

FINAL Preliminary Assessment Report Camp Pendleton, Virginia Virginia Army National Guard

Perfluorooctanesulfonic Acid (PFOS) and Perfluorooctanoic
Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

August 2020

Prepared for:



Army National Guard Bureau
111 S. George Mason Drive
Arlington, VA 22204

UNCLASSIFIED

Table of Contents

Executive Summary	1
1. Introduction	4
1.1 Authority and Purpose	4
1.2 Preliminary Assessment Methods	4
1.3 Report Organization.....	5
1.4 Facility Location and Description.....	5
1.5 Facility Environmental Setting.....	6
1.5.1 Soil.....	6
1.5.2 Geology	7
1.5.3 Hydrogeology.....	7
1.5.4 Hydrology.....	8
1.5.5 Climate.....	8
1.5.6 Current and Future Land Use.....	8
2. Fire Training Areas.....	13
3. Non-Fire Training Areas	14
3.1 VAANG Civil Engineer Unit Property.....	14
3.2 Building 424.....	14
3.3 Fueling Station.....	14
3.4 Maintenance Building.....	15
3.5 Readiness Center	15
3.6 1970s Controlled Burn Area.....	15
3.7 Building 4.....	15
3.8 Helipad – Halon Staging Area	15
3.9 Building 410.....	16
4. Emergency Response Areas.....	18
5. Adjacent Sources.....	19
5.1 NAS Oceana.....	19
5.2 Virginia Beach Fire Training Center and Fire Station 12.....	20
5.3 2012 Navy Jet Crash Site	20
6. Preliminary Conceptual Site Model	23
6.1 AOI 1: Building 4.....	23
6.2 AOI 2: Helipad	24
6.3 AOI 3: Building 410.....	24
7. Conclusions and Data Uncertainty	27
7.1 Findings.....	27
7.2 Uncertainties.....	28
7.3 Potential Future Actions	29
8. References	32

Tables

Table ES-1	AOIs at Camp Pendleton
Table 1-1	Soil Component Properties
Table 5-1	Suspected Releases at NAS Oceana
Table 7-1	AOIs at Camp Pendleton
Table 7-2	No Suspected Release Areas
Table 7-3	Sources of Uncertainties
Table 7-4	PA Findings Summary

Figures

Figure ES-1	Summary of Findings
Figure ES-2	Preliminary Conceptual Site Model for Camp Pendleton
Figure 1-1	Facility Location
Figure 1-2	Groundwater Features
Figure 1-3	Surface Water Features
Figure 3-1	Non-Fire Training Areas
Figure 5-1	Adjacent Sources
Figure 6-1	Areas of Interest
Figure 6-2	Preliminary Conceptual Site Model AOI 1 Building 4, AOI 2 Helipad, and AOI 3 Building 410
Figure 7-1	Summary of Findings

Appendices

Appendix A	Data Resources
Appendix B	Preliminary Assessment Documentation
	B.1 Interview Records
	B.2 Visual Site Inspection Checklists
	B.3 Conceptual Site Model Information
Appendix C	Photographic Log

Acronyms and Abbreviations

AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
EDR™	Environmental Data Resources, Inc.™
FTA	fire training area
HA	Health Advisory
NAS	Naval Air Station
NPS	National Park Service
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
SI	Site Inspection
SMR	State Military Reservation
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VA	Virginia
VAARNG	Virginia Air National Guard
VAARNG	Virginia Army National Guard
VSI	visual site inspection
WWTP	wastewater treatment plant

Executive Summary

The Army National Guard (ARNG) is performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide. A PA for per- and polyfluoroalkyl substances (PFAS)-containing materials was completed for Camp Pendleton, Virginia (VA), to assess potential PFAS release areas and exposure pathways to receptors. The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)TM report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 6 February 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed personnel with first-hand knowledge of Camp Pendleton and its surrounding areas during the site visit, including the Camp Pendleton Buildings and Grounds Supervisor and City of Virginia Beach Fire Department Battalion Chief;
- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

Three AOIs related to potential PFAS releases were identified at Camp Pendleton based on PA data (**Figure ES-1**) and is summarized in **Table ES-1** below:

