

**PRELIMINARY ASSESSMENT OF PER- AND
POLYFLUOROALKYL SUBSTANCES AT
UMATILLA CHEMICAL DEPOT, OREGON**

Prepared for:



U.S. ARMY
ODCS, G-9, ISE BRAC

Final
December 2023

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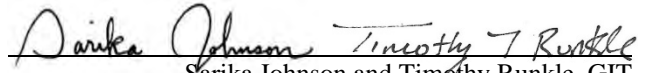
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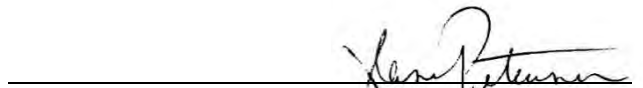
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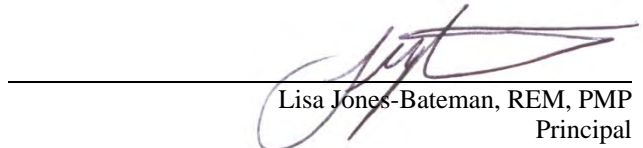
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LIST OF ACRONYMS AND ABBREVIATIONS

ADA	Ammunition Demolition Activity
AFFF	Aqueous Film-Forming Foam
AOI	Area of Interest
AOPI	Area of Potential Interest
Army	U.S. Army
BEC	Base Environmental Coordinator
BRAC	Base Realignment and Closure
bgs	Below Ground Surface
CDA	Columbia Development Authority
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COI	Constituent of Interest
CSM	Conceptual Site Model
DERP	Defense Environmental Restoration Program
DoD	U.S. Department of Defense
EDR	Environmental Data Resources, Inc.
FHA	Federal Highway Administration
FTA	Fire Training Area
gpm	Gallons per Minute
HFPO-DA	Hexafluoropropylene Oxide Dimer Acid
HQ	Hazard Quotient
IPaC	Information for Planning and Consultation
JBLM	Joint Base Lewis-McChord
LHA	Lifetime Health Advisory
MEC	Munitions and Explosives of Concern
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NGB	National Guard Base
NPL	National Priorities List
OB/OD	Open Burning/Open Detonation
ODEQ	Department of Environmental Quality
ODOT	Oregon Department of Transportation
OHA	Oregon Health Authority
ORARNG	Oregon Army National Guard
OSD	Office of the Assistant Secretary of Defense
OWRD	Oregon Water Resources Department
PA	Preliminary Assessment
PAL	Project Action Limit
PCB	Polychlorinated Biphenyl
PFAS	Per- and Polyfluoroalkyl Substances
PFBA	Perfluorobutanoic Acid
PFBS	Perfluorobutane Sulfonate
PFHpA	Perfluoroheptanoic Acid
PFHxA	Perfluorohexanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFNA	Perfluorononanoic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonate
ppb	Parts per Billion
ppt	Parts per Trillion

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
RTC	Raymond F. Rees Training Center
SDWA	Safe Drinking Water Act
SI	Site Inspection
T&E	Threatened and Endangered
U.S.C.	United States Code
UCMR3	Third Unregulated Contaminant Monitoring Rule
UCMR5	Fifth Unregulated Contaminant Monitoring Rule
UMCD	Umatilla Chemical Depot
UMCDF	Umatilla Chemical Agent Disposal Facility
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

The objective of a Preliminary Assessment (PA) is to identify areas of potential interest (AOPIs) based on whether use, storage, or disposal of potential per- and polyfluoroalkyl substances (PFAS)-containing materials, including aqueous film-forming foam (AFFF), occurred in accordance with the 2018 *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018). A PA for PFAS-containing materials with a focus on perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanoic acid (PFBA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA) and its ammonium salt (“GenX” chemicals) was completed for the Base Realignment and Closure (BRAC) property at the Umatilla Chemical Depot (UMCD) to assess potential PFAS release areas and exposure pathways. The entire UMCD, which is in Umatilla, Oregon, was selected for closure under BRAC. The completion of this PA included the execution of the following tasks:

- Conducted a kickoff meeting with the BRAC Office and U.S. Army Corps of Engineers (USACE) on January 19, 2022, to present all parties’ preliminary knowledge of UMCD to provide information to guide the PA and site visit.
- Reviewed available records (e.g., aerial photography, historical maps, technical reports, previous studies, investigations) from online sources (i.e., Internet-based searches), environmental investigations and/or regulatory programs (e.g., the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA]), and internal U.S. Army (Army) documents from the Administrative Record. In addition, an Environmental Data Resources, Inc. (EDR) Report was generated for UMCD and included any listed sites within and up to a 2-mile search distance.
- Conducted a site visit on May 3, 2022, to identify potential sources of PFAS and gather information for developing conceptual site models (CSMs) at AOPIs.
- Interviewed individuals with historical and present-day knowledge of operations on the BRAC property.
- Identified AOPIs and developed preliminary CSMs for pathways of potential PFAS in soil, groundwater, surface water, and sediment.

In conducting the PA of the BRAC property at UMCD, three AOPIs were identified where a potential for release of PFAS exists resulting from site operational history. AOPIs were identified at potential PFAS-release locations on the BRAC property only.

Based on the potential PFAS releases at the AOPIs, the potential for exposure to PFAS contamination in soil exists. In addition, the potential for off-post exposure in groundwater exists, as on-post groundwater could influence downgradient drinking water sources. Given the findings of this PA, the AOPIs presented warrant further evaluation in a Site Inspection (SI).

1. INTRODUCTION

The U.S. Army (Army) conducted this Preliminary Assessment (PA) to investigate the potential presence of per- and polyfluoroalkyl substances (PFAS) at the former Umatilla Chemical Depot (UMCD), Umatilla, Oregon, in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, 42 United States Code [U.S.C.] §9601 et seq.); the Defense Environmental Restoration Program (DERP, 10 U.S.C. §2701 et seq.); the National Oil and Hazardous Substances Pollution Contingency Plan (NCP, 40 Code of Federal Regulations [CFR] Part 300); and guidance documents developed by the U.S. Environmental Protection Agency (USEPA) and the Department of the Army. The former UMCD is on the National Priorities List (NPL), and the Army is responsible for compliance with CERCLA in accordance with Executive Order 12580, as amended.

The purpose of this PFAS PA is to identify locations that are areas of potential interest (AOPIs) on the former UMCD based on the use, storage, and/or disposal of potential PFAS-containing materials, in accordance with the *Army Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018). The PA was conducted in general accordance with 40 CFR §300.420(b), the USEPA *Guidance for Performing Preliminary Assessments Under CERCLA* (USEPA 1991), and the Army *Guidance for Addressing Releases of Per- and Polyfluoroalkyl Substances* (U.S. Army 2018). This report presents findings from research conducted to assess past use of PFAS-containing materials and identify areas where these materials were stored, handled, used, or disposed of at the former UMCD.

In 2017, 7,500 acres were transferred to the National Guard Bureau (NGB) with a subsequent license to the Oregon Army National Guard (ORARNG). ORARNG renamed it the Raymond F. Rees Training Center (RTC), formerly known as Camp Umatilla. ORARNG performed a PFAS PA at RTC; therefore, RTC was not evaluated as part of this PFAS PA. ORARNG did not include the Ammunition Demolition Activity (ADA), which is being evaluated by Army Base Realignment and Closure (BRAC). Except for the RTC property, the entire former UMCD property was evaluated, including Army-owned property as well as property that has been previously transferred, and will be herein referred to as UMCD. UMCD is located in Umatilla, Oregon, as shown in Figure 1-1.

1.1 PFAS BACKGROUND INFORMATION

PFAS are a group of synthetic compounds that have been manufactured and used extensively worldwide since the 1950s for a variety of purposes. PFAS are stable, man-made fluorinated organic chemicals that repel oil, grease, and water. Common industrial uses of PFAS include paints, varnishes, sealants, hydraulic fluid, surfactants, and firefighting foams. PFAS include both per- and polyfluorinated compounds. Perfluorinated compounds, such as perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA), perfluorobutanoic acid (PFBA), perfluorobutane sulfonate (PFBS), perfluorononanoic acid (PFNA), perfluorohexanoic acid (PFHxA), perfluorohexane sulfonate (PFHxS), and hexafluoropropylene oxide dimer acid (HFPO-DA or Gen X) are a subset of PFAS with completely fluorinated carbon chains, while polyfluorinated compounds have at least one carbon chain atom that is not fully fluorinated. These eight PFAS together, and for the purposes of this PA, are referred to in this report as “Target PFAS.”

UMCD was evaluated for all potential use, storage, and/or disposal of PFAS-containing materials. A variety of PFAS-containing materials are 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 common potential source of PFAS at U.S. Department of Defense (DoD) facilities. As such, this section is organized to summarize the AFFF-related sources first, followed by all remaining potential PFAS-containing materials. AFFF is used as a firefighting agent to suppress petroleum hydrocarbon fires and vapors. Firefighting foams like AFFF were developed in the 1960s (ITRC 2020a), but AFFF did not see widespread DoD use until the early 1970s. Older fire training facilities often were unlined and not constructed to prevent infiltration of firefighting foams and combustion products leaching into the subsurface.

Large quantities of AFFF may have been released into the environment as a result of fire training exercises, fire responses, fire suppression system activations, and tank and pipeline leaks/spills.

Other potential PFAS sources considered include installation storage warehouses, some pesticide use, automobile maintenance shops, photographic processing facilities, laundry/waterproofing facilities, car washes, stormwater or sanitary sewer components, and biosolid application areas.

Many PFAS are highly soluble in water and have low volatility due to their ionic nature. The specific gravity/relative density for PFOS and PFOA is 1.8 (ITRC 2020b). Long-chain perfluorinated compounds have low vapor pressure and are expected to persist in aquatic environments. These compounds do not readily degrade by most natural processes. They are thermally, chemically, and biologically stable, and are resistant to biodegradation, atmospheric photooxidation, direct photolysis, and hydrolysis. The structure of these compounds increases their resistance to degradation; the carbon-fluorine bond is one of the strongest in nature, and the fluorine atoms shield the carbon backbone.

When PFAS are released to the environment, they can readily migrate into soil, groundwater, surface water, and sediment. Once in the environment, PFAS are persistent and may continue to migrate through airborne transport, surface water, groundwater, and/or biologic uptake. The amount of PFAS entering the environment depends on the type and amount of the PFAS material that have been released, where and when it was used, the type of soil, and other factors. If private or public wells are located nearby, they potentially could be affected by PFAS. Similarly, surface water features may be impacted and may convey PFAS to downgradient receptors.

Of the thousands of PFAS, some are considered precursor compounds (typically polyfluoroalkyl substances). Precursor compounds can abiotically or biotically transform into PFOS and PFOA. PFOS and PFOA are referred to as terminal PFAS, meaning no further degradation products will form from them (ITRC 2020c).

1.2 PURPOSE AND OBJECTIVES

The purpose of a PA under the NCP is to 1) eliminate from further consideration those sites that pose no threat to public health or the environment; 2) determine if any potential need for removal action exists; 3) set priorities for Site Inspections (SIs); and 4) gather existing data to facilitate evaluation for the release pursuant to the Hazard Ranking System, if warranted.

The primary objective of the PA is to identify locations at UMCD where PFAS-containing materials were used, stored, or disposed of, resulting in a potential release of PFAS to the environment, and conduct an initial assessment of possible migration pathways of potential contamination. This PA also includes development of a preliminary conceptual site model (CSM) for AOPIs related to PFAS.

1.3 PFAS REGULATORY OVERVIEW AND SCREENING CRITERIA

In May 2016, USEPA issued lifetime health advisories (LHAs) for PFOA and PFOS under the Safe Drinking Water Act (SDWA). To provide Americans, including the most sensitive populations, with a margin of protection from a lifetime of exposure to PFOS and PFOA in drinking water, USEPA established a health advisory level for PFOS and PFOA (individually or combined) of 70 ng/L (USEPA 2016).

In October 2019, the Office of the Secretary of Defense (OSD) issued guidance on investigating PFOS, PFOA, and PFBS at DoD restoration sites. The OSD guidance provided risk screening levels for PFOS, PFOA, and PFBS in groundwater, tap water, and soil, based on the USEPA regional screening level (RSL) calculator for residential and industrial reuse and using the oral reference dose of 2E-05 mg/kg-day. These screening levels are used during an SI to determine if further investigation in a Remedial Investigation (RI) is warranted.

In April, USEPA issued an updated toxicity assessment for PFBS. USEPA developed chronic (0.0003 mg/kg-day) and subchronic (0.001 mg/kg-day) oral reference doses (RfDs) for PFBS as part

of USEPA’s toxicity assessment. The RSL for PFBS was previously calculated using the RfD of 0.02 mg/kg-day. New toxicity values resulted in revisions to the RSLs for PFBS in May 2021 (USEPA 2021).

In September 2021, OSD issued a revision to *Investigating Per- and Polyfluoroalkyl Substances within the Department of Defense Cleanup Program* (DoD 2021). The revised memorandum accounts for the updated PFBS screening levels attributable to USEPA’s reassessment of PFBS toxicity in 2021. Based on USEPA research, the RSLs for PFOS and PFOA are calculated using an RfD of 2E-05 mg/kg-day. The RSL for PFBS is calculated using an RfD of 3E-04 mg/kg-day. When multiple PFAS are encountered at a site, a 0.1 factor is applied to the screening level when it is based on noncarcinogenic endpoints.

In May 2022, based on continued evaluation of Target PFAS by the Agency for Toxic Substances and Disease Registry and the USEPA Office of Water, USEPA provided new screening levels for PFOA, PFOS, PFNA, PFHxS, and HFPO-DA.

