 892 (Gate 11) (FTRI-018, 20605.1018)

The FFTA-Building 892 (Gate 11) (FTRI-018, 20605.1018) at the MAAF was identified as an AOPI due to historical fire training activities (**Figure 5-3**). A former fire department burn pit, designated Building 892,

consisted of a 75 by 75-foot concrete pad with a 6-foot concrete berm where petroleum, oil, and lubricants were ignited and extinguished with AFFF during training exercises from 1988 to the early 2000s. The facility included two underground tanks permitted by KDHE: one to contain training materials (15,000 gallons) and one to collect residual materials after training exercises (1,000 gallons). Runoff from the pit was drained to an oil-water separator and the water was released to the sanitary sewer system but overspray and overflow released to the environment.

The FFTA-Building 892 (Gate 11) was identified as an IRP site due to historical fire training exercises. It initially received No Further Action status in 1989 but required additional sampling to be conducted in fiscal year 2008 to address improper site closure. Regulatory closure was received in January 2009. The current and anticipated future land use is industrial/commercial at the FFTA-Building 892 (Gate 11).

5.2.3 FFTA-Old Taxiway

The FFTA-Old Taxiway at the MAAF was identified as an AOPI due to historical fire training activities (**Figure 5-3**). It was a fire training site for helicopter fire training and practicals from approximately 2000 to 2007. An unknown amount of AFFF was used on the helicopter and flushed immediately to storm drains. In 2010, soil and concrete were excavated during airfield remodeling and taken to the Campbell Hill C/D Landfill. The current and anticipated future land use is industrial/commercial at the FFTA-Old Taxiway.

5.2.4 Former Fire Station #3 (Building 743)

The Former Fire Station #3 (Building 743) at the MAAF was identified as an AOPI due to historical nozzle testing (**Figure 5-3**). From the 1950s until 2010, the site was the location of daily nozzle testing directly outside of the fire truck bays and on the adjacent grass field from the 1950s until 2010. The amount of AFFF released during each nozzle testing is unknown. The current and anticipated future land use is industrial/commercial at the Former Fire Station #3 (Building 743).

5.2.5 Current Fire Station #3 (Building 706)

The Current Fire Station #3 (Building 706) at the MAAF was identified as an AOPI due to historical nozzle testing (**Figure 5-3**). The fire station was built in 2011 and became the location for daily and/or weekly nozzle testing until 2016 when all nozzle testing at FTRI ceased. The amount of foam used during the nozzle testing activities is unknown. Approximately 30 gallons of dry chemical (Chemguard BC and Purple K) are currently stored here. The current and anticipated future land use is industrial/commercial at the Current Fire Station #3 (Building 706).

5.2.6 Former Nozzle Testing Area (FNTA)-Gate 8

The FNTA-Gate 8 at the MAAF was identified as an AOPI due to the use of the area for historical nozzle testing between approximately 2000 to 2007 (**Figure 5-3**). It is the location at which historical monthly nozzle testing occurred. Generally, less than one gallon of AFFF concentrate was used during each test, which was performed on structure trucks with bumper turrets prior to the use of airport crash trucks. The current and anticipated future land use is industrial/commercial at the FNTA-Gate 8.

5.2.7 Building 817 Foam Release

Building 817 at the MAAF was identified as an AOPI due to AFFF use during an emergency fire response (**Figure 5-3**). An aircraft fire occurred on the apron outside of Building 817 in 2012. An aircraft blew over and was leaking fuel which resulted in foam being applied for three minutes. The release drained to the sanitary sewer system via a French drain and oil/water separator. The current and anticipated future land use is industrial/commercial at Building 817 at the MAAF.

5.2.8 Building 710 Foam Storage

Building 710 at the MAAF was identified as an AOPI due to AFFF storage (**Figure 5-3**). The Building 710 Foam Storage location currently stores twenty-six 55-gallon drums of 3% AFFF concentrate in a room with no secondary containment, no drain and no cracks; however, during the PA site visit slight staining was observed on the ground which is an indication of a potential release. The current and anticipated future land use is industrial/commercial at Building 710 at the MAAF.

5.2.9 Hangar 723

Hangar 723 at the MAAF was identified as an AOPI due to an AFFF suppression system (**Figure 5-3**). The suppression system stored 1,455 gallons of Buckeye 3% AFFF concentrate until the foam was replaced in 2018. Site interviews indicated all foam bladders associated with the suppression system had minor leaks. Near the hangars at the MAAF, wash water drains to the sanitary sewer system via a French drain and oil/water separator. The current and anticipated future land use is industrial/commercial at Hangar 723 at the MAAF.

5.2.10 Hangar 746

Hangar 746 at the MAAF was identified as an AOPI due to an AFFF suppression system (**Figure 5-3**). In late 2017 to early 2018 AFFF was released into the pump room. The remaining AFFF in the suppression system was replaced in 2018. Site interviews indicated all foam bladders associated with the suppression system had minor leaks. Near the hangars at the MAAF, wash water drains to the sanitary sewer system via a French drain and oil/water separator. The current and anticipated future land use is industrial/commercial at Hangar 746 at the MAAF.

5.2.11 Hangar 837

Hangar 837 at the MAAF was identified as an AOPI due to an AFFF suppression system (**Figure 5-3**). The Hangar 837 suppression system housed 800 gallons of Chemguard 3% AFFF concentrate and was found empty during a routine inspection in 2017 due to a leaking pipe. The system released approximately 750 gallons of AFFF concentrate during the release and was flushed with water to a sanitary sewer drain. Near the hangars at the MAAF, wash water drains to the sanitary sewer system via a French drain and oil/water separator. The current and anticipated future land use is industrial/commercial at Hangar 837 at the MAAF.

5.2.12 Hangar 863

Hangar 863 at the MAAF was identified as an AOPI due to an AFFF suppression system (**Figure 5-3**). The hangar suppression system of Hangar 863 housed 900 gallons of Chemguard 3% AFFF. One release was recorded in 2016 and one in 2018 when a broken bladder was identified as having no foam when the system was inspected prior to the replacement of all AFFF. Site interviews indicated all foam bladders have minor leaks. In July 2020, a release of Solberg 3% AFFF C6 liquid concentrate occurred, expelling more than 10 gallons of foam concentrate from the suppression system. An unknown amount of foam drained into the combined storm drain/sanitary sewer. Near the hangars at the MAAF, wash water drains to the sanitary sewer system via a French drain and oil/water separator. The current and anticipated future land use is industrial/commercial at Hangar 863 at the MAAF.

5.2.13 FFTA-SFL (OU 001, FTRI-028, 20605.1027)

The FFTA-SFL (FTRI-028, OU 001, 20605.1027) was identified as an AOPI due to historical fire training activities (**Figure 5-4**). The training area has been described as an elevated, large-diameter "drum", with an overall size of 150 by 200-feet, into which flammable liquids (e.g., JP-4, diesel, oil, MOGAS) were poured, ignited, and extinguished with AFFF. The top six inches of soil was removed from this site when it was closed in 1982 and was disposed in the Whitside C/D Landfill (FTRI-002). The site is located within 100-feet of Threemile Creek, at the end of Well House Road, off the western border of Camp Funston and east of the SFL.

The FFTA-SFL was identified as IRP site FTRI-028, called Former Fire Training Area Camp Funston, due to the use of fuels and/or solvents during fire training activities. The FFTA-SFL (FTRI-028) IRP site was located within the IRP site boundary for the SFL (FTRI-003) and received closure from USEPA Region VII and KDHE in 2007. The SFL (FTRI-003) is also identified as OU 001 and was identified as an IRP site due to the presence of volatile organic compounds. After completing the determined remedial actions which included institutional controls and implementation of land use controls, bank stabilization along the Kansas River banks, repairing and maintaining soil cover, and semiannual groundwater monitoring, a Remedial Action Completion Report was approved in 2010 and the site was transitioned to the long-term monitoring phase. KDHE and the USEPA have approved a reduced sampling strategy to every five years with annual cap inspections based on a recommendation report submitted by FTRI in May 2018 (FTRI 2009, FTRI 2016a, FTRI 2019). The current and anticipated future land use is industrial/commercial at the FFTA-SFL.

5.2.14 FFTA-Camp Funston

The FFTA-Camp Funston was identified as an AOPI due to historical fire training activities (**Figure 5-4**). The FFTA-Camp Funston was a former training pit to which propane was piped and the area was used for fire training exercises. It is unknown if AFFF was used during these training exercises at this area, although personnel interviews indicated it was unlikely. An adjacent helicopter shell was also used for fire training activities where the historical use/application of AFFF was confirmed. The exact dates of AFFF releases to this area is unknown and the installation personnel with knowledge of this area indicated AFFF was likely only released 5 to 10 times, as foam was not used for regular training activities due to its corrosive nature. The current and anticipated future land use is industrial/commercial at the FFTA-Camp Funston.

5.2.15 Camp Funston Advanced WWTP

The Camp Funston Advanced WWTP was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the treatment of wastewater potentially containing PFAS (**Figure 5-4**). The WWTP began operations in 2011 and it is currently the only active WWTP at FTRI. This WWTP received all recent foam releases at the MAAF. The current and anticipated future land use is industrial/commercial at the Camp Funston Advanced WWTP.

5.2.16 Camp Funston Biosolids Application Site

The Camp Funston Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-4**). Biosolids from the Main Post WWTP, which potentially contained PFAS due to historical releases of AFFF to the sanitary sewer system at the MAAF, were land-applied at this site prior to 1996. The Camp Funston Biosolids Application Site has three separate application fields, all of which historically received biosolids. The current and anticipated future land use is industrial/commercial at the Camp Funston Biosolids Application Site.

5.2.17 Whitside C/D Landfill (FTRI-002, 20605.1002)

The Whitside C/D Landfill (FTRI-002, 20605.1002) was identified as an AOPI following personnel interviews, and site reconnaissance due to disposal of soil and construction debris potentially containing PFAS (**Figure 5-5**). In 1982, the landfill received potentially PFAS-impacted soil excavated from FFTA-SFL (FTRI-028). The former C/D landfill operated from 1980 to 2002 and is unlined. Disposal consisted primarily of traditional C/D debris such as wood, concrete, and metal as well as smaller items such as appliances, drums (nonhazardous waste or empty), and organic/vegetative wastes.

The Whitside C/D Landfill (FTRI-002) was identified as an IRP site due to historical landfill activities and disposal of C/D debris materials. The site received No Further Action status in 1998, was closed and inspected by KDHE in 2002, and received regulatory closure in 2007. The current and anticipated future land use is industrial/commercial at the Whitside C/D Landfill.

5.2.18 Campbell Hill C/D Landfill

The Campbell Hill C/D Landfill was identified as an AOPI following personnel interviews, and site reconnaissance due to disposal of soil and construction debris potentially containing PFAS (**Figure 5-6**). The active unlined C/D landfill began operation in 2000 and received potentially PFAS-impacted soil and concrete excavation debris from the Old Taxiway at the MAAF after the airfield was remodeled in 2010. AFFF was used at the Old Taxiway during fire training exercises. The current and anticipated future land use is industrial/commercial at the Campbell Hill C/D Landfill.

5.2.19 Custer Hill Sanitary Landfill (FTRI-001, 20605.1001)

The Custer Hill Sanitary Landfill (FTRI-001, 20605.1001) was identified as an AOPI following personnel interviews, and site reconnaissance due to disposal of sludge potentially containing PFAS (**Figure 5-7**). The unlined landfill was active from 1981 to 1994 and received dried sludge from the Main Post WWTP

(FTRI-025), which potentially received Class B AFFF-containing wastewater due to fire training activities at the MAAF.

The landfill is an IRP site (FTRI-001) and has been historically monitored for volatile organic compounds and the Resource Conservation and Recovery Act 8 metals with arsenic being the primary constituent of concern. The site is currently open with groundwater monitoring scheduled through 2025. Post-closure requirements include annual inspection, reporting, cover maintenance and repair, and remediation of post closure groundwater contamination. The current and anticipated future land use is industrial/commercial at the Custer Hill Sanitary Landfill.

5.2.20 Custer Hill WWTP and Sludge Beds (FTRI-023, 20605.1022)

The Custer Hill WWTP and Sludge Beds (FTRI-023, 20605.1022) were identified as an AOPI following personnel interviews, and site reconnaissance due to treatment and storage of wastewater and sludge potentially containing PFAS (**Figure 5-7**). The former WWTP operated from 1955 until 2005 when it was decommissioned. It was converted to an advanced WWTP in March 2005, which was then converted to a pump station in February 2018. The WWTP treated wastewater generated from the Custer Hill maintenance and housing areas, including Building 8100 that had a release of AFFF to the sanitary sewer in 2018.

The Custer Hill WWTP and Sludge Beds (FTRI-023) were identified as an IRP site due to historical disposal activities. It was closed in 1989. The current and anticipated future land use is industrial/commercial at the Custer Hill WWTP and Sludge Beds.

5.2.21 Building 8313 Foam Storage (FTRI-053, CC-FTRI-001, 20605.1052)

The Building 8313 Foam Storage location (FTRI-053 / CC-FTRI-001) at Custer Hill was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to historical and current AFFF storage (**Figure 5-7**). It was reported in the 2016 IMCOM AFFF inventory that 300 gallons of Ansulite 3% was stored at Building 8313. It is unknown if this foam concentrate is currently stored at Building 8313.

The Building 8313 Foam Storage AOPI overlaps with the Petroleum, Oil, and Lubricants Tank Farm (FTRI-053 / CC-FTRI-001) IRP / Compliance Restoration site identified due to storage of petroleum products. The tank farm currently stores MOGAS, diesel, and slop oil. The constituents of concern include fuel and fuel-byproducts in soil and groundwater. The area is currently open and eight monitoring wells in the area are being monitored. The tank farm is scheduled to be decommissioned in 2023 at which time a full-scale Site Investigation will be initiated. The current and anticipated future land use is industrial/commercial at the Building 8313 Foam Storage AOPI.

5.2.22 Building 8100 Foam Release

The Building 8100 Foam Release location at Custer Hill was identified as an AOPI following personnel interviews, and site reconnaissance due to the release of AFFF from a crash truck during maintenance activities in 2018 (**Figure 5-7**). Building 8100 is currently a vehicle maintenance facility that typically houses at least one fire department vehicle throughout the year. Small amounts of AFFF were potentially released during maintenance activities and flushed out of the bays onto nearby paved surfaces and soil.

The foam from the 2018 release was drained to the sanitary sewer system in the building. The current and anticipated future land use is industrial/commercial at the Building 8100 Foam Release AOPI.

5.2.23 Main Post WWTP and Sludge Beds (FTRI-025, 20605.1024)

The Main Post WWTP and Sludge Beds (FTRI-025, 20605.1024) were identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the treatment and storage of wastewater and sludge potentially containing PFAS (**Figure 5-8**). The former WWTP operated from 1940 until 2005 when it was decommissioned. It treated wastewater generated from the Main Post, the MAAF, Camp Whitside, and Camp Funston areas. Historical foam releases at the MAAF drained to the sanitary sewer system into this WWTP.

The Main Post WWTP and Sludge Beds (FTRI-025) were identified as an IRP site due to historical WWTP activities. It was closed in 1993. The current and anticipated future land use is industrial/commercial at the Main Post WWTP and Sludge Beds.

5.2.24 MPRC Biosolids Application Site

The MPRC Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-9**). The MPRC Biosolids Application Site has been active since the 2000s and contains multiple fields for spreading biosolids. MPRC Fields 1, 2, 2A, 5, 6, 7, 7A, 7B, 8, and 9 received biosolids from the Camp Funston Advanced WWTP and/or the Custer Hill WWTP that potentially contained PFAS due to AFFF releases at the MAAF and Building 8100 Foam Release AOPI. The current and anticipated future land use is industrial/commercial at the MPRC Biosolids Application Site.

5.2.25 Firebreak 1 Biosolids Application Site

The Firebreak 1 Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-10**). Biosolids application records indicated that Field 1.09 received biosolids from the Main Post WWTP in 2005. The biosolids potentially contained PFAS due to historical releases of AFFF to the sanitary sewer system at the MAAF. The current and anticipated future land use is industrial/commercial at the Firebreak 1 Biosolids Application Site.

5.2.26 Firebreak 9 Biosolids Application Site

The Firebreak 9 Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-11**). Biosolids application records indicated that Firebreak 9 received biosolids from the Main Post WWTP in 2005; however, the records available were limited and the specific fields in which biosolids were applied is unknown. The biosolids potentially contained PFAS due to historical releases of AFFF to the sanitary sewer system at the MAAF. The current and anticipated future land use is industrial/commercial at the Firebreak 9 Biosolids Application Site.

5.2.27 Firebreak 10 Biosolids Application Site

The Firebreak 10 Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-12**). Biosolids application records indicated that Fields 10.01, 10.05, 10.06, 10.07, and 10.11 received biosolids from the Main Post WWTP in 2005. The biosolids potentially contained PFAS due to historical releases of AFFF to the sanitary sewer system at the MAAF. The current and anticipated future land use is industrial/commercial at the Firebreak 10 Biosolids Application Site.

5.2.28 Camp Forsyth Biosolids Application Site

The Camp Forsyth Biosolids Application Site was identified as an AOPI following records research, personnel interviews, and site reconnaissance due to the historical placement of biosolids potentially containing PFAS (**Figure 5-13**). Biosolids application records indicated that the Camp Forsyth Original Site (not the Expansion Site) received biosolids from the Main Post WWTP in 2004 and 2006. The biosolids potentially contained PFAS due to historical releases of AFFF to the sanitary sewer system at the MAAF. The current and anticipated future land use is residential at the Camp Forsyth Biosolids Application Site.

6 SUMMARY OF SI ACTIVITIES

Based on the results of the PA at FTRI, an SI for PFOS, PFOA, and PFBS was conducted in accordance with CERCLA. SI sampling was completed at FTRI at all 28 of the AOPIs to evaluate presence or absence of PFOS, PFOA, and PFBS in comparison with the OSD risk screening levels. As such, an installation-specific QAPP Addendum (Arcadis 2020a) 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 2012). The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil and groundwater 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 March and May 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 2020a) 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 FTRI. Non-conformances to the prescribed procedures in the PQAPP and QAPP Addendum are described in **Section 6.3.3**. 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 2020a), 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. SI sampling at locations at or in close proximity of the AOPIs and potable water wells did not delineate the extent of PFOS, PFOA, and PFBS impacts or identify the primary migration pathways for the chemicals.

This SI evaluated groundwater, drinking water, and soil for PFOS, PFOA, or PFBS presence or absence at each of the sampled AOPIs.

6.2 Sampling Design and Rationale

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

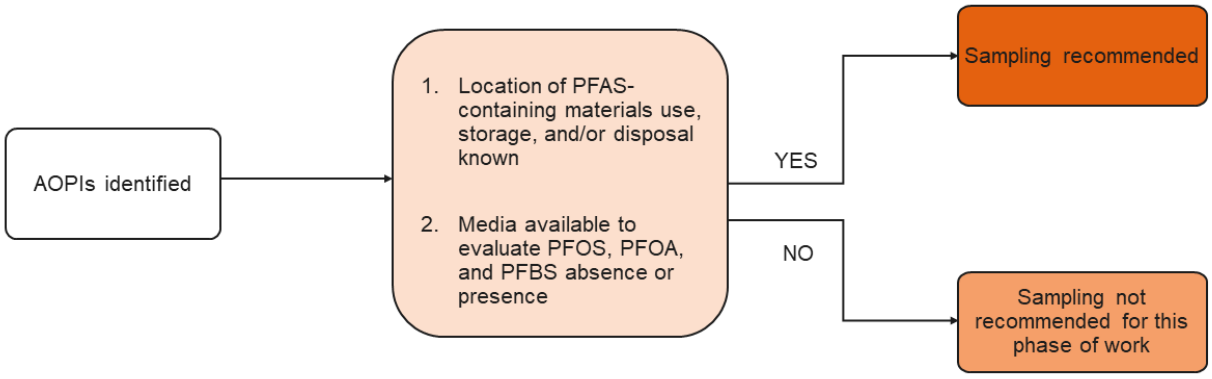

Figure 6-1: AOPI Sampling Decision Tree

The sampling design for SI sampling activities at FTRI is detailed in Worksheet #17 of the QAPP Addendum (Arcadis 2020a). Briefly, groundwater and soil samples were collected from on post drinking water production wells, existing monitoring wells, and soil borings at and downgradient of areas with known or suspected use, storage, and/or disposal of PFAS-containing materials. Soil and groundwater samples were analyzed for PFOS, PFOA and PFBS, and one soil sample from each AOPI was also analyzed for total organic carbon (TOC), pH, and grain size.

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

6.3 Sampling Methods and Procedures

Environmental data were collected and analyzed in accordance with the PQAPP (Arcadis 2019), the SOPs and TGIs included as Appendix A to the PQAPP, the QA/QC requirements identified in Worksheet #20 of the PQAPP, the approved scope and sampling methods outlined in the site-specific QAPP Addendum (Arcadis 2020a), and the safety procedures specified in the Accident Prevention Plan (Arcadis 2018) and SSHP (Arcadis 2020b). 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 2020a). 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

Groundwater samples were collected using low flow purging methods from approximately the center of the saturated screened interval at existing monitoring wells. At sampling locations where boreholes were advanced using direct push technology (DPT) or rotosonic methods using a top-down sampling method to minimize cross-contamination at depth. Shallow (first encountered) groundwater was sampled at each of these sampling points. DPT and Sonic borings were advanced to groundwater using two separate drill rigs (one for DPT and one for Sonic). DPT and Sonic boring advancement and sampling was completed in accordance with TGI P-12 in Appendix A to the PQAPP (Arcadis 2019).

Shallow soil samples (0 to 2 feet bgs) were collected at all locations using hand auger methods, in accordance with the TGI P-12 in Appendix A to the PQAPP (Arcadis 2019). Decontaminated stainless-steel trowels were used to collect soil from the borehole walls in the 0 to 2 feet bgs interval. In locations collocated with groundwater samples, borings were advanced via DPT or rotosonic drilling methods until groundwater was encountered. Upon completion of sampling, the boreholes were backfilled with the augured cuttings. Depending on field conditions, groundwater samples were collected with either a peristaltic pump, portable bladder pump with PFAS-free disposable high-density polyethylene tubing, or a PFAS-free disposable bailer through a screen-point sampler (Arcadis 2020a).

Decontamination procedures for non-dedicated equipment used during sampling are described in **Section 6.3.4**.

6.3.2 Quality Assurance/Quality Control

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

QA/QC samples were collected at the frequencies specified in the QAPP Addendum (Arcadis 2020a), 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 2020a). The decontaminated reusable equipment from which EBs were collected include drill casing and cutting shoes, hand augers, water-level meters, bladder pump, bladder, and bailer as applicable to the sampled media. Source blanks were collected from the water used to pressure-wash drill tooling. Analytical results for QA/QC samples are discussed in **Section 7.9**.

6.3.3 KDHE Split Sampling

KDHE requested split samples at selected groundwater monitoring well sampling locations including AGL-MW-03, B710-01, B817-01, FFTA-MAAF-01, FFTA-SFL-01, 1637CF95-05, and MPWWTP-01A KDHE representative was onsite during the first week of sampling and collected samples following the purging done by Arcadis. The samples collected by KDHE were analyzed by Pace Analytical Laboratories. The analytical results pages of the laboratory reports and a data validation memorandum from the USEPA are included in **Appendix M** to this report.

6.3.4 Dedicated Equipment Background

Dedicated equipment background (DEB) samples were collected at a frequency of one DEB per AOPI at AOPIs where groundwater sampling was conducted at existing monitoring wells that contained dedicated, down-hole equipment. When collecting samples from monitoring wells with dedicated, down-hole equipment, two water samples were taken from one monitoring well at each AOPI. One DEB sample was collected from the first water produced through the pump and tubing and was used to evaluate whether the dedicated equipment may be impacting the PFOS, PFOA, and/or PFBS results, as it is unknown if the dedicated equipment was comprised of PFOS, PFOA, and/or PFBS containing components. The parent sample was collected after the well was purged until the field parameters stabilized.

A DEB was collected from the first monitoring well sampled in the group of wells associated with the MAAF AOPIs, Camp Funston Advanced WWTP, Custer Hill Sanitary Landfill, Building 8313 Foam Storage, and drinking water supply wells, all of which contained dedicated down-hole equipment.

6.3.5 Field Change Reports

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

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

- The soil and groundwater samples slated to be collected at the second soil boring location at the Campbell Hill C/D Landfill (CHCD-02-SO and CHCD-02-GW) were not sampled due to unsafe conditions related to access. Significant rainfall that occurred during the sampling event caused muddy roads that were not accessible by the drill rig. The DQOs were unaffected by this change in scope due to the successful sampling of the AOPI at another location (CHCD-01-SO and CHCD-01-GW).
- A duplicate sample was unintentionally collected at B706-01-SO. After the initial sample was collected on 16 March 2020, an additional sample was collected within a one-foot radius of the DPT location. DQOs were unaffected by this scope change.
- DEB samples were previously identified as dedicated equipment background blanks in the QAPP Addendum due to programmatic changes that occurred after the development of the QAPP Addendum. In developing this PA/SI report, the word ‘blank’ was removed from the discussion of these samples. This sample is not to be used as a blank but was used to help inform where the dedicated equipment may have influenced PFOS, PFOA, and PFBS concentrations in the associated groundwater sample.
- A DEB was planned to be collected at monitoring well SFL92-301 but was not collected during the field work because the well did not have dedicated down-hole equipment.

- Field parameters (i.e., temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential) were not collected with groundwater samples that were collected using a bailer (CWCD-01, CWCD-02, CHCD-01, B8100-01, CHWWTP-01, FRBK1-01, and FRBK9-01).

6.3.6 Decontamination

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

6.3.7 Investigation-Derived Waste

IDW, including soil cuttings, groundwater, decontamination fluids, and disposable equipment were collected and placed in Department of Transportation-approved 55-gallon drums, labeled as non-hazardous, segregated by media (i.e., water, soil/sediment, and equipment), and transported to a staging area at FTRI for off-site disposal. Equipment IDW includes personal protective equipment and other disposable materials (e.g., gloves, plastic sheeting, Lexan tubes, and high-density polyethylene and silicon tubing) that may come in contact with sampling media.

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 Eurofins Lancaster Laboratories Environmental (ELLE) / Pace South Carolina (formerly Shealy Environmental Services, Inc.), an ELAP-accredited laboratory for PFAS analysis, including PFOS, PFOA, and PFBS analysis by LC/MS/MS. 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, surface water, and sediment samples using an analytical method that is ELAP-accredited and compliant with QSM 5.1.1 (DoD 2018) and 5.3 (DoD and Department of Energy 2019), Table B-15. Potable water samples were analyzed for 14 compounds, including PFOS, PFOA, and PFBS, according to USEPA Method 537 Version 1.1. in accordance with Worksheet #15 of the FTRI QAPP Addendum (Arcadis 2020a).

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 2020a) 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 LOD is defined as “the lowest concentration for reliable reporting of a non-detect of a specific analyte in a specific matrix with a specific method at 99 percent confidence” (DoD 2017). The lowest concentration of a substance that produces a quantitative result within specified limits of precision and bias is known as the limit of quantitation (LOQ; DoD 2017). Concentrations detected between the LOD and LOQ, therefore, are considered estimates and are qualified as such on laboratory analytical reports. Instrument-specific detection limits (e.g., the smallest analyte concentration that can be demonstrated to be different from zero or a blank concentration with 99 percent confidence; DoD 2017), as provided for each analyte by the laboratory, are reported along with the LODs and LOQs in the laboratory analytical reports included in the DUSR (**Appendix O**).

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 5.1.1 (DoD 2018) and 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 O**.

6.4.3 Data Usability Assessment and Summary

A data usability assessment was completed for all analytical data associated with SI sampling at FTRI. Documentation generated during the data usability assessments, which were compiled into a DUSR (**Appendix O**), was prepared in accordance with the USACE Engineer Manual 200-1-10 (USACE 2005), the Final DoD General Data Validation Guidelines (DoD 2019) and the Final DoD Data Validation 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 FTRI 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 O**), and as indicated in the full analytical tables (**Appendix P**) provided for the SI results. All results, except for the rejected result of N-MeFOSAA for sample location FTRI-FRBK10-01-SO-(0-2)-03112020, are considered valid and usable. The results that are qualified as estimated are usable with caution. These data are of sufficient quality to meet the objectives and requirements of the PQAPP (Arcadis 2019) and FTRI QAPP Addendum (Arcadis 2020a). Data qualifiers applied to laboratory analytical results for samples collected during the SI at FTRI are provided in the data tables, data validation reports, and the Data Usability Summary Table located at the end of the DUSR. Qualifiers for data shown on figures are defined in the notes of the figures. Data qualifiers applied to laboratory analytical results for samples collected during the SI at FTRI are defined below:

- U – The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
- DJ – The compound was analyzed at dilution and the result is an estimated quantity.
- EDJ – The compound was analyzed at dilution and the result is an estimated quantity; however, the reported result is above the limit of the calibration range.
- J – The compound was positively identified; however, the associated numerical value is an estimated concentration only.
- J+ – The result is an estimated quantity and may be biased high.
- J- – The result is an estimated quantity and may be biased low.
- UJ – The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation (LOQ).
- UJ- – The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual LOQ. The result may be biased low.
- R – The result is rejected.

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 values are shown in **Table 6-2**.

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

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

Notes:

1. Risk screening levels for tap water and soil provided by the OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15 (**Appendix A**).
2. All soil data will be screened against both the Residential Scenario and Industrial/Commercial risk screening levels (if collected from less than 2 feet below ground surface), 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/or WWTP effluent data for this Army PFAS PA/SI. While the current and most likely future land uses of the AOPIs at FTRI are industrial/commercial, both residential and industrial/commercial soil risk screening levels for PFOS, PFOA, and PFBS will be used to evaluate detected soil concentrations. The data from the SI sampling event are compared to the OSD risk screening levels in **Section 7**. If concentrations of PFOS, PFOA, or PFBS are detected greater than the applicable OSD risk screening levels, further study in a remedial investigation is recommended in **Section 9**.

7 SUMMARY AND DISCUSSION OF SI RESULTS

This section summarizes the analytical results obtained from samples collected during the SI at FTRI (field duplicate results are provided in the associated tables). Sampled media and QA/QC samples were analyzed for the constituents prescribed per Worksheet #18 of the QAPP Addendum (Arcadis 2020a). The sample results discussion below focuses on the PFOS, PFOA, and PFBS analytical results because they have applicable 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 **7-4** provide a summary of the groundwater, soil, WWTP effluent, and drinking water, analytical results for PFOS, PFOA, and PFBS. **Table 7-5** summarizes AOPIs and whether their SI results exceed the OSD risk screening levels. **Appendix P** includes the full suite of analytical results for these media, as well as for the QA/QC samples. An overview of AOPIs at FTRI with OSD risk screening level exceedances is depicted on **Figure 7-1**. **Figures 7-2a** through **7-12** show the PFOS, PFOA, and PFBS analytical results for groundwater, WWTP effluent, and soil for each AOPI. Drinking water and supply well analytical results are not shown on a figure in consideration of Operations Security. Non-detected results are reported as less than the LOQ. Detections of PFOS, PFOA, and/or PFBS greater than or equal to the OSD risk screening levels are highlighted in summary tables and on figures. The OSD risk screening levels for PFOS, PFOA, and PFBS are conservative to be inclusive of any current and potential future land use scenario noted for each AOPI in **Section 5.2** (i.e., residential or industrial/commercial [**Table 6-2**]) (OSD 2021). The current and anticipated future land use is industrial/commercial for all AOPIs at FTRI with the exception of the Camp Forsyth Biosolids Application Site, which is residential; however, to be conservative all sampling results were compared to the residential scenario risk screening level (**Table 6-2**) to consider a potential (but unlikely) future residential use. Final qualifiers applied to the data by the laboratory and the Arcadis project chemist (as defined in **Section 6.4.3**) are presented on the analytical tables. Groundwater and drinking 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 J**. Soil and sediment lithological descriptions are provided on the field forms in **Appendix K**. The results of the SI are presented by AOPI or AOPI group (e.g., MAAF AOPIs) and discussed for each medium as applicable.

Table 7-5 AOPIs and OSD Risk Screening Level Exceedances

AOPI Name	OSD Exceedances (Yes/No)
FFTA-MAAF (OU 004, FTRI-019, 20605.1019)	Yes
FFTA-Building 892 (Gate 11) (FTRI-018, 20605.1018)	Yes
FFTA-Old Taxiway	No
Former Fire Station #3 (Building 743)	Yes
Current Fire Station #3 (Building 706)	Yes
Building 817 Foam Release	No
FNTA-Gate 8	Yes

AOPI Name	OSD Exceedances (Yes/No)
Building 710 Foam Storage	No
Hangar 723	No
Hangar 746	No
Hangar 837	Yes
Hangar 863	Yes
FFTA-SFL (OU 001 FTRI-028, 20605.1027)	Yes
FFTA-Camp Funston	No
Camp Funston Advanced WWTP	No
Camp Funston Biosolids Application Site	No
Whitside C/D Landfill (FTRI-002, 20605.1002)	Yes
Campbell Hill C/D Landfill	Yes
Building 8313 Foam Storage (FTRI-053, CC-FTRI-001, 20605.1052)	Yes
Building 8100 Foam Release	No
Custer Hill WWTP and Sludge Beds (FTRI-023, 20605.1022)	No
Custer Hill Sanitary Landfill (FTRI-001, 20605.1001)	Yes
Main Post WWTP and Sludge Beds (FTRI-025, 20605.1024)	No
Firebreak 1 Biosolids Application Site	No
Firebreak 9 Biosolids Application Site	No
Firebreak 10 Biosolids Application Site	No
MPRC Biosolid Application Site	No
Camp Forsyth Biosolid Application Site	No

7.1 MAAF AOPIs

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the 12 AOPIs at the MAAF. The maximum concentrations of PFOA and PFBS in groundwater and PFOS, PFOA, and PFBS in soil at FTRI were observed at the MAAF. The MAAF is located near the southeast installation boundary adjacent to the Kansas River. Groundwater at the MAAF occurs within the alluvial aquifer of the Kansas River. The area is underlain by approximately 70 feet of unconsolidated alluvial deposits, which are predominantly sand with occasional clay and silt layers and some gravel (Burns and McDonnell 2001). During SI sampling, depth to groundwater was observed to be between 18 and 27 feet bgs at the MAAF groundwater sampling locations. Groundwater at the MAAF

generally flows north-northeast, parallel to the Kansas River. However, closer to the Kansas River, on the western portion of the MAAF, groundwater flow direction is variable and may flow towards or away from the river depending on the stage of the river (USGS 2000, Burns and McDonnell 2001). Seven AOPIs are located on the western or northwestern portions of the MAAF, within 1,500 feet of the Kansas River, while five AOPIs are in the north-central or eastern portions of the MAAF, farther than 1,500 feet from the Kansas River. PFOS, PFOA, and PFBS analytical results for groundwater and soil sampling locations collected from the AOPIs located in western portion of the MAAF are shown on **Figure 7-2a**. Analytical results for groundwater and soil samples collected from the AOPIs on the northern portion of the MAAF are shown on **Figure 7-2b**. Analytical results for groundwater and soil samples collected from the AOPIs on the southeastern portion of the MAAF are shown on **Figure 7-2c**.