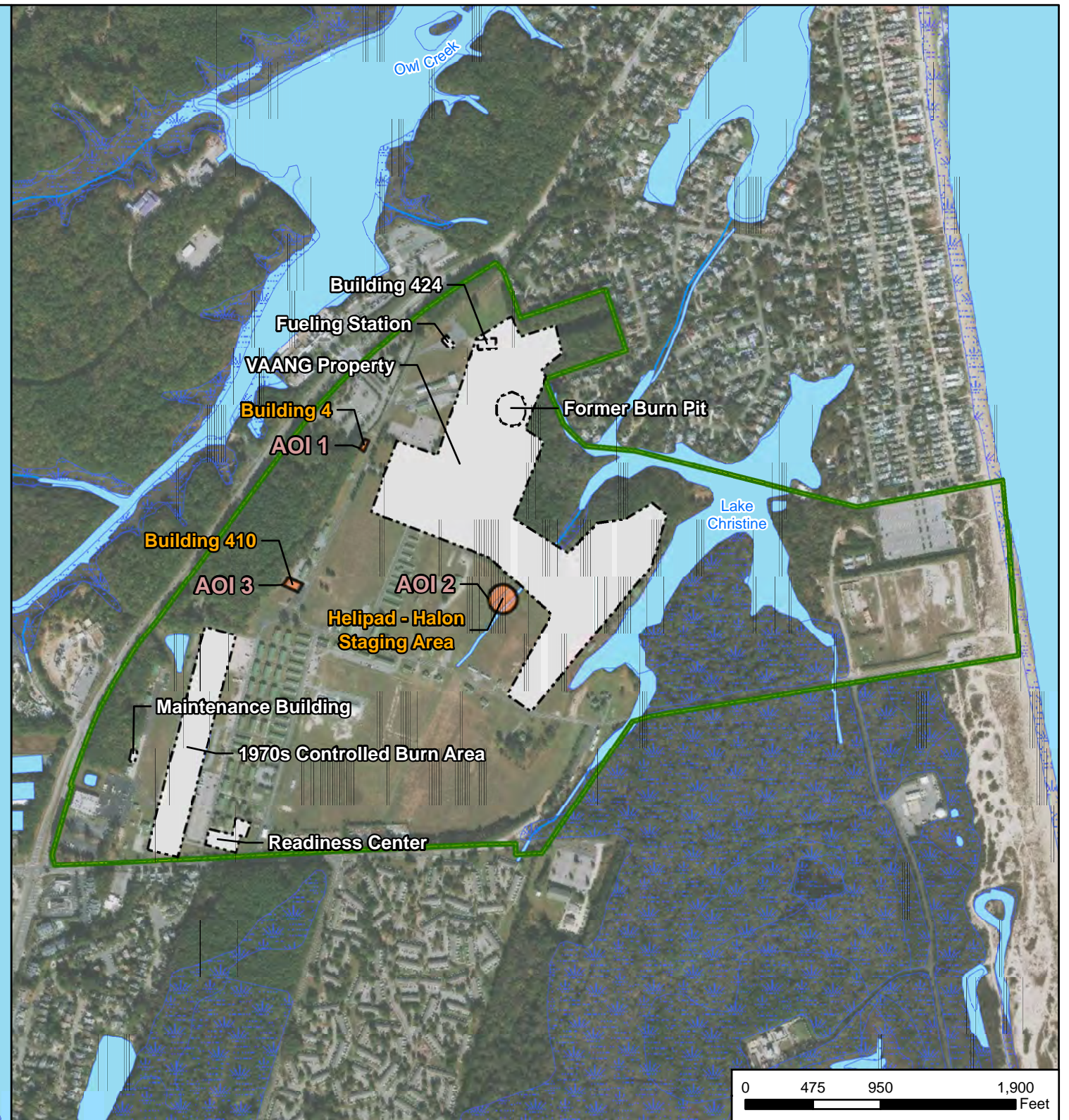
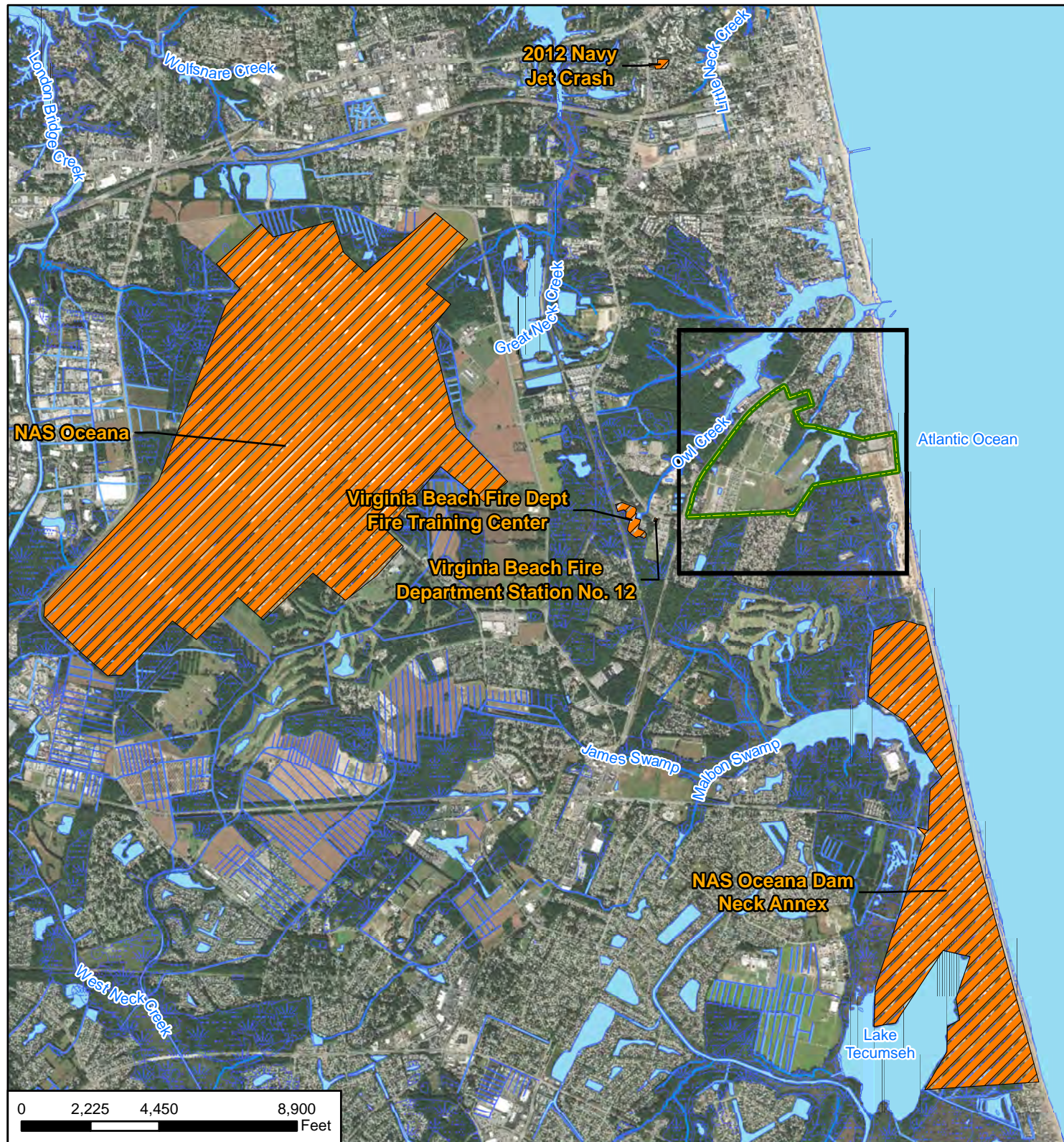
Table ES-1: AOIs at Camp Pendleton