In July 2022, OSD issued a policy memorandum adopting these new screening levels to be used during the SI phase to determine whether further investigation in an RI is warranted. This revised guidance was in effect as of July 2022 and was applicable to investigating PFOS, PFOA, PFBS, PFNA, PFHxS, and HFPO-DA at DoD restoration sites, including BRAC sites (DoD 2022). In August 2023, OSD issued a memorandum to account for the May 2023 USEPA RSLs for PFBA and PFHxA in addition to the RSLs for the other six PFAS (DoD 2023). The screening levels for Target PFAS are listed in Table 1-1. Currently, no legally enforceable Federal standards exist for PFAS in groundwater, surface water, soil, or sediment.

Table 1-1. Screening Levels from the 2023 OSD Memorandum

Chemical	Residential Tap Water HQ = 0.1 (ng/L or ppt)	Residential Soil HQ = 0.1 (µg/kg or ppb)
HFPO-DA (GenX)	6	23
PFBA	1,800	7,800
PFBS	600	1,900
PFHxA	990	3,200
PFHxS	39	130
PFNA	5.9	19
PFOA	6	19
PFOS	4	13

Note: The residential tap water screening levels are used to evaluate groundwater and surface water data. The residential soil screening levels are used to evaluate soil and sediment data.

The Army’s strategy is to continue to assess and investigate potential releases and implement necessary response actions in accordance with CERCLA to ensure that no human health-based exposures are above the CERCLA risk-based values in drinking water. Therefore, sites where human exposure to contaminated drinking water exists will be addressed first and as quickly as possible to eliminate the exposure, and then other sites will be subsequently prioritized and sequenced to conduct the investigations and response actions necessary to characterize and, if necessary, remediate the source of PFAS contamination (U.S. Army 2018).

1.4 PA METHODOLOGY

The PA for UMCD included a site visit, aerial photographic analysis, records review, and interviews that were conducted in accordance with the methods detailed in the Programmatic PA Work Plan (Leidos 2021). The Programmatic PA Work Plan outlines the approach and methodology for conducting the PFAS PA. As detailed in the Programmatic PA Work Plan, the PA activities focused on ascertaining and documenting the following information regarding PFAS history and use, storage, or disposal at UMCD:

- On-post fire training activities
- Use of PFAS-based AFFF in fire suppression systems or other systems

- AFFF stored, used, and/or disposed of at buildings and crash sites
- Activities or use of materials that are likely to contain PFAS, such as metal plating operations
- Wastewater treatment plants (WWTPs) and landfills that may have received PFAS-containing materials
- Studies conducted to assess environmental impacts at the facility
- Potential PFAS use at parcels post transfer
- Potential off-post sources that may impact UMCD.

The data gathered during PA activities are summarized in Section 3.

1.5 REPORT ORGANIZATION

The contents of this PA Report are summarized below:

- **Section 2. Site Background**—This section presents site-specific information related to site operational history and discusses the environmental setting. Demographics, land use, topography, geology, hydrogeology, hydrology, groundwater, potable wells, ecological receptors, and climate are described.
- **Section 3. PA Analysis**—This section provides observations and results from the PA site visit, aerial photographic analysis, records review, and interviews.
- **Section 4. Summary of PA Data**—This section provides an overview of the data collected during the PA for the different potential PFAS sources.
- **Section 5. Summary of PA Results**—This section synthesizes the data gathered from the PA activities and determines whether each area evaluated during the PA is an AOPI or was not retained as an AOPI.
- **Section 6. Conclusions**—This section presents conclusions of the PA.
- **Section 7. References**—This section lists the references that were used in the preparation of this report.
- **Appendices**—Appendices A through F include data from field activities or related assessments:
 - Appendix A. Final UMCD Kickoff Meeting Minutes
 - Appendix B. Documents/Sources Reviewed During PA
 - Appendix C. Aerial Photographs
 - Appendix D. Site Visit Photographs
 - Appendix E. Interview Notes
 - Appendix F. Environmental Data Resources, Inc. (EDR) Report.

2. SITE BACKGROUND

2.1 SITE LOCATION

UMCD is a 17,148-acre property located in northeastern Oregon in Umatilla and Morrow Counties, approximately 3 miles south of the Columbia River and 180 miles east of Portland. Situated on the southern edge of the Columbia Plateau that extends north across the Columbia River into Washington State, UMCD is positioned at the intersection of Interstate Highways 82 and 84, approximately 35 miles south of the Tri-Cities area of Washington State, in a region of gently rolling hills sloping northwest to the Columbia River. The closest city to UMCD is Hermiston, Oregon, located approximately 5 miles east of the facility's eastern border. The only prominent surface feature at UMCD is Coyote Coulee, a valley that cuts across the facility (AECOM 2020). Figure 2-1 depicts the site features.

The site is entirely enclosed by fencing. The property's main features include 1,000 concrete igloo structures, active and inactive buildings, roads, and a chemical disposal facility (Umatilla Chemical Agent Disposal Facility [UMCDF]). The igloos that were once used to store conventional and chemical munitions are now empty, as the remaining chemical stockpiles were eliminated by October 2011. Other actively used buildings are predominantly in the Administration Area in the south-central portion of the base, UMCDF, and K-Block area (USACE 2013).

2.2 SITE OPERATIONAL HISTORY

UMCD property was used as farmland prior to the Federal Government's purchase of the parcels in 1941. The construction of 1,000 ammunition storage igloos began in February 1941. By the end of 1941, UMCD began functioning as an ammunition storage facility. In 1945, ammunition demolition began, and in 1947, an ammunition renovation complex was constructed. Two ammunition maintenance buildings were added in 1955 and 1958. The Army began storing chemical agent-filled munitions and 1-ton containers of chemical agents at the K-Block igloos in 1962. However, no chemical weapons were used, manufactured, or tested at UMCD. The chemical munitions were received for storage at the site from 1962 through 1969 (USACE 2013).

In 1988, the BRAC Commission listed UMCD for realignment. From 1990 to 1994, the facility reorganized in preparation for eventual closure, shipping all conventional ammunition and supplies to other installations. At one time, UMCD stored 12 percent of the nation's stockpile of chemical weapons, but no chemical weapons were used, manufactured, or tested at UMCD. Construction of UMCDF began in 1997. Demolition of chemical agent began in 2004 and was completed in 2011. In 2005, BRAC identified UMCD for closure upon completion of demolition of chemical agent. After completion of the chemical weapon demolition, the incineration plant was demolished, but some non-agent-related structures were retained. UMCD was formally closed in 2012, resulting in approximately 17,148 acres available for redevelopment. In 2017, 7,500 acres were transferred to ORARNG. In March 2023, 9,511 acres were transferred to the Columbia Development Authority (CDA), which includes a wildlife conservation refuge and an industrial zone to promote economic growth in the area. A 109-acre parcel is pending transfer to the Oregon Department of Transportation (ODOT) (Interstate I-80), and 28 acres are being retained by the Army.

2.3 DEMOGRAPHICS, PROPERTY TRANSFERS, AND LAND USE

Towns near UMCD include Umatilla, Hermiston, and Irrigon, Oregon, located 3, 4, and 2 miles from the site, respectively. UMCD is located approximately 2 miles south of the Columbia River and the border with Washington State. Nearby towns in Washington include Kennewick, Pasco, and Richland, approximately 22, 23, and 25 miles from UMCD, respectively (USACE 2013). According to the 2020 census, the city of Umatilla had a population of 7,363. The other nearby towns of Hermiston and Irrigon had 2020 populations of 19,354 and 2,011, respectively (U.S. Census Bureau 2020).

Most of the area surrounding UMCD is rural and agricultural. The primary agricultural uses include wheat, potatoes, watermelon, onions, carrot, and livestock. Major employers include food processing plants, Amazon, Walmart Distribution, Union Pacific Railroad, and Good Shepherd Medical Center.

In 2017, 7,500 acres of the property were transferred to NGB and licensed to ORARNG to provide training to soldiers in ORARNG and other military branches. The ORARNG parcel was withdrawn from Federal Surplus on June 16, 2017, and transferred in December 2017. Of the remaining property, 9,511 acres were transferred to CDA in 2023, 109 acres will transfer to the Federal Highway Administration (FHA), and another 28 acres (currently being remediated) will transfer to CDA in 2024. Future land uses for the CDA property include a wildlife conservation refuge (most of which will go to the Confederated Tribes of the Umatilla Indian Reservation) and an industrial zone to promote economic growth in the area. The FHA parcel will transfer to ODOT (Interstate I-82 easement) (U.S. Army 2020). UMCD property transfers are shown in Figure 2-2.

Based on the current and anticipated future industrial land use, institutional controls are in place at the closed solid and hazardous waste management units shown in Figure 2-3. Land use restrictions in these areas include residential or agricultural use of any kind, childcare or recreational facilities, and educational facilities for children in grades K-12. The groundwater underlying the Explosives Washout Lagoons Groundwater Pump and Treat Area and the Former Landfill are subject to restrictions. In addition, excavation activities of any kind (i.e., digging, drilling, or any other excavation or disturbance of the land surface or subsurface) or other activities are prohibited near the Former Landfill. The Army is responsible for conducting annual property inspections and CERCLA 5-Year Reviews for these areas. However, the subsequent owner will assume the inspection responsibilities following transfer of the property (U.S. Army 2022).

2.4 TOPOGRAPHY

The portion of Oregon within an approximate 50-mile radius of UMCD includes parts of two geomorphic regions: the Deschutes-Umatilla plateau and the Blue Mountains. Elevations on UMCD range from 400 to 677 feet above mean sea level. The northern, western, and central portions of UMCD are generally flat to very gently rolling. The only predominant geological feature on UMCD is an escarpment that cuts across the facility along a north 30 degrees east axis. The western edge of the escarpment slopes at 5 to 10 percent, and the eastern edge rises 60 to 90 feet at a 30 to 45 percent slope. The western (downhill) side of the escarpment is called Coyote Coulee. The lands east and west of the Coulee consist of gently rolling hills (Earth Technology Corporation 1994 and 1995, USACE 2013).

2.5 GEOLOGY

The geology of northeastern Oregon is dominated by basaltic lava flows of the Columbia River Group, Miocene and Pliocene in age and approximately 10,000 feet thick. These lava flows underlie the lowlands areas and form the down-warped bedrock surface of the Dalles-Umatilla Syncline. The three uppermost basalt flows and interbeds are part of the Saddle Mountain Formation and include, from youngest to oldest, the Elephant Mountain Member, the Rattlesnake Ridge Interbed, the Pamona Member, the Selah Interbed, the Umatilla Member, and the Mabton Interbed. UMCD is near the base of the southern flanks of this broad syncline (USACE 2013).

The underlying basalt is composed of layers of separate basaltic lava flows, each of which is up to 100 feet thick. Dense, hard olivine basalt at the base of each layer grades upward to softer, vesicular, and scoriaceous zones at the top. Some interlayers of clay, or clay and tuffaceous sand, up to 100 feet thick, are present in the group. Below the 751-foot elevation, which includes the entire UMCD, the basaltic bedrock is generally covered with as much as 200 feet of Pleistocene alluvial deposits. These surface deposits are generally permeable silts, sands, and gravels, with some cobbles to the west of Coyote Coulee. Much coarser permeable deposits containing considerable quantities of boulders occur along the eastern wall of the

Coulee and toward the eastern side of the installation. Soils at UMCD consist of sandy loam and coarse sand developed primarily from the alluvial deposits. The soils have been modified by wind action. The upper 8 inches of soil consist of a noncalcareous, loose, fine to medium loamy sand. The 8- to 32-inch depths consists of fine to medium sand, which overlies 8 inches of sand containing no organic matter. Below 40 inches, the soil consists of gravel and gravelly sand with varying amounts of cobbles (Earth Technology Corporation 1994, USACE 2013).

2.6 HYDROGEOLOGY

Groundwater occurs beneath UMCD in several distinct hydrogeologic settings, in a series of relatively deep confined basalt aquifers and in a highly productive permeable unconfined aquifer to the south of UMCD (extending off-post). The unconfined aquifer at UMCD consists of the alluvial deposits and weathered surface of the Elephant Mountain Member basalt and is overlain by approximately 20 to 125 feet of unsaturated alluvial sand and gravel. Depth to groundwater ranges from 60 to 100 feet below ground surface (bgs).

Groundwater flow beneath UMCD exhibits seasonal variation due to groundwater extraction for irrigation and recharge from agricultural canals in the vicinity. In the summer and fall, groundwater flow direction is generally to the east and south, while in the winter and early spring, groundwater flow direction is generally to the northwest, toward the Columbia River (USACE 2013).

2.7 SURFACE WATER HYDROLOGY

No surface water bodies are located at UMCD. The closest surface water sources are the Umatilla River and the Columbia River, which are approximately 2 and 3 miles from the installation, respectively. Stormwater runoff is minimal at UMCD because of the small amount of precipitation and permeable soils. The UMCD Administration Area storm sewer stormwater is carried by gravity to an outfall west of the sewage treatment plant. The outfall is to an open ditch, where it is allowed to percolate into the ground. Natural surface drainage channels control any stormwater runoff that accumulates (Earth Technology Corporation 1994 and 1995, USACE 2013). Surface runoff in the area east of Coyote Coulee is toward the southern boundary into a shallow, elongated depression running parallel to the Union Pacific Railroad and Interstate Highway 84. The central part of UMCD lacks any well-defined drainage pattern. The minimal runoff generated in this area generally flows into the numerous shallow depressions found in the flat and gently rolling topography in the area. The most significant of these depressions are located at the base of the west-facing bluff of Coyote Coulee. The drainage from several of the buildings at the top of the bluff go into these depressions (USACE 2013).