7.1.1 Groundwater

Groundwater sampling was conducted at the MAAF at 12 DPT borings (one in each of the AOPI sources areas) and at two downgradient existing monitoring wells located approximately 250 feet from the Kansas River. **Figures 7-2a** through **7-2c** and **Table 7-1** show the analytical results for groundwater sampling locations at the MAAF. Groundwater samples were collected at the first-encountered groundwater, ranging from 18 feet bgs to 27 feet bgs, in the DPT borings. At the existing monitoring wells, the depth to groundwater ranged from approximately 22.5 feet bgs to 25 feet bgs at the time the samples were collected. PFOS, PFOA, and PFBS were not detected in groundwater at the boring located at the Building 817 Foam Release AOPI (B817-01). All other groundwater sampling locations at the MAAF had detections of PFOS, PFOA, and/or PFBS.

PFOS was detected in groundwater at seven of 12 borings and both monitoring wells at the MAAF. At four borings and both monitoring wells (i.e., FFTA-MAAF-01, B743-01, B863-01, B892-01, AGL-MW-03, and AGL-MW-05), concentrations of PFOS exceeded the OSD risk screening level for tap water with concentrations ranging from 80 J- ng/L at B863-01 to 840 J- ng/L at B892-01.

PFOA was detected in groundwater at ten of 12 borings and both monitoring wells at the MAAF. At five borings and both monitoring wells (i.e., B743-01, B837-01, B863-01, B892-01, G8-01, AGL-MW-03, and AGL-MW-05), concentrations of PFOA exceeded the OSD risk screening level for tap water with concentrations ranging from 40 J ng/L at G8-01 and 30,000 DJ ng/L at AGL-MW-05. Of these seven groundwater sampling locations, both PFOS and PFOA were detected above the OSD risk screening levels with the exception of boring B837-01 at which PFOS was not detected and PFOA was detected at 1,100 DJ ng/L.

PFBS was detected in 11 of 12 borings and both monitoring wells at the MAAF. At five monitoring wells (i.e., B743-01, B706-01, B892-01, AGL-MW-03, and AGL-MW-05), concentrations of PFBS exceeded the OSD risk screening level for tap water (600 ng/L) with concentrations ranging from 750 J- ng/L at B892-01 to 14,000 DJ ng/L at B743-01. PFBS was not detected in groundwater at boring B817-01.

KDHE split samples were collected at four groundwater monitoring well sampling locations at the MAAF: three borings (FFTA-MAAF-01, B710-01, and B817-01) and one monitoring well (AGL-MW-03). The reproducibility between the parent sample and the split sample was good (i.e., less than 35% relative percent difference) at all four locations. The KDHE split sample results are included in **Appendix M**.

Generally, the highest concentrations of PFOA and PFBS in groundwater at the MAAF are observed on the western side of the MAAF, closer to the Kansas River, while PFOS concentrations in groundwater are highest on the eastern side of the MAAF. The FFTA-MAAF AOPI is located closest to the downgradient installation boundary and had a PFOS concentration in groundwater greater than the OSD risk screening level with a concentration of PFOS at 300 DJ ng/L. Based on the results of the SI at these locations, an off-post private well investigation was initiated. Further discussion of the results of this investigation is summarized in **Section 8.**

7.1.2 Soil

Soil sampling was conducted at the MAAF at 36 borings with three borings located at each AOPI within the potential source area. Composite soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figures 7-2a** through **7-2c** and **Table 7-2** show the analytical results for soil sampling locations at the MAAF AOPIs. PFOS, PFOA, and PFBS were not detected in soil at the three borings located at the Building 817 Foam Release AOPI (B817-01, B817-02, and B817-03). All other soil sampling locations at the MAAF AOPIs had detections of PFOS, PFOA, and/or PFBS. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at the MAAF AOPIs (**Table 6-4**). The concentrations of PFOA and PFBS in soil at the MAAF AOPIs did not exceed their respective OSD risk screening levels. Concentrations of PFOS exceeded the OSD residential risk screening level but were less than the OSD industrial/commercial risk screening level at two AOPIs: FFTA-MAAF and Former Fire Station #3 (Building 743). At the FFTA-MAAF AOPI, PFOS exceeded the OSD risk screening level at one location with a concentration of 0.290 DJ mg/kg. At the Former Fire Station #3 (Building 743), PFOS exceeded the OSD risk screening level at three locations with concentrations ranging from 0.420 DJ mg/kg to 0.790 DJ mg/kg.

Concentrations of PFOS were detected at 32 soil sampling locations and ranged from 0.00071 J mg/L at B863-02 to 0.790 DJ mg/kg at B743-03. Concentrations of PFOA were detected at 18 soil sampling locations and ranged from 0.00051 J mg/kg at B746-01 to 0.019 mg/kg at B706-01. PFBS was detected in soil at only one location, B706-03, at a concentration of 0.0058 mg/kg. The maximum PFOS, PFOA, and PFBS concentrations in soil at the MAAF were observed at the current and former fire station AOPIs where daily and/or weekly nozzle testing was conducted.

7.2 Camp Funston AOPIs

The subsections below summarize the groundwater, soil, and WWTP effluent PFOS, PFOA, and PFBS analytical results associated with four AOPIs located within the Camp Funston cantonment area:

- FFTA-SFL
- FFTA-Camp Funston
- Camp Funston Biosolids Application Site
- Camp Funston Advanced WWTP

The Camp Funston AOPIs are located near the southeast installation boundary adjacent to the Kansas River. Groundwater at the Camp Funston AOPIs occurs in the alluvial aquifer of the Kansas River and

generally flows east-southeast towards the Kansas River. Groundwater flow in this area is influenced by the stage of the Kansas River and groundwater inflow from bedrock. Threemile Creek, a tributary of the Kansas River, interacts with shallow groundwater according to the stage of the creek; it does not act as a hydraulic barrier and groundwater can flow southeast under the creek towards the Kansas River (USGS 2000). The FFTA-SFL and Camp Funston Advanced WWTP AOPIs are located west of Threemile Creek while the Camp Funston FFTA and Camp Funston Biosolids Application Site AOPIs are located east of Threemile Creek. During SI sampling, depth to groundwater was observed to be between 14 and 23 feet bgs.

7.2.1 Groundwater

Groundwater sampling was conducted at Camp Funston at one DPT boring located in the potential source area of the FFTA-SFL AOPI and eight existing monitoring wells. Four of the existing monitoring wells sampled were located east of Threemile Creek within or downgradient of the Camp Funston FFTA and the Camp Funston Biosolids Application Site. The other four existing monitoring wells sampled were located west or immediately east of Threemile Creek, downgradient of the FFTA-SFL and/or the Camp Funston Advanced WWTP. **Figure 7-3** and **Table 7-1** show the analytical results for groundwater sampling locations at the Camp Funston AOPIs.

The maximum PFOA and PFBS concentrations in groundwater were observed west of Threemile Creek with the highest PFBS concentration at the FFTA-SFL AOPI and the highest PFOA concentrations at downgradient monitoring wells located at the SFL. The maximum PFOS concentration was observed east of Threemile Creek at the southernmost sampled monitoring well, closest to the Kansas River.

At the boring located within the FFTA-SFL AOPI (FFTA-SFL-01), concentrations of PFOS, PFOA, and PFBS in groundwater were less than the OSD risk screening levels (PFOS at 4.6 ng/L, PFOA at 7.8 ng/L, and PFBS at 20 ng/L).

At the four monitoring wells located east of Threemile Creek (1245MW07-10, 1637CF95-05, CF97-101, and CF99-901), PFOS, PFOA, and/or PFBS were detected at concentrations below the OSD risk screening levels. PFOS was detected at concentrations of 2.6 J ng/L at CF99-901 and 28 ng/L at 1637CF95-05. PFOA was detected at concentrations of 2.8 ng/L at 1637CF95-05 and 20 ng/L at CF97-101. PFBS concentrations were detected at 1245MW07-10, 1637CF95-05, and CF99-901 with concentrations ranging from 1.4 J ng/L at 1637CF95-05 to 11 J- ng/L at 1245MW07-10.

At the four monitoring wells located west or immediately east of Threemile Creek (SFL92-301, SFL92-601, SFL92-803, and SFL93-903), PFOS, PFOA, and/or PFBS were detected at concentrations less than the OSD risk screening levels with the exception of PFOA at monitoring wells SFL92-301 and SFL92-601, which exceeded the OSD risk screening level at a concentration of 110 J- ng/L at both locations. PFOS was detected in groundwater at concentrations less than the OSD risk screening level in two of the four monitoring wells (8.0 ng/L at SFL92-803 and 13 ng/L at SFL97-903). Concentrations of PFOA in groundwater exceeded the OSD risk screening level in two of the four monitoring wells (110 J- ng/L at SFL92-301 and SFL92-601); concentrations of PFOA ranged from 2.1 J ng/L to 110 J- ng/L. PFBS was detected in groundwater at concentrations less than the OSD risk screening level at all four monitoring wells with concentrations ranging from 3.8 ng/L to 17 ng/L.

KDHE split samples were collected from one boring at the FFTA-SFL (FFTA-SFL-01) and one monitoring well located within the Camp Funston Biosolids Application Site (1637CF95-05). The reproducibility of PFOS, PFOA, and PFBS results between the parent sample and the split sample was good (i.e., less than 35% relative percent difference) at all four locations. The KDHE split sample results are included in **Appendix M.**

7.2.2 Soil

Soil sampling was conducted at the potential source areas associated with three AOPIs at Camp Funston: FFTA-SFL, FFTA-Camp Funston, and Camp Funston Biosolids Application Site. Soil sampling was not conducted at the Camp Funston WWTP AOPI since the potential PFOS, PFOA, and PFBS release would result from wastes as they move through the WWTP/associated infrastructure and there were no reported or suspected uses, storage, and/or disposal of WWTP wastes to surface soil in the general area of the WWTP. Composite soil samples were collected from 0 to 2 feet bgs using a hand auger from a total of 11 borings. **Figure 7-3** and **Table 7-2** show the analytical results for soil sampling locations at the Camp Funston AOPIs. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at the Camp Funston AOPIs (**Table 6-4**). The concentrations of PFOS, PFOA, and PFBS in soil at the Camp Funston AOPIs did not exceed their respective OSD risk screening levels. PFBS was not detected in soil at any of the Camp Funston AOPIs. The maximum PFOS and PFOA concentrations in soil at Camp Funston were observed at the FFTA-Camp Funston AOPI, which is located east of Threemile Creek.

Four soil borings were located at the FFTA-SFL AOPI. At this AOPI, PFOA and PFBS were not detected in soil. PFOS was detected at concentrations below the OSD risk screening level at three of four sampling locations with concentrations ranging from 0.0011 mg/kg at FFTA-SFL-01 to 0.0056 mg/kg at FFTA-SFL-03.

Three soil borings were located at the FFTA-Camp Funston AOPI. PFOS and PFOA were detected at concentrations less than the OSD risk screening level at all three soil sampling locations. Concentrations of PFOS ranged from 0.067 mg/kg at FFTA-CF-02 to 0.120 mg/kg at FFTA-CF-01. Concentrations of PFOA ranged from 0.0012 mg/kg at FFTA-CF-01 to 0.0026 mg/kg at FFTA-CF-03. PFBS was not detected at this AOPI.

PFOS, PFOA, and PFBS were not detected in soil at the Camp Funston Biosolids Application Site AOPI.

7.2.3 WWTP Effluent

The effluent from the Camp Funston Advanced WWTP was sampled at the outfall during the SI (CFWWTP-EFF). The outfall flows into Threemile Creek upstream of the FFTA-SFL AOPI. Concentrations of PFOS, PFOA, and PFBS in the effluent sample were detected below the OSD residential tap water risk screening levels with concentrations of PFOS at 5.7 ng/L, PFOA at 10 ng/L, and PFBS at 10 ng/L. Field duplicate sample results were similar with concentrations of PFOS at 5.6 ng/L, PFOA at 10 ng/L, and PFBS at 9.5 ng/L. **Figure 7-3** and **Table 7-3** show the analytical results for the WWTP effluent sample at the Camp Funston Advanced WWTP AOPI.

7.3 C/D Landfill AOPIs

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with two C/D landfills at FTRI: Camp Whitside C/D Landfill and Campbell Hill C/D Landfill. The C/D Landfill AOPIs are located in the southeast portion of FTRI. In relation to the Camp Funston AOPIs (discussed in **Section 7.2**), the Camp Whitside C/D Landfill is located approximately 2 miles west and the Campbell Hill C/D Landfill is located approximately 1 mile north. Groundwater at both C/D landfills occurs in the limestone and shale bedrock aquifer of the Chase group and generally flows east-southeast towards the Kansas River. Groundwater originating from these AOPIs likely flows laterally into the alluvial aquifer of the Kansas River at the walls of the Kansas River Valley (USGS 2000). During SI sampling, depth to groundwater was observed to be between 50 and 59 feet bgs at the Camp Whitside C/D Landfill and 41 feet bgs at the Campbell Hill C/D Landfill.

7.3.1 Groundwater

Groundwater sampling was conducted at two sonic borings at the Camp Whitside C/D Landfill (CWCD-01 and CWCD-02) and one sonic boring at the Campbell Hill C/D Landfill (CHCD-01). Due to site accessibility affecting field personnel safety, only one of two planned sonic borings were drilled at the Campbell Hill C/D Landfill. Groundwater samples were collected at first-encountered groundwater, or 52 feet bgs at CWCD-01, 60 feet bgs at CWCD-02, and 45 feet bgs at CHCD-01. **Figure 7-4** and **Table 7-1** show the analytical results for groundwater sampling locations at the Camp Whitside C/D Landfill. **Figure 7-5** and **Table 7-1** show the analytical results for groundwater sampling locations at the Campbell Hill C/D Landfill.

At the Camp Whitside C/D Landfill, PFOS, PFOA, and PFBS were detected in groundwater at both sonic borings. Concentrations of PFOS and PFOA were greater than the OSD risk screening levels. PFOS concentrations ranged from 87 J- ng/L at CWCD-02 to 160 J- ng/L at CWCD-01. PFOA concentrations ranged from 94 J- ng/L at CWCD-01 to 110 J- ng/L at CWCD-02. Concentrations of PFBS were less than the OSD risk screening level at 32 J- ng/L at CWCD-01 and 46 J- ng/L at CWCD-02.

At the Campbell Hill C/D Landfill, PFOA and PFBS were detected in groundwater. The PFOA concentration of 42 J- ng/L exceeded the OSD risk screening level. PFBS at 400 J- ng/L did not exceed the OSD risk screening level. PFOS was not detected in groundwater.

7.3.2 Soil

Soil sampling was conducted at two sonic borings at the Camp Whitside C/D Landfill (CWCD-01 and CWCD-02) and one sonic boring at the Campbell Hill C/D Landfill (CHCD-01). Composite soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figure 7-4** and **Table 7-2** show the analytical results for soil sampling locations at the Camp Whitside C/D Landfill. **Figure 7-5** and **Table 7-2** show the analytical results for soil sampling locations at the Campbell Hill C/D Landfill. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at C/D Landfill AOPIs (**Table 6-4**).

PFOA and PFBS were not detected at the Camp Whitside C/D Landfill and the Campbell Hill C/D Landfill soil sampling locations. PFOS was detected in soil less than the OSD risk screening level at one Camp

Whitside C/D Landfill boring (0.00043 J mg/kg at CWCD-01) and the Campbell Hill C/D Landfill boring (0.021 mg/kg at CHCD-01). PFOS, PFOA, and PFBS were not detected in boring CWCD-02.

7.4 Custer Hill AOPIs

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with four AOPIs located within the Custer Hill cantonment area:

- Custer Hill Sanitary Landfill
- Building 8313 Foam Storage
- Building 8100 Foam Release
- Custer Hill WWTP and Sludge Beds

The maximum concentration of PFOS in groundwater at FTRI was observed at the Building 8313 Foam Storage AOPI within Custer Hill. The Custer Hill AOPIs are centrally located in the southern portion of FTRI. Groundwater at the Custer Hill AOPIs occurs in the limestone and shale bedrock of the Chase Group and generally flows south-southeast. Groundwater flow is influenced by topography and interconnectedness of bedrock joints, fractures, and bedding planes. During SI sampling, depth to groundwater was observed to be between 14 and 46 feet bgs.

7.4.1 Groundwater

Groundwater sampling was conducted at two sonic borings and five existing monitoring wells associated with the Custer Hill AOPIs. One sonic boring was located within or near the potential source areas at the Building 8100 Foam Release AOPI and the Custer Hill WWTP and Sludge Beds AOPI. Four existing monitoring wells were located on the downgradient perimeters of the Custer Hill Sanitary Landfill and one existing monitoring well was located downgradient of the Building 8313 Foam Storage AOPI. **Figure 7-6** and **Table 7-1** show the analytical results for groundwater sampling locations at the Custer Hill AOPIs. The maximum PFOS and PFBS concentrations in groundwater at Custer Hill was observed at the Building 8313 Foam Storage AOPI and the maximum PFOA concentration in groundwater was observed at the Custer Hill Sanitary Landfill AOPI.

At the Building 8313 Foam Storage AOPI, PFOS, PFOA, and PFBS were detected in groundwater at monitoring well PTF-03-8. The concentrations of PFOS and PFOA exceeded the OSD risk screening levels with PFOS at 2100 DJ ng/L and PFOA at 110 J ng/L. The concentration of PFBS at 96 ng/L was less than the OSD risk screening level.

PFOS and PFBS were detected in groundwater less than the OSD risk screening levels at the Building 8100 Foam Release boring (B8100-01) with PFOS at 19 J- ng/L and PFBS at 10 J- ng/L. PFOA was not detected in groundwater at the Building 8100 Foam Release AOPI.

At the Custer Hill WWTP and Sludge Beds boring (CHWWTP-01), the concentration of PFOS in groundwater was less than the OSD risk screening level at 26 J- ng/L. PFOA and PFBS were not detected in groundwater at the Custer Hill WWTP and Sludge Beds AOPI.

At the Custer Hill Sanitary Landfill AOPI, concentrations of PFOS, PFOA, and PFBS in groundwater were detected in three of the four existing monitoring wells sampled (CH03-15, CH03-19, and CH91-07). PFOS, PFOA, and PFBS were not detected in well CH03-17. PFOS and PFOA concentrations in groundwater exceeded the OSD risk screening levels in wells CH03-15 and CH91-07. Concentrations of PFOS in groundwater ranged from 3.8 ng/L in CH03-19 to 1100 DJ ng/L in CH91-07. Concentrations of PFOA in groundwater ranged from 12 ng/L in CH03-19 to 440 DJ ng/L in CH03-15. PFBS concentrations did not exceed the OSD risk screening level and ranged from 1.8 ng/L in CH03-19 to 65 ng/L in CH91-07.

7.4.2 Soil

Soil sampling was conducted at two borings located at the Building 8313 Foam Storage AOPI, one boring at the Building 8100 Foam Release AOPI, and four borings located at the Custer Hill WWTP and Sludge Beds AOPI. Composite soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figure 7-6** and **Table 7-2** show the analytical results for soil sampling locations at the Custer Hill AOPIs. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at the Custer Hill AOPIs (**Table 6-4**). PFBS was not detected at any of the soil sampling locations at the Custer Hill AOPIs. The maximum PFOS and PFOA concentrations in soil at Custer Hill were observed at the Custer Hill WWTP AOPI.

At the Building 8313 Foam Storage AOPI, PFOS was detected in soil at a concentration less than the OSD risk screening level at one of two soil sampling locations with a concentration of 0.00066 J mg/kg at B8313-01. PFOS, PFOA, and PFBS were detected at the second boring, B8313-02.

Concentrations of PFOS and PFOA in soil were less than the OSD risk screening levels at the Building 8100 Foam Release AOPI boring, B8100-01, with concentrations of 0.0047 mg/kg and 0.00065 J mg/kg, respectively. PFBS was not detected in soil at the Building 8100 Foam Release AOPI.

At all four borings at the Custer Hill WWTP and Sludge Beds AOPI, PFOS concentrations were less than the OSD risk screening level and ranged from 0.00056 J mg/kg at CHWWTP-01 to 0.015 mg/kg at CHWWTP-04. PFOA was detected at concentrations less than the OSD risk screening level at three of borings (CHWWTP-02, CHWWTP-03, and CHWWTP-04) with concentrations ranging from 0.00079 mg/kg at CHWWTP-02 to 0.0035 mg/kg at CHWWTP-04.

Soil sampling was not conducted at the Custer Hill Sanitary Landfill because it is an actively monitored IRP site (i.e., for non-PFAS constituents) and has an existing groundwater monitoring well network which monitors known source areas for constituents in the landfill. The existing monitoring wells are sufficient to determine absence of presence of PFOS, PFOA, and PFBS related to landfill contents at the AOPI and additional media sampling (i.e., soil) may be evaluated at a later date. Additionally the landfill is currently capped and exact location of disposal of potential PFAS containing materials is not known.

7.5 Main Post WWTP and Sludge Beds

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with the Main Post WWTP and Sludge Beds AOPI. The Main Post WWTP and Sludge Beds AOPI is located near the southeastern installation boundary, approximately 0.4 miles northwest of the MAAF. The former sludge drying beds are located approximately 300 feet west of the Kansas River. The

former WWTP facility and former lagoons are located approximately 1,500 feet west of the Kansas River. Groundwater at this AOPI occurs in the alluvial aquifer of the Kansas River. The stage of the Kansas River and groundwater inflow from bedrock influences groundwater flow at this AOPI (USGS 2000). Groundwater generally flows east-northeast to discharge to the Kansas River. During SI sampling, depth to groundwater was approximately 21 feet bgs at the former sludge drying beds during SI sampling.

7.5.1 Groundwater

Groundwater sampling was conducted at one DPT boring located within the outline of the former sludge drying beds, visible on historical aerial imagery, at the Main Post WWTP and Sludge Beds AOPI. PFOS and PFOA were detected in groundwater at concentrations less than the OSD risk screening levels. The concentrations of PFOS and PFOA were 34 J- ng/L and 16 J- ng/L (35 ng/L and 16 ng/L in the field duplicate sample), respectively. PFBS was not detected in groundwater in the parent sample; however, PFBS was detected in the field duplicate at a concentration less than the OSD risk screening level with a concentration of 10 ng/L. **Figure 7-7** and **Table 7-1** show the analytical results for this groundwater sampling location. A KDHE split sample was also collected at this location with good reproducibility of PFOS, PFOA and PFBS analytical results (i.e., less than 35% relative percent difference). The KDHE split sample results are included in **Appendix M**.

7.5.2 Soil

Soil sampling was conducted at seven total borings at the Main Post WWTP and Sludge Beds AOPI with three borings located within the outline of the former sludge drying beds and four in the locations of the four former WWTP lagoons, visible on historical aerial imagery. Composite soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figure 7-7** and **Table 7-2** show the analytical results for soil sampling locations at the Main Post WWTP and Sludge Beds. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at the Main Post WWTP and Sludge Beds AOPIs (**Table 6-4**).

The maximum PFOS and PFOA concentrations in soil were observed at the former sludge drying beds but were less than the OSD risk screening levels. PFOS was detected at concentrations less than the OSD risk screening levels at one boring at the former sludge drying beds area (MPWWTP-03) and two borings at the former lagoons (MPWWTP-04 and MPWWTP-05) with concentrations ranging from 0.00060 J mg/kg to 0.0077 mg/kg. PFOA was detected in soil at only the former sludge drying beds boring MPWWTP-03 with a concentration of 0.00046 J mg/kg. PFBS was not detected at the Main Post WWTP and Sludge Beds AOPI.

7.6 Biosolids Application Site AOPIs

The subsections below summarize the groundwater and soil PFOS, PFOA, and PFBS analytical results associated with five of the six Biosolids Application Site AOPIs, as follows. The Camp Funston Biosolids Application Site is discussed in **Section 7.2**.

- Firebreak 1 Biosolids Application Site
- Firebreak 9 Biosolids Application Site

- Firebreak 10 Biosolids Application Site
- MPRC Biosolids Application Site
- Camp Forsyth Biosolids Application Site

Firebreak 1 Biosolids Application Site is located on the eastern installation boundary within glacial drift deposits and adjacent to ephemeral tributaries of the Kansas River. Groundwater and surface water flow is generally east-southeast at this AOPI. The other four of these five Biosolids Application Site AOPIs are in the western portion of FTRI, within the Lower Republican Watershed, and groundwater and surface water flow are generally southwest towards the Republican River. Groundwater at these AOPIs generally occurs in limestone and shale of the Chase Group or in loess deposits and is approximately 60 to 100 feet bgs.

7.6.1 Groundwater

Groundwater sampling was conducted at three sonic borings (one each at the Firebreak 1, Firebreak 9, and Firebreak 10 Biosolids Application Sites) and three monitoring wells located downgradient of the Camp Forsyth Biosolids Application Sites. Groundwater sampling was not conducted at the MPRC Biosolids Application Site based on the availability of historical downgradient groundwater data that did not have PFOS, PFOA, and PFBS detections (see **Section 2.12** and **Table 2-1**). **Figures 7-8 through 7-12** and **Table 7-1** show the analytical results for the groundwater sampling locations at these four biosolids application sites.

Groundwater samples were collected at first-encountered groundwater in the sonic borings, which generally occurred in weathered shale deposits, as follows:

- Firebreak 1: 41 feet bgs within alternating layers of clay and weathered shale
- Firebreak 9: 62 feet bgs within weathered shale
- Firebreak 10: 53 feet bgs within slightly weathered shale and slate

The depth to groundwater at the Camp Forsyth Biosolids Application Site AOPI was approximately 25 feet bgs in all three monitoring wells.

The maximum PFOS and PFOA concentrations in groundwater at these five biosolids application sites were observed at Firebreak 10 and were less than the OSD risk screening levels. PFOS and PFOA were detected in groundwater at Firebreak 1 and Firebreak 10 with PFOS at 1.9 ng/L and 38 J- ng/L and PFOA at 2.3 ng/L and 28 J- ng/L, respectively. PFBS was detected in groundwater at a concentration below the OSD risk screening level at one Camp Forsyth monitoring well (CF-P10) with a concentration of 2.3 ng/L. PFOS, PFOA, and PFBS were not detected in groundwater at Firebreak 9.

7.6.2 Soil

Soil sampling was conducted at a total of 27 borings with three at Firebreak 1, four at Firebreak 9, six at Firebreak 10, and 14 at the MPRC Biosolids Application Site. Soil sampling was not conducted at the Camp Forsyth Biosolids Application Site because the soil was extensively reworked during development and construction of the residences at the site. Composite soil samples were collected from 0 to 2 feet bgs using a hand auger. **Figures 7-8 through 7-12** and **Table 7-2** show the analytical results for soil sampling

locations at these four Biosolids Application Site AOPIs. Concentrations of PFOS, PFOA, and PFBS were compared to the residential soil OSD risk screening levels, though current and future land use is anticipated to be commercial/industrial at the Firebreak 1, Firebreak 9, Firebreak 10, and MPRC Biosolids Application Sites (**Table 6-4**).

The maximum PFOS concentration in soil was observed at the Firebreak 10 AOPI and the maximum PFOA concentration in soil was observed at the MPRC AOPI. Concentrations of PFOS and PFOA in soil were less than the OSD risk screening levels. PFOS concentrations ranged from 0.00052 J mg/kg at FRBK1-02 in Field 1.09 to 0.013 mg/kg at FRBK10-05 in Field 10.07. PFOA concentrations ranged from 0.00058 J mg/kg at FRBK10-06 in Field 10.11 to 0.0064 mg/kg at MPRC-03 in MPRC Field 2. PFOA was not detected in soil at the three Firebreak 1 sampling locations. PFBS was not detected in soil at all 27 soil sampling locations. PFOS, PFOA, and PFBS were not detected in soil at the four Firebreak 9 sampling locations.

7.7 Drinking Water and Supply Wells

During the SI, drinking water from the Main Post PWS (DW1) and groundwater from four of eight on-installation supply wells that provide raw water to the Main Post PWS (PW2, PW3, PW4, and PW7) were sampled. The water supply wells are screened within the alluvial aquifer of the Republican River and are located in the southern portion of the installation, downgradient from the Custer Hill AOPIs. **Table 7-4** shows the analytical results for the drinking water and water supply well sampling at FTRI. Note that drinking water and supply well sampling results are not shown on a figure in consideration of Operations Security. PFOS and PFBS were detected in drinking water (DW1) at concentrations less than the OSD risk screening levels and LHA with concentrations of PFOS at 3.4 ng/L and PFBS at 4.3 ng/L. PFOA was not detected in drinking water (DW1). At all four water supply wells, PFOS, PFOA, and PFBS were detected in groundwater at concentrations less than the OSD risk screening levels and LHA with the maximum concentrations observed at well PW3. Concentrations of PFOS ranged from 2.0 ng/L at PW2 to 6.8 ng/L at PW3 and PW4. PFOA concentrations ranged from 1.4 J ng/L at PW7 to 6.0 ng/L at PW3. Concentrations of PFBS ranged from 4.0 ng/L at PW7 to 7.3 ng/L at PW3.

7.8 Dedicated Equipment Background Samples

DEB samples were collected at one monitoring well with dedicated down-hole equipment per AOPI to assess potential PFOS, PFOA, and/or PFBS impacts in groundwater from dedicated equipment, as described in **Section 6.3.4**. PFOS, PFOA, and/or PFBS analytical results for the DEB sample were compared to the parent sample to evaluate the potential influence on PFOS, PFOA, and/or PFBS presence in groundwater due to dedicated equipment. PFOS, PFOA, and/or PFBS concentrations ranging from single digits to low tens of ng/L in groundwater are expected from PFOS, PFOA, and/or PFBS-containing equipment in a monitoring well. If the concentration in the DEB is greater than the parent sample concentration, then the dedicated equipment may be contributing to PFOS, PFOA, and/or PFBS concentrations in groundwater. For groundwater samples with low-level detections and higher concentrations in the DEB, the dedicated equipment potentially influences PFOS, PFOA, and/or PFBS presence in that monitoring well. However, if PFOS, PFOA, and/or PFBS concentrations in the DEB and parent sample are greater than the OSD risk screening levels, then the PFOS, PFOA, and/or PFBS concentrations in groundwater within the formation are greater than the expected concentrations from

PFOS, PFOA, and/or PFBS-containing equipment in the well. In this case, the determination of PFOS, PFOA, and/or PFBS presence is not influenced by dedicated equipment. A total of five DEB samples were collected from the following wells: AGL-MW-03 (MAAF AOPIs), SFL92-803 (Camp Funston Advanced WWTP AOPI), CH03-15 (Custer Hill Sanitary Landfill AOPI), PTF-03-8 (Building 8313 Foam Storage AOPI), and PW7 (drinking water supply wells). DEB sample results for PFOS, PFOA, and PFBS are shown on **Table 7-1** and full PFAS analytical results are included in **Appendix P**.

The concentrations of PFOS and PFOA in the DEB collected from well AGL-MW-03 at the MAAF are greater than in the parent sample; however, PFOS and PFOA concentrations are greater than the OSD risk screening levels in both the parent sample and DEB, and, therefore, the results of the DEB do not change the conclusions for this AOPI. The DEB indicates that the contribution of PFOS and PFOA from dedicated equipment is possible, but the magnitude of the difference in concentrations (i.e., 360-1000 ng/L) indicates the dedicated equipment is likely not the only contribution to the elevated PFOS and PFOA concentrations in the DEB (i.e., concentrations may also be due to PFOS, PFOA, and/or PFBS entrained in the sampling equipment, representative of unequilibrated aquifer conditions). PFBS was detected at concentrations below the OSD risk screening level in both the parent sample and the DEB.

PFOS, PFOA, and PFBS were detected at concentrations less than the OSD risk screening levels in both the parent sample and the DEB sample collected at monitoring well SFL92-803, associated with the Camp Funston Advanced WWTP and FFTA-SFL wells. The difference in PFOA concentrations between the two samples was 16.9 ng/L, with 2.1 J ng/L in the parent sample and 19 ng/L in the DEB. PFOS and PFBS concentrations are slightly greater in the DEB sample with a difference of 3.0 ng/L for PFOS and 1.3 ng/L for PFBS. These results indicate the dedicated equipment may contribute to the PFOS, PFOA, and/or PFBS concentrations in groundwater sampled from this well; however, presence of PFOS, PFOA, and PFBS at concentrations less than the OSD risk screening levels was established for this AOPI based on sampling the WWTP effluent at the outfall. Therefore, any potential impacts from the dedicated equipment to the groundwater results at the monitoring well do not impact decisions made for this AOPI during the SI.

Concentrations of PFOS and PFOA were greater than the OSD risk screening levels in both the parent sample and the DEB sample at Custer Hill Sanitary Landfill monitoring well CH03-15. PFOS, PFOA, and PFBS concentrations in the DEB were slightly greater than in the parent sample with a difference of 20 ng/L for PFOS, 10 ng/L for PFOA, and 1.6 ng/L for PFBS. However, a different Custer Hill Sanitary Landfill monitoring well did not have detections of PFOS, PFOA, and PFBS, with non-detect concentrations reported at the LOQ of 1.7 ng/L. These results indicate the dedicated, down-hole equipment at the Custer Hill Sanitary Landfill wells did not contribute detectable levels of PFOS, PFOA, and/or PFBS to the groundwater.

Only one groundwater sample was collected at the Building 8313 Foam Storage AOPI, from monitoring well PTF-03-8. PFOS and PFOA concentrations were significantly greater than the OSD risk screening levels with PFOS at 2100 DJ ng/L and PFOA at 110 J ng/L in the parent sample. In the DEB sample, PFOS was 100 ng/L greater and PFOA was 10 ng/L less than their respective concentrations in the parent sample. The difference in PFBS concentrations was 3 ng/L with concentrations in the parent sample greater than the DEB. These results indicate minimal, if any, contribution of PFOS, PFOA, and/or PFBS to the groundwater from dedicated equipment at this AOPI.

Concentrations of PFOS, PFOA, and PFBS in groundwater were less than the OSD risk screening levels in both the parent sample and DEB sample collected at the drinking water supply well PW7. PFOS and PFOA concentrations in the DEB were less than in the parent sample by 0.3 to 0.4 ng/L and PFBS was only 0.1 ng/L greater in the DEB than in the parent sample. Therefore, dedicated, down-hole equipment in the drinking water supply wells does not appear to contribute PFOS, PFOA, and/or PFBS to groundwater.

Overall, the DEB samples indicated that the dedicated, down-hole equipment in monitoring wells sampled during the SI at FTRI do not contribute PFOS, PFOA, and/or PFBS to the groundwater or if there is a potential contribution of PFOS, PFOA, and/or PFBS from dedicated equipment, the SI decisions for an AOPI do not change in consideration of other sample results and the magnitude of the PFOS, PFOA, and/or PFBS concentrations.

7.9 TOC, pH, and Grain Size

In addition to sampling soil for PFOS, PFOA, and PFBS, one soil sample per AOPI was analyzed for TOC, pH, moisture content, and grain size data as they may be useful in future fate and transport studies. The TOC in the soil samples ranged from 6,800 to 39,700 mg/kg. The TOC at this installation was higher to within range than typically observed in topsoil: 5,000 to 30,000 mg/kg. The combined percentage of fines (i.e., silt and clay) in soils at FTRI ranged from 45.9 to 95.5% with an average of 75.38%. 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, averaging 18.1%, was typical for clay (0 to 20%). The pH of the soil was slightly alkaline (pH 7 to 9 standard units). Based on these geochemical and physical soil characteristics, high percentage of fines and TOC observed underlying the installation during the SI, PFAS constituents are expected to be relatively less mobile at FTRI than in soils with lower percentages of fines and TOC. Additionally, while PFAS constituents are relatively less mobile in soils with high percentages of fines, depleted TOC may allow for enhanced mobility of the constituents in soil.