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Building 4	VAARNG, Navy	1990s-2010
AOI 2	Helipad	VAARNG, non-ARNG units	Unknown
AOI 3	Building 410	VAARNG	1969-1976

Based on the possible releases of PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for Camp Pendleton, which presents the potential receptors and media impacted, is shown on **Figure ES-2**.

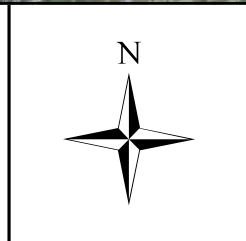
Additionally, several adjacent sources of potential PFAS release were identified in areas surrounding Camp Pendleton including Naval Air Station (NAS) Oceana, the Virginia Beach Fire Department Fire Station Number 12, and numerous jet crash emergency response locations. It is possible that a potential PFAS release at one of the adjacent sources identified may have contributed to PFAS within environmental media at Camp Pendleton. Adjacent off-facility potential PFAS sources are shown on **Figure ES-1**.

Based on the USEPA Unregulated Contaminant Monitoring Rule 3 data, it was indicated that no PFAS were detected in a public water system above the USEPA Health Advisory level within 20 miles of Camp Pendleton. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.



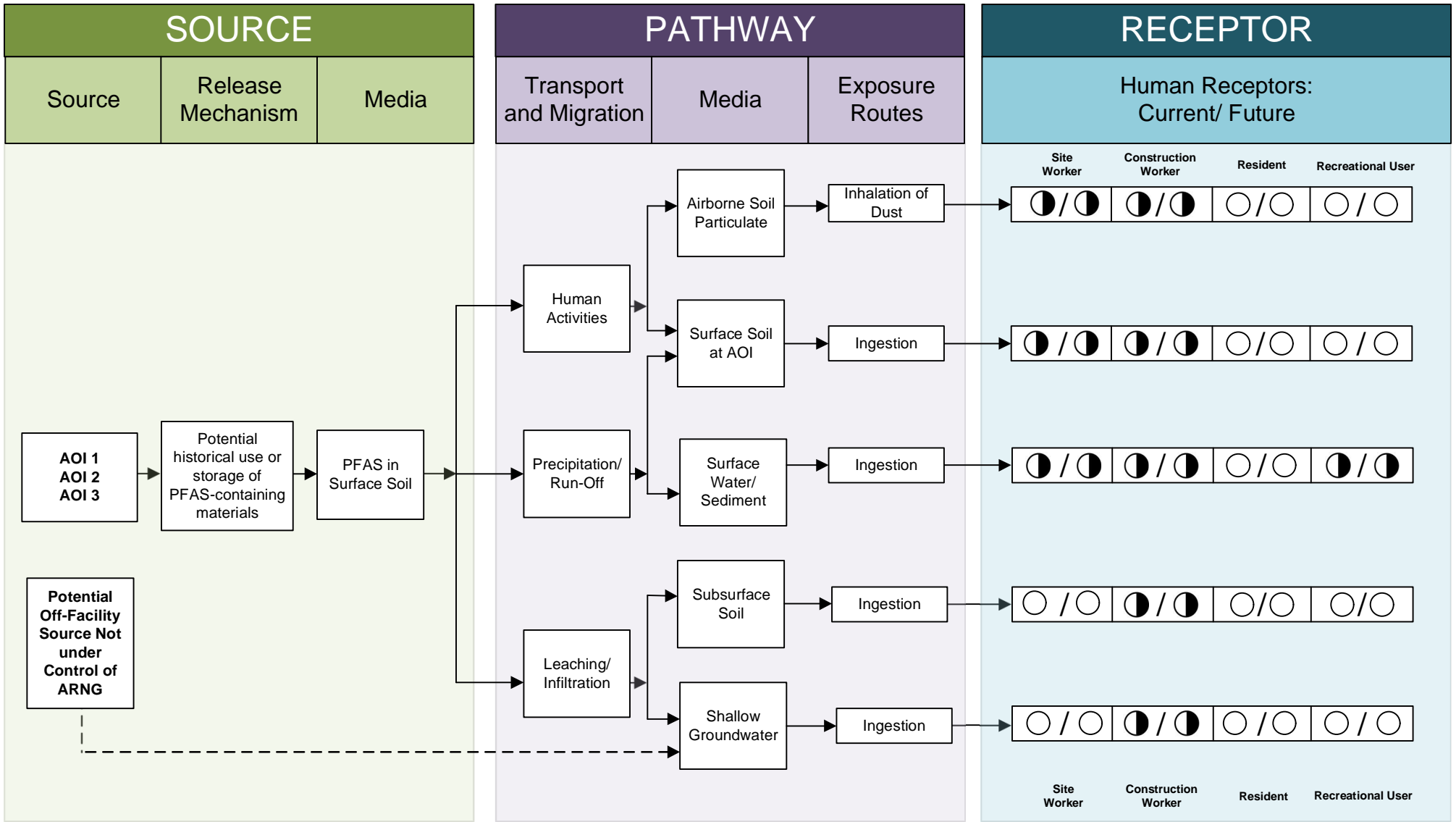
CLIENT	ARNG				
PROJECT	Preliminary Assessment for PFAS at Camp Pendleton, VA				
REVISED	5/19/2020	GIS BY	MS	5/19/2020	
SCALE	1:53,400	CHK BY	AS	5/19/2020	
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community	PM	RG	5/19/2020		