2.8 WATER USAGE

UMCD used seven on-post wells to extract water from the basalt aquifer; none of the drinking water supplies at UMCD draw water from the overlying unconfined alluvial aquifer. Four of the seven wells were active (wells 4, 5, 6, and 7) when UMCD closed in 2012. The wells range from 327 to 600 feet bgs, and their pumping capacity ranges from 400 to 800 gallons per minute (gpm). Wells 4 and 5 are on the Army property in the southwestern corner. They supply all water use for both the UMCD and ORARNG property. ORARNG intends to have wells 6 and 7 on the northern part of their property online in early 2023 to provide water for the ORARNG property and will sever their connection to wells 4 and 5.

Three municipal water systems (Hermiston, Umatilla, and Irrigon) draw from groundwater within a 4-mile radius of UMCD. The Columbia River is a major source of potable and irrigation water in the region and is used for recreation, fishing, and the generation of hydroelectric power. The Umatilla River is a tributary to the Columbia River, and its principal use is for irrigation (USACE 2016). According to the Oregon Water Resources Department (OWRD), more than 1,000 wells are within a 4-mile radius of UMCD. Most of these wells are primarily used for domestic, irrigation, and industrial purposes. The locations with the highest

concentration of wells are near the two towns of Hermiston and Irrigon as well as the southern portion of UMCD (OWRD 2022). Figure 2-4 presents the water wells within a 4-mile radius of UMCD.

2.9 ECOLOGICAL PROFILE

UMCD is a 17,148-acre property. Approximately 5,613 acres will be used as a wildlife refuge to preserve shrub-steppe habitat for existing and potential wildlife species. Vegetation at UMCD is typical of a cold desert. In general, the UMCD site supports large communities of shrublands, dominated by sagebrush and bitterbrush, with an understory of annual grasses and forbs, and grasslands, dominated by a mixture of native and exotic species, such as Sandberg's bluegrass (*Poa secunda*), cheatgrass (downy brome grass) (*Bromus tectorum*), and crested wheatgrass (*Agropyron cristatum*). UMCD contains the largest remnant of bitterbrush habitat in the Columbia Basin, as well as high-quality needle-and-thread sandy grasslands (USACE 2016). No wetlands or surface water are present on-post (NWI 2023).

Wildlife species present are typical of those found in Columbia Basin native shrub-steppe and grassland habitats. Coyote (*Canis latrans*), American badger (*Taxidea taxus*), jackrabbits (*Lepus californicus*) and cottontail rabbits (*Sylvilagus floridanus*), Swainson's (*Buteo swainsoni*) and redtail hawks (*Buteo jamaicensis*), burrowing owl (*Athene cunicularia*), long-billed curlew (*Numenius americanus*), and many other species are common to this habitat (USACE 2016). Pronghorn (*Antilocapra americana*) were present at UMCD until 2013. The herd of pronghorns was relocated from UMCD to the Beulah Wildlife Management Unit near Ontario, Oregon, after chemical demilitarization activities were completed at UMCD in 2013 (Spokesman-Review 2013). While the pronghorns were at Umatilla, the burrowing owl population declined in response to the trapping and relocating of coyotes and inadvertently badgers to protect the herd. Rather than digging their own burrows, burrowing owls reuse the burrows created by badgers, prairie dogs, or ground squirrels. With the removal of the badgers, the owls lacked critical nesting sites. Artificial burrows were placed at UMCD with plans to reintroduce the badger, and the burrowing owl population has rebounded (Greenburg 2019).

The U.S. Fish and Wildlife Service (USFWS) Environmental Conservation Online System Information for Planning and Consultation (IPaC) tool identified two federally listed threatened and endangered (T&E) species potentially occurring on or near UMCD (USFWS 2023). The listed species consist of the federally endangered gray wolf (*Canis lupus*) and the threatened bull trout (*Salvelinus confluentus*). A candidate species, the monarch butterfly (*Danaus plexippus*), also has been identified by IPaC as potentially occurring at UMCD (USFWS 2023). The potential for these T&E and candidate species to occur does not mean they are present at UMCD. No surface water bodies are on UMCD; all of the water infiltrates into the desert soils before running off onto lower surrounding lands. The closest aquatic habitat for the bull trout are the Columbia River (3 miles north) and the Umatilla River (2 miles east). Gray wolves have never been observed at UMCD (ORARNG 2018). No federally listed T&E species are currently recorded on UMCD grounds (USACE 2016).

Eleven migratory birds of particular concern are identified by the IPaC tool as potentially occurring on UMCD. These birds include species such as the American white pelican (*Pelecanus erythrorhynchos*), evening grosbeak (*Coccothraustes vespertinus*), long-eared owl (*Asio otus*), lesser yellowlegs (*Tringa flavipes*), and olive-sided flycatcher (*Contopus cooperi*) (USFWS 2023).

2.10 CLIMATE

UMCD is influenced by the air from the Pacific Ocean. Predominating, stagnant, high-pressure systems in the north or east in the summer or early fall can result in dry and hot southerly air in the region surrounding UMCD. It is this southerly air that increases the risk of wildfires. The lowest temperatures in the winter tend to occur when high pressure systems in central Canada force cold air down and southwesterly across the Rockies and into the Columbia Basin.

The average temperature typically varies from 27 to 93°F over the course of a year. During the summer months, average daily high temperatures are typically above 82°F, with the hottest temperatures occurring in July. The coldest month of the year in the Umatilla area is December, with an average low of 28°F and high of 40°F. The wetter season for the area typically lasts from October to June. November has an average of 6.2 days, with at least 0.04 inches of precipitation, making it the wettest month for the region. July is typically the driest month, with an average rainfall total of 0.2 inches. The area experiences snowfall from November to February, with an average snowfall total of 2.4 inches in December, the month with the highest snowfall totals (Weather Spark 2022).

Wind in the UMCD vicinity tends to be channeled by the Columbia River system. Channeling of winds along the Columbia River valley, in conjunction with a prevailing westerly wind direction in the area, results in a prevailing west-southwest wind at UMCD (AMEC 2012). Average wind speeds for the area are approximately 8.2 miles per hour (Weather Spark 2022).

3. PA ANALYSIS

The primary components of the PA are records reviews, analysis of aerial photographs, a site visit, and interviews. The following sections summarize the methods used and activities conducted for the UMCD PA. The references to “on-post” refer to property that has been or still is owned by the Army. The references to “off-post” refer to areas that have never been owned by the Army.

3.1 RECORDS REVIEW

Prior to the records review, site visit, and interviews, a kickoff meeting was held between the BRAC Office, the U.S. Army Corps of Engineers (USACE), and Leidos on January 19, 2022. The purpose of the kickoff meeting was to present preliminary knowledge of UMCD and collect information from Army participants to guide the PFAS PA and site visit. The final kickoff meeting minutes are presented in Appendix A.

Preliminary research was conducted prior to the site visit to determine the potential for use, storage, or disposal of PFAS-containing materials, including if any of the following activities were conducted at UMCD:

- On-post fire training
- Use of PFAS-based AFFF in fire suppression systems or other systems
- AFFF used, stored, or disposed of at buildings and emergency response sites
- Activities or materials used that are likely to include PFAS-containing materials
- Studies conducted to assess the environmental impacts of PFAS-containing materials
- Review of potential off-post sources.

The records review included a combination of Internet-based searches and reviews of aerial photography, historical maps, technical reports, previous studies, and investigations available online. In addition, an EDR report was generated and is included in Appendix F. An EDR report includes search results from a variety of environmental, state, city, and other publicly available databases for up to 2 miles surrounding a referenced property.

The records review also evaluated environmental investigations conducted under CERCLA and Resource Conservation and Recovery Act (RCRA) regulatory programs. In addition, the PA team reviewed internal Army documents, which included transfer documents, inspection reports, regulatory correspondence, and UMCD drawings and maps. Table 3-1 lists the documents reviewed that are relevant to the evaluation of AOPIs in this PA. A complete list of documents reviewed is included in Appendix B.

Information gathered during the records review helped identify data gaps and enabled elimination of several areas based on their historical use. Data gaps associated with facility operations; PFAS-containing material use, storage, or disposal; and current exposure receptors at UMCD contributed to a conservative approach for identifying AOPIs. However, areas with little potential to result in a PFAS release, such as storage igloos and warehouses, were eliminated from further evaluation early in the PA process.

Areas identified to have potentially used, stored, or disposed of, or had recorded the potential for a release of PFAS-containing chemicals, including AFFF, were further evaluated.

Table 3-1. Summary of Relevant Records Reviewed

Document Title	Author	Date	Relevance
<i>Enhanced Preliminary Assessment</i>	Dames & Moore	April 1990	Building information
<i>CERFA Report</i>	Earth Technology Corporation	April 1994	Installation history and identification of environmental concerns
<i>BRAC Cleanup Plan</i>	Earth Technology Corporation	January 1995	Installation history

Table 3-1. Summary of Relevant Records Reviewed (Continued)

Document Title	Author	Date	Relevance
<i>Environmental Condition of Property</i>	USACE	September 2013	Installation history, environmental setting, previous environmental investigations, and identifications of environmental concerns
<i>Preliminary Assessment Report for PFOS and PFOA Impacted Sites</i>	AECOM	May 2020	PFAS investigation on RTC property
<i>Conveyance Progress Report</i>	U.S. Army	October 1, 2020	Property transfers
<i>Site Inspection Quality Assurance Project Plan Addendum – Camp Umatilla</i>	AECOM	January 2022	Addition of the WWTP as an area of interest for the SI

3.2 AERIAL PHOTOGRAPHIC ANALYSIS

The PA included review of the 1990 Dames & Moore aerial photographic analysis, which included aerial photographs dated 1939 to 1988 (Dames & Moore 1990). Three aerial photographs provided by the Army Base Environmental Coordinator (BEC) and 11 aerial photographs available on <https://historicalaerials.com> were also included in the analysis. Select aerial photographs are presented in Appendix C. The aerial photographs were analyzed to identify potential activities or developments that may suggest the potential use, storage, or disposal of PFAS-containing materials, including AFFF (e.g., evidence of fire training activities, such as fire pits or burn scars); however, no conclusions on AFFF use or storage were drawn from the aerial photograph review. The aerial photographic analysis is summarized as follows:

- **1939** – The natural, undeveloped area prior to the construction of UMCD (Dames & Moore 1990).
- **1956** – Dark stains on a square concrete pad at Building 131 may indicate the paint waste discharge area of the paint spray operations at Building 131. The Former Landfill appears as a large gravel pit north of D-Block. Entrance to the pit is from the northwestern corner.
- **1968** – Material disposal is evident at the Former Landfill. Debris consists of dark- and light-toned objects of various shapes and sizes.
- **1970** – The hangar at the airfield in the southeastern corner of UMCD is visible. Evidence of vehicle traffic and possible dumping at the Former Landfill can be seen. Disturbed soil and small buildings scattered throughout the Ammunition Demolition Activity (ADA) are visible.
- **1972** – The entrance road to the Former Landfill has widened, suggesting increased use. Some disposal is apparent along the northern side of the pit. The roofed structure at the Deactivation Furnace has new additions, including an apparent aboveground storage tank with piping and square shed on the southeastern corner. Several objects also are visible near the structure.
- **1981** – Activity at the Former Landfill has increased based on aerial photographs showing areas with more traffic. The size of the disturbed ground at the Active Landfill has also increased. A large area of disturbed soil is visible at the ADA.
- **1994** – In 1988, UMCD was recommended for closure and experienced changes from 1990 to 1994 in preparation for closure. By 1994, Building T-104 (Former Fire Station) had been demolished, and only the footprint can be seen from aerial photographs. The hangar at the airfield also had been demolished by 1994. A long rectangular structure is visible at the Former Landfill.
- **2001** – The structure at the Former Landfill has been removed and the landfill has been capped. UMCDF, built in 1996, can be seen in the central portion of the facility. The incineration plant at the facility was demolished after closure of UMCD in 2012.

- **2009 to 2012** – Redevelopment of the firing ranges in the southern portion of the ADA can be seen throughout this period.
- **2012** – UMCD closed in 2012; however, no significant changes to the facility were observed from aerial photographs.
- **2016** – Twenty-three warehouses in the 100 Area have been demolished (demolition occurred in 2015); their foundations are still visible.
- **2020** – Warehouse 202 appears to be demolished (demolition occurred in 2018). A ground level foundation remains.

3.3 PA SITE VISIT

Prior to the site visit, the PA team corresponded with the Army BEC to coordinate the site visit date and access to the facility and to identify potential interviewees. The UMCD PA site visit was conducted on May 3, 2022. The Army BEC accompanied the PA team on the PA site visit, which included a site walk and visual inspection of all readily accessible areas at UMCD to identify potential sources of PFAS and gather information for developing CSMs at AOPIs. Appendix D contains photographs from the PA site visit. During the site visit, the PA team conducted interviews with two former Army personnel that the BEC had contacted (discussed in Section 3.4).

3.4 SUMMARY OF INTERVIEWS

Prior to the site visit, an interview was conducted with the Army BEC. Subsequent interviews with former Army personnel were conducted during the site visit. Interview summaries are included in Appendix E. The primary goal of the interviews was to identify whether PFAS-containing materials or AFFF were used at UMCD, where they were used, how much was used, how much remains, and whether any releases may have occurred. Based on the input received, PFAS-containing materials or AFFF currently are not being used on the property. Table 3-2 summarizes the interviews conducted and the pertinent information provided.