7.10 Blank Samples

Detections of PFOS, PFOA, and PFBS are summarized below for QA/QC samples. Other than those noted below, concentrations of PFOS, PFOA, and PFBS in all other QA/QC samples were not detected.

- PFOS was detected in the equipment blank sample FTRI-EB-04-031020, which was an equipment blank taken off the Sonic drill casing after decontamination. The concentration of PFOS in FTRI-EB-04-031020 was 16 ng/L.
- PFOS, PFOA, and PFBS were detected in the source blank sample FTRI-SB-01-03102020 with concentrations of 5.7 ng/L, 5.5 J ng/L, and 7.8 ng/L, respectively. The source blank water was used as the drilling fluid at all Sonic boring locations and decontamination water for the Sonic and DPT drilling equipment. The source blank sample was collected from water at the Sonic drilling rig. The source water came from a non-chlorinated hydrant located upgradient of the FTRI AOPIs and was not known to contain PFAS prior to the field event.

The groundwater sample results reported in sample delivery group 085 were evaluated against the detections in the source blank FTRI-SB-01-03102020 and equipment blank FTRI-EB-04-031020. The PFOA result was qualified J+ for sample location FTRI-B710-01-GW-(27)-03112020, and the PFOA and

PFOS results were qualified J+ for sample location FTRI-OTW-01-GW-(19)-03122020. The qualified results may be biased high due to contributions from the source blank.

The full analytical results for QA/QC samples collected during the SI are included in **Appendix P**.

7.11 Conceptual Site Models

The preliminary CSMs presented in the QAPP Addendum (Arcadis 2020a) were re-evaluated and updated, if necessary, based on the SI sampling results. The CSMs presented on **Figures 7-13** through **7-20** and in this section therefore represent the current understanding of the potential for human exposure. For some AOPIs, the CSM is the same and thus shown on the same figure.

Many of the PFAS constituents found in AFFF are surfactants (which do not volatilize) and are found in a charged or ionic state at environmentally relevant pH (i.e., pH 5 to 9 standard units). PFOS, PFOA, and PFBS are each negatively charged at environmentally relevant pH. The media potentially affected by PFOS, PFOA, and/or 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 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 historical use and disposal of AFFF at the AOPIs, affected media are likely to consist of groundwater, soil, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, transport via sediment carried in and dissolution to stormwater and surface water, discharge/recharge between groundwater and surface water, and adsorption/desorption between surface water and sediment. Generic categories of potential human receptors and their associated exposure scenarios that are typically evaluated in a CERCLA human health risk assessment were considered and include on-installation site workers (e.g., industrial/commercial workers, utility workers, or future construction workers who could be exposed to chemicals in soil at an AOPI or to chemicals in tap water in an industrial/commercial building), on-installation residents (e.g., adults and children who could be exposed to chemicals in tap water in a residence), and on-installation recreational users (e.g., hikers or hunters who could be exposed to chemicals in waterways at an installation). Off-installation receptor types could include drinking water receptors (i.e., commercial/industrial workers or residents) and recreational users.

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

Following the SI sampling, 26 out of the 28 AOPIs with confirmed PFOS, PFOA, and/or PFBS presence 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**).

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

- Recreational users are not likely to contact groundwater during outdoor recreational activities; therefore, the groundwater exposure pathway for on-installation recreational users is incomplete.
- Groundwater originating at the FTRI AOPIs flows off-post through the installation's southeast and/or southwest boundaries. Therefore, the groundwater exposure pathway for off-installation receptors is potentially complete, except at Building 817 Foam Release and Firebreak 9 Biosolids Application Site AOPIs where PFOS, PFOA, and PFBS were not detected in groundwater or soil and the groundwater exposure pathway for off-installation receptors is incomplete.
- Surface water bodies on-post are not used for drinking water. On-installation site workers and residents are not likely to otherwise contact surface water and sediment. Therefore, the surface water and sediment exposure pathways for these receptors are incomplete.
- Recreational users could contact constituents in unnamed tributaries, Threemile Creek, and/or the Kansas River through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete, except at Building 817 Foam Release and Firebreak 9 Biosolids Application Site AOPIs where PFOS, PFOA, and PFBS were not detected in groundwater or soil and the surface water and sediment exposure pathways for on-installation recreational users are incomplete.
- Surface water bodies flow off-post through unnamed tributaries, Madison Creek, Threemile Creek, Sevenmile Creek, the Republican River, and/or the Kansas River. Recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact. Therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete. The exception is at Building 817 Foam Release and Firebreak 9 Biosolids Application Site AOPIs where PFOS, PFOA, and PFBS were not detected in groundwater or soil and the surface water and sediment exposure pathways for off-installation receptors are incomplete.

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

Figure 7-13 shows the CSM for FFTA-MAAF, FFTA-Building 892 (Gate 11), Former Fire Station #3 (Building 743), FFTA-Old Taxiway, FNTA-Gate 8, Current Fire Station #3 (Building 706), Building 710 Foam Storage, Hangars 723, 746, 837, and 863, FFTA-SFL, FFTA-Camp Funston, Building 8313 Foam Storage, and Building 8100 Foam Release AOPIs. AFFF was historically released to soil and/or paved surfaces at these AOPIs during fire training exercises, hangar suppression system releases, nozzle testing, foam storage, or crash truck maintenance.

- PFOS, PFOA, and/or PFBS were detected in soil at these AOPIs. Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete.
- The AOPIs are wholly located on-post and are not used for residential or recreational purposes; therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.

- PFOS, PFOA, and/or PFBS were detected in groundwater. Building 8313 Foam Storage and Building 8100 Foam Release AOPIs are upgradient of the on-installation potable supply wells. The remaining AOPIs are downgradient of and not likely to affect the existing drinking water wells used to supply potable water at FTRI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-14 shows the CSM for Building 817 Foam Release AOPI. AFFF was historically released to soil and/or paved surfaces at this AOPI during a single emergency application of foam on an aircraft fire.

- PFOS, PFOA, and/or PFBS were not detected in soil at this AOPI; therefore, the soil exposure pathways are incomplete.
- PFOS, PFOA, and/or PFBS were not detected in groundwater, and the AOPI is downgradient of and not likely to affect drinking water wells used to supply potable water at FTRI. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are incomplete.
- The transport mechanism of PFOS, PFOA, and/or PFBS to surface water and sediment is via groundwater discharge and surface runoff. Because PFOS, PFOA, and PFBS were not detected in soil and groundwater at this AOPI, the surface water and sediment exposure pathways for all receptors are considered to be incomplete.

Figure 7-15 shows the CSM for the Whitside C/D Landfill and Campbell Hill C/D Landfill AOPIs. Soil and construction debris from the FFTA-SFL and FFTA-Old Taxiway AOPIs (respectively), which potentially included PFOS, PFOA, and/or PFBS-containing materials, was historically disposed of at these landfills.

- The landfills are capped and the source media, buried soil and/or construction debris, is not exposed. PFOS, PFOA, and PFBS were detected in a surface soil sample adjacent to the AOPI in the 0 to 2 feet bgs interval. Site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete.
- The AOPIs are wholly located on-post and are not used for residential or recreational purposes; therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater. The AOPIs are downgradient of and not likely to affect the existing drinking water wells used to supply potable water at FTRI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-16 shows the CSM for the Main Post WWTP and Sludge Beds, Firebreak 1 Biosolids Application Site, Firebreak 10 Biosolids Application Site, MPRC Biosolids Application Site, Custer Hill Sanitary Landfill AOPI, and the Custer Hill WWTP and Sludge Beds AOPIs. Wastewater and/or sludge potentially containing PFOS, PFOA, and/or PFBS was historically deposited at these AOPIs.

- PFOS, PFOA, and PFBS were detected in soil at these AOPIs. Site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete.

- The AOPIs are wholly located on-post and are not used for residential or recreational purposes; therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater at all of these AOPIs except for the MPRC Biosolids Application Site AOPI, where groundwater was not sampled. The Custer Hill AOPIs are upgradient of the on-installation potable supply wells. The remaining AOPIs are far upgradient of and not likely to affect the existing drinking water wells used to supply potable water at FTRI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-17 shows the CSM for Camp Forsyth Biosolids Application Site AOPI. Wastewater and/or sludge potentially containing PFOS, PFOA, and/or PFBS was historically deposited at this AOPI. Residential development of the AOPI occurred after its historical use as a biosolids application site.

- Soil was not sampled at this site as described in **Section 7.6.2**. If PFOS, PFOA, and PFBS are present in soil, site workers and residents could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust. Therefore, the soil exposure pathways for on-installation site workers and residents are potentially complete.
- The site is not likely to be accessed by recreational users, or by off-installation receptors. Therefore, the soil exposure pathways for these receptors are incomplete.
- PFOS, PFOA, and PFBS were detected in groundwater samples collected at Camp Forsyth Biosolids Application Site. This AOPI is far side-gradient of drinking water wells used to supply potable water at FTRI. The groundwater and surface water draining from the AOPI may discharge to the Republican River upstream of on-post potable wells screened in the alluvium of the Republican River. Therefore, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete.

Figure 7-18 shows the CSM for the Camp Funston Biosolids Application Site AOPI. Wastewater and/or sludge potentially containing PFOS, PFOA, and/or PFBS was historically deposited at this AOPI.

- PFOS, PFOA, and PFBS were not detected in soil samples collected at this AOPI. Based on the SI sample results, the soil exposure pathways are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater samples associated with this AOPI. The AOPI is downgradient of and not likely to affect the existing drinking water wells used to supply potable water at FTRI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

Figure 7-19 shows the CSM for the Firebreak 9 Biosolids Application Site AOPI. Sludge potentially containing PFOS, PFOA, and/or PFBS was historically deposited at this AOPI.

- PFOS, PFOA, and PFBS were not detected in soil at this AOPI; therefore, the soil exposure pathways for all receptors are incomplete.
- PFOS, PFOA, and PFBS were not detected in groundwater at this AOPI; therefore, the groundwater exposure pathways for all receptors are incomplete.

- The transport mechanism of PFOS, PFOA, and/or PFBS to surface water and sediment is via groundwater discharge and surface runoff. Because PFOS, PFOA, and PFBS were not detected in soil and groundwater at this AOPI, the surface water and sediment exposure pathways for all receptors are considered to be incomplete.

Figure 7-20 shows the CSM for the Camp Funston Advanced WWTP AOPI. Wastewater and/or sludge potentially containing PFOS, PFOA, and/or PFBS was historically deposited at this AOPI.

- Soil was not sampled at this AOPI. If PFOS, PFOA, and/or PFBS are present in soil, site workers could contact constituents in soil via incidental ingestion, dermal contact, and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is potentially complete.
- The AOPI is wholly located on-post and is not used for residential or recreational purposes; therefore, the soil exposure pathways for on-installation residents and recreational users and for off-installation receptors are incomplete.
- PFOS, PFOA, and/or PFBS were detected in groundwater samples associated with this AOPI. The AOPI is downgradient of and not likely to affect the existing drinking water wells used to supply potable water at FTRI. However, the groundwater exposure pathways (via drinking water ingestion and dermal contact) for on-installation site workers and residents are potentially complete to account for potential future use of the downgradient on-post groundwater.

8 OFF-POST PRIVATE WELL INVESTIGATION

Based on SI sampling results, off-post private potable wells were identified for potential sampling as part of the PA/SI investigation at FTRI to determine whether there are off-post impacts to drinking water due to Army operations. These wells are downgradient of groundwater wells at the MAAF on FTRI's southeastern boundary where PFOS and PFOA concentrations were detected above the USEPA LHA. To identify potential potable wells that were downgradient of the eastern/southeastern installation boundary to include in this sampling effort, an off-post well survey was completed using readily available information from the online Kansas Geological Survey (KGS) Water Well Completion Records Database. After reviewing available groundwater modeling reports (United States Geological Survey [USGS] 2000) and particle tracking information contained therein, numerous wells were identified for possible sampling as part of this investigation. The Fort Riley installation team confirmed approximately 50 parcels were included within the 5-mile downgradient area and the team agreed that all property owners included in this plat map would be contacted via the United States Postal Service (USPS) mail to ensure no drinking water wells are excluded during this investigation. FTRI personnel were responsible for obtaining permission to sample the wells on these properties prior to the sampling event.

The following steps were followed to ground-truth the wells identified to be sampled as part of the off-post sampling efforts:

- Well records were obtained from the KGS and reviewed (e.g., well logs, tax records) to determine which private wells that fell within the 5-mile downgradient search radius were to be included in this effort. The county well database was also reviewed to identify any wells that were not included in the KGS database. Additionally, parcels in the downgradient location were reviewed to compile the list of all property owners in the area.
- FTRI personnel notified the property owners of this sampling event by letter delivered by the USPS on 05 October 2020. The letter included a questionnaire regarding the presence of a drinking water well on the property, whether the owner would allow access to the property for sampling, and, if access is allowed, requested the owner determine an available date for their well to be sampled. Property access was obtained by FTRI personnel prior to or during the sampling event.

Sampling protocols followed those outlined in this PA/SI report and the Fort Riley QAPP Addendum (Arcadis 2020a). Based on the results of the off-post sampling, the Army identified one location where drinking water exceeded the USEPA LHA of 70 ppt for PFOS and PFOA, individually or combined. The Army immediately provided bottled water to the effected location. This area will be included in the Army's remedial investigation to further delineate the nature and extent of the release and evaluate any risks posed to human health from the release. A letter report presenting the results of this data and the laboratory reports will be included as **Appendix Q** (when available).

9 CONCLUSIONS AND RECOMMENDATIONS

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

OSD provided residential risk screening levels for PFOS, PFOA, and PFBS in soil and groundwater (tap water) and industrial/commercial risk screening levels based on the USEPA oral reference dose 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 FTRI. Following the evaluation, 28 AOPIs were identified.

FTRI currently has three on-installation PWSs (i.e., Main Post, MPRC, and AQT). Eight on-post supply wells provide pre-treatment water for the Main Post PWS. These supply wells are screened in alluvial deposits of the Republican River. Water levels in these water supply wells range from 15 to 25 feet bgs (Malcolm Pirnie 2009). One of two available bedrock wells supplies water for the MPRC PWS that serves approximately 650 people; the second bedrock well is inactive. The supply water at the AQT PWS is treated with chlorine only and supplies water to latrines and wash basins; there is no fountain or spigot designed for consumption and any ingestion at this location is assumed to be incidental. Two additional water supply wells are not permitted drinking water wells, but serve approximately 10 and 25 people, respectively, and are considered to be potential on-installation drinking water receptor points. In addition, the MAAF has one well that is screened in bedrock and is utilized as an emergency water supply for firefighting and would require modification to use as a potable well.

PFOS, PFOA, and PFBS were historically detected in drinking water from the Main Post and MPRC PWSs in 2016 through 2018. The maximum concentrations of PFOS, PFOA, and PFBS in drinking water were 2.54 ng/L PFOS at the Main Post PWS, 11 ng/L PFOA at the MPRC PWS, and 5.52 ng/L PFBS at the Main Post PWS.

During the SI sampling in 2020, PFOS and PFBS were detected in drinking water at the Main Post PWS at concentrations less than the OSD risk screening levels and LHA with concentrations of PFOS at 3.4 ng/L and PFBS at 4.3 ng/L. PFOA was not detected in drinking water. At four water supply wells, PFOS, PFOA, and PFBS were detected in groundwater at concentrations less than the OSD risk screening levels and LHA with the maximum concentrations observed at well PW3. Concentrations of PFOS ranged from 2.0 ng/L at PW2 to 6.8 ng/L at PW3 and PW4. PFOA concentrations ranged from 1.4 J ng/L at PW7 to 6.0 ng/L at PW3. Concentrations of PFBS ranged from 4.0 ng/L at PW7 to 7.3 ng/L at PW3.

The available PFOS, PFOA, and PFBS analytical data collected during the SI is limited to groundwater samples from existing monitoring wells at or downgradient from AOPIs, groundwater and soil samples at AOPIs, one WWTP effluent sample, one on-installation drinking water sample, and four water supply well samples.

All AOPIs were sampled during the SI at FTRI to further evaluate PFAS-related use, storage, and/or disposal and identify presence or absence of PFOS, PFOA, and PFBS. The SI scope of work was completed in accordance with the Final PQAPP and the FTRI QAPP Addendum (Arcadis 2020a). Of the

28 AOPIs that were sampled for PFOS, PFOA, and PFBS in groundwater and/or soil, 26 AOPIs had detections of PFOS, PFOA, and PFBS in groundwater and/or soil samples. Of the 26 AOPIs with detections, twelve AOPIs exceeded the OSD risk screening levels. PFOS, PFOA, and PFBS were not detected in groundwater and soil at the Building 817 Foam Release and the Firebreak 9 Biosolids Application Site AOPIs.

Groundwater sampling was conducted at a total of 22 borings, 18 existing monitoring wells, and four on-installation drinking water supply wells for a total of 44 groundwater samples. Groundwater samples were collected at the first-encountered groundwater at borings drilled using either DPT or rotosonic methods. Soil sampling was conducted at a total of 91 borings with composite soil samples collected from 0 to 2 feet bgs using a hand auger at each location. One sample of WWTP effluent was collected at the outfall of the Camp Funston Advanced WWTP. One drinking water sample was collected at the Main Post PWS. Surface water and sediment were not sampled during the SI for PFOS, PFOA, and PFBS at FTRI.

PFOS, PFOA, and PFBS were detected in groundwater at 41 of the 44 sampling locations, including 20 borings, 17 existing monitoring wells, and all four drinking water supply wells. The maximum concentrations of PFOA and PFBS in groundwater and PFOS, PFOA, and PFBS in soil at FTRI were observed at the MAAF AOPIs while the maximum concentration of PFOS in groundwater at FTRI was observed at the Building 8313 Foam Storage AOPI. PFOS and PFOA concentrations in groundwater were greater than or equal to the OSD risk screening levels (i.e., 40 ng/L) at six borings and five existing monitoring wells for PFOS, and eight borings and seven existing monitoring wells for PFOA. PFBS concentrations in groundwater did not exceed the OSD risk screening level (i.e., 600 ng/L). The maximum concentrations of PFOS, PFOA, and PFBS observed in groundwater at FTRI during SI sampling were:

- PFOS: 2,100 DJ ng/L at monitoring well PTF-03-8 at the Building 8313 Foam Storage AOPI at Custer Hill
- PFOA: 30,000 DJ ng/L at downgradient monitoring well AGL-MW-05 at the MAAF
- PFBS: 14,000 DJ ng/L at the Former Fire Station #3 (Building 743) AOPI at the MAAF

PFOS, PFOA, and PFBS were detected in soil at 68 out of 92 borings. The current and anticipated future land use is industrial/commercial at all AOPIs at FTRI where soil sampling was conducted during the SI; however, to be conservative, PFOS, PFOA, and PFBS in soil were compared to the residential soil OSD risk screening levels of 0.13 mg/kg PFOS and PFOA and 1.9 mg/kg PFBS. PFOA and PFBS concentrations in soil did not exceed the OSD residential risk screening levels at all soil sampling locations. PFOS concentrations exceeded the OSD residential risk screening level at two AOPIs: FFTA-MAAF and the Former Fire Station #3 (Building 743). The maximum concentrations of PFOS, PFOA, and PFBS observed in soil at FTRI were observed at the current and former fire station AOPIs at the MAAF where daily and/or weekly nozzle testing was conducted:

- PFOS: 0.790 DJ mg/kg at the Former Fire Station #3 (Building 743) AOPI at the MAAF
- PFOA: 0.019 mg/kg at the Current Fire Station #3 (Building 706) AOPI at the MAAF
- PFBS: 0.0058 mg/kg at the Current Fire Station #3 (Building 706) AOPI at the MAAF

Concentrations of PFOS, PFOA, and PFBS in the WWTP effluent sample were less than the OSD residential tap water risk screening levels with concentrations of PFOS at 5.7 ng/L, PFOA at 10 ng/L, and PFBS at 10 ng/L.

PFOS and PFBS were detected in drinking water at the Main Post PWS at concentrations less than the OSD risk screening levels and the LHA with concentrations of PFOS at 3.4 ng/L and PFBS at 4.3 ng/L. PFOA was not detected in drinking water at a concentration above OSD risk screening level, and the LHA. At all four water supply wells, PFOS, PFOA, and PFBS were detected in groundwater at concentrations less than the OSD risk screening levels and the LHA with maximum concentrations of 6.8 ng/L PFOS, 6.0 ng/L PFOA, and 7.3 ng/L PFBS.

Following the SI sampling, 26 out of the 28 AOPIs with confirmed PFOS, PFOA, and PFBS presence were considered to have complete or potentially complete exposure pathways, as follows:

- Site workers (i.e., installation personnel) could contact constituents in soil via incidental ingestion, dermal contact and inhalation of dust; therefore, the soil exposure pathway for on-installation site workers is complete or potentially complete at all AOPIs except Building 817 Foam Release and Firebreak 9 Biosolids Application Site.
- There are six AOPIs at which the groundwater exposure pathways for on-post receptors are potentially complete: Building 8313 Foam Storage, Building 8100 Foam Release, Camp Forsyth Biosolids Application Site, Firebreak 10 Biosolids Application Site, Custer Hill Sanitary Landfill, and Custer Hill WWTP and Sludge Beds. These AOPIs are upgradient of or potentially impacting groundwater wells that are used to provide drinking water at FTRI.
- Recreational users could contact constituents in unnamed tributaries, Threemile Creek, and/or the Kansas River through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for on-installation recreational users are potentially complete at all AOPIs except Building 817 Foam Release and Firebreak 9 Biosolids Application Site.
- Due to a lack of land use controls off-installation and downgradient of FTRI, the groundwater exposure pathways for off-installation receptors are also potentially complete for all AOPIs except Building 817 Foam Release and Firebreak 9 Biosolids Application Site.
- Surface water bodies flow off-post through unnamed tributaries, Madison Creek, Threemile Creek, Sevenmile Creek, the Republican River, and/or the Kansas River. Recreational users off-post could contact constituents in surface water and sediment through incidental ingestion and dermal contact; therefore, the surface water and sediment exposure pathways for off-installation recreational users are potentially complete at all AOPIs except Building 817 Foam Release and Firebreak 9 Biosolids Application Site.

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**). **Table 9-1** below summarizes the sampling at FTRI and recommendations for future study in a remedial investigation or no action at this time at each AOPI.

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

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Y/N/ND/NS)		Recommendation
	GW	SO	
FFTA-MAAF (OU 004, FTRI-019, 20605.1019)	Y	Y	Further study in a remedial investigation
FFTA-Building 892 (Gate 11) (FTRI-018, 20605.1018)	Y	N	Further study in a remedial investigation
FFTA-Old Taxiway	N	N	No action at this time
Former Fire Station #3 (Building 743)	Y	Y	Further study in a remedial investigation
Current Fire Station #3 (Building 706)	Y	N	Further study in a remedial investigation
Building 817 Foam Release	N	N	No action at this time
FNTA-Gate 8	Y	N	Further study in a remedial investigation
Building 710 Foam Storage	N	N	No action at this time
Hangar 723	N	N	No action at this time
Hangar 746	N	N	No action at this time
Hangar 837	Y	N	Further study in a remedial investigation
Hangar 863	Y	N	Further study in a remedial investigation
FFTA-SFL (OU 001 FTRI-028, 20605.1027)	Y	N	Further study in a remedial investigation
FFTA-Camp Funston	N	N	No action at this time
Camp Funston Advanced WWTP	N	NS	No action at this time
Camp Funston Biosolids Application Site	N	N	No action at this time
Whitside C/D Landfill (FTRI-002, 20605.1002)	Y	N	Further study in a remedial investigation
Campbell Hill C/D Landfill	Y	N	Further study in a remedial investigation
Building 8313 Foam Storage (FTRI-053, CC-FTRI-001, 20605.1052)	Y	N	Further study in a remedial investigation

AOPI Name	PFOS, PFOA, and/or PFBS detected greater than OSD Risk Screening Levels? (Y/N/ND/NS)		Recommendation
	GW	SO	
Building 8100 Foam Release	N	N	No action at this time
Custer Hill WWTP and Sludge Beds (FTRI-023, 20605.1022)	N	N	No action at this time
Custer Hill Sanitary Landfill (FTRI-001, 20605.1001)	Y	NS	Further study in a remedial investigation
Main Post WWTP and Sludge Beds (FTRI-025, 20605.1024)	N	N	No action at this time
Firebreak 1 Biosolids Application Site	N	N	No action at this time
Firebreak 9 Biosolids Application Site	N	N	No action at this time
Firebreak 10 Biosolids Application Site	N	N	No action at this time
MPRC Biosolid Application Site	N	N	No action at this time
Camp Forsyth Biosolid Application Site	N	NS	No action at this time

Notes:
Light Gray shading – detection greater than the OSD risk screening level
N – no
NS – not sampled
SO – soil
Y – yes

Data collected during the PA (**Sections 3** through **5**) and SI (**Sections 6 through 8**) were sufficient to draw the conclusions and recommendations summarized above. The data limitations relevant to the development of this PA/SI for PFOS, PFOA, and PFBS at FTRI 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.

Similarly, the information available for biosolids application may be limited or incomplete. During the SI, soil and groundwater sampling locations at the biosolids application sites were selected based on

historical records, personnel interviews, and site reconnaissance. At some biosolids applications sites, such as Firebreak 9, the specific location of biosolids application that may have contained PFOS, PFOA, or PFBS is not documented in historical records and therefore sampling at the selected locations may not be entirely representative.

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 collected during the SI is limited to groundwater samples from existing monitoring wells at or downgradient from AOPIs, groundwater and soil samples at AOPIs, one on-installation drinking water sample, and four water supply well samples. While every effort was made to collect representative soil samples at the biosolids application sites (i.e., sample locations were chosen based on data collected during the PA and additional site reconnaissance conducted during the SI to target areas of known biosolids land-application), in some cases the historical information available was limited (as discussed above) and a small number of soil samples were collected within large application areas (e.g., the Camp Funston Biosolids Application Site is 40 acres and four soil samples were collected). Available data, including PFOS, PFOA, and PFBS, is listed in **Appendix P**, which were analyzed per the selected analytical method.

Overall, the DEB samples indicated that the dedicated, down-hole equipment in monitoring wells sampled during the SI at FTRI do not contribute PFOS, PFOA, and/or PFBS to the groundwater or if there is a potential contribution of PFOS, PFOA, and/or PFBS from dedicated equipment, the SI decisions for an AOPI do not change in consideration of other sample results and the magnitude of the PFOS, PFOA, and/or PFBS concentrations.

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

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ACRONYMS

°F	degrees Fahrenheit
%	percent
6:2 FTSA	6:2 fluorotelomer sulfonate
8:2 FTSA	8:2 fluorotelomer sulfonate
AFFF	aqueous film-forming foam
AOPI	area of potential interest
AQT	Automatic Qualification Training
Arcadis	Arcadis U.S., Inc.
Army	U.S. Army
ASUS	American States Utility Services, Inc.
bgs	below ground surface
C/D	construction and demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CSM	conceptual site model
CVWF	Central Vehicle Wash Facility
DEB	dedicated equipment background
DoD	Department of Defense
DPT	direct-push technology
DQO	data quality objectives
DUSR	Data Usability Summary Report
EB	equipment blank
EDR	Environmental Data Resources, Inc.
ELAP	Environmental Laboratory Accreditation Program
FB	field blank
FFTA	former fire training area
FNTA	former nozzle testing area
GIS	geographic information system
gpm	gallons per minute
HDPE	high-density polyethylene

HPRCC	High Plains Regional Climate Center
HQ	hazard quotient
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
ILCR	incremental lifetime cancer risk
IMCOM	Installation Management Command
installation	U.S. Army or Reserve installation
IRP	Installation Restoration Program
KDHE	Kansas Department of Health and Environment
KGS	Kansas Geological Survey
LHA	lifetime health advisory (USEPA)
LOD	limit of detection
LOQ	limit of quantitation
MAAF	Marshall Army Airfield
mg/kg	milligrams per kilogram (parts per million)
MOGAS	motor gasoline
MPRC	Multi-Purpose Range Complex
NA	not available
ng/L	nanograms per liter (parts per trillion)
OB/OD	open burn/open detonation
OSD	Office of the Secretary of Defense
OU	operable unit
PA	preliminary assessment
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid

PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPA	perfluoropentanoic acid
PFTA	perfluorotetradecanoic acid
PFTrDA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
POC	point of contact
ppm	parts per million
ppt	parts per trillion
PQAPP	Programmatic Uniform Federal Policy-Quality Assurance Project Plan
PWS	public water system
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QSM	Quality Systems Manual
RSL	Regional Screening Level
SFL	Southwest Funston Landfill
SI	site inspection
SOP	standard operating procedure
SSHP	Site Safety and Health Plan
TGI	technical guidance instruction
UCMR3	Third Unregulated Contaminant Monitoring Rule
U.S.	United States
USACE	United States Army Corps of Engineers
USAEC	United States Army Environmental Command
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USDHH	United States Department of Health and Human Services
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WWC5	Kansas Geological Survey Well Completion Records

WWTP	wastewater treatment plant

TABLES

FIGURES

APPENDIX A

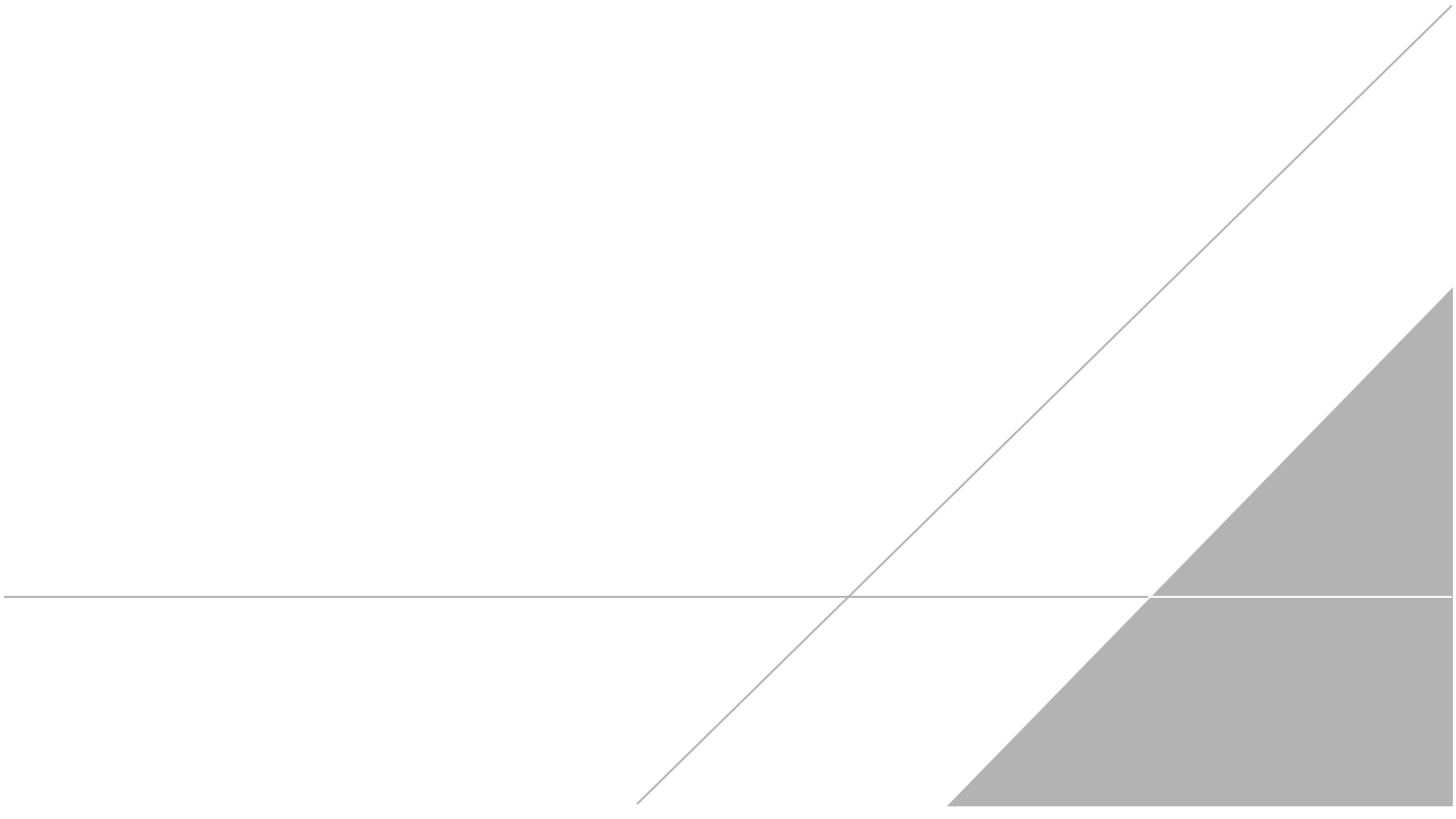
Office of the Secretary of Defense. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September 15.