Area of Interest	River/Stream
Potential PFAS Release	Canal/Ditch
No Suspected Release	
Facility Location	
Water Body	
Wetland	



Summary of Findings	
AECOM	12420 Milestone Center Drive Germantown, MD 20876
Figure ES-1	

C:\Users\stankevich\OneDrive - AECOM Directory\ARNG_PFA_GIS_60552172\MXD\VA\Camp_Pendleton_Figures\PA_Figures\Fig_ES-1_Camp_Pendleton_Summary.mxd



LEGEND

- Flow-Chart Stops
- Flow-Chart Continues
- - - - -→ Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Complete Pathway

Notes:

1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. The site worker and construction worker receptors refer only to Camp Pendleton site and construction workers.
3. Dermal contact exposure pathway is incomplete for PFAS.

Figure ES-2
Preliminary Conceptual Site Model
Camp Pendleton

1. Introduction

1.1 Authority and Purpose

The Army National Guard (ARNG) G9 is the lead agency in performing Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) at Impacted Sites at ARNG Facilities Nationwide. This work is supported by the United States (US) Army Corps of Engineers (USACE) Baltimore District and their contractor AECOM Technical Services, Inc. (AECOM) under Contract Number W912DR-12-D-0014, Task Order W912DR17F0192, issued 11 August 2017.

The ARNG is assessing potential effects on human health related to processes at facilities that used per- and poly-fluoroalkyl substances (PFAS), primarily in the form of aqueous film forming foam (AFFF) released as part of firefighting activities, although other PFAS sources are possible. In addition, the ARNG is assessing businesses or operations adjacent to the ARNG facility (not under the control of ARNG) that could potentially be responsible for a PFAS release.

PFAS are classified as emerging environmental contaminants that are garnering increasing regulatory interest due to their potential risks to human health and the environment. PFAS formulations contain highly diverse mixtures of compounds. Thus, the fate of PFAS compounds in the environment varies. The regulatory framework at both federal and state levels continues to evolve. The US Environmental Protection Agency (USEPA) issued Drinking Water Health Advisories for PFOA and PFOS in May 2016, but there are currently no promulgated national standards regulating PFAS in drinking water.

This report presents the findings of a PA for PFAS-containing materials at Camp Pendleton (also referred to as the “facility”), Virginia (VA), in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, the National Oil and Hazardous Substances Pollution Contingency Plan (40 Code of Federal Regulations [CFR] Part 300), and Army requirements and guidance.

This PA documents the known fire training areas (FTAs) as well as other locations where PFAS may have been released into the environment at Camp Pendleton. The term PFAS will be used throughout this report to encompass all PFAS chemicals being evaluated, including PFOS and PFOA, which are key components of AFFF.

1.2 Preliminary Assessment Methods

The performance of this PA included the following tasks:

- Reviewed available administrative record documents and Environmental Data Resources, Inc. (EDR)TM report packages to obtain information relevant to potential PFAS releases, such as: drinking water well locations, historical aerial photographs, Sanborn maps, and environmental compliance actions in the area surrounding the facility;
- Conducted a site visit on 6 February 2019 and completed visual site inspections at locations where PFAS-containing materials were suspected of being stored, used, or disposed;
- Interviewed personnel with first-hand knowledge of Camp Pendleton and its surrounding areas during the site visit, including the Camp Pendleton Buildings and Grounds Supervisor and City of Virginia Beach Fire Department Battalion Chief;
- Identified Area(s) of Interest (AOIs) and developed a preliminary conceptual site model (CSM) to summarize potential source-pathway-receptor linkages of potential PFAS in soil, groundwater, surface water, and sediment for each AOI.

1.3 Report Organization

This report has been prepared in accordance with the USEPA *Guidance for Performing Preliminary Assessments under CERCLA* (USEPA 1991). The report sections and descriptions of each are:

- **Section 1 – Introduction:** identifies the project purpose and authority and describes the facility location, environmental setting, and methods used to complete the PA
- **Section 2 – Fire Training Areas:** describes the potential or suspected FTAs at the facility identified during the site visit
- **Section 3 – Non-Fire Training Areas:** describes other locations of potential PFAS releases at the facility identified during the site visit
- **Section 4 – Emergency Response Areas:** describes areas of potential PFAS release at the facility, specifically in response to emergency situations
- **Section 5 – Adjacent Sources:** describes sources of potential PFAS release adjacent to the facility that are not under the control of ARNG
- **Section 6 – Conceptual Site Model:** describes the pathways of PFAS transport and receptors for the AOIs and the facility
- **Section 7 – Conclusions:** summarizes the data findings and presents the conclusions of the PA
- **Section 8 – References:** provides the references used to develop this document
- **Appendix A – Data Resources**
- **Appendix B – Preliminary Assessment Documentation**
- **Appendix C – Photographic Log**