Table 3-2. Interviews Conducted for PA

Title	Date	Information Provided
Army BEC	2003 to Present	<p>The Army BEC has 20 years of experience at UMCD. She provided the following information:</p> <ul style="list-style-type: none"> • Not aware of any storage, uses, or disposal of AFFF. In 2004, observed foam being used in front of Building 2 (the fire station, for training, but could not verify it was AFFF. • Fires were responded to with water only. • JBLM conducted drinking water sampling at the four wells for PFAS, and no contamination was detected. • Water is extracted from the deeper basalt aquifer. • Drinking water is supplied by four on-post deep wells: two are on Army property and two are on ORARNG property. • Small volume chemicals were used on-post during maintenance activities. • A former fire station, located in the southwestern corner, operated until the 1980s. • A deactivation furnace was in the southwestern corner; buildings have been demolished. • UMCD has no active environmental sites, except the ADA in the ORARNG area and 28 acres west of the ORARNG property. • Groundwater restoration is underway by ORARNG at the Explosives Washout Lagoons Groundwater operable unit on ORARNG property, including a portion underlying Army property. • Not aware of any metal plating activity at UMCD.

Table 3-2. Interviews Conducted for PA (Continued)

Title	Date	Information Provided
		<ul style="list-style-type: none">• A 17.49-acre landfill was located in the northeastern portion of UMCD.• The Army BEC contacted a former Fire Chief, who indicated that AFFF was used at UMCD for fire training exercises in the past. The PA team made several attempts but was not successful in reaching the former Fire Chief for an interview.
Former Army employee	1990 to 2012	The former Army employee was not aware of AFFF use at UMCD.
Former Army employee	1980 to 2000	The former Army employee provided the following information: <ul style="list-style-type: none">• The former Army employee recalled the Former Fire Station and the Former Airfield being in operation.• The Former Fire Station was used by the UMCD Fire Department and fire trucks were parked outside the building.

4. SUMMARY OF PA DATA

4.1 PREVIOUS INVESTIGATIONS

In 2012, USEPA published the Third Unregulated Contaminant Monitoring Rule (UCMR3), which required nationwide public water systems (i.e., waterworks) to sample for a list of 30 unregulated contaminants, including 6 PFAS (i.e., PFOS, PFOA, PFBS, PFNA, perfluoroheptanoic acid [PFHpA], and PFHxS). In Oregon, 65 public water systems were included in the UCMR3 evaluation. Public drinking water for the cities of Hermiston and Boardman were sampled in 2014 and 2015, and analytical results for the six PFAS sampled were non-detect (OHA 2022, USEPA 2017). USEPA published the Fifth Unregulated Contaminant Monitoring Rule (UCMR5) in 2021, which expanded the list to 29 PFAS (USEPA 2023). UCMR5 sampling will occur throughout the nation between January 2023 and December 2025 and may include water systems from the nearby cities of Hermiston and Boardman (USEPA 2023).

Joint Base Lewis-McChord (JBLM) conducted PFAS sampling of UMCD drinking water wells 4, 5, and 6 in October 2016, and samples were analyzed by USEPA Method 537. An unvalidated laboratory analytical report for three samples indicated the six reported PFAS were not detected above screening levels or the method detection limit of 2.0 ng/L (AECOM 2022, APHC 2016, DoD 2021). Two drinking water wells were sampled in August 2019, and samples were analyzed by USEPA Method 537 Version 1.1. An unvalidated laboratory analytical report for 4 water samples and 1 field duplicate indicated the 14 reported PFAS were not detected above screening levels or limits of quantitation ranging from 1.7 to 1.9 ng/L (AECOM 2022, DoD 2021).

In 2021, the Oregon Health Authority (OHA) conducted a PFAS drinking water monitoring project that included the analysis of 25 PFAS using USEPA Method 533. The sampled public water systems were chosen due to their proximity to a known or suspected PFAS use or contamination site. The drinking water samples from the select public water systems were analyzed by the Oregon Department of Environmental Quality (ODEQ). Twelve public water systems were sampled between Umatilla and Morrow Counties where UMCD is located. PFAS were not detected at any of the 12 public water systems. Of all the public water systems sampled as part of the 2021 PFAS drinking water monitoring project across the state, PFAS were only detected at five public water systems in western Oregon (OHA 2022).

In 2018, AECOM completed a PA for PFAS at RTC to assess potential PFAS release areas; RTC is a 7,500-acre property transferred to ORARNG and used for readiness training. Three areas of interest (AOIs) were identified on ORARNG property. The RTC 2018 PA identified AFFF storage and potential releases from the Fire Station and two fire training areas (FTAs) (FTA-01 and Burn Pit) (AECOM 2020). The WWTP was added as a third AOI during the SI Quality Assurance Project Plan; SI sampling was recommended for these sites (AECOM 2022). Because a PA was conducted at RTC and an SI is ongoing, RTC was excluded from evaluation in this PA. A 1,750-acre ADA area is within the RTC property. This area was used for demilitarizing conventional munitions and burning defective or expired propellants. Although the ADA is part of RTC property, ORARNG PA did not include the ADA because the Army is responsible for environmental cleanup in the ADA; therefore, the ADA is included in the discussion below.

4.2 EVALUATED SITES

During the PA records reviews, interviews, aerial photographic analysis, and site reconnaissance, the PA team investigated available documentation and physical evidence for areas having a potential historical PFAS release. The sites evaluated include a fire station, an airfield, a landfill, burn areas, a vehicle maintenance shop, a paint shop, a pesticide facility, and a hazardous waste storage facility, as shown in Figure 4-1 and described in the following sections.

4.2.1 AFFF Use, Storage, and Disposal

The PA included a search for evidence of current or historical AFFF use, storage, or disposal at UMCD. Based on the records review, historical AFFF storage and use were identified. The areas identified as potential areas of AFFF storage and/or use at UMCD are discussed below.

A former fire station (Building T-104) was in the southwestern corner of UMCD, southeast of the 100 Area warehouses. The fire station operated from the late 1940s until the early 1980s (Dames & Moore 1990). Based on aerial photograph analysis, the building was demolished by 1994. According to a former Army personnel interview, fire trucks were parked outside on the fire station ramp during operation. Fire trucks were reportedly used during nozzle testing in the past. Fire trucks used during nozzle testing events were AFFF-capable fire trucks. The locations of the nozzle testing areas are unknown (AECOM 2022); a former Fire Chief indicated that AFFF was historically used at UMCD for fire training exercises.

A former airfield is on the southeastern portion of UMCD. The airstrip, parking lot, and plane parking lot are visible on a 1963 facility drawing (U.S. Army 1963). The airfield was depicted on U.S. Air Force Operational Navigation Charts (1964 and 1966) and was described as having a 3,000-foot east/west runway. The airfield is visible on a 1970 aerial photograph, which depicted the field as having an asphalt runway with a small ramp and a single small building on the southern side (Freeman 2022). In addition, an airplane hangar was at the airfield from the mid-1960s until the mid-1980s (Dames & Moore 1990). Hangars typically have fire suppression systems or other types of mobile fire extinguishers to aid in emergency response activities on or near the flightline, which often include the use or storage of AFFF. A 1991 topographic map and a 1994 aerial photograph depicted the single east/west runway. A roadway led from the end of the runway to the south and another road led away from the middle of the runway toward the ammunition bunkers to the north. The airfield was listed as closed on the 1998 World Aeronautical Chart (Freeman 2022).

The 1,750-acre ADA area, in the northwestern portion of UMCD, was operational from 1945 to 1992 (Earth Technology Corporation 1994). It consists of 20 sites that include areas that were used to dispose of ordnance by burning, detonation, dumping, or burial (USACE 2013). A Record of Decision (ROD) was prepared in June 1994 for the ADA. Due to soil contamination, several sites within the ADA (Sites 15, 17, 19, 31, and 32) were identified for soil remediation. The ROD selected the remedial alternative of soil excavation and treatment through a process of solidifying the soil and stabilization. In addition, munitions and explosives of concern (MEC) were to be removed in support of the soil remediation project. Excavated soils were treated and disposed of in the Active Landfill at UMCD until the landfill was closed in 2011. In June 2002, an Explanation of Significant Difference was approved to revise the remedy, which allowed for disposal in an off-post landfill. Of the five sites, Sites 19 (A-F) and 32 were included in the 1985 permit application for open burning/open detonation (OB/OD), suggesting the other sites were no longer being used for OB/OD. In 1995, the sites were removed from the RCRA application and were to be managed under CERCLA.

Wildland fires occur regularly at UMCD. Most of these fires originated from lightning strikes or at the railroad tracks or roadsides and were responded to by the UMCD Fire Department (ORARNG 2018). In August 2009, significant areas of grass and shrubland in the ADA Area Site 19 were burned after a lightning strike fire (AMEC 2012). An ORARNG training activity resulted in a large brush fire in May 2016, which extended outside the RTC boundary. Several local area fire departments, including ORARNG personnel, responded to the brush fire. Water and Class A foam were reportedly used to suppress this brush fire (AECOM 2020).

4.2.2 Metal Plating Operations

No current or historical metal plating operations were identified at UMCD.

4.2.3 Landfills

A state-permitted landfill, originally referred to as the Active Landfill but is now closed, covered 17.49 acres in the northeastern portion of UMCD north of D-Block. The landfill was in operation from 1968 until 1997, and the permit closed in 2011. The disposal area consisted of a depression approximately 50 feet deep, which was a former gravel pit. Materials disposed of included garbage, demolition debris, non-friable asbestos (such as brake shoes), dried sludge from the sewage treatment plant, ash from the Deactivation Furnace, and sludges that contained explosive residual (U.S. Army 1993, USACE 2013). Empty pesticide containers also were reportedly disposed of in the landfill (Dames & Moore 1990).

4.2.4 Other Potential Sources of PFAS

In addition to AFFF-related PFAS sources, other potential sources of PFAS may be associated with the use of some types of pesticides, car washes, engine lubricants, paint shops, laundry or waterproofing facilities, and photographic processing facilities. Document research, site visit, and interviews resulted in identification of other potential PFAS sources at UMCD. The following paragraphs describe potential non-AFFF PFAS sources at UMCD; the locations are noted on Figure 4-1:

- **Vehicle Maintenance** – Building 130 was an 18,120-ft² warehouse built in 1942. The building was originally used for vehicle maintenance and storage of brass for the Deactivation Furnace. The facility was later used to conduct maintenance on vehicles prior to shipment off-post. Maintenance activities included the removal of oil that was collected and disposed of off-post (Dames & Moore 1990). Building 130 was demolished in 2015.
- **Paint Shop** – Building 131 was an 18,120-ft² warehouse built in 1942. The building was originally used for paint spray operations. A paint sludge discharge area was west of the building (Dames & Moore 1990). Building 131 was demolished in 2015.
- **Pesticide Storage** – Building 202 was an 86,400-ft² warehouse built in 1942. Building 202 was used as a general purpose warehouse for equipment storage. Building 202 was used to store pesticides in the 1970s through the early 1980s (Dames & Moore 1990). Although a complete list of pesticides used, stored, or disposed of at UMCD is not available, the use of fluorinated pesticides was infrequent until about the mid-2000s (Alexandrino et al. 2022). Given the operational period of UMCD, the likelihood of PFAS impacts due to pesticide use, storage, or disposal is assumed to be low.
- **Hazardous Waste Storage** – Building 203 was a large structure of wood-frame construction with a metal roof and siding and a concrete floor. The RCRA permitted hazardous waste facility was a 3,600-ft² fenced area in the northeastern corner of Building 203. A 6-inch-high concrete berm around the storage area would contain any spills. Hazardous wastes such as baghouse dust, battery acid, and used oil were stored in 55-gallon drums. In addition, polychlorinated biphenyl (PCB) transformers, Agent Orange, and pesticides were stored from the 1970s through the early 1980s. In the 1990s, waste ash from the Deactivation Furnace and waste film developing chemicals were stored (Dames & Moore 1990, USACE 2013).

During the document research and site visit, no additional potential PFAS-containing material use, storage, or disposal activities were identified.

4.3 POST TRANSFER AND POTENTIAL OFF-POST PFAS SOURCES

The search to identify potential off-post PFAS sources (i.e., not related to operations at UMCD), although not exhaustive, included review of significant potential contributors (i.e., airports, landfills, WWTPs). In addition, EDR conducted a search of state and Federal environmental databases for the UMCD property and adjacent properties (EDR 2021). Figure 4-2 shows the fire stations, helipads, and WWTP within a

5-mile radius of UMCD. Most of the surrounding area is used for agricultural purposes. The Umatilla National Wildlife Refuge is approximately 3 miles to the northwest, as shown in Figure 4-2.

The three AOIs identified by ORARNG are potential adjacent PFAS sources. The AOIs include:

- AOI 1: Two FTAs (FTA-01 and Burn Pit) – AFFF may have been used at the former FTAs; however, it could not be confirmed during the ORARNG PFAS PA whether the foam used during fire training events was AFFF or Class A foam (AECOM 2020).
- AOI 2: Fire Station – Five-gallon AFFF buckets and AFFF-capable fire trucks were located at the Fire Station. The Fire Station also was identified as a potential post-transfer PFAS source. During the ORARNG PFAS PA, which was conducted after the 2017 transfer of property, a half-filled 5-gallon bucket of concentrated Angus Tridol AFFF was observed within the Fire Station. Based on the presence of AFFF, post-transfer PFAS releases may have occurred at the Fire Station on ORARNG property (AECOM 2020).
- AOI 3: WWTP – Drains within the Fire Station are directed to the WWTP. Treated wastewater is discharged to the tile field, where it dissipates by evapotranspiration and controlled seepage. In addition, the stormwater conveyance system that services the cantonment area discharges to an open ditch adjacent to the WWTP. Potential AFFF releases at the Fire Station could have been captured as domestic wastewater or stormwater and discharged to the tile field or to the open ditch (AECOM 2022).