APPENDIX B

Preliminary Assessment/Site Inspection Quality Control Checklist

APPENDIX C

Antiterrorism/Operations Security Review Cover Sheet



APPENDIX D

GIS Deliverable CD

APPENDIX E

Installation EDR Survey Reports

APPENDIX F

Compiled Research Log

APPENDIX G

Compiled Interview Logs

APPENDIX H

Site Reconnaissance Photo Log

APPENDIX I

Compiled Site Reconnaissance Logs

APPENDIX J

Site Inspection Field Notes

APPENDIX K

Site Inspection Field Forms

APPENDIX L

Site Inspection Photo Log

APPENDIX M

KDHE Split Sampling Analytical Results

APPENDIX N

Field Change Reports

APPENDIX O

Data Usability Summary Report

APPENDIX P

Site Inspection Laboratory Analytical Results

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Table 2-1 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Sample Location				Main Post PWS					
Sample Date[1,2]				16-Apr-2013	5-Nov-2013	7-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units						
Perfluorobutane sulfonic acid (PFBS)	--	600	ng/L	<90	<90	**5.30**	**4.05**	**5.52**	**2.48**
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<10	<10	<2.0	<2.0	<2.0	<2.0
Perfluorohexane sulfonic acid (PFHxS)	--	--	ng/L	<30	<30	**13.3**	**11.5**	**11.2**	**8.67**
Perfluorononanoic acid (PFNA)	--	--	ng/L	<20	<20	<2.0	<2.0	<2.0	<2.0
Perfluorooctanesulfonic acid (PFOS)	70	40	ng/L	<40	<40	**2.13**	**2.54**	<2.0	<2.0
Perfluorooctanoic acid (PFOA)	70	40	ng/L	<20	<20	**6.82**	**4.65**	**8.76**	**4.43**
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
Perfluorodecanoic acid (PFDA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	--	--	--	--	**3.51**	**2.14**
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
Perfluorotridecanoic acid (PFTrDA)	--	--	ng/L	--	--	--	--	<2.0	<2.0
Perfluoroundecanoic acid (PFUdA)	--	--	ng/L	--	--	--	--	<2.0	<2.0

Sample Location				MPRC PWS				
Sample Date[1,2]				8-Nov-2016	7-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units					
Perfluorobutane sulfonic acid (PFBS)	--	600	ng/L	<80	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<8.9	<2.0	<2.0	<2.0	<2.0
Perfluorohexane sulfonic acid (PFHxS)	--	--	ng/L	<27	**3.35**	**3.16**	<2.0	**2.11**
Perfluorononanoic acid (PFNA)	--	--	ng/L	<18	<2.0	<2.0	<2.0	<2.0
Perfluorooctanesulfonic acid (PFOS)	70	40	ng/L	<35	**2.30**	<2.0	<2.0	<2.0
Perfluorooctanoic acid (PFOA)	70	40	ng/L	**11**	**5.58**	**6.26**	**2.05**	**3.91**
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorodecanoic acid (PFDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotridecanoic acid (PFTrDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluoroundecanoic acid (PFUdA)	--	--	ng/L	--	--	--	<2.0	<2.0

Table 2-1 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

			Sample Location	Range 5 Water Supply				
			Sample Date[1,2]	8-Nov-2016	7-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units					
Perfluorobutane sulfonic acid (PFBS)	--	600	ng/L	<80	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<8.9	<2.0	<2.0	<2.0	<2.0
Perfluorohexane sulfonic acid (PFHxS)	--	--	ng/L	<27	<2.0	<2.0	<2.0	<2.0
Perfluorononanoic acid (PFNA)	--	--	ng/L	<18	<2.0	<2.0	<2.0	<2.0
Perfluorooctanesulfonic acid (PFOS)	70	40	ng/L	<36	<2.0	<2.0	<2.0	<2.0
Perfluorooctanoic acid (PFOA)	70	40	ng/L	<1.8	<2.0	<2.0	<2.0	<2.0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorodecanoic acid (PFDA)	--	--	ng/L	--	--	--	<2.0	<2.0
			Sample Location	Range 5 Water Supply				
			Sample Date[1,2]	8-Nov-2016	7-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units					
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotridecanoic acid (PFTrDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluoroundecanoic acid (PFUdA)	--	--	ng/L	--	--	--	<2.0	<2.0

Table 2-1 - Historical PFAS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Sample Location				Range 18 Water Supply				
Sample Date[1,2]				8-Nov-2016	7-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units					
Perfluorobutane sulfonic acid (PFBS)	--	600	ng/L	<78	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<8.7	<2.0	<2.0	<2.0	<2.0
Perfluorohexane sulfonic acid (PFHxS)	--	--	ng/L	<26	<2.0	<2.0	<2.0	<2.0
Perfluorononanoic acid (PFNA)	--	--	ng/L	<17	<2.0	<2.0	<2.0	<2.0
Perfluorooctanesulfonic acid (PFOS)	70	40	ng/L	<35	<2.0	<2.0	<2.0	<2.0
Perfluorooctanoic acid (PFOA)	70	40	ng/L	<1.7	<2.0	<2.0	<2.0	<2.0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorodecanoic acid (PFDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotridecanoic acid (PFTrDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluoroundecanoic acid (PFUdA)	--	--	ng/L	--	--	--	<2.0	<2.0

Sample Location				AQT PWS				
Sample Date[1,2]				8-Nov-2016	11-Sep-2017	4-Dec-2017	27-Mar-2018	25-Jun-2018
PFAS[3]	USEPA LHA	OSD Tapwater Risk Screening Level	Units					
Perfluorobutane sulfonic acid (PFBS)	--	600	ng/L	<80	<2.0	<2.0	<2.0	<2.0
Perfluoroheptanoic acid (PFHpA)	--	--	ng/L	<8.9	<2.0	<2.0	<2.0	<2.0
Perfluorohexane sulfonic acid (PFHxS)	--	--	ng/L	<27	<2.0	<2.0	<2.0	<2.0
Perfluorononanoic acid (PFNA)	--	--	ng/L	<18	<2.0	<2.0	<2.0	<2.0
Perfluorooctanesulfonic acid (PFOS)	70	40	ng/L	<36	<2.0	<2.0	<2.0	<2.0
Perfluorooctanoic acid (PFOA)	70	40	ng/L	<1.8	<2.0	<2.0	<2.0	<2.0
N-Ethyl perfluorooctane sulfonamidoacetic acid (EtFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
N-Methylperfluoroocatane sulfonamidoacetic acid (MeFOSAA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorodecanoic acid (PFDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorohexanoic acid (PFHxA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorododecanoic acid (PFDoA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotetradecanoic acid (PFTeA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluorotridecanoic acid (PFTrDA)	--	--	ng/L	--	--	--	<2.0	<2.0
Perfluoroundecanoic acid (PFUdA)	--	--	ng/L	--	--	--	<2.0	<2.0

Notes:

[1] Samples were collected in 2013 per the Third Unregulated Contaminant Monitoring Rule (United States Environmental Protection Agency, 2012. Revisions to the Unregulated Contaminant Monitoring Rule (UCMR 3) for Public Water Systems, Federal Register Vol. 77, No. 85, May 2).

[2] Samples were collected in 2016 through 2018 per IMCOM Operations Order 16-088.

[3] Samples were analyzed by USEPA Method 537. Pace Analytical Services performed the 5 November 2013 and 8 November 2016 analyses. Eurofins/Eaton Analytical performed the 7 September 2017, 11 September 2017, 4 December 2017, 27 March 2018, and 25 June 2018 analyses.

Acronyms/Abbreviations:

Bold = concentration detected greater than the method reporting limit
< = compound was not detected greater than the method reporting limit
-- = not applicable
AQT = Automatic Qualification Training
ID = identification
LHA = Lifetime Health Advisory
MPRC = Multi Purpose Range Complex
ng/L = nanograms per liter (parts per trillion)
OSD = Office of the Secretary of Defense
PWS = Public Water System
USEPA = United States Environmental Protection Agency

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
MAAF	FFTA-MAAF (OU 004, FTRI-019)	GW	Boring (DPT)	FFTA-MAAF-01	FFTA-MAAF-01-GW-(18)-03122020	18.0	Low-Flow (Peristalstic Pump)	PFAS group[3], field parameters[4]
		SO			FFTA-MAAF-01-SO-(0-2)-03122020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	FFTA-MAAF-02	FFTA-MAAF-02-SO-(0-2)-03122020			PFAS group
				FFTA-MAAF-03	FFTA-MAAF-03-SO-(0-2)-03122020			
	Current Fire Station #3 (Building 706)	GW	Boring (DPT)	B706-01	FTRI-B706-01-GW-(19)-03122020	19.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B706-01-SO-(0-2)-03122020 / FTRI-B706-01-SO-(0-2)-03162020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B706-02	FTRI-B706-02-SO-(0-2)-03162020			PFAS group
				B706-03	FTRI-B706-03-SO-(0-2)-03162020			
	Building 710 Foam Storage	GW	Boring (DPT)	B710-01	FTRI-B710-01-GW-(27)-03112020	27.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B710-01-SO-(0-2)-03112020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B710-02	FTRI-B710-02-SO-(0-2)-03112020 / FTRI-FD-1-SO-03112020			PFAS group
				B710-03	FTRI-B710-03-SO-(0-2)-03112020			
	Hangar 723	GW	Boring (DPT)	B723-01	FTRI-B723-01-GW-(22)-03122020	22.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B723-01-SO-(0-2)-03122020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B723-02	FTRI-B723-02-SO-(0-2)-03162020			PFAS group
				B723-03	FTRI-B723-03-SO-(0-2)-03162020			
	Former Fire Station #3 (Building 743)	GW	Boring (DPT)	B743-01	FTRI-B743-01-GW-(19)-03132020	19.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B743-01-SO-(0-2)-03132020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B743-02	FTRI-B743-02-SO-(0-2)-03132020			PFAS group
				B743-03	FTRI-B743-03-SO-(0-2)-03132020			
	Hangar 746	GW	Boring (DPT)	B746-01	FTRI-B746-01-GW-(21)-03182020	21.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B746-01-SO-(0-2)-03192020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B746-02	FTRI-B746-02-SO-(0-2)-03192020			PFAS group
				B746-03	FTRI-B746-03-SO-(0-2)-03192020			

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
MAAF	Building 817 Foam Release	GW	Boring (DPT)	B817-01	FTRI-B817-01-GW-(27)-03122020	27.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B817-01-SO-(0-2)-03192020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B817-02	FTRI-B817-02-SO-(0-2)-03192020			PFAS group
				B817-03	FTRI-B817-03-SO-(0-2)-03192020			
	Hangar 837	GW	Boring (DPT)	B837-01	FTRI-B837-01-GW-(22)-03182020	22.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B837-01-SO-(0-2)-03162020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B837-02	FTRI-B837-02-SO-(0-2)-03192020			PFAS group
				B837-03	FTRI-B837-03-SO-(0-2)-03192020			
	Hangar 863	GW	Boring (DPT)	B863-01	FTRI-B863-01-GW-(19)-03182020	19.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B863-01-SO-(0-2)-03162020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B863-02	FTRI-B863-02-SO-(0-2)-03102020			PFAS group
				B863-03	FTRI-B863-03-SO-(0-2)-03102020			
	FFTA-Building 892 (Gate 11) (FTRI-018)	GW	Boring (DPT)	B892-01	FTRI-B892-01-GW-(18)-03182020	18.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-B892-01-SO-(0-2)-03162020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	B892-02	FTRI-B892-02-SO-(0-2)-03182020			PFAS group
				B892-03	FTRI-B892-03-SO-(0-2)-03182020			
	FNTA-Gate 8	GW	Boring (DPT)	G8-01	FTRI-G8-01-GW-(21)-03132020	21.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-G8-01-SO-(0-2)-03132020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	G8-02	FTRI-G8-02-SO-(0-2)-03132020			PFAS group
				G8-03	FTRI-G8-03-SO-(0-2)-03132020			
	FFTA-Old Taxiway	GW	Boring (DPT)	OTW-01	FTRI-OTW-01-GW-(19)-03122020	17.5	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO			FTRI-OTW-01-SO-(0-2)-03102020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	OTW-02	FTRI-OTW-02-SO-(0-2)-03102020			PFAS group
				OTW-03	FTRI-OTW-03-SO-(0-2)-03102020			
	General - the MAAF Downgradient Monitoring Wells	GW	Monitoring Well	AGL-MW-03	FTRI-AGL-MW-03-03172020 / FTRI-AGL-MW-03-DEBB-03172020	22.53	Low-Flow (Bladder Pump)	PFAS group, field parameters
				AGL-MW-05	FTRI-AGL-MW-05-03172020	24.84		

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
Camp Funston	Camp Funston Biosolids Application Site	GW	Monitoring Well	1245MW07-10	FTRI-1245MW07-10-03182020	18.20	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		GW		1637CF95-05	FTRI-1637CF95-05-03172020	14.38	Low-Flow (Peristalstic Pump)	
		GW		CF97-101	FTRI-CF97-101-03182020	15.50	Low-Flow (Bladder Pump)	
		GW		CF99-901	FTRI-CF99-901-03182020	19.32	Low-Flow (Peristalstic Pump)	
	Camp Funston Biosolids Application Site	SO	Boring (Hand Auger)	CFBAS-01	FTRI-CFBAS-01-SO-(0-2)-03182020 / FTRI-FD-02-SO-03182020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
				CFBAS-02	FTRI-CFBAS-02-SO-(0-2)-03182020			PFAS group
				CFBAS-03	FTRI-CFBAS-03-SO-(0-2)-03182020			
				CFBAS-04	FTRI-CFBAS-04-SO-(0-2)-05012020			
	FFTA-Camp Funston	SO	Boring (Hand Auger)	FFTA-CF-01	FTRI-FFTA-CF-01-SO-(0-2)-05012020	0-2	Hand Auger	PFAS group
				FFTA-CF-02	FTRI-FFTA-CF-02-SO-(0-2)-05012020			
				FFTA-CF-03	FTRI-FFTA-CF-03-SO-(0-2)-05012020			
	FFTA-SFL (OU 001, FTRI-028)	GW	Monitoring Well	SFL92-301	FTRI-SFL92-301-03182020	19.93	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
				SFL92-601	FTRI-SFL92-601-03192020	22.22	Low-Flow (Bladder Pump)	
				SFL97-903	FTRI-SFL97-903-03162020	18.96	Low-Flow (Bladder Pump)	
			Boring (DPT)	FFTA-SFL-01	FTRI-FFTA-SFL-01-GW-(18)-03172020	18.0	Low-Flow (Peristalstic Pump)	
		SO			FTRI-FFTA-SFL-01-SO-(0-2)-03182020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	FFTA-SFL-02	FTRI-FFTA-SFL-02-SO-(0-2)-03182020			PFAS group
				FFTA-SFL-03	FTRI-FFTA-SFL-03-SO-(0-2)-03182020			
				FFTA-SFL-04	FTRI-FFTA-SFL-04-SO-(0-2)-03182020			
	Camp Funston Advanced WWTP	GW	Monitoring Well	SFL92-803	FTRI-SFL92-803-03162020 / FTRI-FD-1-GW-03162020 / FTRI-SFL92-803-DEBB-03162020	19.36	Low-Flow (Bladder Pump)	PFAS group, field parameters
		WWTP Effluent	Outfall	CFWWTP-EFF	FTRI-CFWWTP-EFF-03172020 / FTRI-FD-1-EFF-0317202	N/A	Grab	PFAS group, field parameters
C/D Landfills	Whitside C/D Landfill (FTRI-002)	GW	Boring (Sonic)	CWCD-01	FTRI-CWCD-01-GW-(52)-03182020	52.0	Grab (Bailer)	PFAS group
				CWCD-02	FTRI-CWCD-02-GW-(60)-03182020	60.0	Grab (Bailer)	
		SO		CWCD-01	FTRI-CWCD-01-SO-(0-2)-03172020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
				CWCD-02	FTRI-CWCD-02-SO-(0-2)-03172020			PFAS group
	Campbell Hill C/D Landfill	GW	Boring (Sonic)	CHCD-01	FTRI-CHCD-01-GW-(45)-03162020	45.0	Grab (Bailer)	PFAS group
		SO			FTRI-CHCD-01-SO-(0-2)-03162020	0-2	Hand Auger	PFAS group, TOC, grain size, pH

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
Custer Hill	Building 8100 Foam Release	GW	Boring (Sonic)	B8100-01	FTRI-B8100-01-GW-(55)-03132020	55.0	Grab (Bailer)	PFAS group
		SO			FTRI-B8100-01-SO-(0-2)-03132020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
	Custer Hill Sanitary Landfill (FTRI-001)	GW	Monitoring Well	CH03-17	FTRI-CH03-17-03192020	28.54	Low-Flow (Bladder Pump)	PFAS group, field parameters
		GW		CH03-15	FTRI-CH03-15-03162020 / FTRI-CH03-15-DEBB-03162020	14.38		
		GW		CH03-19	FTRI-CH03-19-03192020	45.56		
		GW		CH91-07	FTRI-CH91-07-03172020	42.40		
	Custer Hill WWTP and Sludge Beds (FTRI-023)	GW	Boring (Sonic)	CHWWTP-01	FTRI-CHWWTP-01-GW-(55)-03172020	55.0	Grab (Bailer)	PFAS group
		SO		CHWWTP-01	FTRI-CHWWTP-01-SO-(0-2)-03172020 / FTRI-FD-03-SO-03172020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	CHWWTP-02	FTRI-CHWWTP-02-SO-(0-2)-03172020			
				CHWWTP-03	FTRI-CHWWTP-03-SO-(0-2)-03172020			
				CHWWTP-04	FTRI-CHWWTP-04-SO-(0-2)-03172020			
	Building 8313 Foam Storage	GW	Monitoring Well	PTF-03-8	FTRI-PTF-03-8-03172020 / FTRI-PTF-03-8-DEBB-03172020	22.0	Low-Flow (Bladder Pump)	PFAS group, field parameters
		SO	Boring (Hand Auger)	B8313-01	FTRI-B8313-01-SO-(0-2)-03192020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
				B8313-02	FTRI-B8313-02-SO-(0-2)-03192020			PFAS group
Main Post	Main Post WWTP and Sludge Beds (FTRI-025)	GW	Boring (DPT)	MPWWTP-01	FTRI-MPWWTP-01-GW-(21)-03172020 / FTRI-FD-2-GW-03172020	21.0	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		SO		MPWWTP-01	FTRI-MPWWTP-01-SO-(0-2)-03172020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	MPWWTP-02	FTRI-MPWWTP-02-SO-(0-2)-03172020 / FTRI-FD-4-SO-03172020			PFAS group
				MPWWTP-03	FTRI-MPWWTP-03-SO-(0-2)-03172020			
				MPWWTP-04	FTRI-MPWWTP-04-SO-(0-2)-03182020			
				MPWWTP-05	FTRI-MPWWTP-05-SO-(0-2)-03182020			
				MPWWTP-06	FTRI-MPWWTP-06-SO-(0-2)-03182020			
				MPWWTP-07	FTRI-MPWWTP-07-SO-(0-2)-03182020			
	General - Drinking Water and Supply Wells	DW	DW Tap	DW1	FTRI-DW1-03202020 / FTRI-FD-DW1-03202020	N/A	Grab	PFAS group[5]
		GW	Supply Well	PW2	FTRI-PW2-03202020			PFAS group, field parameters
		GW		PW3	FTRI-PW3-03202020			
		GW		PW4	FTRI-PW4-03202020			
		GW		PW7	FTRI-PW7-03202020 / FTRI-PW7-DEBB-03202020			

Table 6-1 - Site Inspection Sampling Location Details
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
Biosolids Application Sites (not including Camp Funston)	Firebreak 1 Biosolids Application Site	GW	Boring (Sonic)	FRBK1-01	FTRI-FRBK1-01-GW-(41)-03132020	41.0	Grab (Bailer)	PFAS group
		SO			FTRI-FRBK1-01-SO-(0-2)-03132020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	FRBK1-02	FTRI-FRBK1-02-SO-(0-2)-03182020			PFAS group
				FRBK1-03	FTRI-FRBK1-03-SO-(0-2)-03182020			
	Firebreak 9 Biosolids Application Site	GW	Boring (Sonic)	FRBK9-01	FTRI-FRBK9-01-GW-(75)-03112020 / FTRI-FD-3-GW-03112020	75.0	Grab (Bailer)	PFAS group
		SO			FTRI-FRBK9-01-SO-(0-2)-03102020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	FRBK9-02	FTRI-FRBK9-02-SO-(0-2)-03102020			PFAS group
				FRBK9-03	FTRI-FRBK9-03-SO-(0-2)-03102020			
				FRBK9-04	FTRI-FRBK9-04-SO-(0-2)-03102020			
	Firebreak 10 Biosolids Application Site	GW	Boring (Sonic)	FRBK10-01	FTRI-FRBK10-01-GW-(60)-03122020	60.0	Grab (Bailer)	PFAS group, field parameters
		SO			FTRI-FRBK10-01-SO-(0-2)-03112020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
			Boring (Hand Auger)	FRBK10-02	FTRI-FRBK10-02-SO-(0-2)-03192020			PFAS group
				FRBK10-03	FTRI-FRBK10-03-SO-(0-2)-03192020			
				FRBK10-04	FTRI-FRBK10-04-SO-(0-2)-03192020			
				FRBK10-05	FTRI-FRBK10-05-SO-(0-2)-03192020			
				FRBK10-06	FTRI-FRBK10-06-SO-(0-2)-03192020			
	MPRC Biosolids Application Site	SO	Boring (Hand Auger)	MPRC-01	FTRI-MPRC-01-SO-(0-2)-03122020	0-2	Hand Auger	PFAS group, TOC, grain size, pH
				MPRC-02	FTRI-MPRC-02-SO-(0-2)-03122020			PFAS group
				MPRC-03	FTRI-MPRC-03-SO-(0-2)-03122020			
				MPRC-04	FTRI-MPRC-04-SO-(0-2)-03122020			
				MPRC-05	FTRI-MPRC-05-SO-(0-2)-03122020 / FTRI-FD-5-SO-03122020			
				MPRC-06	FTRI-MPRC-06-SO-(0-2)-03122020			
				MPRC-07	FTRI-MPRC-07-SO-(0-2)-03122020			
				MPRC-08	FTRI-MPRC-08-SO-(0-2)-03122020			
				MPRC-09	FTRI-MPRC-09-SO-(0-2)-03122020			
				MPRC-10	FTRI-MPRC-10-SO-(0-2)-03122020			
				MPRC-11	FTRI-MPRC-11-SO-(0-2)-03122020			
				MPRC-12	FTRI-MPRC-12-SO-(0-2)-03122020			
				MPRC-13	FTRI-MPRC-13-SO-(0-2)-03122020			
				MPRC-14	FTRI-MPRC-14-SO-(0-2)-03122020			

Area / AOPI Group	AOPI	Matrix	Location Type	Location ID	Sample ID / Field Duplicate ID / DEB Sample ID	Depth Interval[1] (ft bmp)	Sample Method[2]	Analytes
Biosolids Application Sites (not including Camp Funston)	Camp Forsyth Biosolids Application Site	GW	Monitoring Well	CF-P10	FTRI-CF-P10-03182020	25.01	Low-Flow (Peristalstic Pump)	PFAS group, field parameters
		GW		CF-W10	FTRI-CF-W10-03192020	25.02		
		GW		CF-W11	FTRI-CF-W11-03182020	24.53		

Notes:
1. Depth units are reported in ft bmp unless otherwise noted. The measuring point for monitoring wells was typically the top of casing. The measuring point for boring locations was the ground surface. The groundwater sampling depth noted for borings indicates the approximate depth of the pump intake or bailer during sampling. The sampling depth noted for existing monitoring wells indicates the depth to groundwater. Available monitoring well construction details are included in **Table 6-2**.
2. The first 5 feet of all DPT and Sonic borings was hand augered. Soil samples were collected from the top two feet of native soil at the DPT and Sonic boring locations.
3. The PFAS analyte group includes PFOS, PFOA, PFBS and 15 other PFAS constituents.
4. In addition to laboratory analytes, field parameters were measured for groundwater samples and include temperature, pH, conductivity, dissolved oxygen, turbidity, and oxidation-reduction potential. Lithologic descriptions were logged continuously at soil boring locations. Field parameters and lithological descriptions are shown on field sampling forms included in **Appendix K**.
5. PFAS analysis for drinking water and associated QA/QC samples is analyzed using USEPA Method 537 for drinking water and consists of 14 constituents listed on **Table 6-3** of this PA/SI Report.

Acronyms/Abbreviations:
AOPI = Area of Potential Interest
C/D = Construction and Demolition
DEB = Dedicated Equipment Background
DPT = Direct Push Technology
DW = drinking water
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
ft bmp = feet below measuring point
FTRI = Fort Riley
GW = groundwater
ID = identification
MAAF = Marshall Army Airfield
MPRC = Multi-Purpose Range Complex
OU = operable unit
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
SFL = Southwest Funston Landfill
SI = site inspection
SO = soil
TOC = total organic carbon
WWTP = wastewater treatment plant

Area of Potential Interest	Well ID	Water Level[1] (ft btoc)	Well Depth (ft btoc)	Screened interval (ft btoc)	Well Diameter (inches)
Monitoring Wells					
MAAF AOPIs	AGL-MW-03	22.53	30.40	NA - NA	2.0
	AGL-MW-05	24.84	29.22	20.00 - 30.00	2.0
FFTA-Camp Funston	SFL92-301	19.50	25.0	16.40 - 26.40	2.0
	SFL92-601	21.70	30.0	21.40 - 31.40	2.0
	SFL97-903	18.96	65.0	NA	2.0
Camp Funston Advanced WWTP	SFL92-803	19.93	67.0	57.01 - 67.01	2.0
Camp Funston Biosolids Application Site	CF99-901	19.32	26.5	16 - 26	2.0
	CF97-101	15.5	24.0	NA	2.0
	1245MW07-10	18.2	NA	NA	2.0
	1637MW95-05	14.38	25.21	11.50 - 26.50	2.0
Custer Hill Sanitary Landfill	CH03-15	14.38	34.5	16.66 - 36.71	2.0
	CH03-17	28.54	59.3	41.42 - 61.46	2.0
	CH03-19	45.56	70.9	52.2 - 72.61	2.0
	CH91-07	42.4	63.0	NA	4.0
Building 8313 Foam Storage	PTF-03-8	22.00	28.0	NA	4.0
Camp Forsyth Biosolids Application Site	P10	25.01	NA	NA	2.0
	W11	24.53	NA	NA	2.0
	W10	25.02	NA	NA	2.0

Notes:

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

AOPI = Area of Potential Interest
btoc = below top of casing
FFTA = former fire training area
ft = feet
ID = identification
MAAF = Marshall Army Airfield
NA = not available
WWTP = Wastewater Treatment Plant

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

ARCADIS Design & Consultancy for natural and built assets

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Tapwater Risk Screening Level					40		40		600	
MAAF AOPIs											
FFTA-MAAF (OU 004, FTRI-019)	DPT Boring	FFTA-MAAF-01	FTRI-FFTA-MAAF-01-GW-(18)-03122020	3/12/2020	N	**300**	DJ	**26**		**5.0**	
Current Fire Station #3 (Building 706)	DPT Boring	B706-01	FTRI-B706-01-GW-(19)-03122020	3/12/2020	N	180	U	180	U	**3,200**	DJ
Building 710 Foam Storage	DPT Boring	B710-01	FTRI-B710-01-GW-(27)-03112020	3/11/2020	N	1.9	U	**23**	J+	**170**	DJ
Hangar 723	DPT Boring	B723-01	FTRI-B723-01-GW-(22)-03122020	3/12/2020	N	**8.4**		**30**		**29**	
Former Fire Station #3 (Building 743)	DPT Boring	B743-01	FTRI-B743-01-GW-(19)-03132020	3/13/2020	N	**180**	DJ	**890**	DJ	**14,000**	DJ
Hangar 746	DPT Boring	B746-01	FTRI-B746-01-GW-(21)-03182020	3/18/2020	N	**1.6**	J	**32**		**8.5**	
Building 817 Foam Release	DPT Boring	B817-01	FTRI-B817-01-GW-(27)-03122020	3/12/2020	N	1.8	U	1.8	U	1.8	U
Hangar 837	DPT Boring	B837-01	FTRI-B837-01-GW-(22)-03182020	3/18/2020	N	1.8	U	**1,100**	DJ	**2.3**	
Hangar 863	DPT Boring	B863-01	FTRI-B863-01-GW-(19)-03182020	3/18/2020	N	**80**	J-	**120**	J-	**14**	J-
FFTA-Building 892 (Gate 11) (FTRI-018)	DPT Boring	B892-01	FTRI-B892-01-GW-(18)-03182020	3/18/2020	N	**840**	J-	**1,700**	J-	**750**	J-
FNTA-Gate 8	DPT Boring	G8-01	FTRI-G8-01-GW-(21)-03132020	3/13/2020	N	**2.7**		**40**	J	**34**	
FFTA-Old Taxiway	DPT Boring	OTW-01	FTRI-OTW-01-GW-(19)-03122020	3/11/2020	N	20	U	**25**	J+	**52**	
General - the MAAF AOPIs	Monitoring Well	AGL-MW-03	FTRI-AGL-MW-03-03172020	3/17/2020	N	**100**		**1,100**	DJ	**2,600**	DJ
			FTRI-AGL-MW-03-DEBB-03172020	3/17/2020	N	**460**	DJ	**2,100**	DJ	**1,000**	DJ
		AGL-MW-05	FTRI-AGL-MW-05-03172020	3/17/2020	N	**300**	J-	**30,000**	DJ	**790**	J-
Camp Funston AOPIs											
Camp Funston Biosolids Application Site	Monitoring Well	1245MW07-10	FTRI-1245MW07-10-03182020	3/18/2020	N	20	UJ-	20	UJ-	**11**	J-
		1637CF95-05	FTRI-1637CF95-05-03172020	3/17/2020	N	**28**		**2.8**		**1.4**	J
		CF97-101	FTRI-CF97-101-03182020	3/18/2020	N	1.7	U	**20**		1.7	U
		CF99-901	FTRI-CF99-901-03182020	3/18/2020	N	**2.6**	J	1.8	U	**8.4**	
FFTA-SFL (OU 001, FTRI-028)	DPT Boring	FFTA-SFL-01	FTRI-FFTA-SFL-01-GW-(18)-03172020	3/17/2020	N	**4.6**		**7.8**		**20**	
	Monitoring Well	SFL92-301	FTRI-SFL92-301-03182020	3/18/2020	N	20	UJ-	**110**	J-	**17**	J-
		SFL92-601	FTRI-SFL92-601-03192020	3/19/2020	N	20	UJ-	**110**	J-	**16**	J-
		SFL97-903	FTRI-SFL97-903-03162020	3/16/2020	N	**13**		**8.8**		**4.8**	
Camp Funston Advanced WWTP	Monitoring Well	SFL92-803	FTRI-SFL92-803-03162020	3/16/2020	N	**8.0**		**2.1**	J	**3.8**	
			(FTRI-FD-1-GW-03162020)		FD	**9.3**		**5.8**	J	**4.1**	
			FTRI-SFL92-803-DEBB-03162020	3/16/2020	N	**11**	J	**19**		**5.1**	

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

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Tapwater Risk Screening Level					40		40		600	
C/D Landfills											
Whitside C/D Landfill (FTRI-002)	Sonic Boring	CWCD-01	FTRI-CWCD-01-GW-(52)-03182020	3/18/2020	N	**160**	J-	**94**	J-	**32**	J-
		CWCD-02	FTRI-CWCD-02-GW-(60)-03182020	3/18/2020	N	**87**	J-	**110**	J-	**46**	J-
Campbell Hill C/D Landfill	Sonic Boring	CHCD-01	FTRI-CHCD-01-GW-(45)-03162020	3/16/2020	N	20	UJ-	**42**	J-	**400**	J-
Custer Hill AOPIs											
Building 8100 Foam Release	Sonic Boring	B8100-01	FTRI-B8100-01-GW-(55)-03132020	3/13/2020	N	**19**	J-	20	UJ-	**10**	J-
Custer Hill Sanitary Landfill (FTRI-001)	Monitoring Well	CH03-17	FTRI-CH03-17-03192020	3/19/2020	N	1.7	U	1.7	U	1.7	U
		CH03-15	FTRI-CH03-15-03162020	3/16/2020	N	**150**	DJ	**440**	DJ	**9.4**	DJ
			FTRI-CH03-15-DEBB-03162020	3/16/2020	N	**170**	DJ	**450**	DJ	**11**	DJ
		CH03-19	FTRI-CH03-19-03192020	3/19/2020	N	**3.8**		**12**		**1.8**	
		CH91-07	FTRI-CH91-07-03172020	3/17/2020	N	**1,100**	DJ	**47**		**65**	
Custer Hill WWTP and Sludge Beds (FTRI-023)	Sonic Boring	CHWWTP-01	FTRI-CHWWTP-01-GW-(55)-03172020	3/17/2020	N	**26**	J-	20	UJ-	20	UJ-
Building 8313 Foam Storage	Monitoring Well	PTF-03-8	FTRI-PTF-03-8-03172020	3/17/2020	N	**2,100**	DJ	**110**	J	**96**	
			FTRI-PTF-03-8-DEBB-03172020	3/17/2020	N	**2,200**	DJ	**100**		**93**	
Main Post AOPI											
Main Post WWTP and Sludge Beds (FTRI-025)	DPT Boring	MPWWTP-01	FTRI-MPWWTP-01-GW-(21)-03172020	3/17/2020	N	**34**	J-	**16**	J-	20	UJ-
			(FTRI-FD-2-GW-03172020)		FD	**35**		**16**		**10**	
Biosolids Application Sites (not including Camp Funston)											
Firebreak 1 Biosolids Application Site	Sonic Boring	FRBK1-01	FTRI-FRBK1-01-GW-(41)-03132020	3/13/2020	N	**1.9**		**2.3**		1.8	U
Firebreak 9 Biosolids Application Site	Sonic Boring	FRBK9-01	FTRI-FRBK9-01-GW-(75)-03112020	3/11/2020	N	20	UJ-	20	UJ-	20	UJ-
			(FTRI-FD-3-GW-03112020)		FD	19	UJ-	19	UJ-	19	UJ-
Firebreak 10 Biosolids Application Site	Sonic Boring	FRBK10-01	FTRI-FRBK10-01-GW-(60)-03122020	3/12/2020	N	**38**	J-	**28**	J-	20	UJ-
Camp Forsyth Biosolids Application Site	Monitoring Well	CF-P10	FTRI-CF-P10-03182020	3/18/2020	N	1.8	U	1.8	U	**2.3**	
		CF-W10	FTRI-CF-W10-03192020	3/19/2020	N	1.8	U	1.8	U	1.8	U
		CF-W11	FTRI-CF-W11-03182020	3/18/2020	N	1.9	U	1.9	U	1.9	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than or equal to the Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).
3. Samples were analyzed for PFAS by LC/MS/MS Compliant with Table B-15 of DoD QSM 5.1.1 (DoD. 2018. Quality Systems Manual, Version 5.1.1, 2018. February.)