1.4 Facility Location and Description

Camp Pendleton, formerly known as Camp Pendleton State Military Reservation (SMR), is located just south of the main resort area of Virginia Beach, VA (**Figure 1-1**). Camp Pendleton provides support facilities for the VAARNG, as well as tenants including the Commonwealth Challenge Program, and federal and local government. Camp Pendleton occupies a parcel of land owned by the Navy and leased to the VAARNG. Real property documents for Camp Pendleton are included in **Appendix A**. The Virginia Air National Guard (VAANG) 203rd Civil Engineer Flight Unit also occupies a portion of the facility. Camp Pendleton incorporates approximately 327 acres and is bounded by General Booth Boulevard to the west, Birdneck Road to the south, the Croatan residential neighborhood to the north, and the Atlantic Ocean to the east.

The facility was founded by the Virginia state militia, the precursor to the VAARNG, and began construction in 1912. It originally comprised approximately 400 acres. During the height of its training mission, Camp Pendleton consisted of as much as 1,200 acres. The facility was constructed during three distinct building campaigns with interspersed construction on a smaller scale since its establishment as the State Rifle Range in 1912. The first campaign laid out the original core of the rifle range, and the layout remains extant. The second campaign of major construction, performed by the U.S. Navy in 1919, brought further development of the rifle ranges. Although the buildings constructed by the U.S. Navy no longer exist, the layout and configuration of the original development areas have been retained. The final major construction campaign,

completed by the U.S. Army during World War II, provides the majority of extant buildings and denotes when the facility was dedicated as Camp Pendleton.

1.5 Facility Environmental Setting

Information presented in this section was gathered from several sources, including the National Register of Historic Places (National Park Service [NPS], 2013), a 2018 Final SI report for the adjacent Naval Air Station (NAS) Oceana (CH2M, 2018), a 2017 Navy Integrated Natural Resources Management Plan for NAS Oceana (Navy, 2017), and a 1998 Feasibility Study for the conversion of Camp Pendleton into a state park (JLARC, 1998). Camp Pendleton was originally established on farmland and beachfront and has since been surrounded by the development of the city of Virginia Beach. The overall terrain of Camp Pendleton consists of a largely level area; elevations that do exist are located primarily near the beach Rifle Range, with dunes in the area tending to be more gently sloping terrain and ranging from approximately 3 to 7 feet in height. The facility also contains some drainage areas, consisting of sloping to steep areas with moderately drained soils. The elevation of the facility is approximately 26 feet above sea level (NPS, 2013).

In addition to the Atlantic Ocean, which borders the facility to the east, Lake Christine extends into the facility footprint. Lake Christine is a freshwater body that spans approximately one-half mile from north to south and one-half mile from east to west. The facility's cottage residences are scattered along the west and south sides of Lake Christine, including the Governor's Cottage to the south, across Jefferson Avenue, and the Post Superintendent's House at the southern end of the lake (NPS, 2013).

Although the majority of Camp Pendleton's grounds consist of open, grassy spaces, there are wooded areas, including the largely wooded zone along the central portion of the facility's northern boundary and east of Lake Christine. These wooded areas contain a variety of coniferous and deciduous trees and shrubs. The remainder of the facility landscape is developed with paved roads, buildings, and structures (NPS, 2013).

The facility is restricted to the general public by locked fence and guarded entryways but is unrestricted to Camp Pendleton personnel. Facility roads are open only to personnel associated with Camp Pendleton. The areas surrounding Camp Pendleton consist of commercial and suburban residential areas, as well as municipal facilities and recreational areas

1.5.1 Soil

According to the Comprehensive Stormwater Management Plan Soil Map (Stantech, 2016), there are five major soil components found at Camp Pendleton: Acredale, Tetotum, Augusta, Chapanoke, and Tomotleys. The properties of each soil component are listed in **Table 1-1** below:

Table 1-1: Soil Component Properties

Soil Component Name	Soil Surface Texture	Hydrologic Group	Soil Drainage Class	Hydric Status	Corrosion Potential
Acredale	Silt loam	Class D	Poorly drained	Yes	High
Tetotum	Loam	Class C	Moderately well drained	No	High
Augusta	Loam	Class D	Somewhat poorly drained	No	Moderate

Soil Component Name	Soil Surface Texture	Hydrologic Group	Soil Drainage Class	Hydric Status	Corrosion Potential
Chapanoke	Silt loam	Class D	Somewhat poorly drained	No	High
Tomotley	Loam	Class C	Poorly drained	Yes	High

Web Soil Survey, Natural Resources Conservation Service, 2019

1.5.2 Geology

Camp Pendleton is on the outer edge of the Atlantic Coastal Plain physiographic province. The Atlantic Coastal Plain is a broad wedge of unconsolidated sediments that dip and thicken to the east. In the vicinity of Camp Pendleton, these sediments consist of several thousand feet of unconsolidated sand, clay, silt, and gravels and are underlain by granite basement rock. The sediments range in age from late Cretaceous to Recent. The eastern portions of Camp Pendleton are underlain by beach sand and dune sand deposits, as well as marsh and intertidal mud deposits. The central and western portions of Camp Pendleton are underlain by the Tabb formation Lynnhaven and Poquoson Members (USGS, 1993) (**Figure 1-2**). The Lynnhaven Member is pebbly and cobbly, fine to coarse gray sand grades upward into clayey and silty fine sand and sandy silt. Locally, at the base of the unit, medium to coarse cross-bedded sand and clayey silt containing abundant plant material fill channels cut into underlying stratigraphic units. The Poquoson Member is the surficial sediment over much of the Tabb formation area and consists of fluvial estuarine fine to medium sand and sandy clay (USGS, 1993).