5. SUMMARY OF PA RESULTS

The areas evaluated for potential PFAS use and/or storage at UMCD were further refined during the PA process and categorized as an AOPI or not retained. Areas not retained as AOPIs are discussed in Section 5.1. AOPIs are discussed in Section 5.2.

5.1 AREAS NOT RETAINED AS AOPIs

Based on analysis of information obtained during this PA, the areas described below were not retained as AOPIs. These areas were previously identified as potential PFAS sources (e.g., AFFF storage, car washes, automobile maintenance, paint shops, photographic processing, pesticide use or storage, WWTPs, landfills) at UMCD. However, PA research does not indicate that PFAS-containing material was used, stored, or disposed of at these areas. A brief site history and the rationale for eliminating the areas as AOPIs are presented in Table 5-1.

Table 5-1. Summary of Areas Not Retained as AOPIs at UMCD

Area Description	Dates of Operation	Relevant Site History	Rationale
Former Landfill	1968 to 1997	The 5-acre Former Landfill consisted of a depression approximately 50 feet deep, which was a former gravel pit. Materials disposed of include garbage, demolition debris, asbestos, dried sludge from the sewage treatment plant, ash from the Deactivation Furnace, sludges that contained explosive residual, and empty pesticide containers.	No evidence of PFAS waste disposal.
Vehicle Maintenance (Building 130)	1942 to 2015	The building was originally used for vehicle, locomotive, and other mechanical maintenance activities. The facility was later used to conduct maintenance on Jeep vehicles, including the removal of oil from the Jeeps that was collected and disposed of off-post. The building was demolished in 2015.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Paint Shop (Building 131)	1942 to 2015	The building was originally used for paint spray operations. A paint sludge discharge area was west of the building. The building was demolished in 2015.	No evidence that PFAS-containing materials were used, stored, or disposed of.
Pesticide Storage (Building 202)	1942 to 2019	Building 202 was used to store pesticides from the 1970s through the early 1980s. This building was demolished in 2019.	No evidence that PFAS-containing materials were used, stored, or disposed of. Given the operational period of UMCD, the likelihood of PFAS impacts due to pesticide use, storage, or disposal is assumed to be low.

Table 5-1. Summary of Areas Not Retained as AOPIs at UMCD (Continued)

Area Description	Dates of Operation	Relevant Site History	Rationale
Hazardous Waste Storage Facility (Building 203)	1942 to 2018	Building 203 was used for RCRA hazardous waste storage. Hazardous wastes, such as baghouse dust, battery acid, and oil, were stored in 55-gallon drums. PCB transformers, Agent Orange, and pesticides were stored. In the 1990s, waste ash from the Deactivation Furnace and waste film developing chemicals were stored. This building was removed from the RCRA permit in 2018 (ODEQ 2018).	No evidence that PFAS-containing materials were used, stored, or disposed of.
Wildfires/Lightning Strike Fires	Ongoing	Several wildfires spanning thousands of acres have been documented. Many fires originated from railroad activities or lightning strikes. The UMCD Fire Department would respond to these fires with water or Class A foam that did not contain PFAS.	No evidence of AFFF use.

5.2 AOPIs

Based on analysis of information obtained during document research, personnel interviews, and/or site reconnaissance, three areas were categorized as AOPIs and are presented in Table 5-2 and Figure 5-1. Site research conducted for this PA indicates that PFAS-containing material use, storage, or disposal is potentially suspected at these areas.

Table 5-2. Summary of AOPIs at UMCD

Area Description	Dates of Operation	Relevant Site History	Rationale
Former Fire Station (Building T-104)	Late 1940s to Early 1980s	According to a former Army personnel interview, fire trucks were parked outside on the fire station ramp during Fire Station operation from the late 1940s to the early 1980s. Fire trucks were reportedly used during nozzle testing in the past.	Former fire station with suspected AFFF use or storage based on dates of operation.
Former Airfield	Early 1960s to 1998	The Former Airfield consisted of a 3,000-foot east/west runway, small ramp, and a small building on the southern side. According to Dames & Moore (1990), an airplane hangar was at the airfield from the mid-1960s until the mid-1980s. The hangar was demolished by 1994.	Potential storage of AFFF in the fire suppression system of the hangar.
ADA Area Site 19	1945 to 1992	The ADA was used to dispose of ordnance by burning, detonation, dumping, or burial.	The frequency of use and size of the ADA Area Site 19 suggests that the UMCD fire department may have used foam on-post for fire suppression.

5.2.1 Preliminary CSM

A preliminary CSM was prepared for each of the installation's AOPIs in accordance with the *USACE Engineer Manual on Conceptual Site Models* (USACE 2012) and USEPA guidance. The preliminary CSMs identified potential human receptors and chemical exposure pathways based on current and/or reasonably anticipated future land uses. The preliminary CSMs identified soil, groundwater, surface water, and sediment pathways as potentially complete.

Based on the documented or potential historical use, storage, or disposal of PFAS-containing materials at UMCD, affected media are likely to consist of soil, groundwater, surface water, and sediment. Release and transport mechanisms include dissolution/desorption from soil to groundwater, runoff/dissolution/adsorption with surface water or stormwater, and recharge to groundwater from surface water. While other potential exposure media (i.e., soil and sediment) besides drinking water sources (i.e., groundwater and/or surface water) may be impacted by PFAS, direct ingestion via drinking water is the most likely exposure route, and thus the Army's primary concern for human exposure. Therefore, the focus of the Army's PA program is on potential human exposures via drinking water ingestion. The potential for human exposures to PFAS through non-drinking water pathways has not yet been established and may be evaluated in the future if it is determined that those pathways warrant further consideration. The CSMs presented in this report focus on drinking water pathways via groundwater and surface water that are known to be used as a source of potable water.

UMCD obtains drinking water via four on-post wells (wells 4, 5, 6, and 7), as described in Section 2.8. A groundwater exposure pathway is considered potentially complete where constituents of interest (COIs) could migrate from the AOPI source area to groundwater that is used for drinking water. Otherwise, the groundwater exposure pathway is considered incomplete. The following parameters are used to determine if an AOPI source area had a potentially complete groundwater exposure pathway:

- AOPIs upgradient or in the vicinity of drinking water sources and that have the potential to influence groundwater associated with these potable sources are considered to have a potentially complete groundwater exposure pathway for on-post drinking water receptors.
- AOPIs outside the vicinity or downgradient from on-post potable sources (drinking water wells) are considered to have an incomplete groundwater exposure pathway for on-post receptors.

The soil exposure pathway is considered potentially complete where COIs could be present in soil. A surface water exposure pathway is considered potentially complete where COIs could be present in a surface water body (e.g., a reservoir or large river) that serves as a potable water source. No on-post surface water features are used as a drinking water source, nor is surface water migration a potential exposure medium for off-post drinking water receptors. No surface water bodies are located at UMCD. The closest surface water sources are the Umatilla River and the Columbia River, which are approximately 2 and 3 miles from the installation, respectively. Figure 5-1 presents the locations of the AOPIs. AOPI-specific drinking water pathway CSM summaries are provided in Tables 5-2 through 5-4.

5.2.2 Former Fire Station (Building T-104) – AOPI Rationale and CSM

The Former Fire Station at Building T-104 is on BRAC property and was identified as an AOPI following records review, interviews, aerial photograph review, and site reconnaissance. The fire station operated from the late 1940s until the early 1980s (Dames & Moore 1990). Based on aerial photograph analysis, the building was demolished by 1994. According to a former Army personnel interview, fire trucks were parked outside on the fire station ramp during operation. Fire trucks were reportedly used during nozzle testing in the past. Fire trucks used during nozzle testing events were AFFF-capable fire trucks. The locations of the nozzle testing areas are unknown (AECOM 2022). Based on the operational dates of the Former Fire Station and information obtained from the former Fire Chief, the potential exists that AFFF was historically used, stored, or released.

The PA team conducted a visual inspection of the Former Fire Station during the site visit. The area is an elevated concrete footprint of the former building surrounded by a grassy field and an asphalt parking lot; no structures are present. Stagnant surface water from recent rainfall was observed on the northern side of the building footprint. A floor drain with stagnant surface water was observed on the concrete building footprint toward the southern end of the building.

Table 5-2. AOPI CSM Information Profile – Former Fire Station (Building T-104)

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	Concrete footprint surrounded by grassy field and asphalt parking lot.
	Latitude, longitude	45.818242, -119.48702
	Size	0.37 acres
Land Use	Current/future land use	Commercial/Industrial
CSM Profile	Source media	Soil
	Migration routes/release mechanisms	The primary release mechanism is the potential release of AFFF through floor drains, the septic system, asphalt cracks, or to adjacent surface soils. Secondary contaminant migration and fate and transport considerations include downward migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation.
	Exposure pathways, media, and human receptors	Soil and groundwater are considered potentially complete exposure pathways at UMCD. Potable water wells are used for potable consumption on-post at UMCD; therefore, the use of groundwater at UMCD is a potentially complete exposure pathway. Drinking water for UMCD is obtained from four on-post potable wells. Groundwater data in this area suggest that groundwater flow would be to the north toward the Columbia River, which is also the closest surface water body downgradient from the site. On-post human receptors at the Former Fire Station would be the industrial/commercial site worker.

5.2.3 Former Airfield – AOPI Rationale and CSM

The Former Airfield is on Army property and was identified as an AOPI following records review, interviews, aerial photograph review, and site reconnaissance. The Former Airfield consisted of an air strip runway, parking lot, and plane parking since the early 1960s. An airplane hangar was at the airfield from the mid-1960s until the mid-1980s. The Former Airfield was listed as closed by 1998.

Hangars typically have fire suppression systems or other types of mobile fire extinguishers to aid in emergency response activities on or near the flightline, which often include the use or storage of AFFF. Based on the operational dates of the Former Airfield and the presence of an airplane hangar, the potential exists that AFFF was historically used, stored, or released at the Former Airfield.

The PA team conducted a visual inspection of the Former Airfield during the site visit. The runway and access roads are unmaintained but still accessible by vehicle. An asphalt parking lot is still present near the footprint of the former airplane hangar. No surface water or drainage was observed at the airfield.

Table 5-3. AOPI CSM Information Profile – Former Airfield

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	Unmaintained runway and asphalt parking lot surrounded by tall grass and vegetation.
	Latitude, longitude	45.802998, -119.395584
	Size	83 acres

Table 5-3. AOPI CSM Information Profile – Former Airfield (Continued)

Profile Type	Information Needs	Preliminary Assessment Findings
Land Use	Current/future land use	Commercial/Industrial
CSM Profile	Source media	Soil
	Migration routes/release mechanisms	The primary release mechanism is the potential release of AFFF through asphalt cracks or to adjacent surface soils. Secondary contaminant migration and fate and transport considerations include downward contaminant migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation.
	Exposure pathways, media, and human receptors	Soil and groundwater are considered potentially complete exposure pathways at UMCD. Potable water wells are used for potable consumption on-post at UMCD; therefore, the use of groundwater at UMCD is a potentially complete exposure pathway. Drinking water for UMCD is obtained from four on-post potable wells at the installation. The nearest surface water body is the Umatilla River, which is east of the airfield. On-post human receptors at the Former Airfield would be the recreational visitor.

5.2.4 ADA Area Site 19 – AOPI Rationale and CSM

The ADA Area Site 19 is on Army property and was identified as an AOPI following records review, interviews, aerial photograph review, and site reconnaissance. Sites 19 and 32 were RCRA permitted OB/OD sites identified in the 1,750-acre ADA Area, in the northwestern portion of UMCD, that was operational from 1945 to 1995 (Earth Technology Corporation 1994). The ADA Area was used to dispose of ordnance by burning, detonation, dumping, or burial (USACE 2013). Located within the ADA area, a 50-acre area referred to as Site 19 included approximately 10 open burning trenches/pads and an adjoining burn field. Burning of sludges containing explosive constituents was conducted in the northernmost trenches of Site 19. The frequency of use and size of the ADA Area Site 19 suggests that the UMCD Fire Department may have used foam on-post for fire suppression.

To address contaminated soils and associated MEC, remedial activities for several sites within the ADA Area (Sites 15, 17, 19, 31, and 32) began in 1996 and removed 1 foot of surface soil from Site 19 with some isolated areas required deeper soil removals up to 10 feet bgs. Initially, excavated soils were treated and then disposed of in the Active Landfill at UMCD. Beginning in 2002, the excavated soils were disposed of in an off-post landfill.

The PA team conducted a visual inspection of the ADA Area Site 19 during the site visit. The entire ADA Area is surrounded by a chain-link fenced with controlled entry. ORARNG has ranges on the southern portion of the ADA. MEC remediation is underway involving the sifting of surface soils and identifying single point anomalies. The ground surface is mostly barren or covered with grass due to current remediation activities. No surface water or drainage was observed at the AOPI.