Table 7-1 - Groundwater PFOS, PFOA, and PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Investigation
Fort Riley, Kansas

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Tapwater Risk Screening Level					40		40		600	

Acronyms/Abbreviations:
-- = not applicable
AOPI = area of potential interest
MAAF = Marshall Army Airfield
DJ = The analyte was analyzed at dilution and the result is an estimated quantity.
C/D = Construction and Debris
DEBB = dedicated equipment background
FD = field duplicate sample
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
FTRI = Fort Riley
GW = groundwater
ID = identification
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.
MAAF = Marshall Army Airfield
N = primary sample
ng/L = nanograms per liter (parts per trillion)
OU = operable unit
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
SFL = Southwest Funston Landfill
U = The analyte was analyzed for but the result was not detected above the limit of detection (LOD) and the limit of quantitation (LOQ). The non-detect value reported is the 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.
USEPA = United States Environmental Protection Agency
WWTP = wastewater treatment plant

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

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Residential Risk Screening Level					0.13		0.13		1.9	
	OSD Industrial/Commercial Risk Screening Level					1.6		1.6		25	
MAAF AOPIs											
FFTA-MAAF (OU 004, FTRI-019)	DPT Boring	FFTA-MAAF-01	FTRI-FFTA-MAAF-01-SO-(0-2)-03122020	3/12/2020	N	**0.290**	DJ	**0.0029**		0.0025	U
	Hand Auger Boring	FFTA-MAAF-02	FTRI-FFTA-MAAF-02-SO-(0-2)-03122020	3/12/2020	N	**0.120**	DJ	**0.0023**		0.0023	U
		FFTA-MAAF-03	FTRI-FFTA-MAAF-03-SO-(0-2)-03122020	3/12/2020	N	**0.054**		**0.0017**		0.0023	U
Current Fire Station #3 (Building 706)	DPT Boring	B706-01	FTRI-B706-01-SO-(0-2)-03122020	3/12/2020	N	**0.120**	DJ	**0.013**		0.0022	U
			FTRI-B706-01-SO-(0-2)-03162020	3/16/2020	N	**0.065**		**0.019**		0.0023	U
	Hand Auger Boring	B706-02	FTRI-B706-02-SO-(0-2)-03162020	03/16/2020	N	**0.100**	DJ	**0.0047**		0.0023	U
		B706-03	FTRI-B706-03-SO-(0-2)-03162020	03/16/2020	N	**0.059**		**0.0075**		**0.0058**	
Building 710 Foam Storage	DPT Boring	B710-01	FTRI-B710-01-SO-(0-2)-03112020	3/11/2020	N	**0.00080**		0.0007	U	0.0023	U
	Hand Auger Boring	B710-02	FTRI-B710-02-SO-(0-2)-03112020	3/11/2020	N	**0.00084**		0.00066	U	0.0022	U
			(FTRI-FD-1-SO-03112020)		FD	**0.00076**		0.00067	U	0.0022	U
		B710-03	FTRI-B710-03-SO-(0-2)-03112020	3/11/2020	N	**0.00078**		0.00068	U	0.0023	U
Hangar 723	DPT Boring	B723-01	FTRI-B723-01-SO-(0-2)-03122020	3/12/2020	N	**0.0020**		0.00068	U	0.0023	U
	Hand Auger Boring	B723-02	FTRI-B723-02-SO-(0-2)-03162020	03/16/2020	N	**0.039**		**0.00090**		0.0024	U
		B723-03	FTRI-B723-03-SO-(0-2)-03162020	03/16/2020	N	**0.0015**		0.00068	U	0.0023	U
Former Fire Station #3 (Building 743)	DPT Boring	B743-01	FTRI-B743-01-SO-(0-2)-03132020	3/13/2020	N	**0.700**	DJ	**0.0033**		0.0023	U
	Hand Auger Boring	B743-02	FTRI-B743-02-SO-(0-2)-03132020	3/13/2020	N	**0.420**	DJ	**0.0049**		0.0024	U
		B743-03	FTRI-B743-03-SO-(0-2)-03132020	3/13/2020	N	**0.790**	DJ	**0.0061**		0.0023	U
Hangar 746	DPT Boring	B746-01	FTRI-B746-01-SO-(0-2)-03192020	3/19/2020	N	**0.0032**		**0.00051**	J	0.0023	U
	Hand Auger Boring	B746-02	FTRI-B746-02-SO-(0-2)-03192020	3/19/2020	N	**0.0012**		0.00068	U	0.0023	U
		B746-03	FTRI-B746-03-SO-(0-2)-03192020	3/19/2020	N	**0.0024**		0.00072	U	0.0024	U
Building 817 Foam Release	DPT Boring	B817-01	FTRI-B817-01-SO-(0-2)-03192020	3/19/2020	N	0.00072	U	0.00072	U	0.0024	U
	Hand Auger Boring	B817-02	FTRI-B817-02-SO-(0-2)-03192020	3/19/2020	N	0.00069	U	0.00069	U	0.0023	U
		B817-03	FTRI-B817-03-SO-(0-2)-03192020	3/19/2020	N	0.00072	U	0.00072	U	0.0024	U
Hangar 837	DPT Boring	B837-01	FTRI-B837-01-SO-(0-2)-03162020	3/16/2020	N	**0.0015**		**0.0022**		0.0023	U
	Hand Auger Boring	B837-02	FTRI-B837-02-SO-(0-2)-03192020	3/19/2020	N	**0.0046**		**0.00068**	J	0.0025	U
		B837-03	FTRI-B837-03-SO-(0-2)-03192020	3/19/2020	N	0.00070	U	**0.00058**	J	0.0023	U

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

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Residential Risk Screening Level					0.13		0.13		1.9	
	OSD Industrial/Commercial Risk Screening Level					1.6		1.6		25	
Hangar 863	DPT Boring	B863-01	FTRI-B863-01-SO-(0-2)-03162020	3/16/2020	N	**0.0017**		0.00071	U	0.0024	U
	Hand Auger Boring	B863-02	FTRI-B863-02-SO-(0-2)-03102020	3/10/2020	N	**0.00071**	J	0.00073	U	0.0024	U
		B863-03	FTRI-B863-03-SO-(0-2)-03102020	3/10/2020	N	**0.00076**		**0.00078**		0.0025	U
FFTA-Building 892 (Gate 11) (FTRI-018)	DPT Boring	B892-01	FTRI-B892-01-SO-(0-2)-03162020	3/16/2020	N	**0.015**		**0.00089**		0.0026	U
	Hand Auger Boring	B892-02	FTRI-B892-02-SO-(0-2)-03182020	3/18/2020	N	**0.010**		0.00070	U	0.0023	U
		B892-03	FTRI-B892-03-SO-(0-2)-03182020	3/18/2020	N	**0.0020**		0.00070	U	0.0023	U
FNTA-Gate 8	DPT Boring	G8-01	FTRI-G8-01-SO-(0-2)-03132020	3/13/2020	N	**0.0092**		**0.00069**	J	0.0023	U
	Hand Auger Boring	G8-02	FTRI-G8-02-SO-(0-2)-03132020	3/13/2020	N	**0.0017**		0.00069	U	0.0023	U
		G8-03	FTRI-G8-03-SO-(0-2)-03132020	3/13/2020	N	**0.071**		**0.0045**		0.0022	U
FFTA-Old Taxiway	DPT Boring	OTW-01	FTRI-OTW-01-SO-(0-2)-03102020	3/10/2020	N	**0.0011**		0.00074	U	0.0025	U
	Hand Auger Boring	OTW-02	FTRI-OTW-02-SO-(0-2)-03102020	3/10/2020	N	**0.0042**		0.00072	U	0.0024	U
		OTW-03	FTRI-OTW-03-SO-(0-2)-03102020	3/10/2020	N	**0.0083**		0.00070	U	0.0023	U
Camp Funston AOPIs											
Camp Funston Biosolids Application Site	Hand Auger Boring	CFBAS-01	FTRI-CFBAS-01-SO-(0-2)-03182020	3/18/2020	N	0.00068	U	0.00068	U	0.0023	U
			(FTRI-FD-02-SO-03182020)		FD	0.00074	U	0.00074	U	0.0025	U
		CFBAS-02	FTRI-CFBAS-02-SO-(0-2)-03182020	3/18/2020	N	0.00070	U	0.00070	U	0.0023	U
		CFBAS-03	FTRI-CFBAS-03-SO-(0-2)-03182020	3/18/2020	N	0.00068	U	0.00068	U	0.0023	U
		CFBAS-04	FTRI-CFBAS-04-SO-(0-2)-05012020	5/1/2020	N	0.00064	U	0.00064	U	0.0021	U
FFTA-Camp Funston	Hand Auger Boring	FFTA-CF-01	FTRI-FFTA-CF-01-SO-(0-2)-05012020	5/1/2020	N	**0.120**	DJ	**0.0012**		0.0024	U
		FFTA-CF-02	FTRI-FFTA-CF-02-SO-(0-2)-05012020	5/1/2020	N	**0.067**		**0.0014**		0.0022	U
		FFTA-CF-03	FTRI-FFTA-CF-03-SO-(0-2)-05012020	5/1/2020	N	**0.088**		**0.0026**		0.0023	U
FFTA-SFL (OU 001, FTRI-028)	DPT Boring	FFTA-SFL-01	FTRI-FFTA-SFL-01-SO-(0-2)-03182020	3/18/2020	N	**0.0011**		0.00067	U	0.0022	U
	Hand Auger Boring	FFTA-SFL-02	FTRI-FFTA-SFL-02-SO-(0-2)-03182020	3/18/2020	N	0.00070	U	0.00070	U	0.0023	U
		FFTA-SFL-03	FTRI-FFTA-SFL-03-SO-(0-2)-03182020	3/18/2020	N	**0.0056**		0.00066	U	0.0022	U
		FFTA-SFL-04	FTRI-FFTA-SFL-04-SO-(0-2)-03182020	3/18/2020	N	**0.0015**		0.00077	U	0.0026	U
C/D Landfills											
Whitside C/D Landfill (FTRI-002)	Sonic Boring	CWCD-01	FTRI-CWCD-01-SO-(0-2)-03172020	3/17/2020	N	**0.00043**	J	0.00065	U	0.0022	U
		CWCD-02	FTRI-CWCD-02-SO-(0-2)-03172020	3/17/2020	N	0.00070	U	0.00070	U	0.0023	U
Campbell Hill C/D Landfill	Sonic Boring	CHCD-01	FTRI-CHCD-01-SO-(0-2)-03162020	3/16/2020	N	**0.021**		0.00073	U	0.0024	U

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

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Residential Risk Screening Level					0.13		0.13		1.9	
	OSD Industrial/Commercial Risk Screening Level					1.6		1.6		25	
Custer Hill AOPIs											
Building 8100 Foam Release	Sonic Boring	B8100-01	FTRI-B8100-01-SO-(0-2)-03132020	3/13/2020	N	**0.0047**		**0.00065**	J	0.0027	U
Custer Hill WWTP and Sludge Beds (FTRI-023)	Sonic Boring	CHWWTP-01	FTRI-CHWWTP-01-SO-(0-2)-03172020	3/17/2020	N	**0.00056**	J	0.00068	U	0.0023	U
			(FTRI-FD-03-SO-03172020)		FD	**0.00063**	J	0.00071	U	0.0024	U
	Hand Auger Boring	CHWWTP-02	FTRI-CHWWTP-02-SO-(0-2)-03172020	3/17/2020	N	**0.0038**		**0.00079**		0.0024	U
		CHWWTP-03	FTRI-CHWWTP-03-SO-(0-2)-03172020	3/17/2020	N	**0.0047**		**0.00099**		0.0024	U
		CHWWTP-04	FTRI-CHWWTP-04-SO-(0-2)-03172020	3/17/2020	N	**0.015**		**0.0035**		0.0025	U
Building 8313 Foam Storage	Hand Auger Boring	B8313-01	FTRI-B8313-01-SO-(0-2)-03192020	3/19/2020	N	**0.00066**	J	0.00073	U	0.0024	U
		B8313-02	FTRI-B8313-02-SO-(0-2)-03192020	3/19/2020	N	0.00080	U	0.00080	U	0.0027	U
Main Post AOPI											
Main Post WWTP and Sludge Beds (FTRI-025)	DPT Boring	MPWWTP-01	FTRI-MPWWTP-01-SO-(0-2)-03172020	3/17/2020	N	0.00064	U	0.00064	U	0.0021	U
	Hand Auger Boring	MPWWTP-02	FTRI-MPWWTP-02-SO-(0-2)-03172020	3/17/2020	N	0.00066	U	0.00066	U	0.0022	U
			(FTRI-FD-4-SO-03172020)		FD	0.00067	U	0.00067	U	0.0022	U
		MPWWTP-03	FTRI-MPWWTP-03-SO-(0-2)-03172020	3/17/2020	N	**0.0077**		**0.00046**	J	0.0023	U
		MPWWTP-04	FTRI-MPWWTP-04-SO-(0-2)-03182020	3/18/2020	N	**0.0012**		0.00081	U	0.0027	U
		MPWWTP-05	FTRI-MPWWTP-05-SO-(0-2)-03182020	3/18/2020	N	**0.00060**	J	0.00071	U	0.0024	U
		MPWWTP-06	FTRI-MPWWTP-06-SO-(0-2)-03182020	3/18/2020	N	0.00063	U	0.00063	U	0.0021	U
		MPWWTP-07	FTRI-MPWWTP-07-SO-(0-2)-03182020	3/18/2020	N	0.00074	U	0.00074	U	0.0025	U
Biosolids Application Sites (not including Camp Funston)											
Firebreak 1 Biosolids Application Site	Sonic Boring	FRBK1-01	FTRI-FRBK1-01-SO-(0-2)-03132020	3/13/2020	N	0.00071	U	0.00071	U	0.0024	U
	Hand Auger Boring	FRBK1-02	FTRI-FRBK1-02-SO-(0-2)-03182020	3/18/2020	N	**0.00052**	J	0.00074	U	0.0025	U
		FRBK1-03	FTRI-FRBK1-03-SO-(0-2)-03182020	3/18/2020	N	0.00070	U	0.00070	U	0.0023	U
Firebreak 9 Biosolids Application Site	Sonic Boring	FRBK9-01	FTRI-FRBK9-01-SO-(0-2)-03102020	3/10/2020	N	0.00073	U	0.00073	U	0.0024	U
	Hand Auger Boring	FRBK9-02	FTRI-FRBK9-02-SO-(0-2)-03102020	3/10/2020	N	0.00074	U	0.00074	U	0.0025	U
		FRBK9-03	FTRI-FRBK9-03-SO-(0-2)-03102020	3/10/2020	N	0.00071	U	0.00071	U	0.0024	U
		FRBK9-04	FTRI-FRBK9-04-SO-(0-2)-03102020	3/10/2020	N	0.00074	U	0.00074	U	0.0025	U

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

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (mg/kg)		PFOA (mg/kg)		PFBS (mg/kg)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Residential Risk Screening Level					0.13		0.13		1.9	
	OSD Industrial/Commercial Risk Screening Level					1.6		1.6		25	
Firebreak 10 Biosolids Application Site	Sonic Boring	FRBK10-01	FTRI-FRBK10-01-SO-(0-2)-03112020	3/11/2020	N	0.00074	U	**0.00064**	J	0.0025	U
	Hand Auger Boring	FRBK10-02	FTRI-FRBK10-02-SO-(0-2)-03192020	3/19/2020	N	**0.0012**		**0.0013**		0.0025	U
		FRBK10-03	FTRI-FRBK10-03-SO-(0-2)-03192020	3/19/2020	N	0.00071	U	0.00071	U	0.0024	U
		FRBK10-04	FTRI-FRBK10-04-SO-(0-2)-03192020	3/19/2020	N	0.00071	U	0.00071	U	0.0024	U
		FRBK10-05	FTRI-FRBK10-05-SO-(0-2)-03192020	3/19/2020	N	**0.013**		**0.0019**		0.0024	U
		FRBK10-06	FTRI-FRBK10-06-SO-(0-2)-03192020	3/19/2020	N	**0.0016**		**0.00058**	J	0.0024	U
MPRC Biosolids Application Site	Hand Auger Boring	MPRC-01	FTRI-MPRC-01-SO-(0-2)-03122020	3/12/2020	N	0.00079	U	**0.00072**	J	0.0026	U
		MPRC-02	FTRI-MPRC-02-SO-(0-2)-03122020	3/12/2020	N	**0.00072**		**0.0014**		0.0024	U
		MPRC-03	FTRI-MPRC-03-SO-(0-2)-03122020	3/12/2020	N	**0.0027**		**0.0064**		0.0025	U
		MPRC-04	FTRI-MPRC-04-SO-(0-2)-03122020	3/12/2020	N	**0.0039**		**0.0036**		0.0026	U
		MPRC-05	FTRI-MPRC-05-SO-(0-2)-03122020	3/12/2020	N	**0.0028**		**0.0028**		0.0026	U
			(FTRI-FD-5-SO-03122020)		FD	**0.0031**		**0.0034**		0.0026	U
		MPRC-06	FTRI-MPRC-06-SO-(0-2)-03122020	3/12/2020	N	**0.0021**		**0.0033**		0.0027	U
		MPRC-07	FTRI-MPRC-07-SO-(0-2)-03122020	3/12/2020	N	**0.0022**		**0.0023**		0.0026	U
		MPRC-08	FTRI-MPRC-08-SO-(0-2)-03122020	3/12/2020	N	**0.0016**		**0.0022**		0.0027	U
		MPRC-09	FTRI-MPRC-09-SO-(0-2)-03122020	3/12/2020	N	**0.0026**		**0.0056**		0.0024	U
		MPRC-10	FTRI-MPRC-10-SO-(0-2)-03122020	3/12/2020	N	**0.00053**	J	**0.0012**		0.0026	U
		MPRC-11	FTRI-MPRC-11-SO-(0-2)-03122020	3/12/2020	N	**0.0016**		**0.0038**		0.0026	U
		MPRC-12	FTRI-MPRC-12-SO-(0-2)-03122020	3/12/2020	N	0.00074	U	0.00074	U	0.0025	U
		MPRC-13	FTRI-MPRC-13-SO-(0-2)-03122020	03/12/2020	N	0.00074	U	**0.0012**		0.0025	U
		MPRC-14	FTRI-MPRC-14-SO-(0-2)-03122020	03/12/2020	N	0.00071	U	0.00071	U	0.0024	U

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Gray shaded values indicate the result was detected greater than or equal to the Office of the Secretary of Defense (OSD) risk screening levels for the residential scenario (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program. September.).
3. Units were converted from ng/g (dry weight), as reported by the laboratory, to mg/kg for agreement with the OSD risk screening levels.
4. Samples were analyzed by Modified USEPA Method 537 in accordance with QSM 5.1.1, Table B-15 (DoD. 2018. Quality Systems Manual, Version 5.1.1, 2018. February.)

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

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

Acronyms/Abbreviations:
AOPI = area of potential interest
C/D = Construction and Debris
DJ = The analyte was analyzed at dilution and the result is an estimated quantity.
DPT = Direct-Push Technology
FD = field duplicate sample
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
FTRI = Fort Riley
ID = identification
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
MAAF = Marshall Army Airfield
mg/kg = micrograms per kilogram (parts per million)
MPRC = Multi-Purpose Range Complex
N = primary sample
OSD = Office of the Secretary of Defense
OU = operable unit
PFAS = per- and polyfluoroalkyl substances
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
SFL = Southwest Funston Landfill
U = The analyte was analyzed for but the result was not detected above the limit of detection (LOD) and the limit of quantitation (LOQ). The non-detect value reported is the LOQ.
WWTP = wastewater treatment plant

Table 7-3 - Wastewater Treatment Plant Effluent PFOS, PFOA, PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
						Result	Qual	Result	Qual	Result	Qual
	OSD Tapwater Risk Screening Level					40		40		600	
Camp Funston Advanced WWTP	Effluent	CFWWTP-EFF	FTRI-CFWWTP-EFF-03172020	3/17/2020	N	**5.7**		**10**		**10**	
			(FTRI-FD-1-EFF-03172020)		FD	**5.6**		**10**		**9.5**	

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Samples were analyzed by Modified USEPA Method 537 in accordance with QSM 5.1.1, Table B-15 (DoD. 2018. Quality Systems Manual, Version 5.1.1, 2018. February.)

Acronyms/Abbreviations:
AOPI = area of potential interest
FD = field duplicate sample
ID = identification
N = primary sample
ng/L = nanograms per liter (parts per trillion)
OSD = Office of the Secretary of Defense
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
Qual = qualifier
WWTP = wastewater treatment plant
USEPA = United States Environmental Protection Agency

Table 7-4 - Drinking Water and Supply Well PFOS, PFOA, PFBS Analytical Results
USAEC PFAS Preliminary Assessment/Site Inspection
Fort Riley, Kansas

Associated AOPI	Location Type	Location ID	Sample ID	Sample Date	Sample Type	PFOS (ng/L)		PFOA (ng/L)		PFBS (ng/L)	
						Result	Qual	Result	Qual	Result	Qual
	USEPA LHA					70		70		--	
	OSD Tapwater Risk Screening Level					40		40		600	
General - Main Post PWS	Drinking Water	DW1	FTRI-DW1-03202020	3/20/2020	N	**3.3**		1.7	U	**4.2**	
			(FTRI-FD-03202020)		FD	**3.4**		1.7	U	**4.3**	
General - Water Supply Wells	Groundwater	PW2	FTRI-PW2-03202020	3/20/2020	N	**2.0**		**5.0**		**5.3**	
		PW3	FTRI-PW3-03202020	3/20/2020	N	**6.8**		**6.0**		**7.3**	
		PW4	FTRI-PW4-03202020	3/20/2020	N	**6.8**		**2.5**	J	**5.3**	
		PW7	FTRI-PW7-03202020	3/20/2020	N	**3.9**		**1.4**	J	**4.0**	
			FTRI-PW7-DEBB-03202020	3/20/2020	N	**3.5**		**1.5**	J	**3.7**	

Notes:
1. **Bolded** values indicate the result was detected greater than the limit of detection.
2. Samples were analyzed by Modified USEPA Method 537 in accordance with QSM 5.1.1, Table B-15 (DoD. 2018. Quality Systems Manual, Version 5.1.1, 2018. February.)

Acronyms/Abbreviations:
AOPI = area of potential interest
DEBB = dedicated equipment background blank
FD = field duplicate sample
FTRI = Fort Riley
ID = identification
J = The analyte was positively identified; however the associated numerical value is an estimated concentration only.
LHA = lifetime health advisory
N = primary sample
ng/L = nanograms per liter (parts per trillion)
PFBS = perfluorobutanesulfonic acid
PFOA = perfluorooctanoic acid
PFOS = perfluorooctane sulfonate
PWS = public water system
Qual = qualifier
U = The analyte was analyzed for but the result was not detected above the limit of detection (LOD) and the limit of quantitation (LOQ). The non-detect value reported is the LOQ.
USEPA = United States Environmental Protection Agency

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

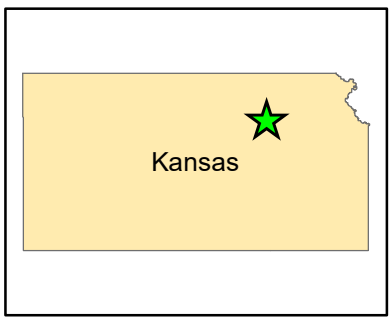
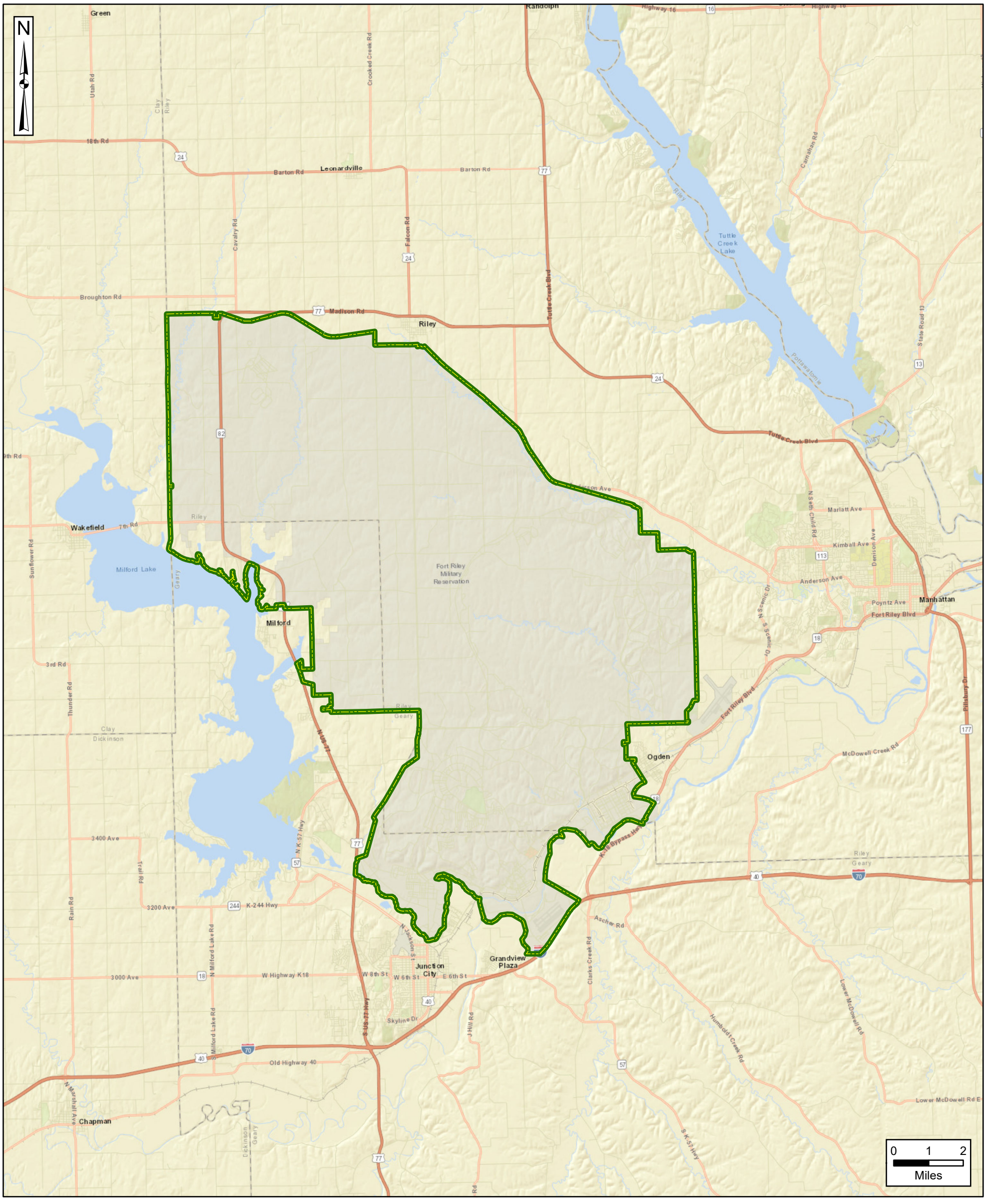


Figure 2-1
Site Location



Installation Boundary

Data Sources:
ESRI ArcGIS Online, Street Map Data

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

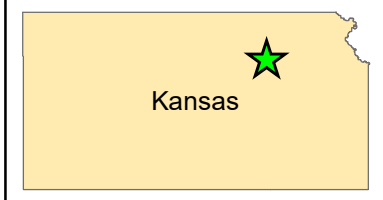
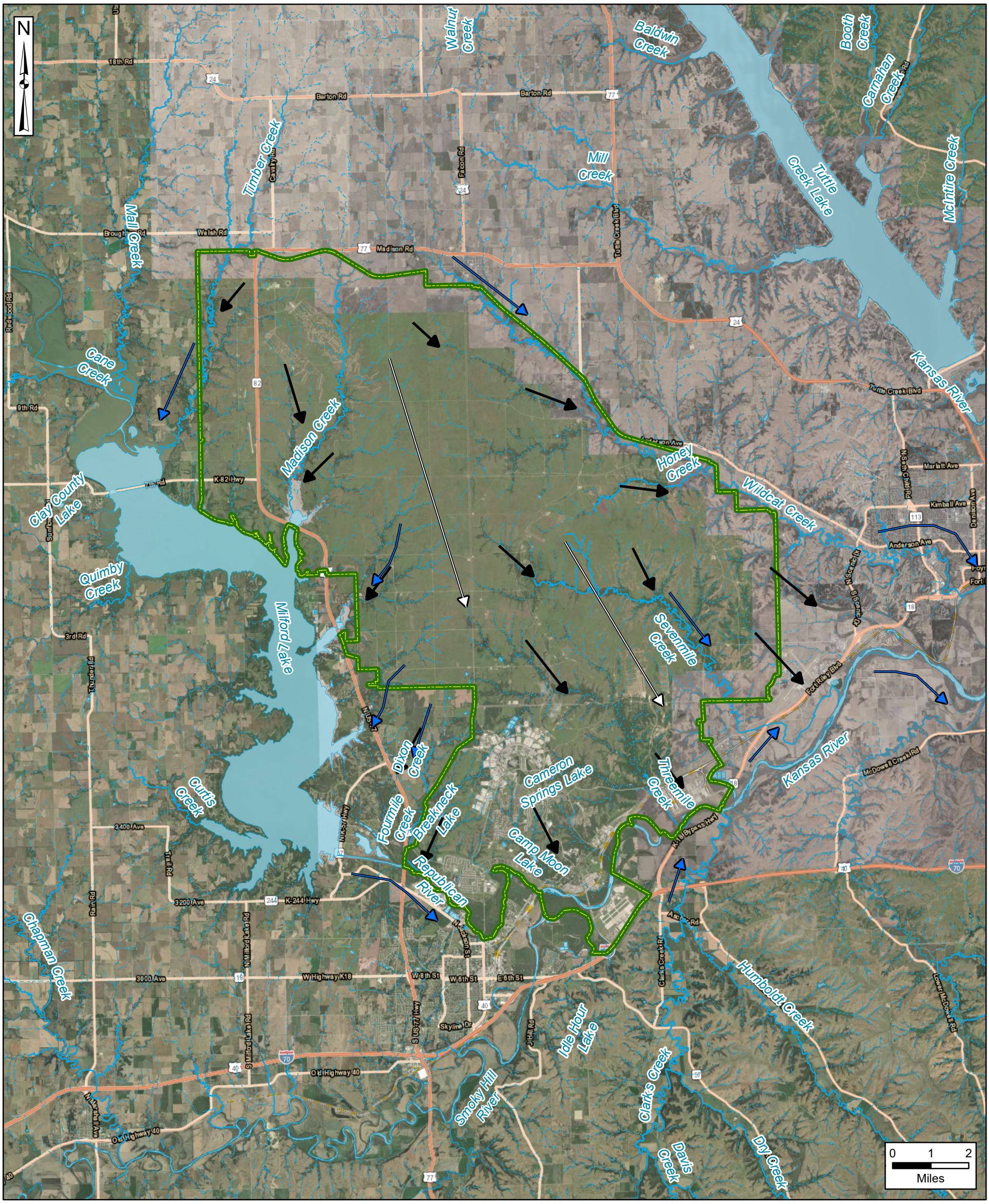


Figure 2-2
Site Layout



- Installation Boundary
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Alluvial Groundwater Flow Direction
- Upper Bedrock Groundwater Flow Direction

Data Sources:
KGS Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

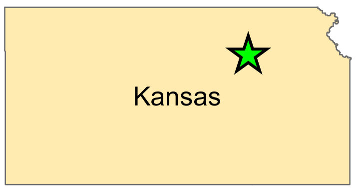


Figure 2-3
Topographic Map

Installation Boundary

River/Stream (Perennial)

Stream (Ephemeral/Intermittent)

Water Body

Elevation Contour (feet)

Data Sources:
ESRI ArcGIS Online, USGS Topo

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

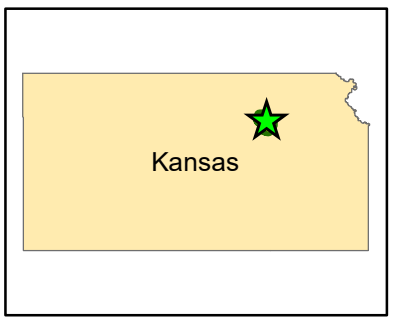
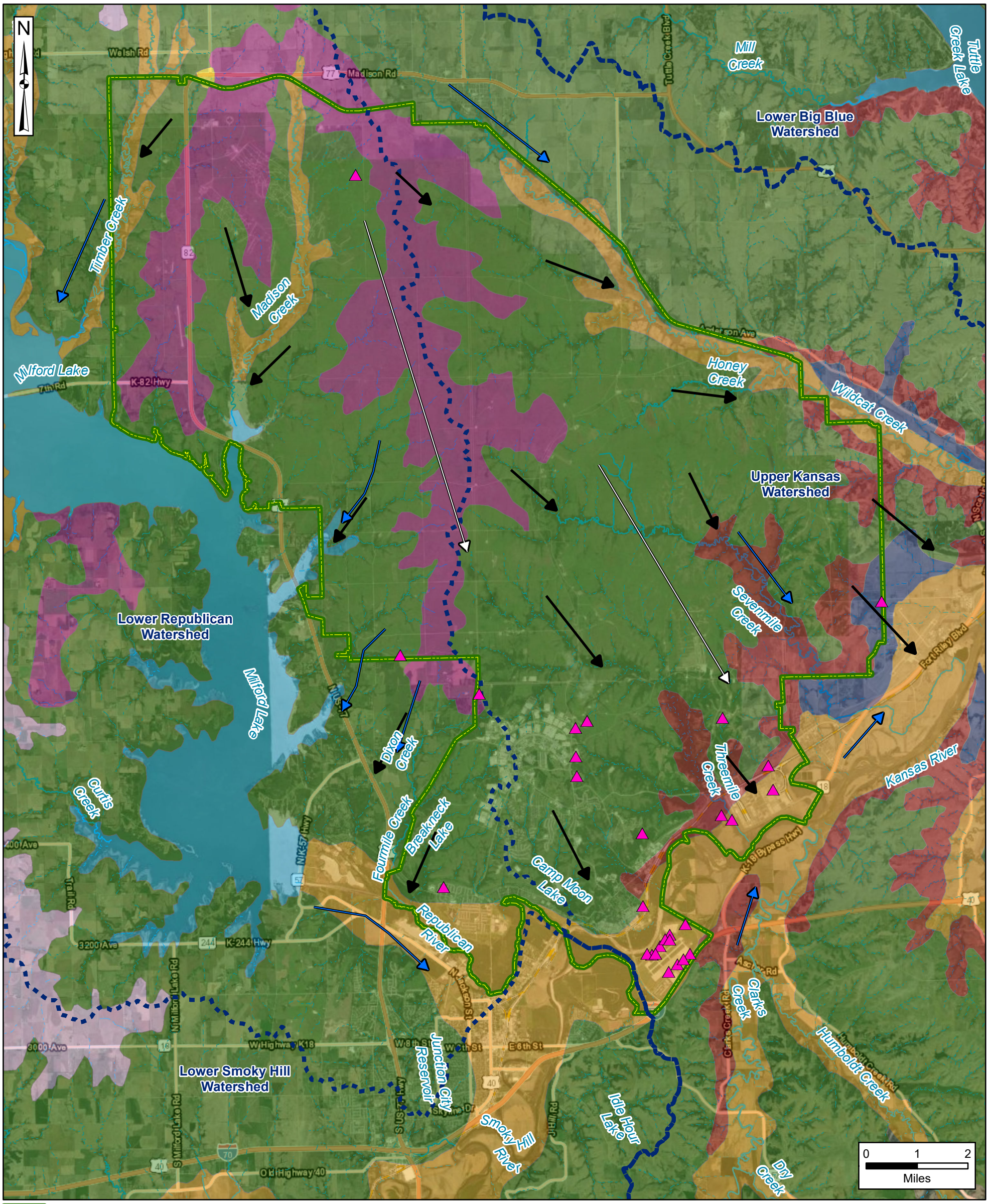


Figure 2-4
Geology and Hydrogeology



Installation Boundary
River/Stream (Perennial)
Stream (Ephemeral/Intermittent)
Watershed Boundary
Surface Water Flow Direction
Alluvial Groundwater Flow Direction
Upper Bedrock Groundwater Flow Direction

AOPI

Major Geologic Unit

ALLUVIUM (POST-KANSAN DEPOSITS)
CHASE GROUP
COUNCIL GROVE GROUP
DRIFT
KIMBERLITE
LOESS
SUMNER GROUP
WATER BODIES

AOPI = Area of Potential Interest

Data Sources:
USGS Watershed Boundaries, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

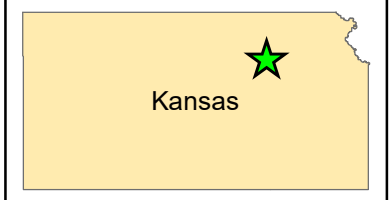


Figure 2-5
Off-Post Potable Supply Wells

EDR = Environmental Data Registry
KGS = Kansas Geological Survey
USACE = United States Army Corps of Engineers

Data Sources:
EDR Well Data, 2018
KGS Well Data, 2019
ESRI ArcGIS Online, Street Map Data