The geologic units described in previous environmental investigations at the adjacent NAS Oceana are the Yorktown Formation and the Columbia Group. The Columbia Group is present at the ground surface in the vicinity of the Base and generally extends to approximately 20 feet below ground surface (bgs). The Yorktown Formation underlies the Columbia Group. The upper Yorktown Formation consists of interbedded layers of shelly, very fine to coarse sands, clayey sands, and sandy clay of Tertiary age. Regionally, the uppermost of these silt and clay beds separates the Yorktown Formation from the sediments of the Columbia Group that overlie it. This uppermost bed consists of massive, well-bedded yellowgray to greenish-gray clays and silty clays, commonly containing shells, fine sand, and mica. The clay layers within the confining bed are generally extensive but are a series of coalescing clay beds rather than a single deposited unit. This unit was deposited in a shallow open-marine environment of broad lagoons and quiet bays (Meng and Harsh, 1984). The sediments of the Columbia Group consist of interbedded gravels, sands, silts, and clays of Pleistocene and Holocene age. The Pleistocene and Holocene sediments were deposited in fluvial-marine terrace and near-shore marine environments such as lagoons, beaches, tidal flats and barrier islands (CH2M, 1991).

1.5.3 Hydrogeology

The surficial hydrogeologic unit at the adjacent NAS Oceana consists of the Columbia aquifer, which extends to a depth of approximately 17 to 30 feet bgs at the facility. The hydrogeologic unit at NAS Oceana is anticipated to be similar at Camp Pendleton. This hydrogeologic unit is underlain by the Yorktown confining unit across much of coastal Virginia; however, this unit is absent across most of Camp Pendleton. Where present, the confining unit is underlain by the Yorktown aquifer. Aquifer conditions are unconfined in the Columbia Group and unconfined to semiconfined within the upper Yorktown Formation. When the clay confining unit overlying the Yorktown is absent, the upper Yorktown and Columbia aquifers act as a single, unconfined, hydrogeologic unit. The approximate thickness of the Yorktown aquifer is 100 feet, based on The

Virginia Coastal Plain Hydrogeologic Framework (USGS, 2006). Groundwater flow beneath Camp Pendleton is unknown; however, groundwater flow at the adjacent NAS Oceana generally flows north on the northern side of the base, west-northwest at the eastern portion of the base, and south-southwest across the southern side of the base (CH2M, 2018). Groundwater at NAS Oceana is generally within 4 to 10 feet of the land surface (USGS, 2006).

Groundwater is not used for drinking water at Camp Pendleton. Public water services are provided by the Virginia Beach Department of Public Utilities; water is sourced from Lake Gaston, via the Lake Gaston Water Supply Pipeline. The 2018 Environmental Data Resources, Inc. (EDR)TM Geocheck Radius Map Report indicated that there are no drinking water wells at Camp Pendleton. VAARNG staff confirmed that no operational wells exist at Camp Pendleton; however, the Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources spatial data for Camp Pendleton shows three groundwater wells located within the camp boundary, as shown on **Figure 1-2** (DMME, 2018). The wells are listed as public/municipal/government wells. Interviewees at Camp Pendleton believe the wells may have been previously abandoned and confirmed that they are not used for drinking water.

The USEPA Unregulated Contaminant Monitoring Rule 3 (UCMR3) data indicate that PFOS/PFOA were not detected in a public water system above the USEPA Health Advisory (HA) within a 20-mile radius of the facility. PFAS analyses performed in 2016 had method detection limits that were higher than currently achievable. Thus, it is possible that low concentrations of PFAS were not detected during the UCMR3 but might be detected if analyzed today.

1.5.4 Hydrology

Owl Creek and Lake Christine are the main drainage features surrounding Camp Pendleton. Surface water in the northwestern section of the site flows north to northwest to a stormwater pond at the northern end of the site and into Owl Creek. Surface water in the eastern section of the site flows into Lake Christine. In the southern section of the site, surface water flows north to northwest towards Owl Creek. A series of in-ground pipes and ditches take water towards two stormwater ponds and eventually discharge in Owl creek.

The city of Virginia Beach's elevation and proximity to water makes it susceptible to flooding. According to the city of Virginia Beach's Online Mapping Service, portions of Camp Pendleton are identified as areas with 0.2% annual chance of flooding, areas with a 1% chance of annual flooding, and areas that are part of the base floodplain (City of Virginia Beach, 2017). The majority of Camp Pendleton is not located in a Special Flood Hazard Area, which means it has a lower risk for flooding.