Table 5-4. AOPI CSM Information Profile – ADA Area Site 19

Profile Type	Information Needs	Preliminary Assessment Findings
Site Profile	AOPI site structures/description	Open and undeveloped and barren area covered with grass.
	Latitude, longitude	45.856977, -119.494675
	Size	50 acres

Table 5-4. AOPICSM Information Profile – ADA Area Site 19 (Continued)

Profile Type	Information Needs	Preliminary Assessment Findings
Land Use	Current/future land use	Commercial/Industrial
CSM Profile	Source media	Soil
	Migration routes/release mechanisms	The primary release mechanism is the potential release of AFFF to surface soils. Secondary contaminant migration and fate and transport considerations include downward migration from surface soil to deeper subsurface soil and groundwater through leaching and percolation.
	Exposure pathways, media, and human receptors	Soil and groundwater are considered potentially complete exposure pathways at UMCD. Potable water wells are used for potable consumption on-post at UMCD; therefore, the use of groundwater at UMCD is a potentially complete exposure pathway. Drinking water for UMCD is obtained from four on-post potable wells at the installation. The nearest surface water body is the Columbia River to the north. On-post human receptors at the ADA Area Site 19 are restricted to on-post workers.

5.3 DATA LIMITATIONS

The data limitations relevant to the development of this PA for PFAS at UMCD are discussed below.

A comprehensive well survey was not completed as part of this PA; therefore, the information reviewed regarding off-post wells is limited to the desktop survey completed. Off-post water supply well information was identified via the online OWRD database (OWRD 2022) and the EDR well search report (Appendix F).

The searches for ecological receptors and off-post PFAS sources were not exhaustive and were limited to readily identifiable and available information evaluated during the relevant documents research and site reconnaissance.

Records reviewed during the PA process were limited in information regarding AFFF use; procurement records of AFFF and documentation of AFFF used during firefighter training activities were not available. Anecdotal accounts of AFFF use (and thus likely PFAS release) were limited to available Army personnel, whose knowledge of AFFF use may have been restricted by their time spent at UMCD or previous roles held that limited their relevant knowledge of potential AFFF (or other PFAS) use. In the absence of AFFF documentation, the PA was conducted through observation of operational periods, site usage, aerial photographs, records review, anecdotal evidence, and personnel interviews to evaluate the likelihood of a release.

Finally, the records review was limited to available Administrative Record, online resources, waste and chemical inventories, historical drawings, blueprints, and as-built drawings. Therefore, conclusions and recommendations presented in this report are based on available information, professional judgment, and industry best practices. Multiple sites were eliminated based on the lack of evidence of PFAS-containing chemical use, AFFF use and storage, and dates of operation. The possibility exists that PFAS-containing chemicals were used at a variety of sites (e.g., photographic processing facilities, wash racks, maintenance shops) and/or AFFF was stored on-post at chemical storage facilities, which were not identified as AOPICs based on lack of evidence and historical information.

6. CONCLUSIONS

This PA was conducted in accordance with DoD, Army, and USEPA guidance documents. Programmatically, the Army has focused its PFAS PA efforts on identifying locations where a potential for a release of PFAS exists (i.e., those locations where PFAS-containing materials were used, stored, or disposed of). Locations on Army installations with the greatest likelihood of releases of PFAS were evaluated as part of this PA, including FTAs, AFFF storage locations, aircraft crash sites, fuel farms, and sites associated with aviation assets. However, other potential sources of PFAS at the installation were considered and have been documented in this PA. A combination of document review, Internet searches, interviews with installation personnel, and an installation site visit were used to identify specific areas of suspected PFAS use and releases at UMCD.

The entire former UMCD installation was assessed except for the RTC property where ORARNG previously performed a PFAS PA. Nine preliminary areas were identified and evaluated for potential use, storage, and/or disposal of PFAS-containing materials. These areas were further refined during the PA process and then identified either as an area not retained for further investigation or as an AOPI. In accordance with the established process for the PA, three of the preliminary areas have been identified as AOPIs.

The AOPIs identified during this PA at UMCD are listed below:

- A former fire station (Building T-104)
- A former airfield with a former airplane hangar
- ADA Area Site 19.

A site-specific CSM was developed for each AOPI based on an assessment of existing records, personnel interviews, and site reconnaissance trips. The CSMs developed for this PA identified the AOPIs as impacting or having the potential to impact on-post drinking water receptors due to the four drinking water wells on-post.

Given the findings of this PA, the AOPIs presented warrant further evaluation in an SI (40 CFR §300.420(c)).

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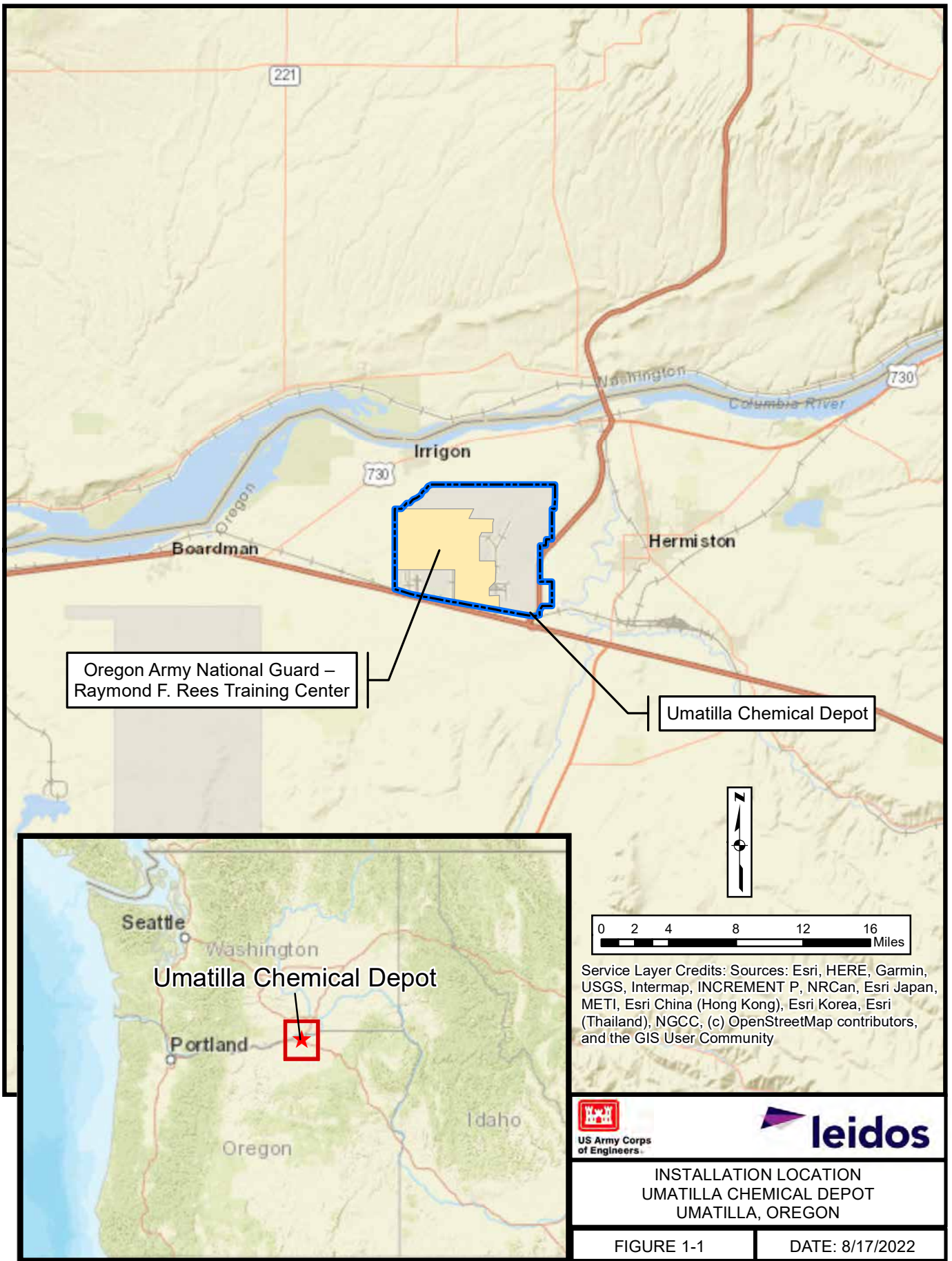
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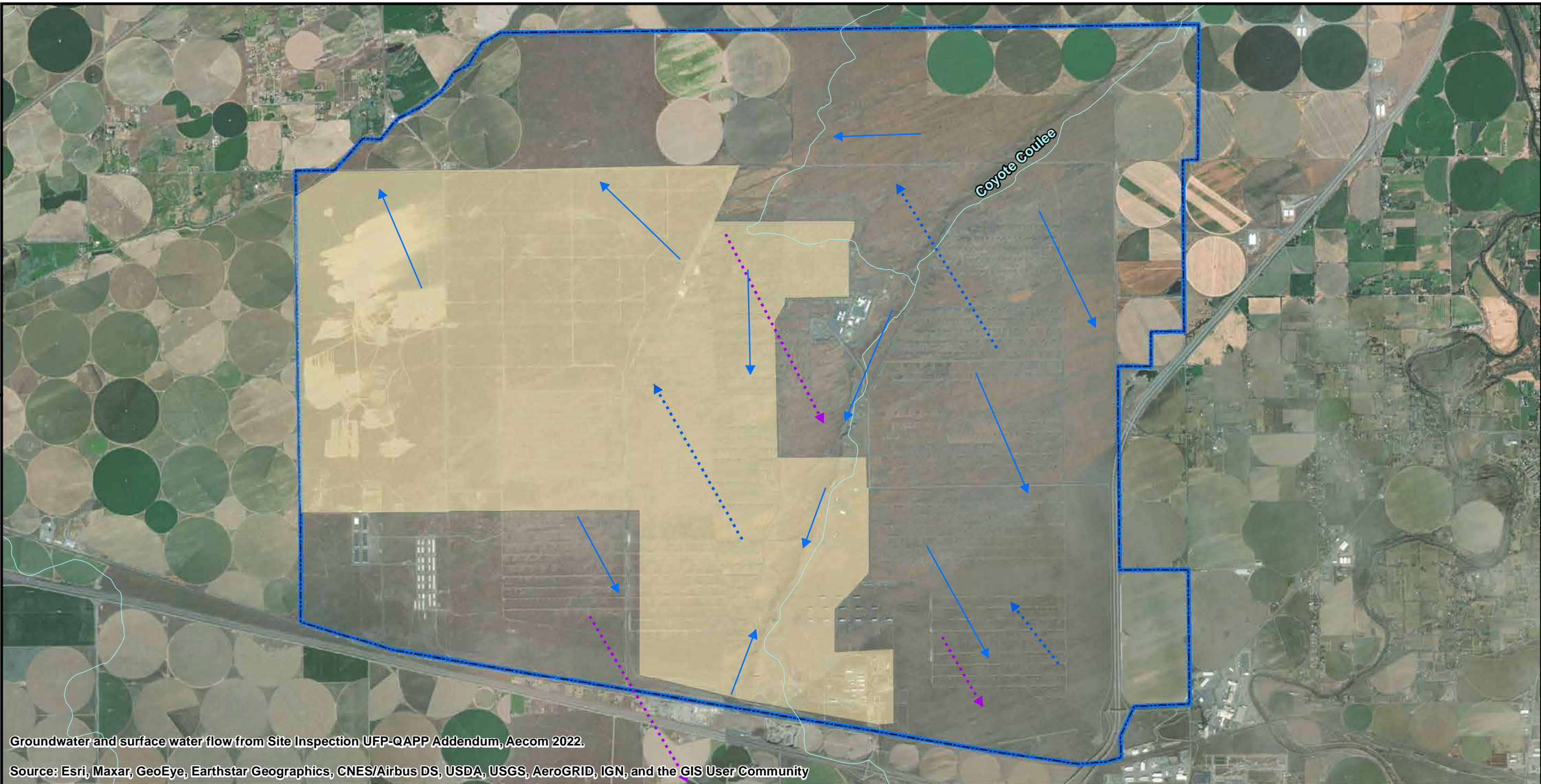
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FIGURES

C:\Users\woodley\Documents\Work\IBRAC PFAS\Umatilla\Figure 1-1 Umatilla Installation Location.mxd









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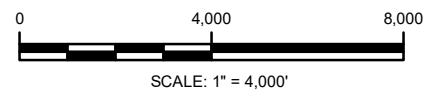


Groundwater and surface water flow from Site Inspection UFP-QAPP Addendum, Aecom 2022.