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

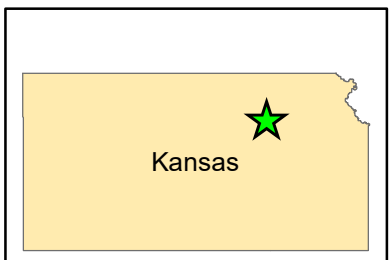
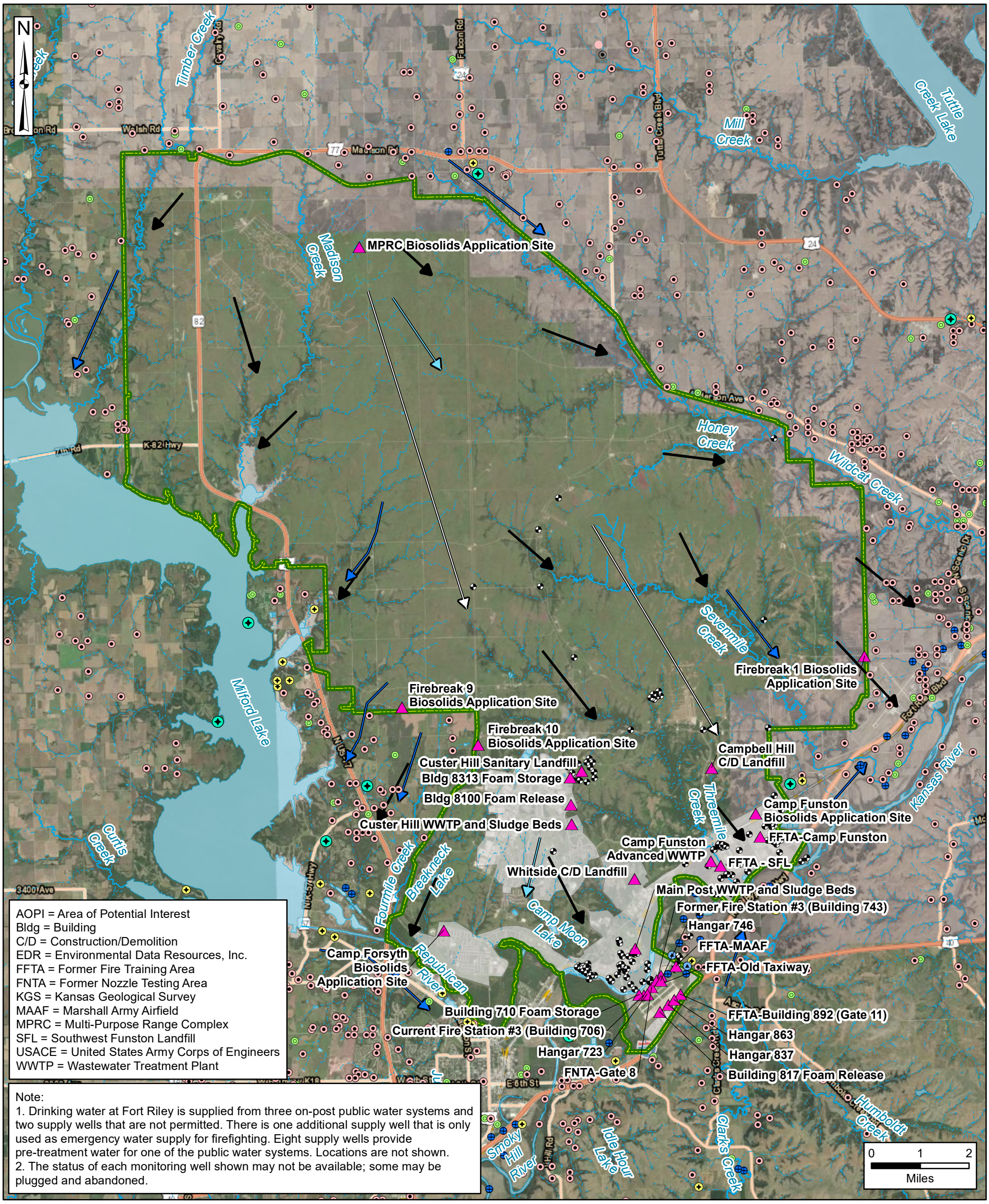


Figure 5-2
AOPI Overview



AOPI = Area of Potential Interest
Bldg = Building
C/D = Construction/Demolition
EDR = Environmental Data Resources, Inc.
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
KGS = Kansas Geological Survey
MAAF = Marshall Army Airfield
MPRC = Multi-Purpose Range Complex
SFL = Southwest Funston Landfill
USACE = United States Army Corps of Engineers
WWTP = Wastewater Treatment Plant

Note:
1. Drinking water at Fort Riley is supplied from three on-post public water systems and two supply wells that are not permitted. There is one additional supply well that is only used as emergency water supply for firefighting. Eight supply wells provide pre-treatment water for one of the public water systems. Locations are not shown.
2. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

- Installation Boundary
- Cantonment Area
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- AOPI
- Surface Water Flow Direction
- Alluvial Groundwater Flow Direction
- Upper Bedrock Groundwater Flow Direction
- Direction of Downgradient Supply Wells
- Monitoring Well
- Public Supply Well (USACE - Kansas City District)
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
- Irrigation Well (KGS)

*Livestock and Garden/Lawn

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

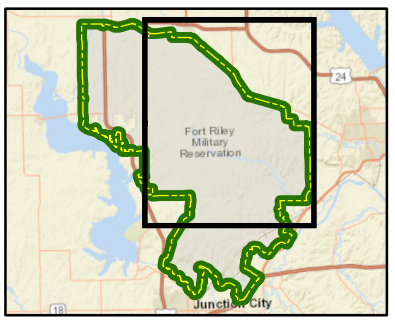
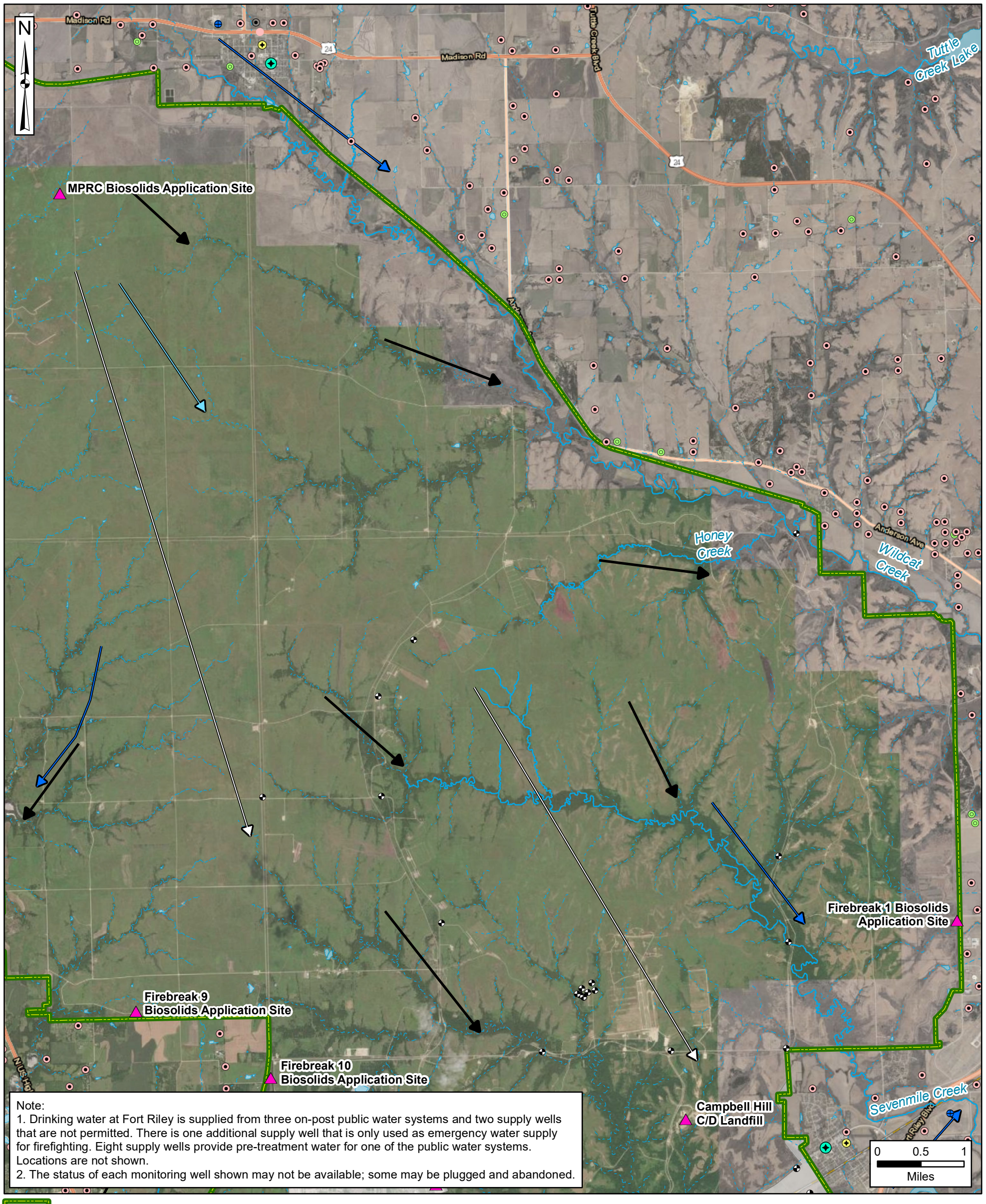


Figure 5-2a
North AOPI Overview



Note:
1. Drinking water at Fort Riley is supplied from three on-post public water systems and two supply wells that are not permitted. There is one additional supply well that is only used as emergency water supply for firefighting. Eight supply wells provide pre-treatment water for one of the public water systems. Locations are not shown.
2. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

- Installation Boundary
- Cantonment Area
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- AOPI
- Surface Water Flow Direction
- Alluvial Groundwater Flow Direction
- Upper Bedrock Groundwater Flow Direction
- Direction of Downgradient Supply Wells
- Monitoring Well
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
- Irrigation Well (KGS)

*Livestock and Garden/Lawn

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

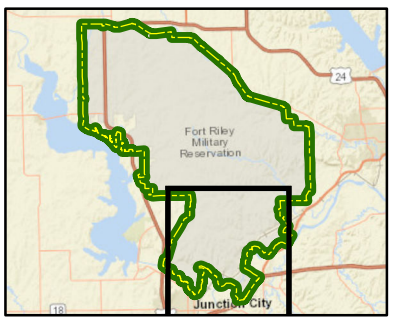


Figure 5-2b
South AOPI Overview

Firebreak 10 Biosolids Application Site
Custer Hill Sanitary Landfill
Bldg 8313 Foam Storage
Bldg 8100 Foam Release
Custer Hill WWTP and Sludge Beds
Campbell Hill C/D Landfill
Camp Funston Biosolids Application Site
FFTA-Camp Funston
Camp Funston Advanced WWTP
FFTA - SFL
Whitside C/D Landfill
Camp Forsyth Biosolids Application Site
Main Post WWTP and Sludge Beds
FFTA-MAAF
Former Fire Station #3 (Building 743)
FFTA-Old Taxiway Hangar 746
FNTA-Gate 8
Building 710 Foam Storage
Current Fire Station #3 (Building 706)
Hangar 723
FFTA-Building 892 (Gate 11)
Hangar 863
Hangar 837
Building 817 Foam Release
Dixon Creek
Breakneck Lake
Camp Moon Lake
Republican River
Junction City Reservoir
Threemile Creek
Kansas River
Clarks Creek
Freeman Field
W 18th St
W 14th St
W 8th St
W 6th St
E 6th St
E Chestnut St
E Flint Hills Blvd
N Jackson St
N Washington St
NE Eisenhower Dr
Clarks Creek Rd
K-18 Bypass Hwy
US-57 Hwy
S K-57 Hwy

Note:
1. Drinking water at Fort Riley is supplied from three on-post public water systems and two supply wells that are not permitted. There is one additional supply well that is only used as emergency water supply for firefighting. Eight supply wells provide pre-treatment water for one of the public water systems. Locations are not shown.
2. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

0 0.5 1
Miles

- Installation Boundary
- Cantonment Area
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- AOPI
- Surface Water Flow Direction
- Alluvial Groundwater Flow Direction
- Upper Bedrock Groundwater Flow Direction
- Direction of Downgradient Supply Wells
- Monitoring Well
- Public Supply Well (USACE - Kansas City District)
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
- Irrigation Well (KGS)

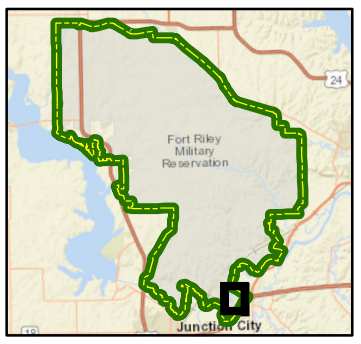
*Livestock and Garden/Lawn

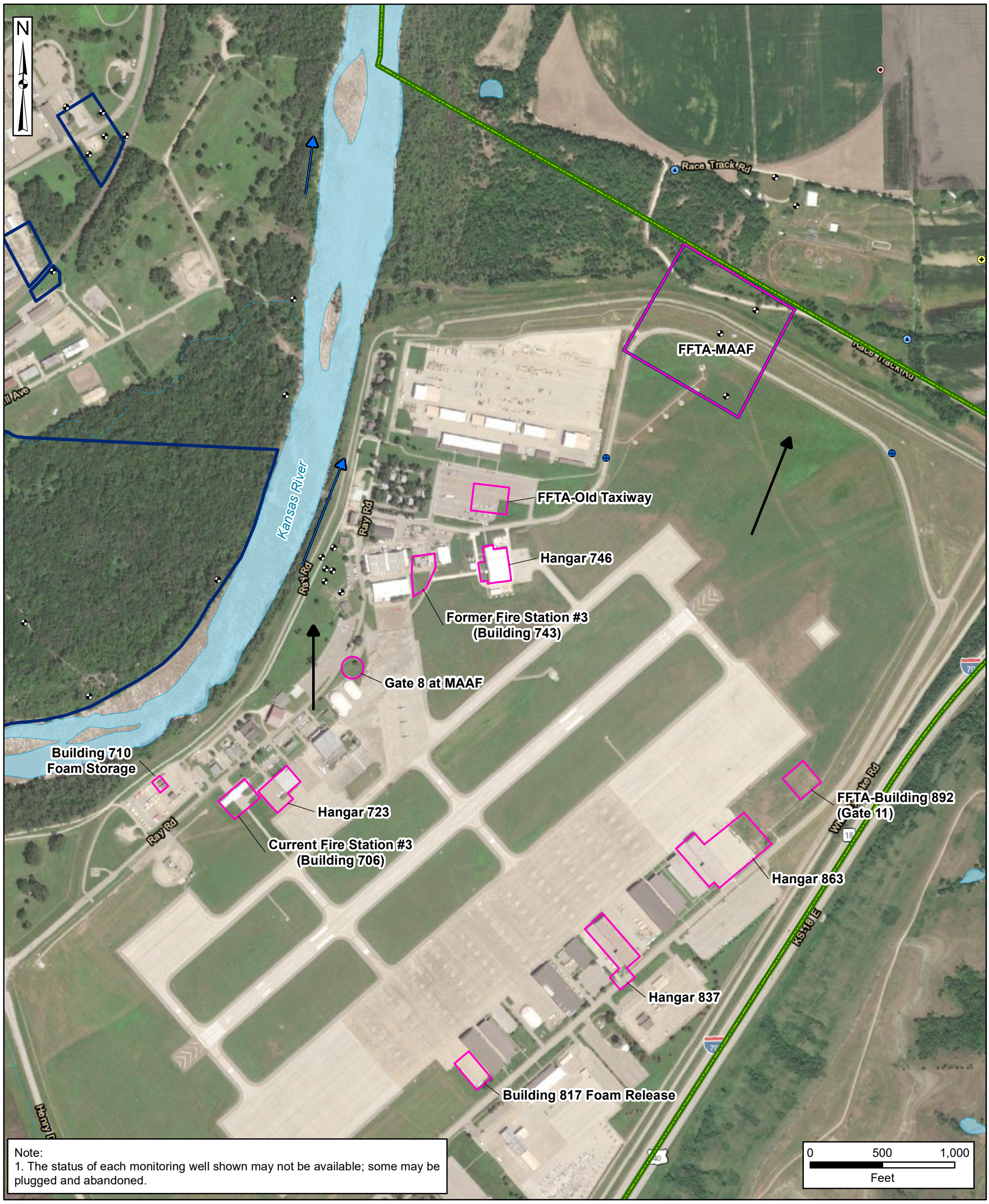
Data Sources:
EDR Well Data, 2018
KGS Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 5-3
Aerial Photo of the
Marshall Army Airfield AOPIs





Note:
1. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

- Installation Boundary
- AOPI
- IRP Influence
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Monitoring Well
- Public Supply Well (USACE - Kansas City District)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Irrigation Well (KGS)

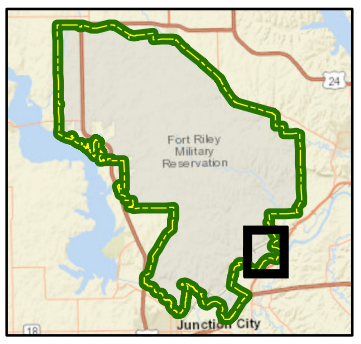
AOPI = Area of Potential Interest
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
IRP = Installation Restoration Program
KGS = Kansas Geological Survey
MAAF = Marshall Army Airfield
USACE = United States Army Corps of Engineers

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 5-4
Aerial Photo of the
Camp Funston AOPIs



Installation Boundary
AOPI
IRP Influence
River/Stream (Perennial)
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Monitoring Well
Public Supply Well (EDR)
Public Supply Well (KGS)
Domestic Well (KGS)
Irrigation Well (KGS)

AOPI = Area of Potential Interest
EDR = Environmental Data Registry
FFTA = Former Fire Training Area
IRP = Installation Restoration Program
KGS = Kansas Geological Survey
SFL = Southwest Funston Landfill
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

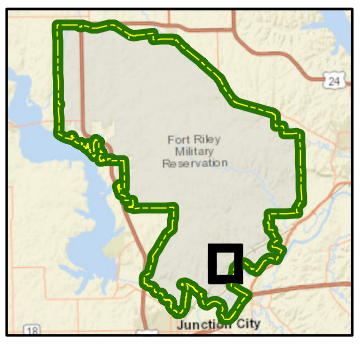


Figure 5-5
Aerial Photo of the
Whitside C/D Landfill AOPI

N

Williston Point Rd
Williston Point Rd
Williston Point Rd
Calsson Hill Rd
Calsson Hill Rd
Whitside
C/D Landfill
4th St
4th St
E St
Huebner Rd
Huebner Rd
Union Pacific
10th St
Union Pacific
Kansas River
3rd St
Calsson Hill Rd
B St
Huebner Rd
Warehouse Rd
Union Pacific
Rim Rock Ter
Rim Rock Ter E
Huebner Rd
Reed Ave
Riley Pl

0 500 1,000
Feet

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

AOPI = Area of Potential Interest
C/D = Construction/Demolition

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

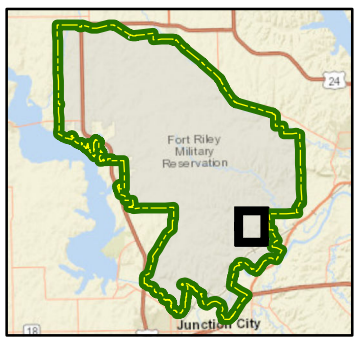


Figure 5-6
Aerial Photo of the
Campbell Hill C/D Landfill AOPI

Note:
1. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

Installation Boundary
AOPI
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Monitoring Well

AOPI = Area of Potential Interest
C/D = Construction/Demolition

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

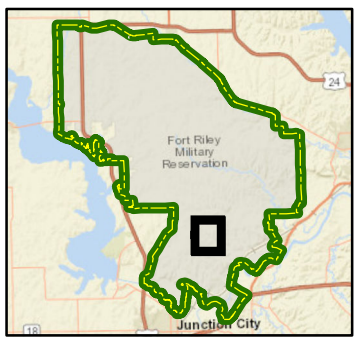
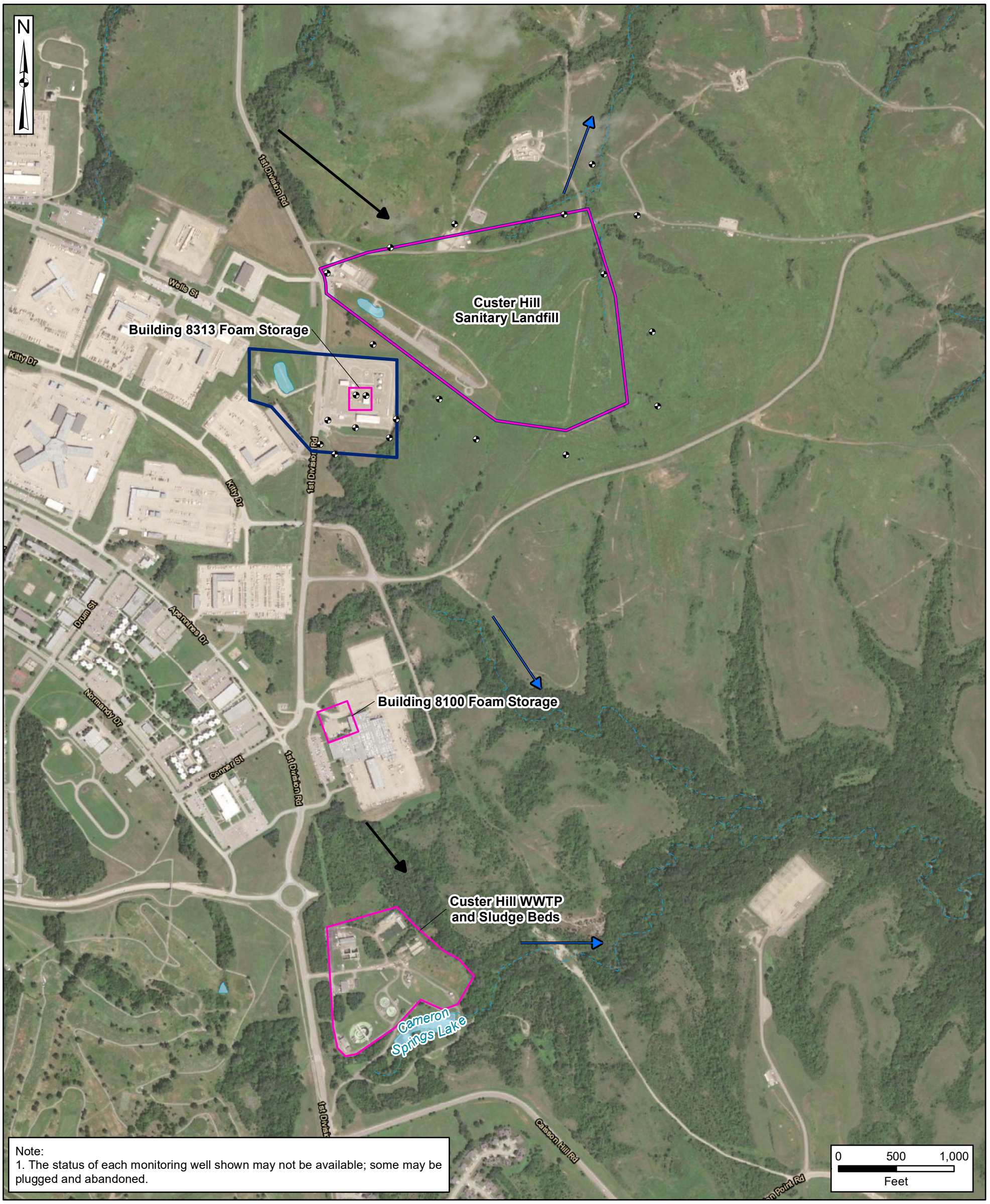


Figure 5-7
Aerial Photo of the
Custer Hill AOPIs



Note:
1. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

Installation Boundary
AOPI
IRP Influence
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Monitoring Well

AOPI = Area of Potential Interest
IRP = Installation Restoration Program
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

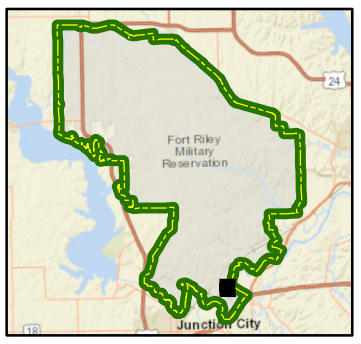


Figure 5-8
Aerial Photo of the
Main Post WWTP and Sludge Beds AOPI

Note:
1. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

AOPI
IRP Influence
Former WWTP Lagoon
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Monitoring Well

AOPI = Area of Potential Interest
IRP = Installation Restoration Program
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

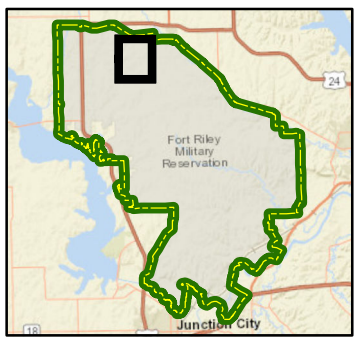


Figure 5-9
Aerial Photo of the
MPRC Biosolids Application Site AOPI

N

6800 Rd N
14800 Rd W
14000 Rd W
5600 Rd N
Field 2A
Field 2
Field 1
Field 5
Field 6
Field 7A
Field 7
Field 7B
Field 9
Madison Creek

Note:
1. Select fields within the MPRC Biosolids Application Site were identified as AOPIs (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconnaissance.

0 500 1,000
Feet

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

AOPI = Area of Potential Interest
MPRC = Multi-Purpose Range Complex

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

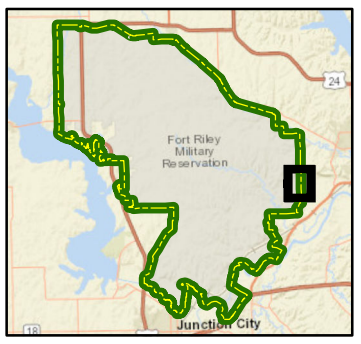
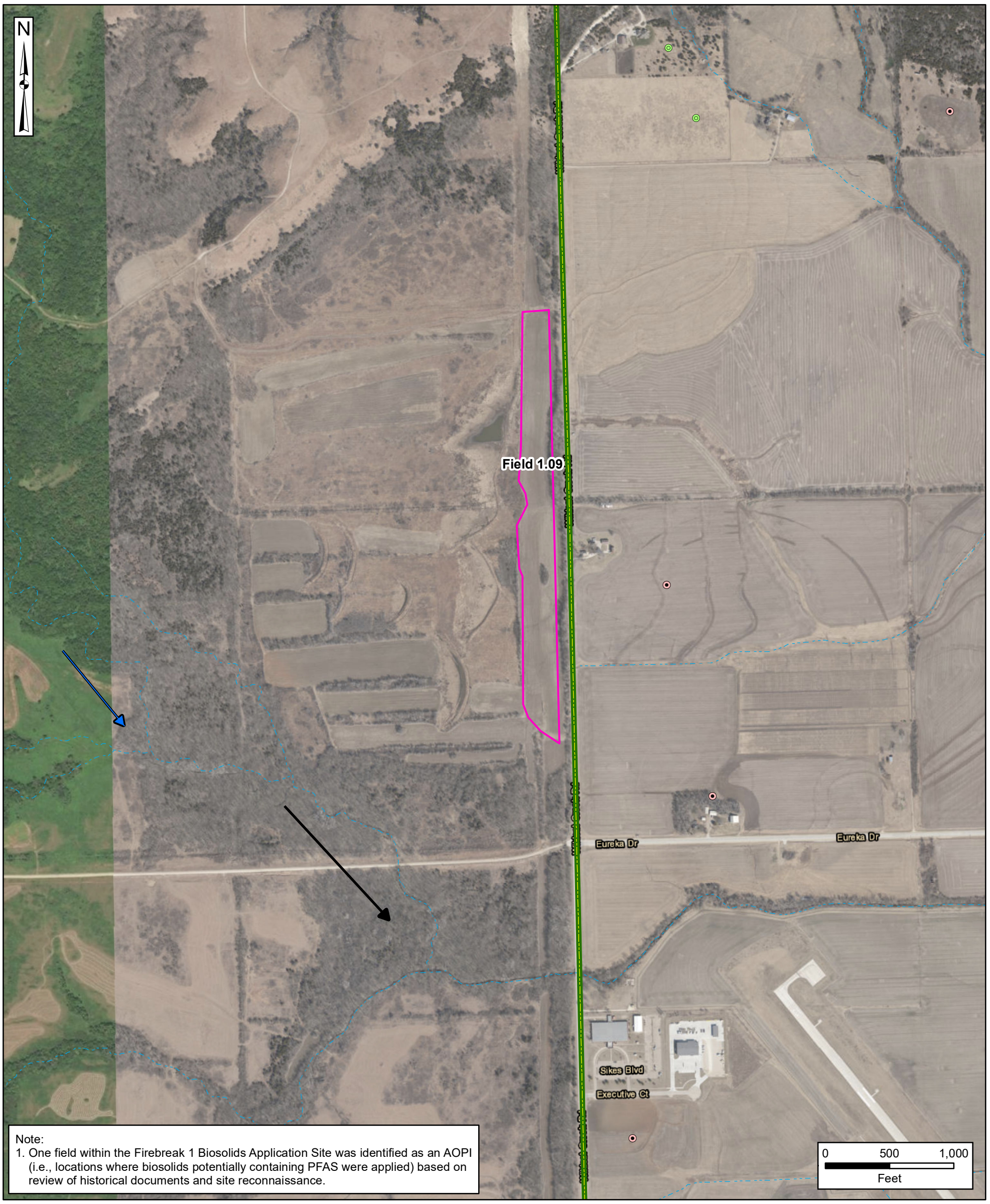


Figure 5-10
Aerial Photo of the
Firebreak 1 Biosolids Application Site AOPI



Note:
1. One field within the Firebreak 1 Biosolids Application Site was identified as an AOPI (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconnaissance.

Installation Boundary
AOPI
Stream (Ephemeral/Intermittent)
Approximate Groundwater Flow Direction
Surface Water Flow Direction
Domestic Well (KGS)
Other* Domestic Well (KGS)
*Livestock and Garden/Lawn

AOPI = Area of Potential Interest
KGS = Kansas Geological Survey

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

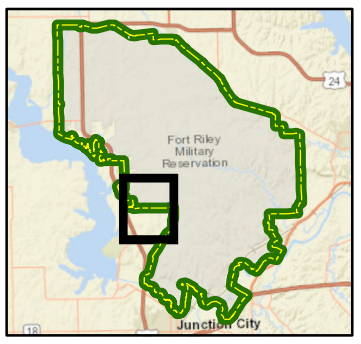
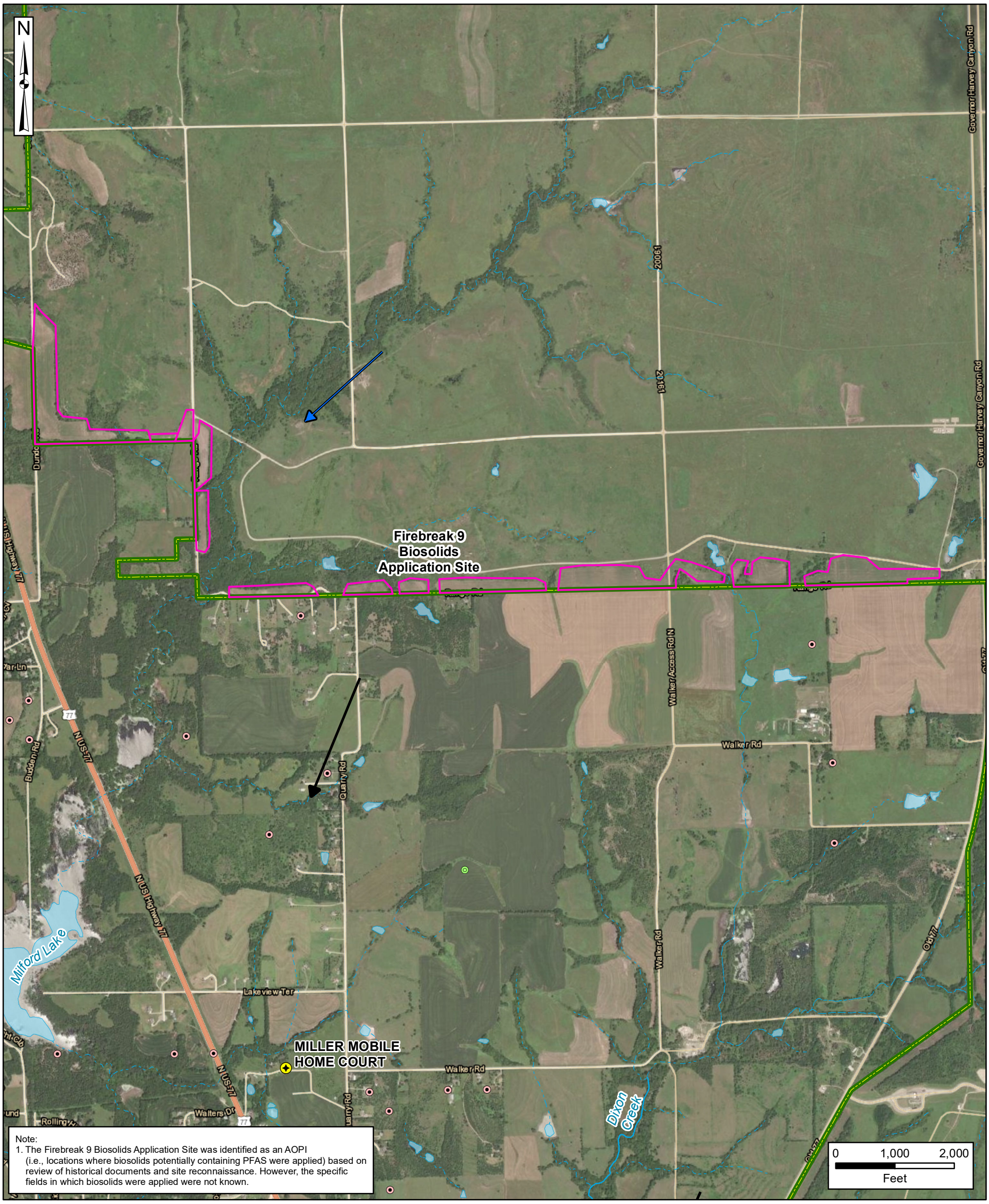


Figure 5-11
Aerial Photo of the
Firebreak 9 Biosolids Application Site AOPI



Installation Boundary
AOPI
River/Stream (Perennial)
Stream (Ephemeral/Intermittent)
Water Body
Approximate Groundwater Flow Direction
Surface Water Flow Direction
Public Supply Well (EDR)
Domestic Well (KGS)
Other* Domestic Well (KGS)
*Livestock and Garden/Lawn

AOPI = Area of Potential Interest
EDR = Environmental Data Resources, Inc.
KGS = Kansas Geological Survey

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

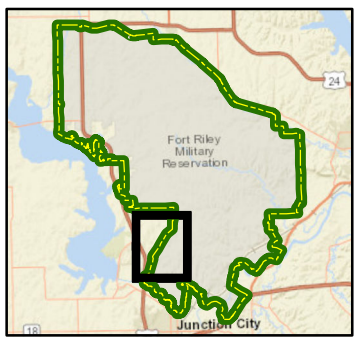


Figure 5-12
Aerial Photo of the
Firebreak 10 Biosolids Application Site AOPI

N
Walker Rd
Vinton School Rd
Quarry Rd
Field 10.01
Old 77
Walker Rd
Lakeview Ter
MILLER MOBILE
HOME COURT
Walker Rd
Quarry Rd
Miller Dr
Armistead St
Estes Rd
Kitty Dr
Parker St
Bamford St
Normandy Dr
Apennines Dr
Bullard St
Siebert St
Governor Harvey Canyon Rd
Kitty Dr
Dixon Creek
Old 77
Redbird Dr
Meadowlark Dr
N US-77
77
Hillside Dr
Trooper Dr
Warren Rd
Field 10.05
Old 77
Field 10.06
Old 77
Field 10.07
Hillside Dr
Hillside Cir
Breakneck
Lake
McClellan Loop
McDowell Ln
Trooper Dr
Burns
Milford Rd
N US-77
77
Fourmile Creek
Field 10.11
Rifle Range
Trooper Dr
0 1,000 2,000
Feet

Note:
1. Select fields within the Firebreak 10 Biosolids Application Site were identified as AOPIs (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconaissance.