1.5.5 Climate

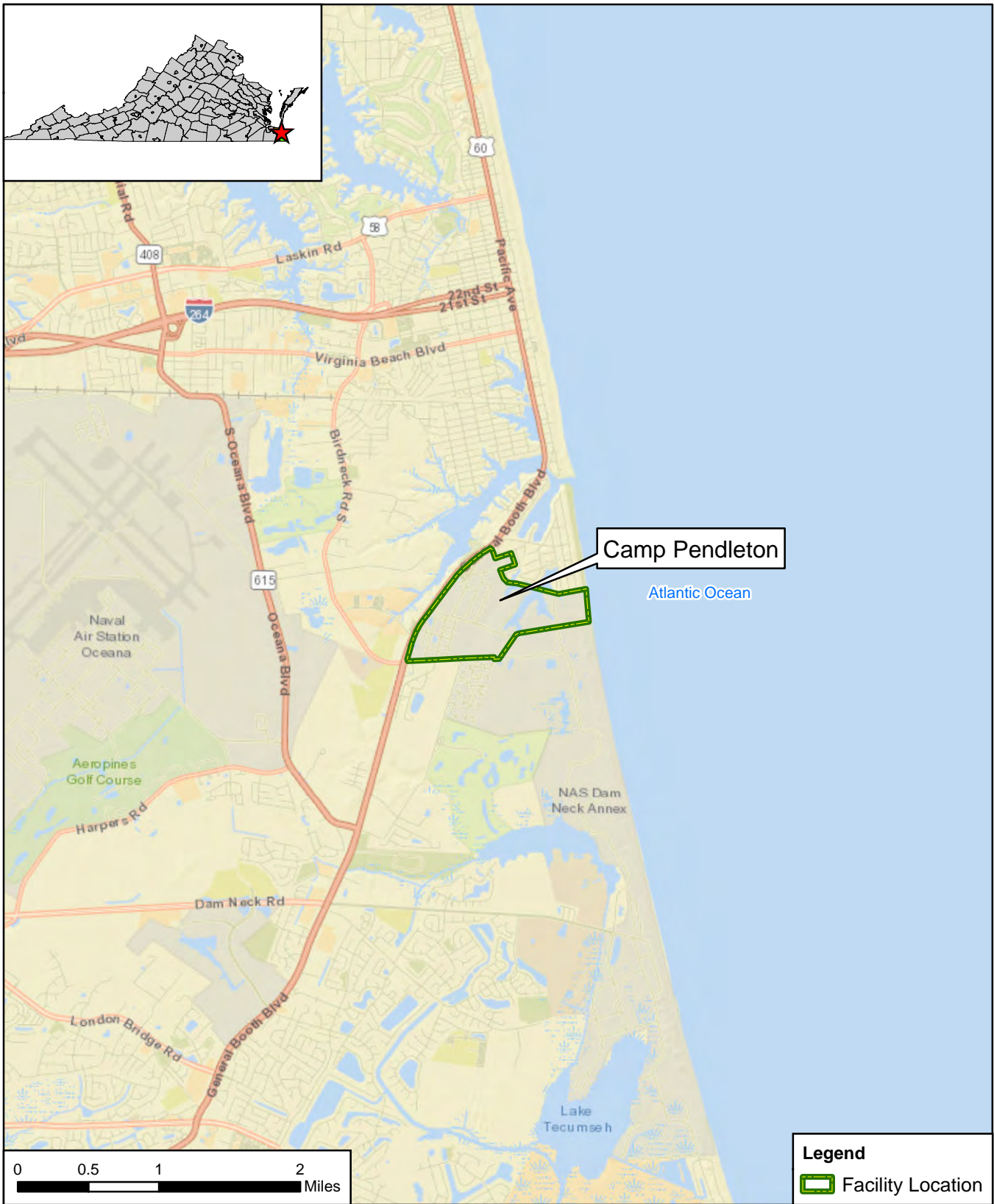
Camp Pendleton is located in an area where temperature extremes are moderated by the Atlantic Ocean. The average yearly temperature is 60.0 degrees Fahrenheit, with an annual precipitation of 45.7 inches. Winds on average blow from a northerly direction from January through March and again in September and October. During the remaining months, winds generally blow from a southerly direction. (Navy, 2017)

1.5.6 Current and Future Land Use

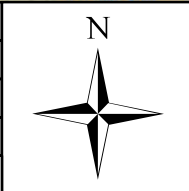
Camp Pendleton's primary purposes are the training of soldiers and personnel. Both VAARNG and Virginia Air National Guard (VAANG) control portions of the facility. When the facilities are not used by military organizations, state and local civilian agencies also conduct training at the site. Virginia Beach City authorities have repeatedly requested to convert the camp to other uses, including partial or complete conversion to a state park (JLARC, 1998). The facility is also

currently listed on the Virginia Landmarks Register and on the National Register of Historic Places.

The Camp proper consists of 229.87 acres owned by the VAARNG. Within the Camp, parcels are leased to the city of Virginia Beach, including 1.4 acres for equipment and materials storage, a 12.2-acre parking lot used by the Virginia Aquarium & Marine Science Center, 600 feet of beachfront, and approximately 505 parking spaces in a beachfront lot. The historic district of the Camp includes a 60.37-acre complex leased to the U.S. Air Force for use by a VAANG Civil Engineer Unit; 2.5 acres for the VAARNG Virginia Beach Readiness Center (Armory), 27.5 acres owned by the US Navy, and the remainder is Lake Christine. Also, within the Camp, the Commonwealth of Virginia's Youth ChalleNGe Academy uses barracks and other buildings in Regimental Camp Area No. 2, located in the southwestern portion of the Camp, between 3rd Street and the Camp boundary along South Birdneck Road (NPS, 2013). Future land use is not expected to change.