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Legend

-  Installation Boundary
-  Oregon Army National Guard – Raymond F. Rees Training Center
-  Streams
-  Surface Water Flow Direction
-  Summer/Fall Inferred Groundwater Flow
-  Winter/Spring Inferred Groundwater Flow

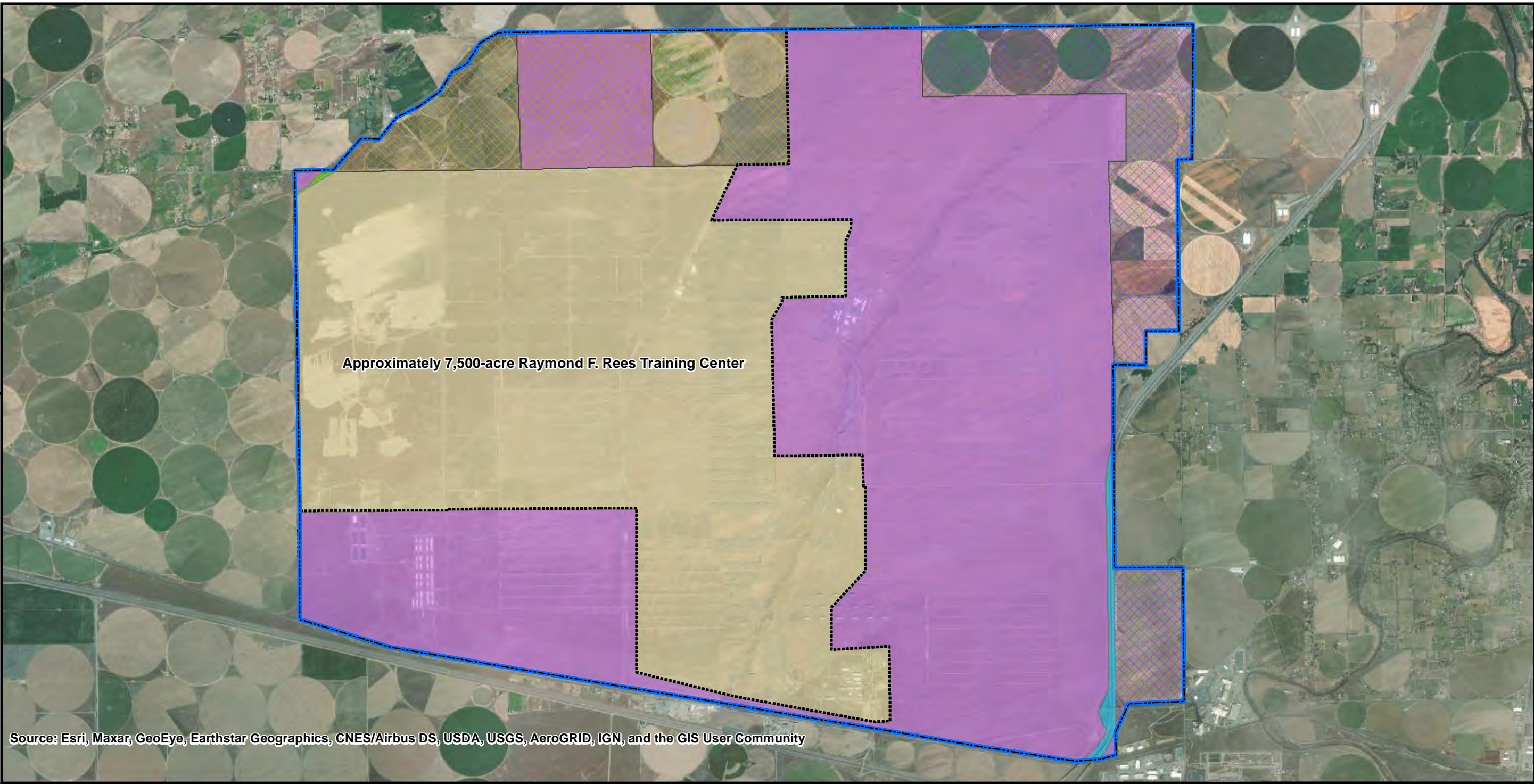


OR STATE PLANE NORTH
(NAD83)



SITE FEATURES UMATILLA CHEMICAL DEPOT UMATILLA, OREGON	
FIGURE 2-1	DATE: 8/17/2022

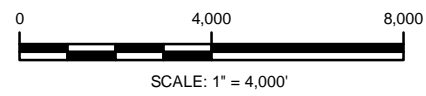
C:\Users\woodley\Documents\Work\BRAC PFAS\Umatilla\Figure 2-2 Umatilla_Transferred_Property.mxd



Approximately 7,500-acre Raymond F. Rees Training Center

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

- Legend**
- Installation Boundary
 - Project Boundary
 - CDA Parcel 1 - Pending transfer
 - CDA Parcel 2 - Pending transfer
 - Raymond F. Rees Training Center - Transferred
 - Pending Disposal to ODOT
 - Safety Easement to Dispose of
 - Safety Easement to Transfer
 - Safety Easements to be Reserved



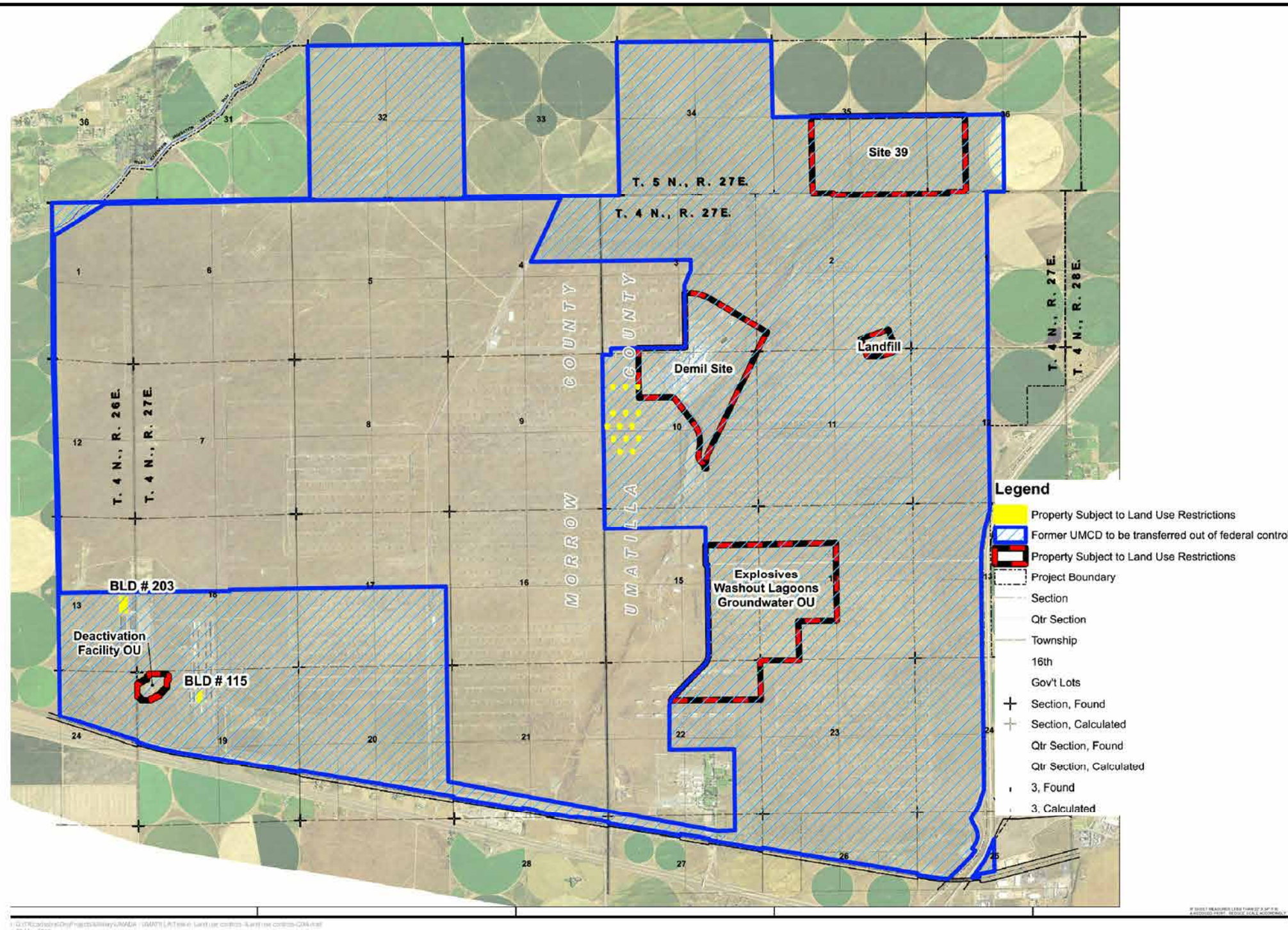
OR STATE PLANE NORTH
(NAD83)



PARCEL TRANSFER MAP
UMATILLA CHEMICAL DEPOT
UMATILLA, OREGON

FIGURE 2-2 DATE: 7/20/2022

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Source: 2022 Easement and Equitable Servitude between the United States of America, acting by and through the Director of Real Estate, Headquarters, U.S. Army Corps of Engineers ("Grantor"), and the State of Oregon ("Grantee"), acting by and through the Oregon Department of Environmental Quality.

OR STATE PLANE NORTH
(NAD83)

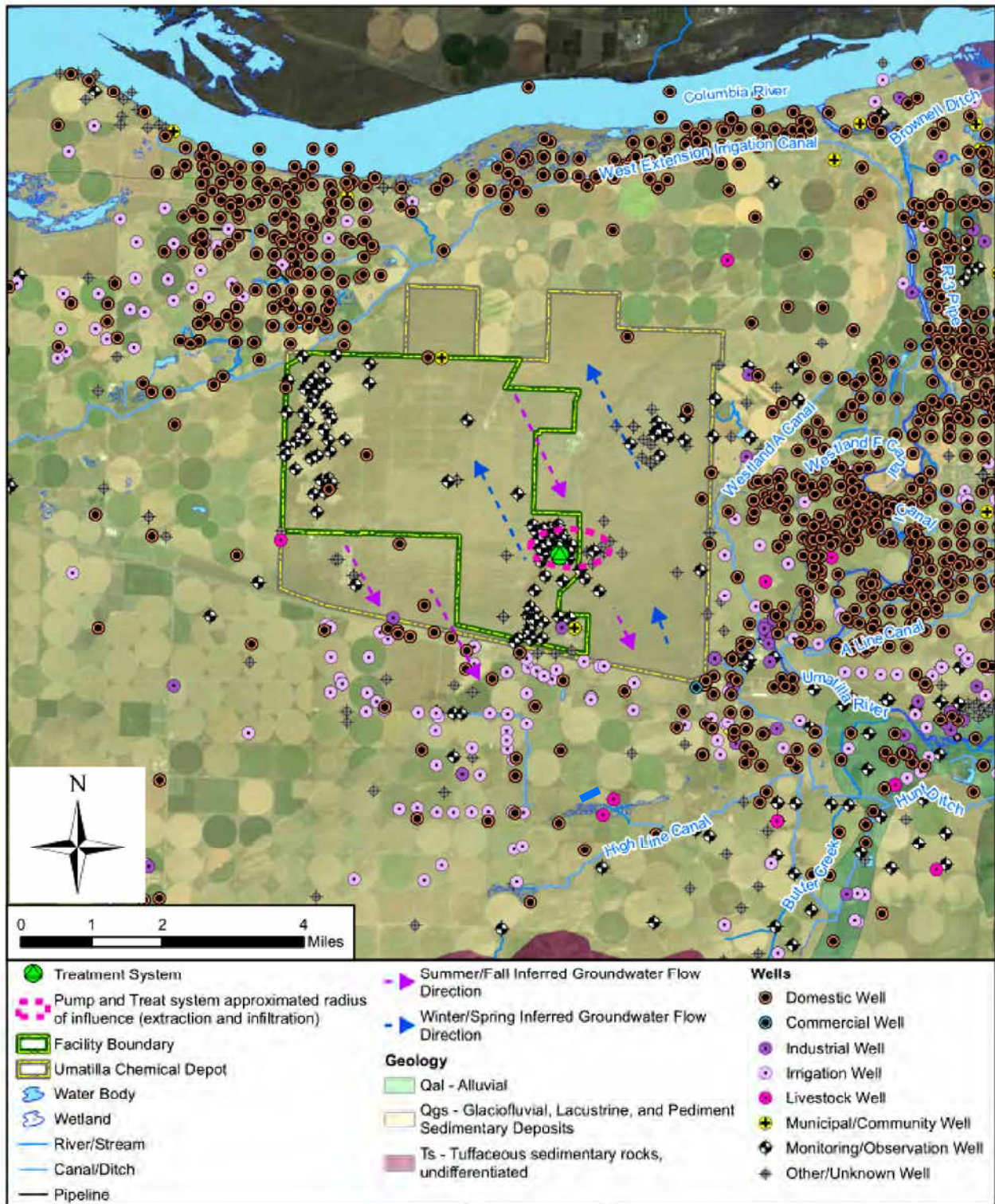


LAND USE RESTRICTIONS
UMATILLA CHEMICAL DEPOT
UMATILLA, OREGON

FIGURE 2-3

DATE: 8/16/2022

C:\Users\woodley\Documents\Work\BRAC PFAS\Umatilla\Figure 2-4 Wells.mxd



Source: Site Inspection UFP-QAPP Addendum, Aecom 2022.