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Approximate Groundwater Flow Direction
- Surface Water Flow Direction
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
  *Livestock and Garden/Lawn

AOPI = Area of Potential Interest
EDR = Environmental Data Resources, Inc.
KGS = Kansas Geological Survey

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

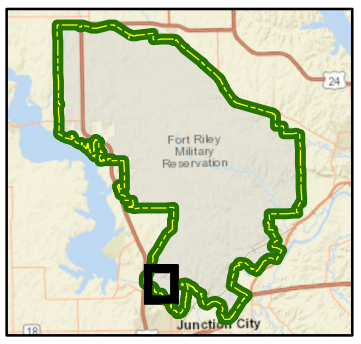


Figure 5-13
Aerial Photo of the
Camp Forsyth Biosolids Application Site AOPI

Note:
1. The Original Camp Forsyth Biosolids Application Site was identified as an AOPI (i.e., location where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconaissance.

- Installation Boundary
- AOPI
- IRP Influence
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Domestic Well (KGS)
- Monitoring Well (USEPA)

AOPI = Area of Potential Interest
IRP = Installation Restoration Program
KGS = Kansas Geological Survey
USEPA = United States Environmental Protection Agency

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

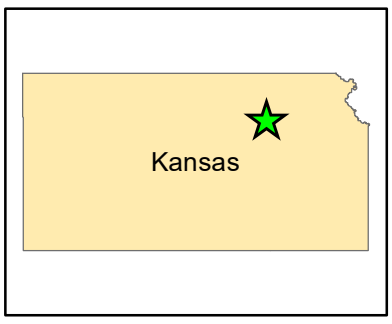
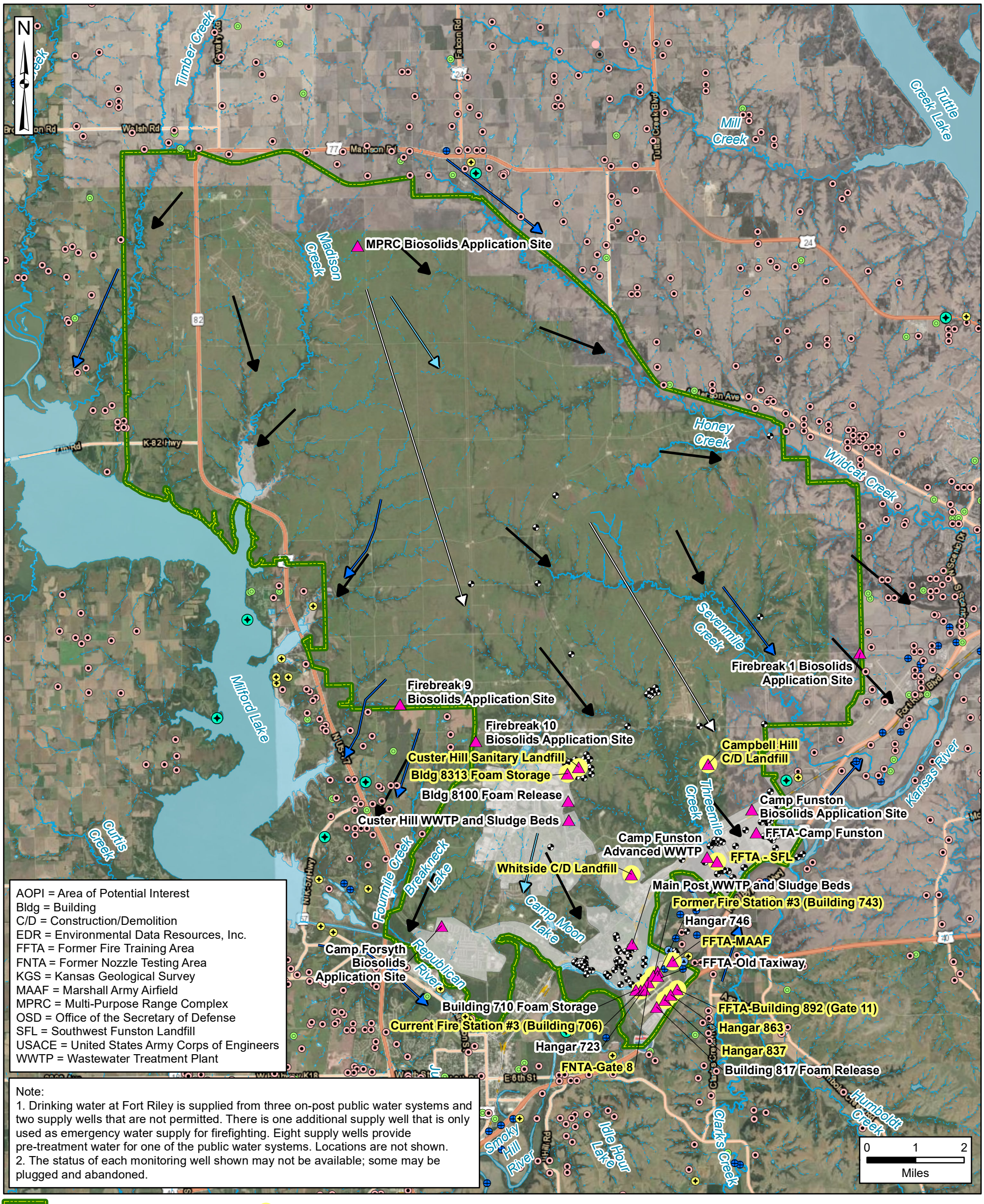


Figure 7-1
AOPI Results Overview



AOPI = Area of Potential Interest
Bldg = Building
C/D = Construction/Demolition
EDR = Environmental Data Resources, Inc.
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
KGS = Kansas Geological Survey
MAAF = Marshall Army Airfield
MPRC = Multi-Purpose Range Complex
OSD = Office of the Secretary of Defense
SFL = Southwest Funston Landfill
USACE = United States Army Corps of Engineers
WWTP = Wastewater Treatment Plant

Note:
1. Drinking water at Fort Riley is supplied from three on-post public water systems and two supply wells that are not permitted. There is one additional supply well that is only used as emergency water supply for firefighting. Eight supply wells provide pre-treatment water for one of the public water systems. Locations are not shown.
2. The status of each monitoring well shown may not be available; some may be plugged and abandoned.

- Installation Boundary
- Cantonment Area
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- AOPI
- AOPI with OSD Risk Screening Level Exceedance
- Surface Water Flow Direction
- Alluvial Groundwater Flow Direction
- Upper Bedrock Groundwater Flow Direction
- Direction of Downgradient Supply Wells
- Monitoring Well
- Public Supply Well (USACE - Kansas City District)
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
- Irrigation Well (KGS)

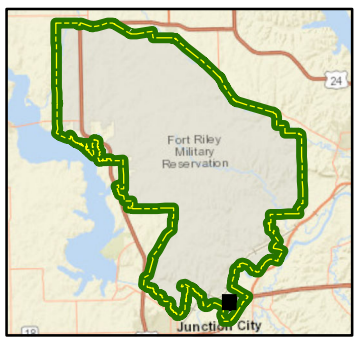
*Livestock and Garden/Lawn

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 7-2a
Marshall Army Airfield West AOPIs
PFOS, PFOA, and PFBS Analytical Results



N

Kansas River

Ray Rd

Gate 8 at MAAF

G8-02-SO	
Date	03/13/2020
PFBS	0.0023 U
PFOS	**0.0017**
PFOA	0.00069 U

G8-03-SO	
Date	03/13/2020
PFBS	0.0022 U
PFOS	**0.071**
PFOA	**0.0045**

G8-01-GW	
Date	03/13/2020
PFBS	**34**
PFOS	**2.7**
PFOA	**40 J**

G8-01-SO	
Date	03/13/2020
PFBS	0.0023 U
PFOS	**0.0092**
PFOA	**0.00069 J**

B710-01-GW	
Date	03/11/2020
PFBS	**170 DJ**
PFOS	1.9 U
PFOA	**23 J+**

B710-01-SO	
Date	03/11/2020
PFBS	0.0023 U
PFOS	**0.00080**
PFOA	0.0007 U

B710-03-SO	
Date	03/11/2020
PFBS	0.0023 U
PFOS	**0.00078**
PFOA	0.00068 U

B710-02-SO	
Date	03/11/2020
PFBS	0.0022 U [0.0022 U]
PFOS	**0.00084 [0.00076]**
PFOA	0.00066 U [0.00067 U]

Building 710 Foam Storage

B706-03-SO	
Date	03/16/2020
PFBS	**0.0058**
PFOS	**0.059**
PFOA	**0.0075**

B723-02-SO	
Date	03/16/2020
PFBS	0.0024 U
PFOS	**0.039**
PFOA	**0.00090**

Hangar 723

B723-03-SO	
Date	03/16/2020
PFBS	0.0023 U
PFOS	**0.0015**
PFOA	0.00068 U

Current Fire Station #3 (Building 706)

B706-02-SO	
Date	03/16/2020
PFBS	0.0023 U
PFOS	**0.1 DJ**
PFOA	**0.0047**

B723-01-GW	
Date	03/12/2020
PFBS	**29**
PFOS	**8.4**
PFOA	**30**

B723-01-SO	
Date	03/12/2020
PFBS	0.0023 U
PFOS	**0.0020**
PFOA	0.00068 U

B706-01-GW	
Date	03/12/2020
PFBS	**3200 DJ**
PFOS	180 U
PFOA	180 U

B706-01-SO		
Date	03/12/2020	03/16/2020
PFBS	0.0022 U	0.0023 U
PFOS	**0.120 DJ**	**0.065**
PFOA	**0.013**	**0.019**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Results in brackets are field duplicate sample results.
5. Bolded values indicate detections.
6. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
7. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
8. D flag indicates the result is from a dilution.
9. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
10. J+ flag indicates the result is an estimated quantity; the result may be biased high.
11. Analytical results for samples located in the northern and southeastern portion of MAAF are shown on Figures 7-1b and 7-1c.

0 100 200
Feet

Installation Boundary
AOPI
IRP Influence
Water Body
Approximate Groundwater Flow Direction
Monitoring Well
Groundwater and Soil Sample Location (DPT Boring)
Surface Soil Sample Location (Hand Auger)

AOPI = Area of Potential Interest
DPT = Direct-Push Technology
IRP = Installation Restoration Program
MAAF = Marshall Army Airfield

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

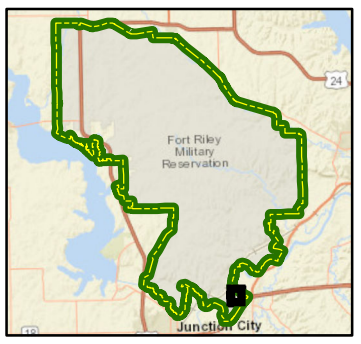


Figure 7-2b
Marshall Army Airfield North AOPIs
PFOS, PFOA, and PFBS Analytical Results

FFTA-MAAF-03-SO	
Date	03/12/2020
PFBS	0.0023 U
PFOS	**0.054**
PFOA	**0.0017**

FFTA-MAAF-01-GW	
Date	03/12/2020
PFBS	**5.0**
PFOS	**300 DJ**
PFOA	**26**

FFTA-MAAF-01-SO	
Date	03/12/2020
PFBS	0.0025 U
PFOS	**0.290 DJ**
PFOA	**0.0029**

OTW-01-GW	
Date	03/11/2020
PFBS	**52**
PFOS	20 U
PFOA	**25 J+**

OTW-01-SO	
Date	03/10/2020
PFBS	0.0025 U
PFOS	**0.0011**
PFOA	0.00074 U

OTW-02-SO	
Date	03/10/2020
PFBS	0.0024 U
PFOS	**0.0042**
PFOA	0.00072 U

OTW-03-SO	
Date	03/10/2020
PFBS	0.0023 U
PFOS	**0.0083**
PFOA	0.00070 U

FFTA-MAAF-02-SO	
Date	03/12/2020
PFBS	0.0023 U
PFOS	**0.120 DJ**
PFOA	**0.0023**

AGL-MW-05-GW	
Date	03/17/2020
PFBS	**790 J-**
PFOS	**300 J-**
PFOA	**30000 DJ**

AGL-MW-03-GW	
Date	03/17/2020
PFBS	**2600 DJ**
PFOS	**100**
PFOA	**1100 DJ**

B746-03-SO	
Date	03/19/2020
PFBS	0.0024 U
PFOS	**0.0024**
PFOA	0.00072 U

B746-01-GW	
Date	03/18/2020
PFBS	**8.5**
PFOS	**1.6 J**
PFOA	**32**

B746-01-SO	
Date	03/19/2020
PFBS	0.0023 U
PFOS	**0.0032**
PFOA	**0.00051 J**

B746-02-SO	
Date	03/19/2020
PFBS	0.0023 U
PFOS	**0.0012**
PFOA	0.00068 U

B743-02-SO	
Date	03/13/2020
PFBS	0.0024 U
PFOS	**0.420 DJ**
PFOA	**0.0049**

B743-01-GW	
Date	03/13/2020
PFBS	**14000 DJ**
PFOS	**180 DJ**
PFOA	**890 DJ**

B743-01-SO	
Date	03/13/2020
PFBS	0.0023 U
PFOS	**0.700 DJ**
PFOA	**0.0033**

B743-03-SO	
Date	03/13/2020
PFBS	0.0023 U
PFOS	**0.790 DJ**
PFOA	**0.0061**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Bolded values indicate detections.
5. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. D flag indicates the analysis was performed at a dilution.
8. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
9. J+ flag indicates the result is an estimated quantity; the result may be biased high.
10. J- flag indicates the result is an estimated quantity; the results may be biased low.
11. Analytical results for samples located in the western and southeastern portion of MAAF are shown on Figure 7-1a and Figure 7-1c.

Installation Boundary
AOPI
IRP Influence
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Irrigation Well (KGS)
Public Supply Well (USACE - Kansas City District)
Monitoring Well
Groundwater and Soil Sample Location (DPT Boring)
Surface Soil Sample Location (Hand Auger)
Groundwater Sample Location - Existing Well

AOPI = Area of Potential Interest
DPT = Direct-Push Technology
FFTA = Former Fire Training Area
IRP = Installation Restoration Program
KGS = Kansas Geological Survey
MAAF = Marshall Army Airfield
USACE = United States Army Corps of Engineers

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

Coordinate System:
WGS 1984, UTM Zone 14 North

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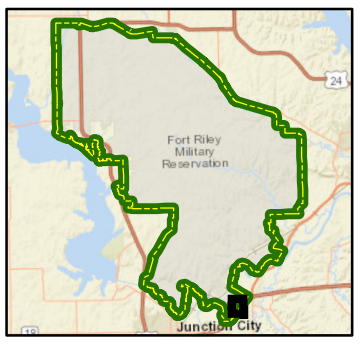
Fort Riley, KS

Figure 7-2c
Marshall Army Airfield Southeast AOPIs
PFOS, PFOA, and PFBS Analytical Results



B892-01-GW	
Date	03/18/2020
PFBS	**750 J-**
PFOS	**840 J-**
PFOA	**1700 J-**

B892-01-SO	
Date	03/16/2020
PFBS	0.0026 U
PFOS	**0.015**
PFOA	**0.00089**

B892-02-SO	
Date	03/18/2020
PFBS	0.0023 U
PFOS	**0.010**
PFOA	0.00070 U

B892-03-SO	
Date	03/18/2020
PFBS	0.0023 U
PFOS	**0.0020**
PFOA	0.00070 U

FFTA-Building 892
(Gate 11)

Hangar 863

B863-02-SO	
Date	03/10/2020
PFBS	0.0024 U
PFOS	**0.00071 J**
PFOA	0.00073 U

B863-01-GW	
Date	03/18/2020
PFBS	**14 J-**
PFOS	**80 J-**
PFOA	**120 J-**

B863-01-SO	
Date	03/16/2020
PFBS	0.0024 U
PFOS	**0.0017**
PFOA	0.00071 U

B863-03-SO	
Date	03/10/2020
PFBS	0.0025 U
PFOS	**0.0076**
PFOA	**0.00078**

Hangar 837

B837-02-SO	
Date	03/19/2020
PFBS	0.0025 U
PFOS	**0.0046**
PFOA	**0.00068 J**

B837-03-SO	
Date	03/19/2020
PFBS	0.0023 U
PFOS	0.00070 U
PFOA	**0.00058 J**

B837-01-GW	
Date	03/18/2020
PFBS	**2.3**
PFOS	1.8 U
PFOA	**1100 DJ**

B837-01-SO	
Date	03/16/2020
PFBS	0.0023 U
PFOS	**0.0015**
PFOA	**0.0022**

B817-01-GW	
Date	03/12/2020
PFBS	1.8 U
PFOS	1.8 U
PFOA	1.8 U

B817-01-SO	
Date	03/19/2020
PFBS	0.0024 U
PFOS	0.00072 U
PFOA	0.00072 U

B817-02-SO	
Date	03/19/2020
PFBS	0.0023 U
PFOS	0.00069 U
PFOA	0.00069 U

B817-03-SO	
Date	03/19/2020
PFBS	0.0024 U
PFOS	0.00072 U
PFOA	0.00072 U

Building 817
Foam Release

Whiskey Lake Rd
I-70 W
I-70 E
US-40 W
US-40 E
40
70

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Bolded values indicate detections.
5. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. D flag indicates the results is from a dilution.
8. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
9. J- flag indicates the result is an estimated quantity; the result may be biased low.
10. Analytical results for samples located in the western and northern portion of MAAF are shown on Figure 7-1a and Figure 7-1b.

0 250 500
Feet

Installation Boundary
AOPI
Stream (Ephemeral/Intermittent)
Water Body
Groundwater and Soil Sample Location (DPT Boring)
Surface Soil Sample Location (Hand Auger)

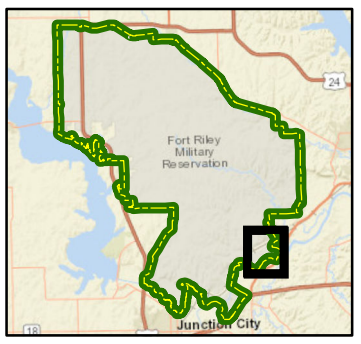
AOPI = Area of Potential Interest
DPT = Direct-Push Technology
FFTA = Former Fire Training Area
MAAF = Marshall Army Airfield

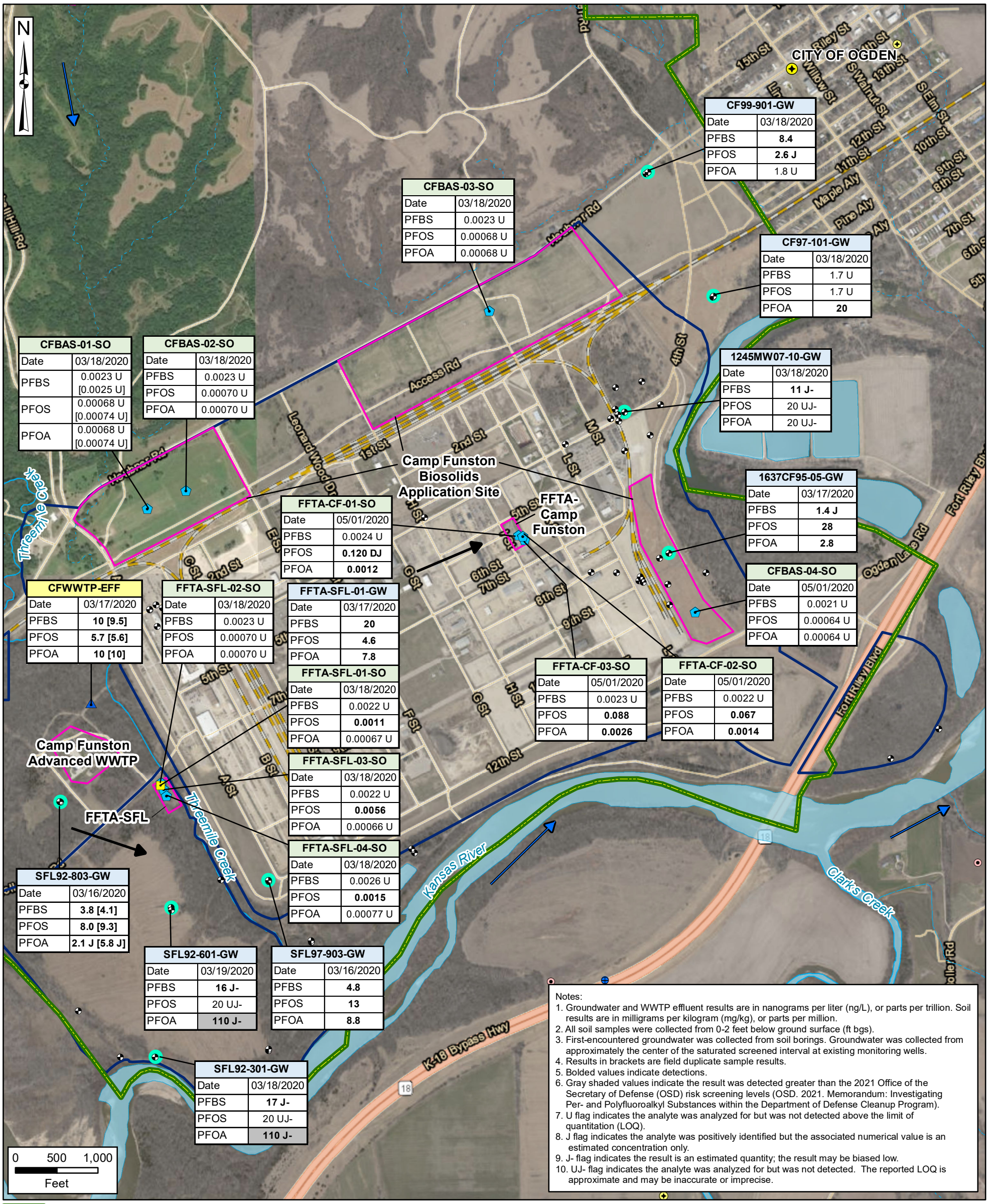
Data Sources:
EDR Well Data, 2018
KGS Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 7-3
Camp Funston AOPIs
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Groundwater and WWTP effluent results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Results in brackets are field duplicate sample results.
5. Bolded values indicate detections.
6. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
7. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
8. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
9. J- flag indicates the result is an estimated quantity; the result may be biased low.
10. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

- Installation Boundary
- AOPI
- IRP Influence
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Monitoring Well
- Groundwater and Soil Sample Location (DPT Boring)
- Surface Soil Sample Location (Hand Auger)
- WWTP Effluent Sample Location
- Groundwater Sample Location - Existing Well

AOPI = Area of Potential Interest
DPT = Direct-Push Technology

Environmental Data Resources, Inc.
FFTA = Former Fire Training Area
IRP = Installation Restoration Program
KGS = Kansas Geological Survey
SFL = Southwest Funston Landfill
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

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Fort Riley, KS

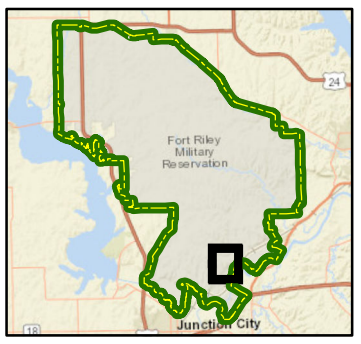


Figure 7-4
Whitside C/D Landfill
PFOS, PFOA, and PFBS Analytical Results

N

Williston Point Rd
Williston Point Rd
Williston Point Rd
Calsson Hill Rd
Calsson Hill Rd
Calsson Hill Rd
Whitside
C/D Landfill
4th St
B St
Warehouse Rd
Huebner Rd
Huebner Rd
Union Pacific
Union Pacific
Union Pacific
10th St
Kansas River

CWCD-01-GW	
Date	03/18/2020
PFBS	**32 J-**
PFOS	**160 J-**
PFOA	**94 J-**

CWCD-01-SO	
Date	03/17/2020
PFBS	0.0022 U
PFOS	**0.00043 J**
PFOA	0.00065 U

CWCD-02-GW	
Date	03/18/2020
PFBS	**46 J-**
PFOS	**87 J-**
PFOA	**110 J-**

CWCD-02-SO	
Date	03/17/2020
PFBS	0.0023 U
PFOS	0.00070 U
PFOA	0.00070 U

0 500 1,000
Feet

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Bolded values indicate detections.
5. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
8. J- flag indicates the result is an estimated quantity; the result may be biased low.

Installation Boundary
AOPI
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Soil Boring Sample Location (Sonic)

AOPI = Area of Potential Interest
C/D = Construction/Demolition
Sonic = Rotosonic Drilling

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

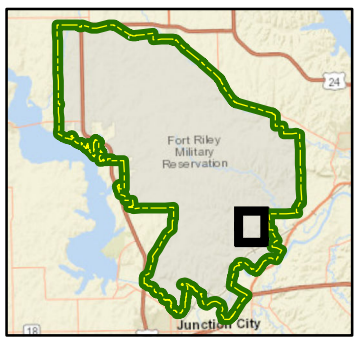
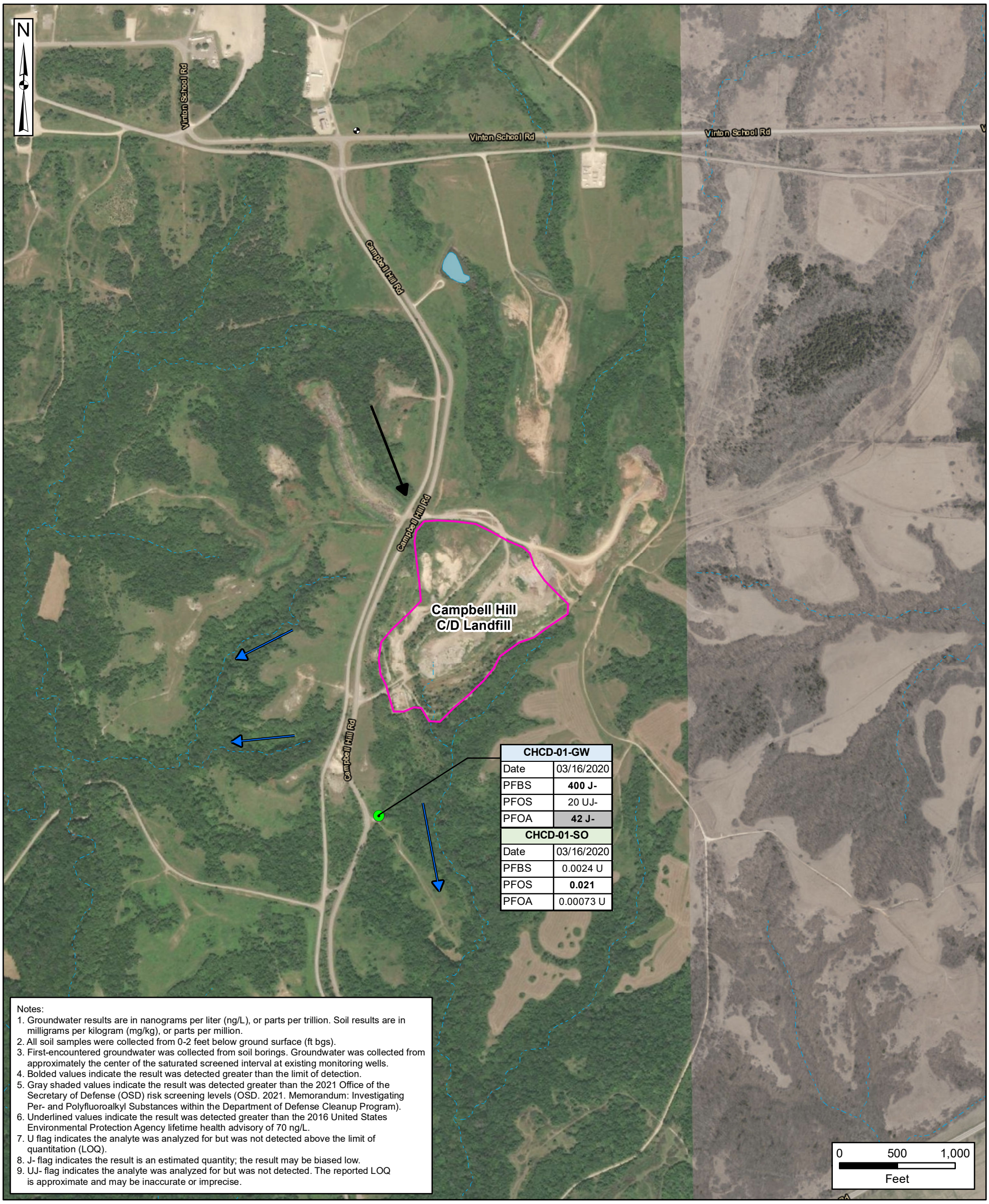


Figure 7-5
Campbell Hill C/D Landfill
PFOS, PFOA, and PFBS Analytical Results



Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Bolded values indicate the result was detected greater than the limit of detection.
5. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
6. Underlined values indicate the result was detected greater than the 2016 United States Environmental Protection Agency lifetime health advisory of 70 ng/L.
7. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
8. J- flag indicates the result is an estimated quantity; the result may be biased low.
9. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

- Installation Boundary
- AOPI
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Monitoring Well
- Soil Boring Sample Location (Sonic)

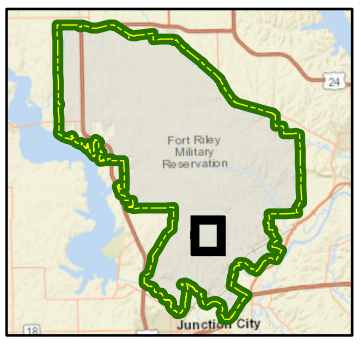
AOPI = Area of Potential Interest
C/D = Construction/Demolition
Sonic = Rotosonic Drilling

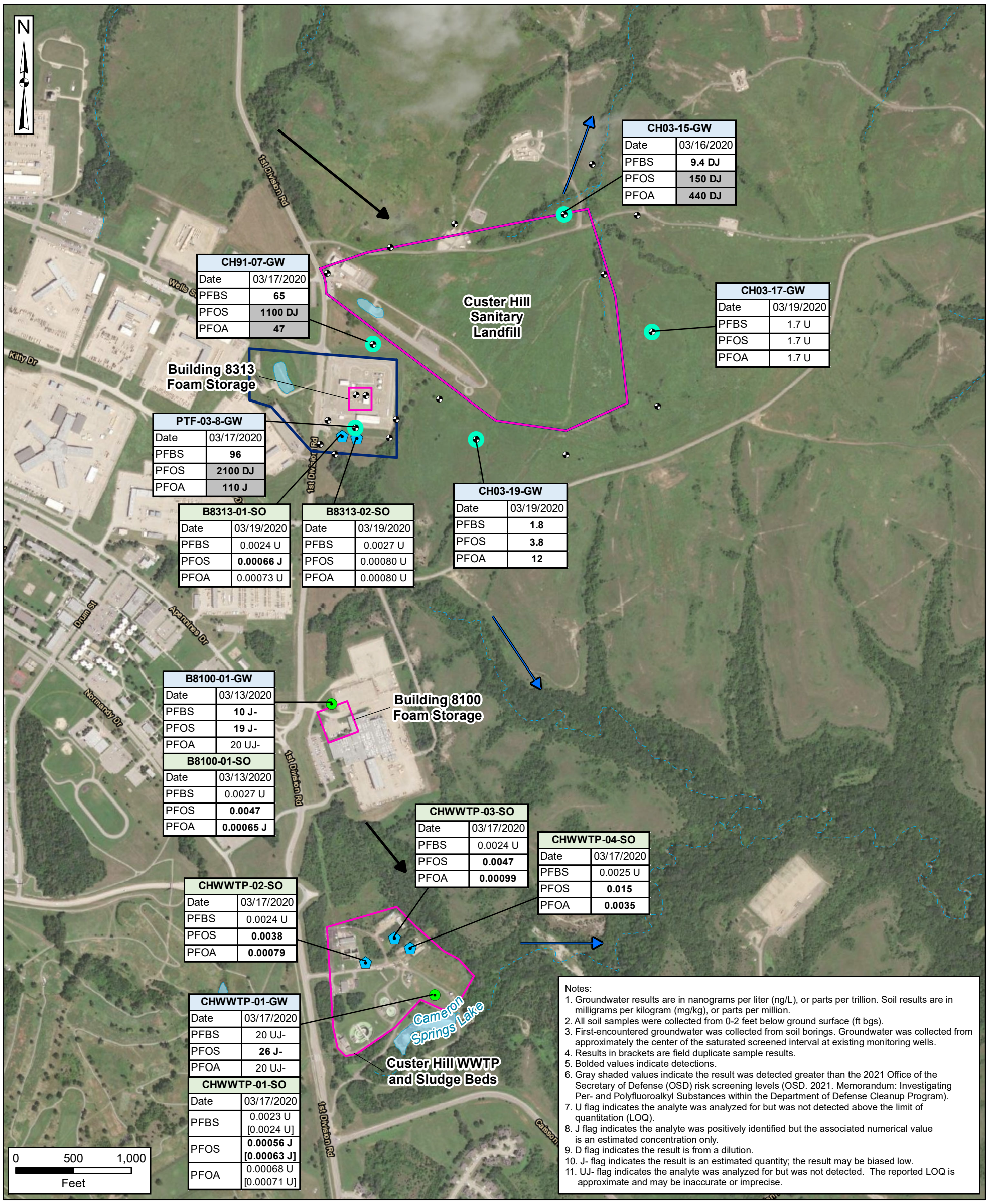
Data Sources:
EDR Well Data, 2018
KGS Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 7-6
Custer Hill AOPIs
PFOS, PFOA, and PFBS Analytical Results





CH03-15-GW	
Date	03/16/2020
PFBS	**9.4 DJ**
PFOS	**150 DJ**
PFOA	**440 DJ**

CH91-07-GW	
Date	03/17/2020
PFBS	**65**
PFOS	**1100 DJ**
PFOA	**47**

CH03-17-GW	
Date	03/19/2020
PFBS	1.7 U
PFOS	1.7 U
PFOA	1.7 U

PTF-03-8-GW	
Date	03/17/2020
PFBS	**96**
PFOS	**2100 DJ**
PFOA	**110 J**

CH03-19-GW	
Date	03/19/2020
PFBS	**1.8**
PFOS	**3.8**
PFOA	**12**

B8313-01-SO	
Date	03/19/2020
PFBS	0.0024 U
PFOS	**0.00066 J**
PFOA	0.00073 U

B8313-02-SO	
Date	03/19/2020
PFBS	0.0027 U
PFOS	0.00080 U
PFOA	0.00080 U

B8100-01-GW	
Date	03/13/2020
PFBS	**10 J-**
PFOS	**19 J-**
PFOA	20 UJ-

B8100-01-SO	
Date	03/13/2020
PFBS	0.0027 U
PFOS	**0.0047**
PFOA	**0.00065 J**

CHWWTP-03-SO	
Date	03/17/2020
PFBS	0.0024 U
PFOS	**0.0047**
PFOA	**0.00099**

CHWWTP-04-SO	
Date	03/17/2020
PFBS	0.0025 U
PFOS	**0.015**
PFOA	**0.0035**

CHWWTP-02-SO	
Date	03/17/2020
PFBS	0.0024 U
PFOS	**0.0038**
PFOA	**0.00079**

CHWWTP-01-GW	
Date	03/17/2020
PFBS	20 UJ-
PFOS	**26 J-**
PFOA	20 UJ-

CHWWTP-01-SO	
Date	03/17/2020
PFBS	0.0023 U [0.0024 U]
PFOS	**0.00056 J [0.00063 J]**
PFOA	0.00068 U [0.00071 U]

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Results in brackets are field duplicate sample results.
5. Bolded values indicate detections.
6. Gray shaded values indicate the result was detected greater than the 2021 Office of the Secretary of Defense (OSD) risk screening levels (OSD. 2021. Memorandum: Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program).
7. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
8. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
9. D flag indicates the result is from a dilution.
10. J- flag indicates the result is an estimated quantity; the result may be biased low.
11. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

- AOPI
- IRP Influence
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Monitoring Well
- Surface Soil Sample Location (Hand Auger)
- Soil Boring Sample Location (Sonic)
- Groundwater Sample Location - Existing Well

AOPI = Area of Potential Interest
IRP = Installation Restoration Program
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

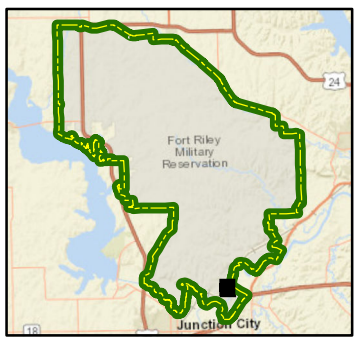


Figure 7-7
Main Post WWTP and Sludge Drying Beds
PFOS, PFOA, and PFBS Analytical Results

MPWWTP-06-SO	
Date	03/18/2020
PFBS	0.0021 U
PFOS	0.00063 U
PFOA	0.00063 U

MPWWTP-07-SO	
Date	03/18/2020
PFBS	0.0025 U
PFOS	0.00074 U
PFOA	0.00074 U

MPWWTP-02-SO	
Date	03/17/2020
PFBS	0.0022 U [0.0022 U]
PFOS	0.00066 U [0.00067 U]
PFOA	0.00066 U [0.00067 U]

MPWWTP-01-GW	
Date	03/17/2020
PFBS	20 UJ- **[10]**
PFOS	**34 J- [35]**
PFOA	**16 J- [16]**

MPWWTP-01-SO	
Date	03/17/2020
PFBS	0.0021 U
PFOS	0.00064 U
PFOA	0.00064 U

MPWWTP-05-SO	
Date	03/18/2020
PFBS	0.0024 U
PFOS	**0.00060 J**
PFOA	0.00071 U

MPWWTP-04-SO	
Date	03/18/2020
PFBS	0.0027 U
PFOS	**0.0012**
PFOA	0.00081 U

MPWWTP-03-SO	
Date	03/17/2020
PFBS	0.0023 U
PFOS	**0.0077**
PFOA	**0.00046 J**

Notes:
1. Groundwater results are in nanograms per liter (ng/L), or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
2. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
3. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Results in brackets are field duplicate sample results.
5. Bolded values indicate detections.
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
8. J- flag indicates the result is an estimated quantity; the result may be biased low.
9. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

AOPI
IRP Influence
Former WWTP Lagoon
Stream (Ephemeral/Intermittent)
Water Body
Surface Water Flow Direction
Approximate Groundwater Flow Direction
Monitoring Well
Groundwater and Soil Sample Location (DPT Boring)
Surface Soil Sample Location (Hand Auger)

AOPI = Area of Potential Interest
DPT = Direct-Push Technology
IRP = Installation Restoration Program
WWTP = Wastewater Treatment Plant

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

Coordinate System:
WGS 1984, UTM Zone 14 North

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Fort Riley, KS

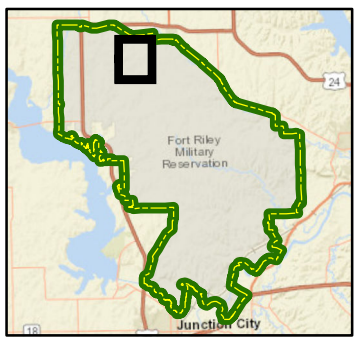


Figure 7-8
MPRC Biosolids Application Site
PFOS, PFOA, and PFBS Analytical Results

MPRC-01-SO	
Date	03/12/2020
PFBS	0.0026 U
PFOS	0.00079 U
PFOA	**0.00072 J**

MPRC-02-SO	
Date	03/12/2020
PFBS	0.0024 U
PFOS	**0.00072**
PFOA	**0.0014**

MPRC-03-SO	
Date	03/12/2020
PFBS	0.0025 U
PFOS	**0.0027**
PFOA	**0.0064**

MPRC-04-SO	
Date	03/12/2020
PFBS	0.0026 U
PFOS	**0.0039**
PFOA	**0.0036**

MPRC-05-SO	
Date	03/12/2020
PFBS	0.0026 U [0.0026 U]
PFOS	**0.0028 [0.0031]**
PFOA	**0.0028 [0.0034]**

MPRC-06-SO	
Date	03/12/2020
PFBS	0.0027 U
PFOS	**0.0021**
PFOA	**0.0033**

MPRC-07-SO	
Date	03/12/2020
PFBS	0.0026 U
PFOS	**0.0022**
PFOA	**0.0023**

MPRC-08-SO	
Date	03/12/2020
PFBS	0.0027 U
PFOS	**0.0016**
PFOA	**0.0022**

MPRC-09-SO	
Date	03/12/2020
PFBS	0.0024 U
PFOS	**0.0026**
PFOA	**0.0056**

MPRC-10-SO	
Date	03/12/2020
PFBS	0.0026 U
PFOS	**0.00053 J**
PFOA	**0.0012**

MPRC-11-SO	
Date	03/12/2020
PFBS	0.0026 U
PFOS	**0.0016**
PFOA	**0.0038**

MPRC-12-SO	
Date	03/12/2020
PFBS	0.0025 U
PFOS	0.00074 U
PFOA	0.00074 U

MPRC-13-SO	
Date	03/12/2020
PFBS	0.0025 U
PFOS	0.00074 U
PFOA	**0.0012**

MPRC-14-SO	
Date	03/12/2020
PFBS	0.0024 U
PFOS	0.00071 U
PFOA	0.00071 U

Notes:
1. Select fields within the MPRC Biosolids Application Site were identified as AOPIs (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconnaissance.
2. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. Results in brackets are field duplicate sample results.
5. Bolded values indicate detections.
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.

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

AOPI = Area of Potential Interest
MPRC = Multi-Purpose Range Complex

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

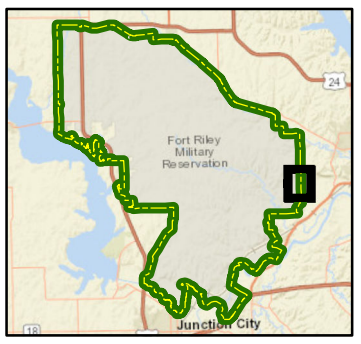


Figure 7-9
Firebreak 1 Biosolids Application Site
PFOS, PFOA, and PFBS Analytical Results

N

FRBK1-03-SO	
Date	03/18/2020
PFBS	0.0023 U
PFOS	0.00070 U
PFOA	0.00070 U

Field 1.09

FRBK1-01-GW	
Date	03/13/2020
PFBS	1.8 U
PFOS	**1.9**
PFOA	**2.3**

FRBK1-01-SO	
Date	03/13/2020
PFBS	0.0024 U
PFOS	0.00071 U
PFOA	0.00071 U

FRBK1-02-SO	
Date	03/18/2020
PFBS	0.0025 U
PFOS	**0.00052 J**
PFOA	0.00074 U

Eureka Dr
Eureka Dr
Sikes Blvd
Executive Ct

0 500 1,000
Feet

Notes:
1. One field within the Firebreak 1 Biosolids Application Site was identified as an AOPI (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconnaissance.
2. Groundwater results are in nanograms per liter, or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
5. Bolded values indicate detections.
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.

- Installation Boundary
- AOPI
- Stream (Ephemeral/Intermittent)
- Approximate Groundwater Flow Direction
- Surface Water Flow Direction
- Surface Soil Sample Location (Hand Auger)
- Soil Boring Sample Location (Sonic)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
  *Livestock and Garden/Lawn

AOPI = Area of Potential Interest
KGS = Kansas Geological Survey
Sonic = Rotosonic Drilling

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

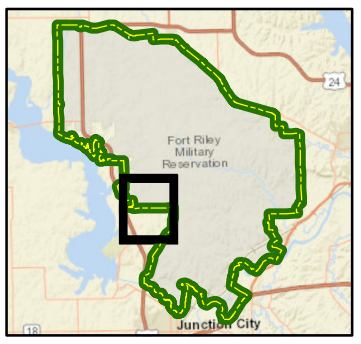


Figure 7-10
Firebreak 9 Biosolids Application Site
PFOS, PFOA, and PFBS Analytical Results

FRBK9-04-SO	
Date	03/10/2020
PFBS	0.0025 U
PFOS	0.00074 U
PFOA	0.00074 U

FRBK9-03-SO	
Date	03/10/2020
PFBS	0.0024 U
PFOS	0.00071 U
PFOA	0.00071 U

FRBK9-01-GW	
Date	03/11/2020
PFBS	20 UJ- [19 UJ-]
PFOS	20 UJ- [19 UJ-]
PFOA	20 UJ- [19 UJ-]

FRBK9-01-SO	
Date	03/10/2020
PFBS	0.0024 U
PFOS	0.00073 U
PFOA	0.00073 U

FRBK9-02-SO	
Date	03/10/2020
PFBS	0.0025 U
PFOS	0.00074 U
PFOA	0.00074 U

Firebreak 9
Biosolids
Application Site

Notes:
1. The Firebreak 9 Biosolids Application Site was identified as an AOPI (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconnaissance. However, the specific fields in which biosolids were applied were not known.
2. Groundwater results are in nanograms per liter, or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
5. Results in brackets are field duplicate sample results.
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

0 1,000 2,000
Feet

Installation Boundary
AOPI
River/Stream (Perennial)
Stream (Ephemeral/Intermittent)
Water Body
Approximate Groundwater Flow Direction
Surface Water Flow Direction
Surface Soil Sample Location (Hand Auger)
Soil Boring Sample Location (Sonic)
Domestic Well (KGS)
Other* Domestic Well (KGS)
*Livestock and Garden/Lawn

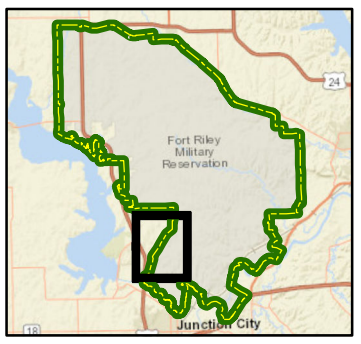
AOPI = Area of Potential Interest
KGS = Kansas Geological Survey
Sonic = Rotosonic Drilling

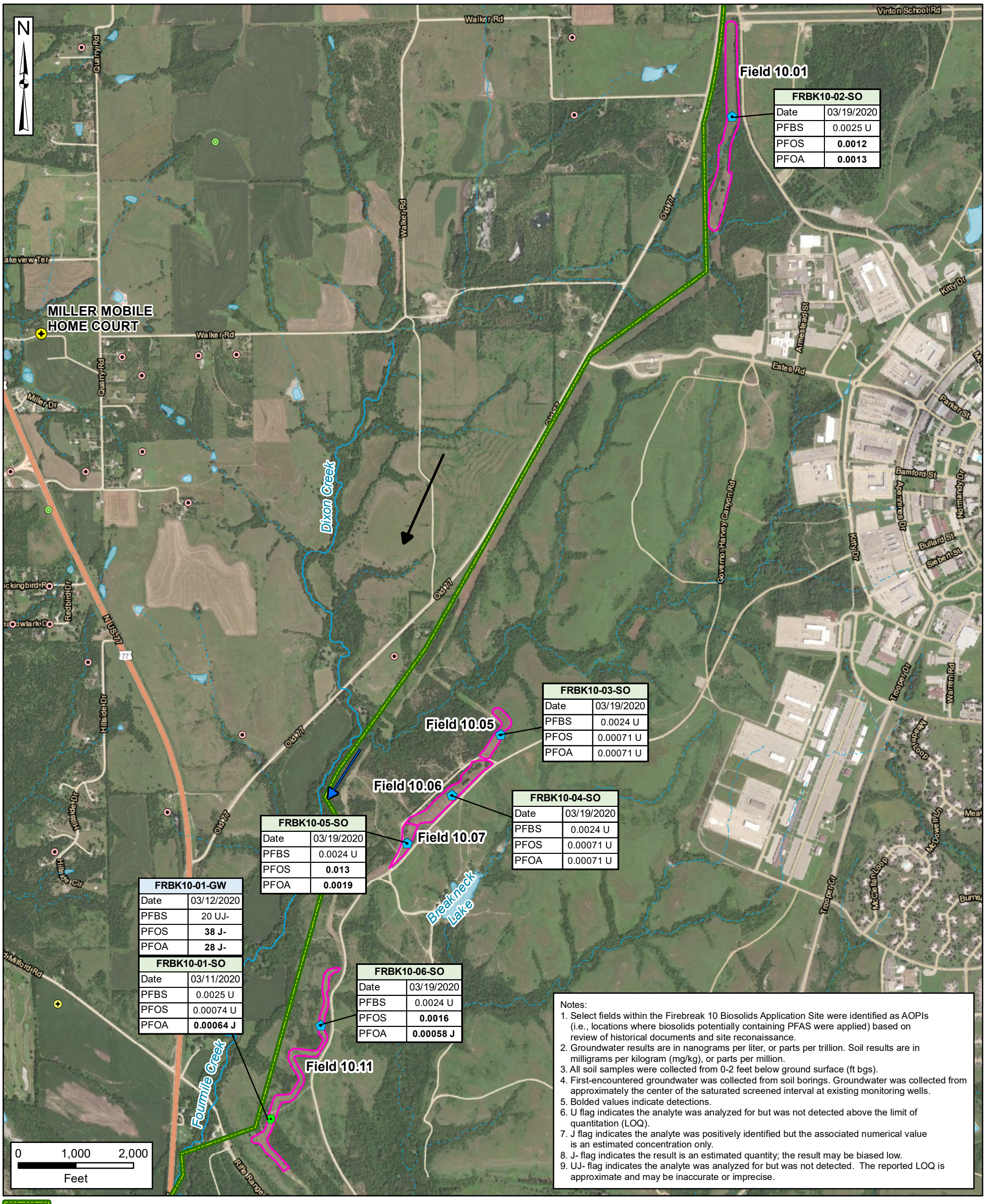
Data Sources:
EDR Well Data, 2018
KGS Well Data, 2019
ESRI ArcGIS Online, Aerial Imagery

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

Figure 7-11
Firebreak 10 Biosolids Application Site
PFOS, PFOA, and PFBS Analytical Results





Notes:
1. Select fields within the Firebreak 10 Biosolids Application Site were identified as AOPIs (i.e., locations where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconaissance.
2. Groundwater results are in nanograms per liter, or parts per trillion. Soil results are in milligrams per kilogram (mg/kg), or parts per million.
3. All soil samples were collected from 0-2 feet below ground surface (ft bgs).
4. First-encountered groundwater was collected from soil borings. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
5. Bolded values indicate detections.
6. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).
7. J flag indicates the analyte was positively identified but the associated numerical value is an estimated concentration only.
8. J- flag indicates the result is an estimated quantity; the result may be biased low.
9. UJ- flag indicates the analyte was analyzed for but was not detected. The reported LOQ is approximate and may be inaccurate or imprecise.

- Installation Boundary
- AOPI
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Public Supply Well (EDR)
- Public Supply Well (KGS)
- Domestic Well (KGS)
- Other* Domestic Well (KGS)
  *Livestock and Garden/Lawn
- Surface Soil Sample Location (Hand Auger)
- Soil Boring Sample Location (Sonic)

AOPI = Area of Potential Interest
Environmental Data Resources, Inc.
KGS = Kansas Geological Survey
Sonic = Rotosonic Drilling

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

Coordinate System:
WGS 1984, UTM Zone 14 North

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, KS

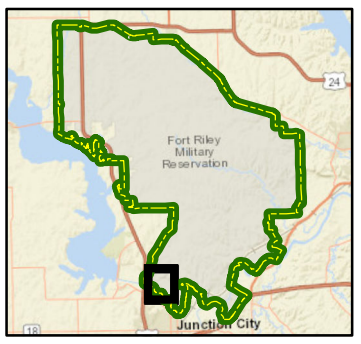


Figure 7-12
Camp Forsyth Biosolids Application Site
PFOS, PFOA, and PFBS Analytical Results

N

Camp Forsyth
Biosolids Application Site

CF-P10-GW	
Date	03/18/2020
PFBS	**2.3**
PFOS	1.8 U
PFOA	1.8 U

CF-W11-GW	
Date	03/18/2020
PFBS	1.9 U
PFOS	1.9 U
PFOA	1.9 U

CF-W10-GW	
Date	03/19/2020
PFBS	1.8 U
PFOS	1.8 U
PFOA	1.8 U

Notes:
1. The Original Camp Forsyth Biosolids Application Site was identified as an AOPI (i.e., location where biosolids potentially containing PFAS were applied) based on review of historical documents and site reconaissance.
2. Groundwater results are in nanograms per liter, or parts per trillion.
3. Groundwater was collected from approximately the center of the saturated screened interval at existing monitoring wells.
4. Bolded values indicate detections.
5. U flag indicates the analyte was analyzed for but was not detected above the limit of quantitation (LOQ).

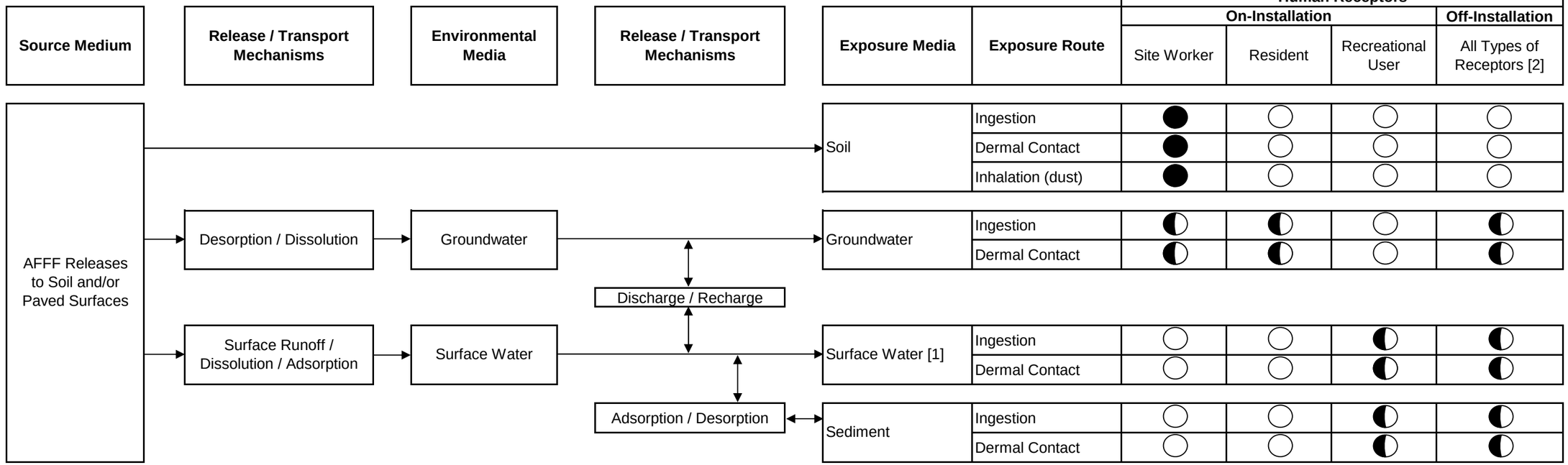
0 500 1,000
Feet

- Installation Boundary
- AOPI
- IRP Influence
- River/Stream (Perennial)
- Stream (Ephemeral/Intermittent)
- Water Body
- Surface Water Flow Direction
- Approximate Groundwater Flow Direction
- Groundwater Sample Location - Existing Well
- Monitoring Well (USEPA)

AOPI = Area of Potential Interest
IRP = Installation Restoration Program
USEPA = United States Environmental Protection Agency

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

Coordinate System:
WGS 1984, UTM Zone 14 North



Legend:

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

Acronyms/Abbreviations:

AFFF = Aqueous Film-Forming Foam
AOPI = Area of Potential Interest
FFTA = Former Fire Training Area
FNTA = Former Nozzle Testing Area
MAAF = Marshall Army Airfield

Notes:

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

* MAAF AOPIs include: FFTA-MAAF, FFTA-Building 892 (Gate 11), Former Fire Station #3 (Building 743), FFTA-Old Taxiway, FNTA-Gate 8, Current Fire Station #3 (Building 706), Building 710 Foam Storage, Hangars 723, 746, 837, and 863.

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Conceptual Site Model - Select MAAF AOPIs*, Former Fire Training Area at Southwest Funston Landfill, Former Fire Training Area at Camp Funston, Building 8313 Foam Storage, and Building 8100 Foam Release AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-13

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	On-Installation: Resident	On-Installation: Recreational User	Off-Installation: All Types of Receptors [2]
AFFF Releases to Soil and/or Paved Surfaces				Soil	Ingestion	◯	◯	◯	◯
					Dermal Contact	◯	◯	◯	◯
					Inhalation (dust)	◯	◯	◯	◯
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◯	◯	◯	◯
					Dermal Contact	◯	◯	◯	◯
			Discharge / Recharge						
	Surface Runoff / Dissolution / Adsorption	Surface Water		Surface Water [1]	Ingestion	◯	◯	◯	◯
					Dermal Contact	◯	◯	◯	◯
			Adsorption / Desorption	Sediment	Ingestion	◯	◯	◯	◯
					Dermal Contact	◯	◯	◯	◯

Legend:

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

Acronyms/Abbreviations:

AFFF = Aqueous Film-Forming Foam
AOPI = Area of Potential Interest

Notes:

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

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Conceptual Site Model - Building 817 Foam Release AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-14

Source Medium	Release / Transport Mechanisms	Environmental Media	Release / Transport Mechanisms	Exposure Media	Exposure Route	Human Receptors: On-Installation: Site Worker	On-Installation: Resident	On-Installation: Recreational User	Off-Installation: All Types of Receptors [2]
Potential PFAS-Containing Construction Debris and/or Soil and/or Sludge				Soil	Ingestion	●	○	○	○
					Dermal Contact	●	○	○	○
					Inhalation (dust)	●	○	○	○
	Desorption / Dissolution	Groundwater		Groundwater	Ingestion	◐	◐	○	◐
					Dermal Contact	◐	◐	○	◐
			Discharge / Recharge						
	Surface Runoff / Dissolution / Adsorption	Surface Water		Surface Water [1]	Ingestion	○	○	◐	◐
					Dermal Contact	○	○	◐	◐
			Adsorption / Desorption	Sediment	Ingestion	○	○	◐	◐
					Dermal Contact	○	○	◐	◐

Legend:

● = Complete Exposure Pathway

◐ = Potentially Complete Exposure Pathway

○ = Incomplete Exposure Pathway

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
C/D = Construction/Demolition
PFAS = per- and polyfluoroalkyl substances

Notes:

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

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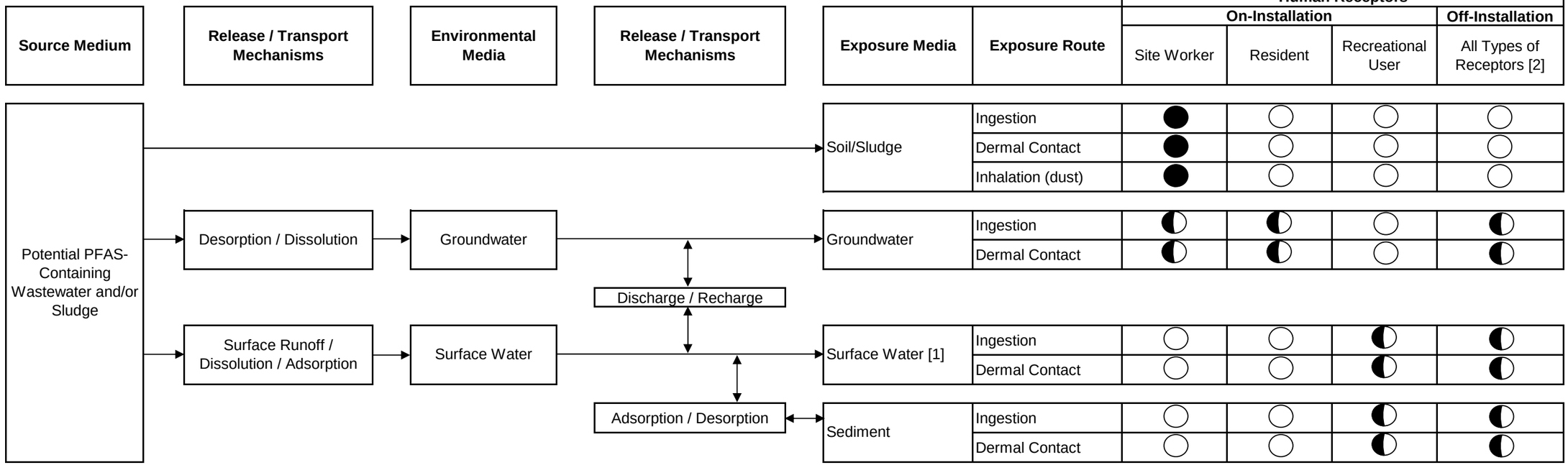
Conceptual Site Model - Whitside C/D Landfill and Campbell Hill C/D Landfill AOPIs
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-15



Legend:

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
MPRC = Mulit-Purpose Range Complex
PFAS = per- and polyfluoralkyl substances
WWTP = Wastewater Treatment Plant

Notes:

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

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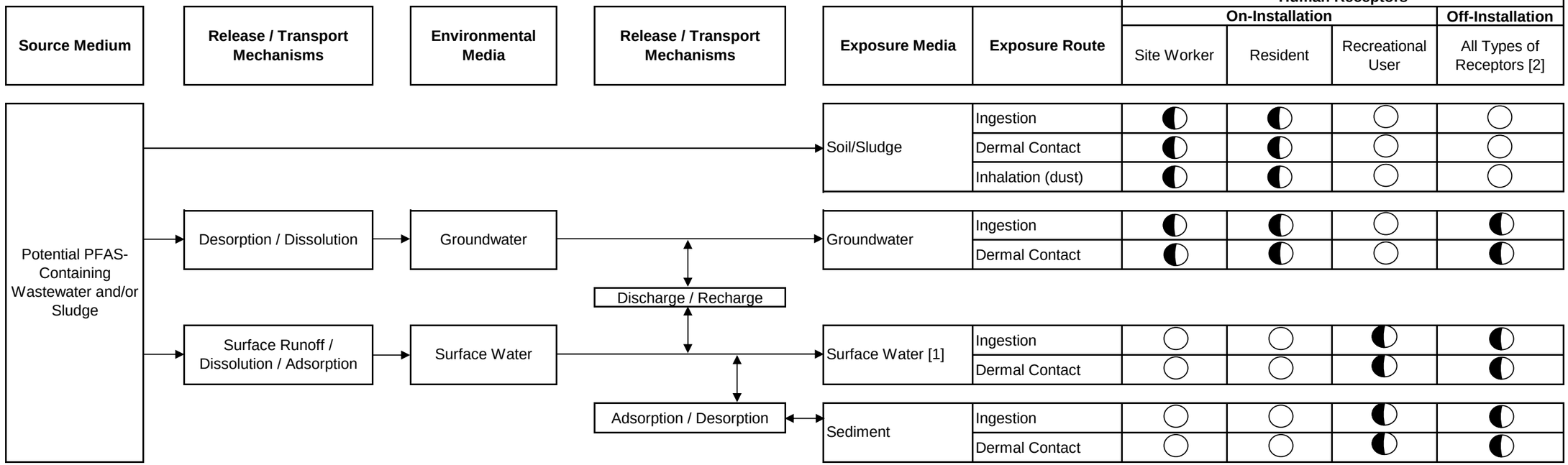
Conceptual Site Model - Main Post WWTP and Sludge Beds, Firebreak 1 Biosolids Application Site, Firebreak 10 Biosolids Application Site, MPRC Biosolids Application Site, Custer Hill Sanitary Landfill, and Custer Hill WWTP and Sludge Beds AOPIs

USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-16



Legend:

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
PFAS = per- and polyfluoralkyl substances

Notes:

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

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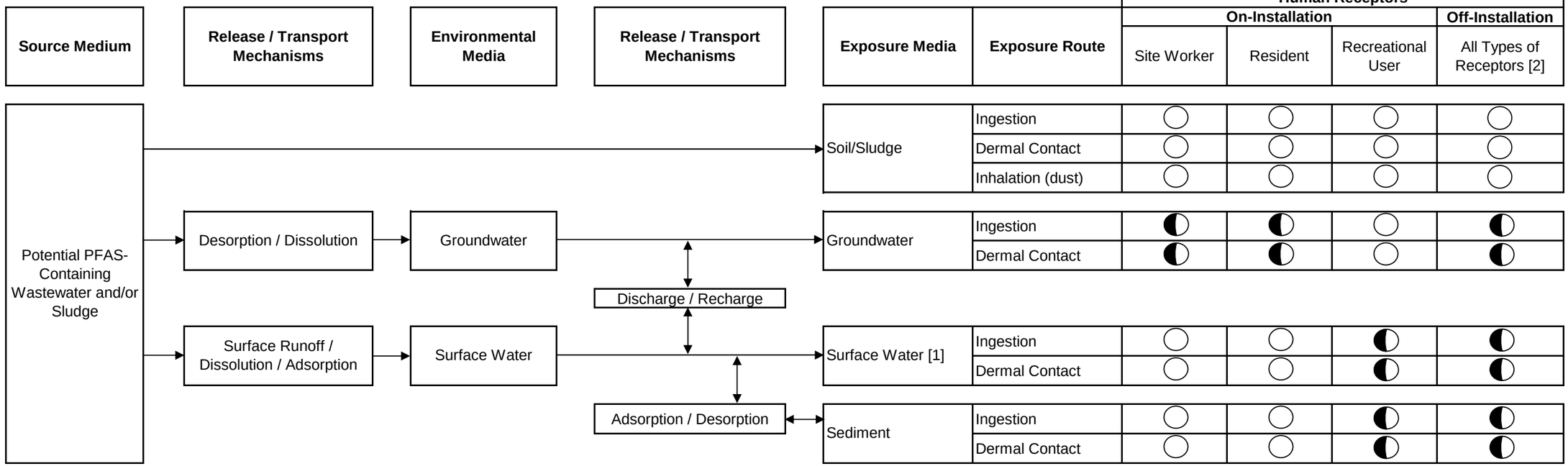
Conceptual Site Model - Camp Forsyth Biosolids Application Site AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-17



Legend:

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
PFAS = per- and polyfluoralkyl substances

Notes:

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

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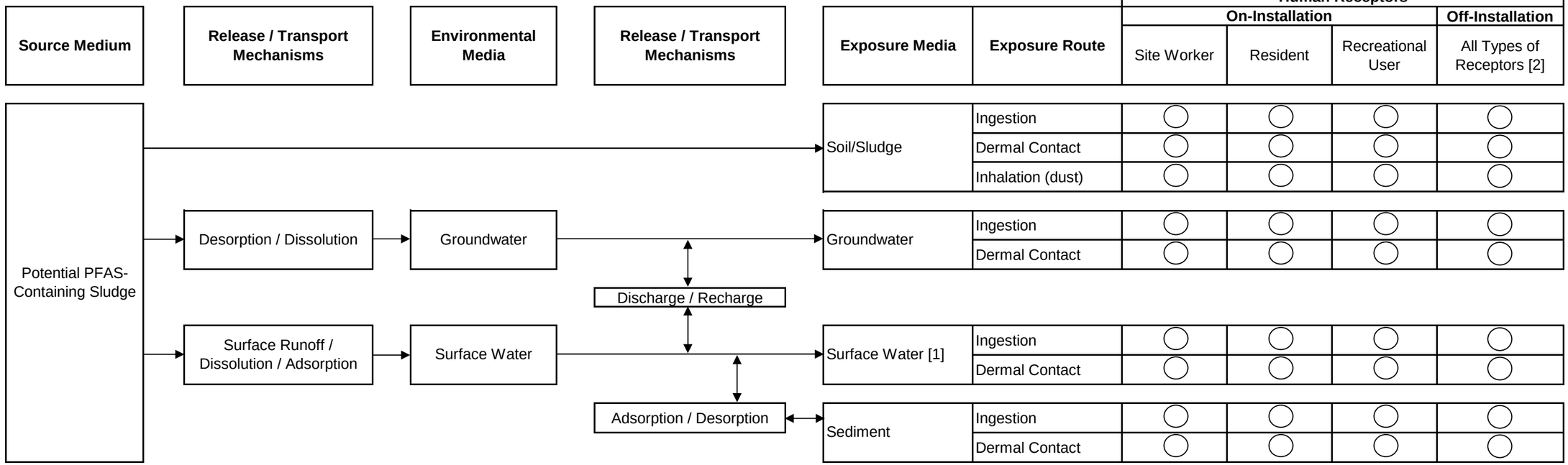
Conceptual Site Model - Camp Funston Biosolids Application Site AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-18



Legend:

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
PFAS = per- and polyfluoralkyl substances

Notes:

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

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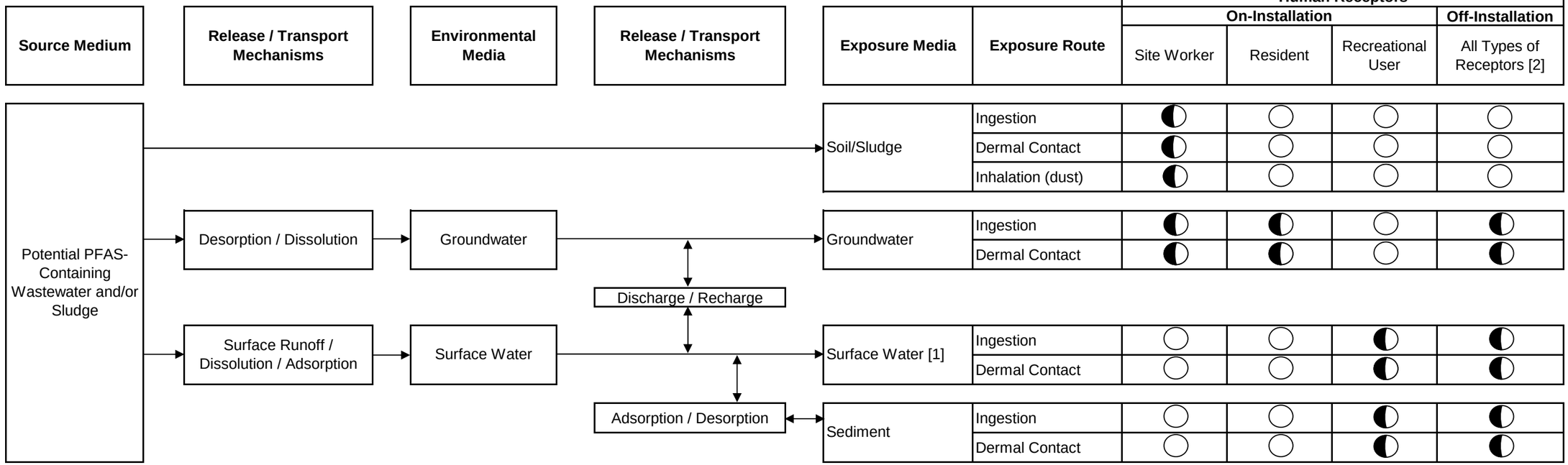
Conceptual Site Model - Firebreak 9 Biosolids Application Site AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-19



Legend:

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

Acronyms/Abbreviations:

AOPI = Area of Potential Interest
PFAS = per- and polyfluoroalkyl substances
WWTP = Wastewater Treatment Plant

Notes:

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

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Conceptual Site Model - Camp Funston Advanced WWTP AOPI
USAEC PFAS Preliminary Assessment / Site Inspection
Fort Riley, Kansas

Figure 7-20