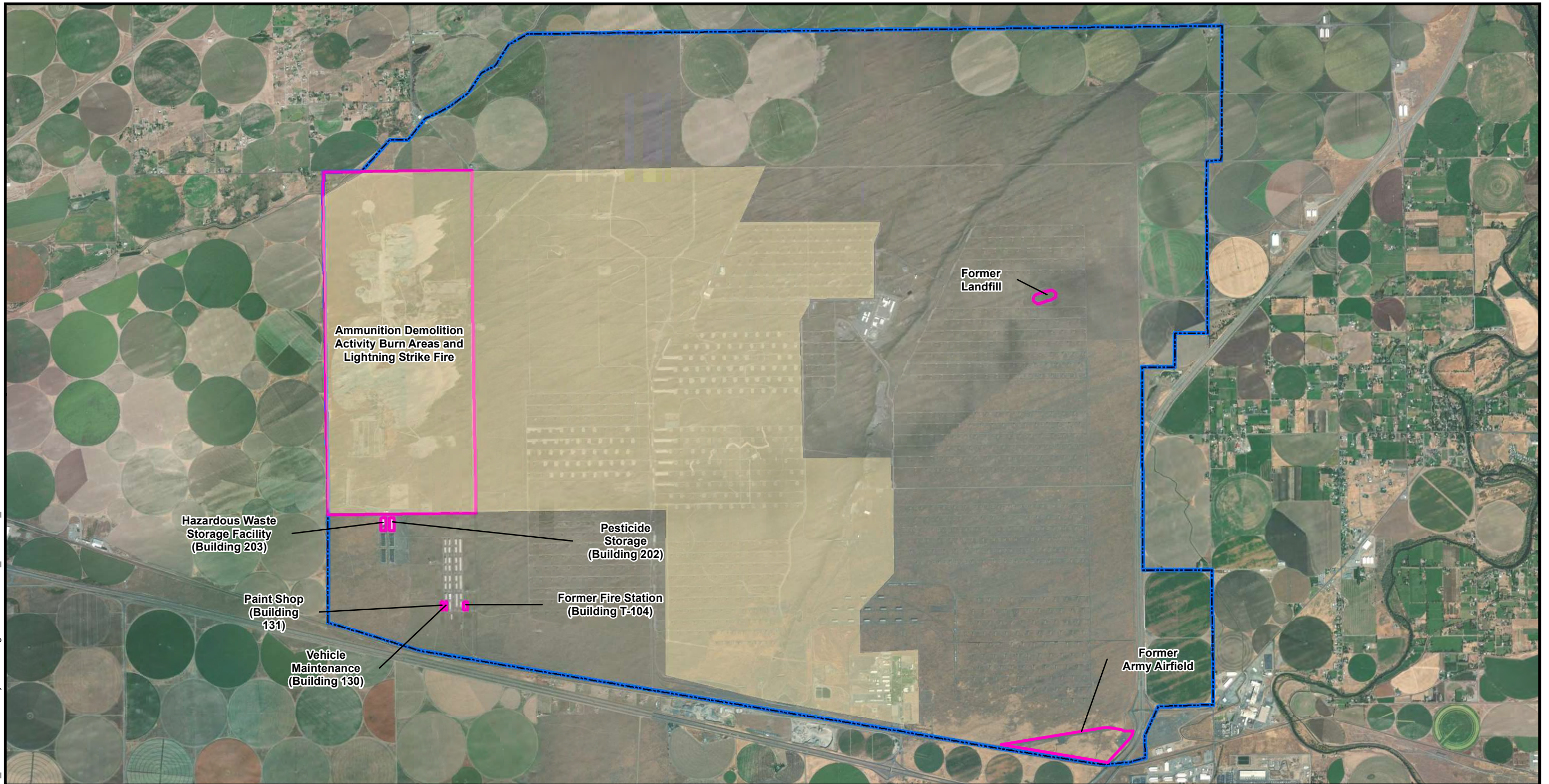
POTABLE WELLS WITHIN A 4-MILE RADIUS

UMATILLA CHEMICAL DEPOT
UMATILLA, OREGON

FIGURE: 2-4

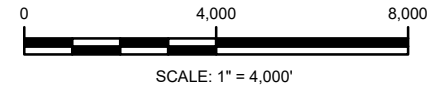
DATE: 8/17/2022

C:\Data\Civil_Transfer\GIS\BRAC_PFA\Umatilla\Projects\PA\Figure 4-1 Umatilla_Evaluated_Sites.mxd



- Legend**
- Installation Boundary
 - Evaluated Sites
 - Raymond F. Rees Training Center

- NOTES:**
1. Ongoing wildfires/lightning strike fires spanning thousands of acres were evaluated but are not depicted on this map.
 2. Oregon ARNG is conducting a PA/SI and therefore the Raymond F. Rees Training Center is excluded from evaluation in this PA (with the exception of the Ammunition Demolition Activity Area which is still being used by the Army and was not included in the Oregon ARNG PA/SI).
 3. Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

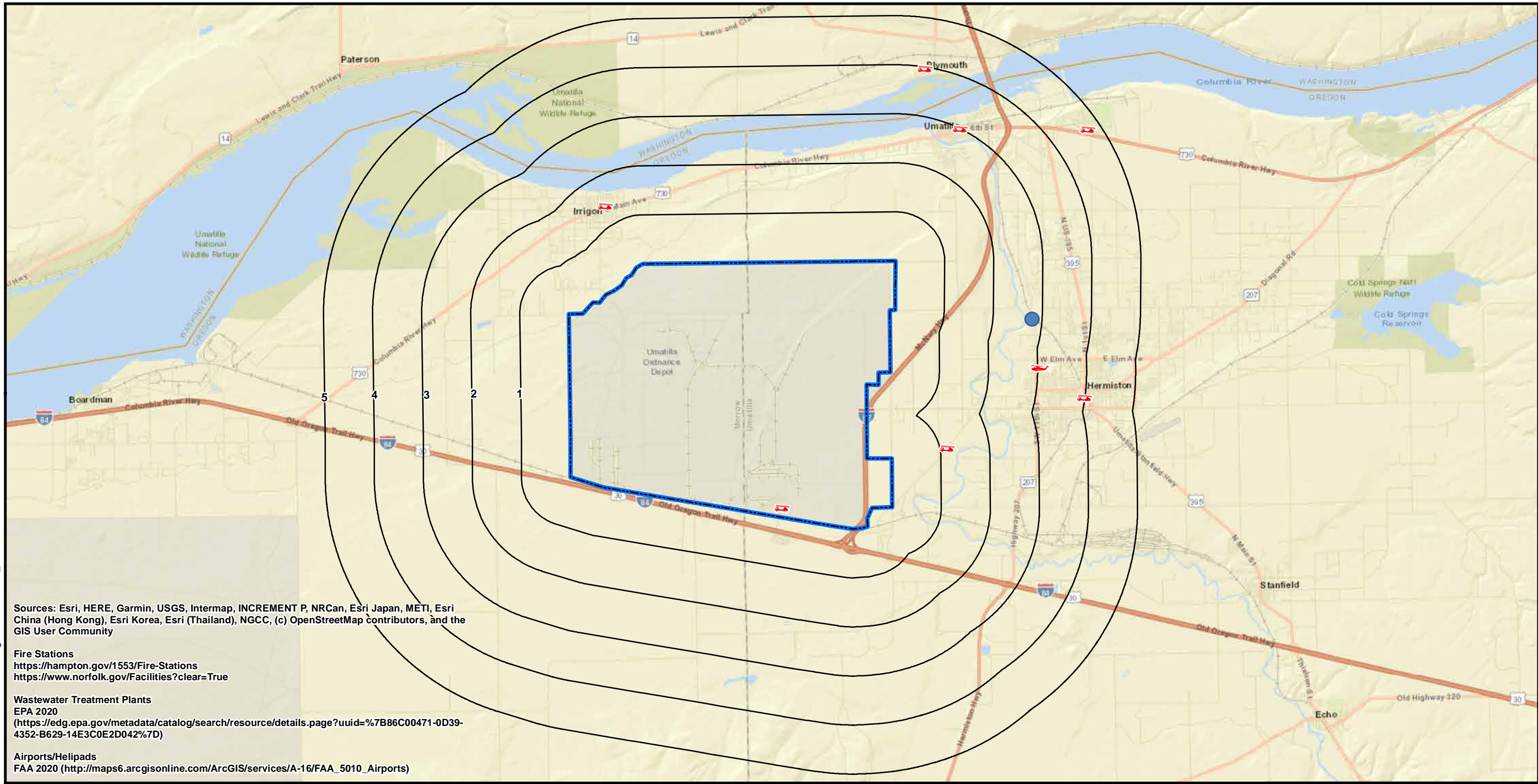


OR STATE PLANE NORTH
(NAD83)



EVALUATED SITES
UMATILLA CHEMICAL DEPOT
UMATILLA, OREGON

FIGURE 4-1	DATE: 12/7/2023
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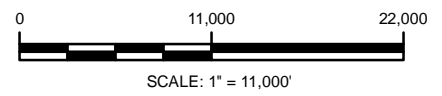
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap Contributors, and the GIS User Community

Fire Stations
<https://hampton.gov/1553/Fire-Stations>
<https://www.norfolk.gov/Facilities?clear=True>

Wastewater Treatment Plants
 EPA 2020
<https://edg.epa.gov/metadata/catalog/search/resource/details.page?uuid=%7B7B86C00471-0D39-4352-B629-14E3C0E2D042%7D>

Airports/Helipads
 FAA 2020 (http://maps6.arcgisonline.com/ArcGIS/services/A-16/FAA_5010_Airports)

- Legend**
- Installation Boundary
 - Wastewater Treatment Plants
 - Fire Station
 - Helipad

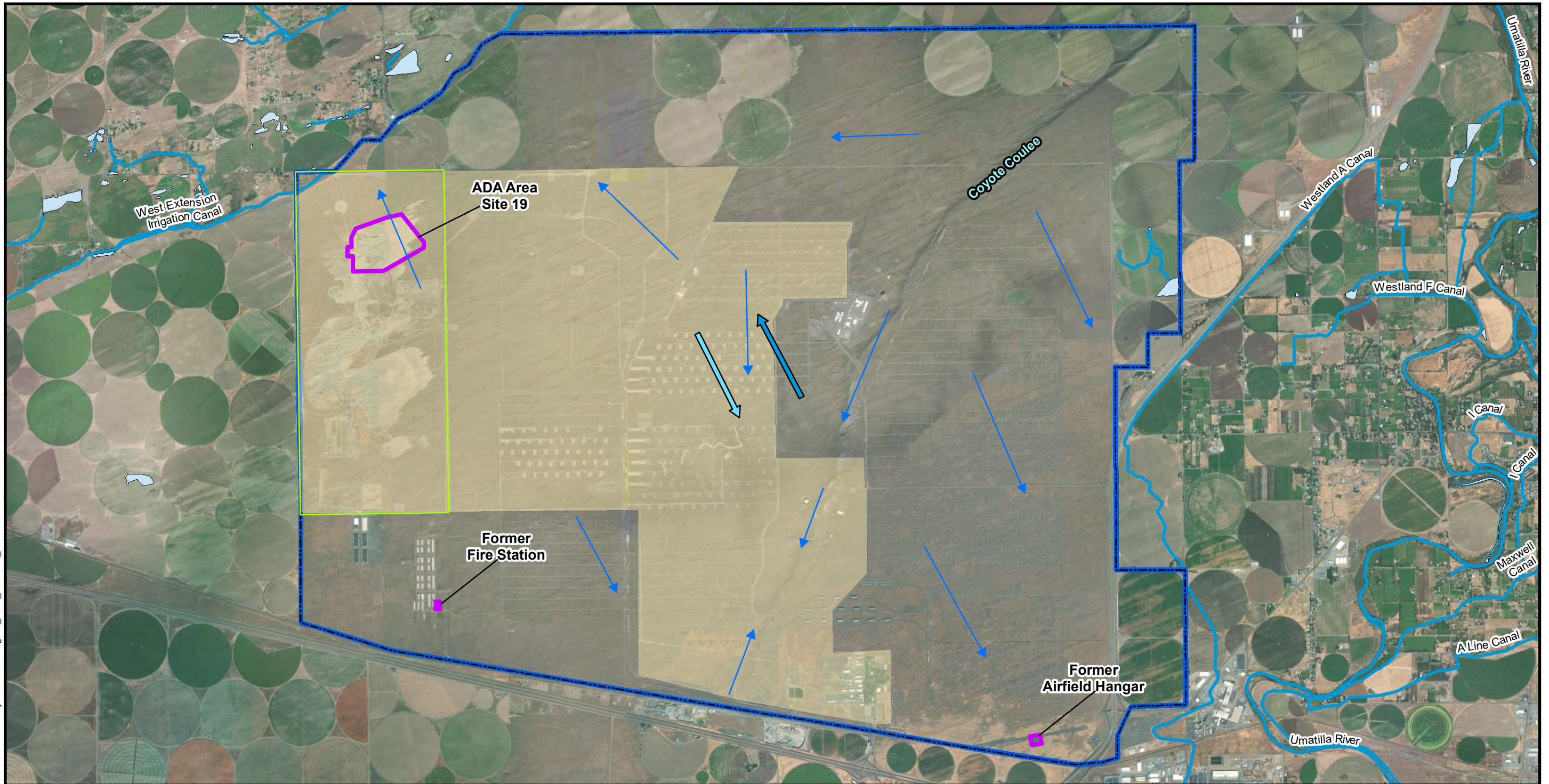


OR STATE PLANE NORTH
 (NAD83)

		POTENTIAL PFAS SOURCES WITHIN A 5-MILE RADIUS UMATILLA CHEMICAL DEPOT UMATILLA, OREGON	
		FIGURE 4-2	DATE: 8/17/2022

C:\Users\woodley\Documents\Work\BRAC PFAS\Umatilla\Figure 4-2 Umatilla_Offsite.mxd

PROJECT: IGIS_DATA\BRAC_PFA\Umatilla\Projects\QAPP\Figure_17-1_Umatilla_AOPI.mxd



<p>Legend</p> <ul style="list-style-type: none"> Installation Boundary Oregon ARNG – Raymond F. Rees Training Center Area of Potential Interest (AOPI) Ammunition Demolition Activity Area → Surface Water Flow Direction Water Bodies ← Stream/River/Canal ← Summer/Fall Inferred Groundwater Flow ← Winter/Spring Inferred Groundwater Flow 		<p>NOTES:</p> <ol style="list-style-type: none"> 1. Background Source: ESRI World Imagery (Vivid/Maxar, 4/2020). 2. USGS National Hydrography Dataset (NHD) 3. Groundwater and surface water flow from Site Inspection UFP-QAPP Addendum, Aecom 2022. 	<p>OR STATE PLANE NORTH (NAD83)</p>		
<p>AOPI MAP UMATILLA CHEMICAL DEPOT UMATILLA, OREGON</p>		<p>FIGURE 5-1</p>	<p>DATE: 4/26/2023</p>		