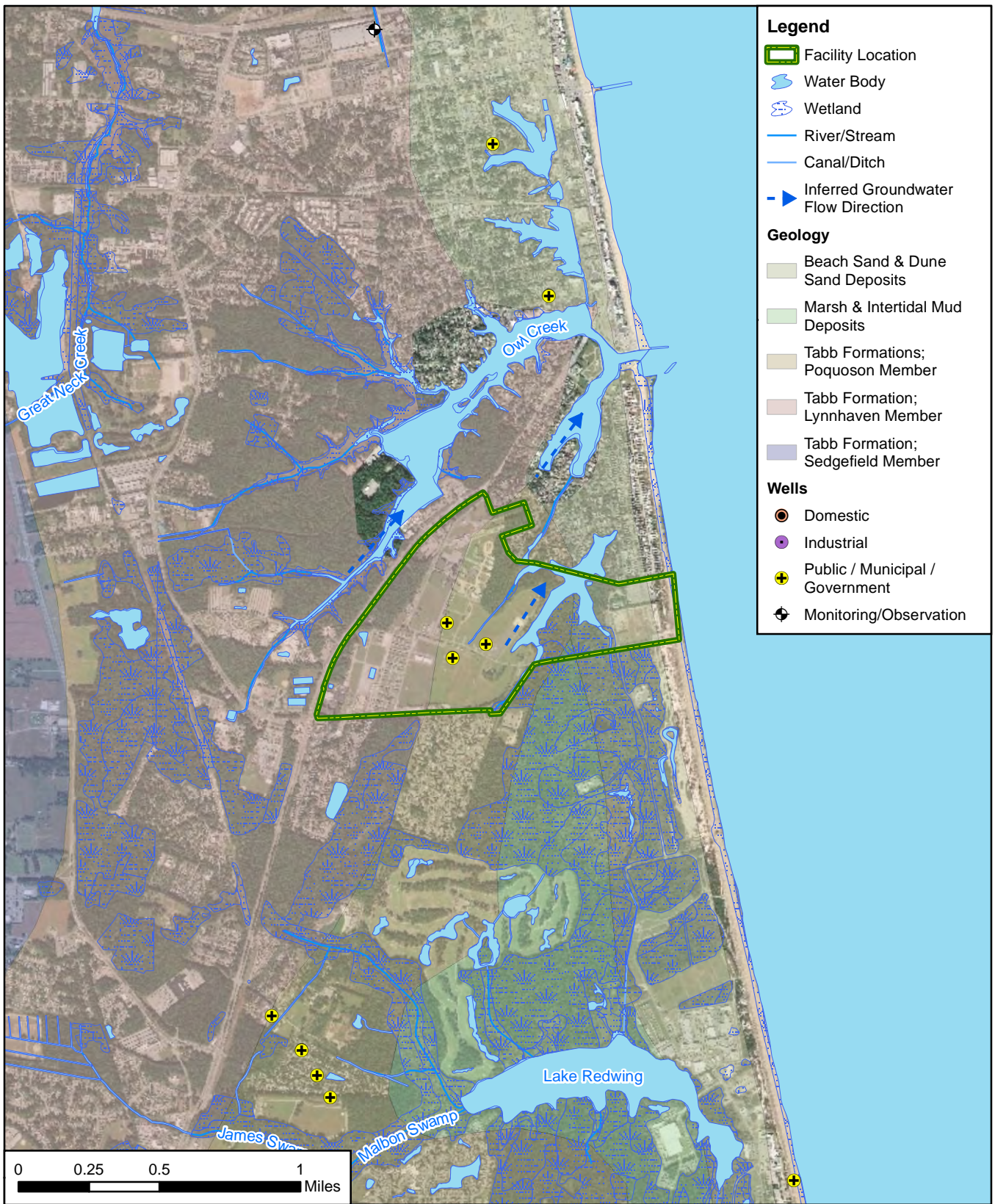


CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Camp Pendleton, VA			
REVISED	4/5/2019	GIS BY	MS	4/5/2019
SCALE	1:63,360	CHK BY	AS	4/5/2019
Base Map: Sources: Esri, HERE, DeLorme, USGS, Intermap, increment P Corp., NRCAN, Esri Japan, METI,	PM	RG	4/5/2019	

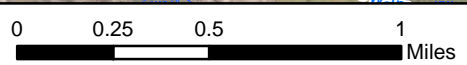


Facility Location	
AECOM 12420 Milestone Center Drive Germantown, MD 20876	Figure 1-1

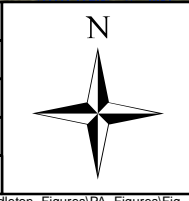
Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\VA\Camp_Pendleton_Figures\Fig_1-1_Camp_Pendleton_Facility_Location.mxd



- Legend**
- Facility Location
 - Water Body
 - Wetland
 - River/Stream
 - Canal/Ditch
 - Inferred Groundwater Flow Direction
- Geology**
- Beach Sand & Dune Sand Deposits
 - Marsh & Intertidal Mud Deposits
 - Tabb Formations; Poquoson Member
 - Tabb Formation; Lynnhaven Member
 - Tabb Formation; Sedgefield Member
- Wells**
- Domestic
 - Industrial
 - Public / Municipal / Government
 - Monitoring/Observation



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Camp Pendleton, VA			
REVISED	5/19/2020	GIS BY	MS	5/19/2020
SCALE	1:31,680	CHK BY	AS	5/19/2020
		PM	RG	5/19/2020

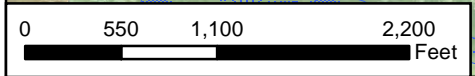
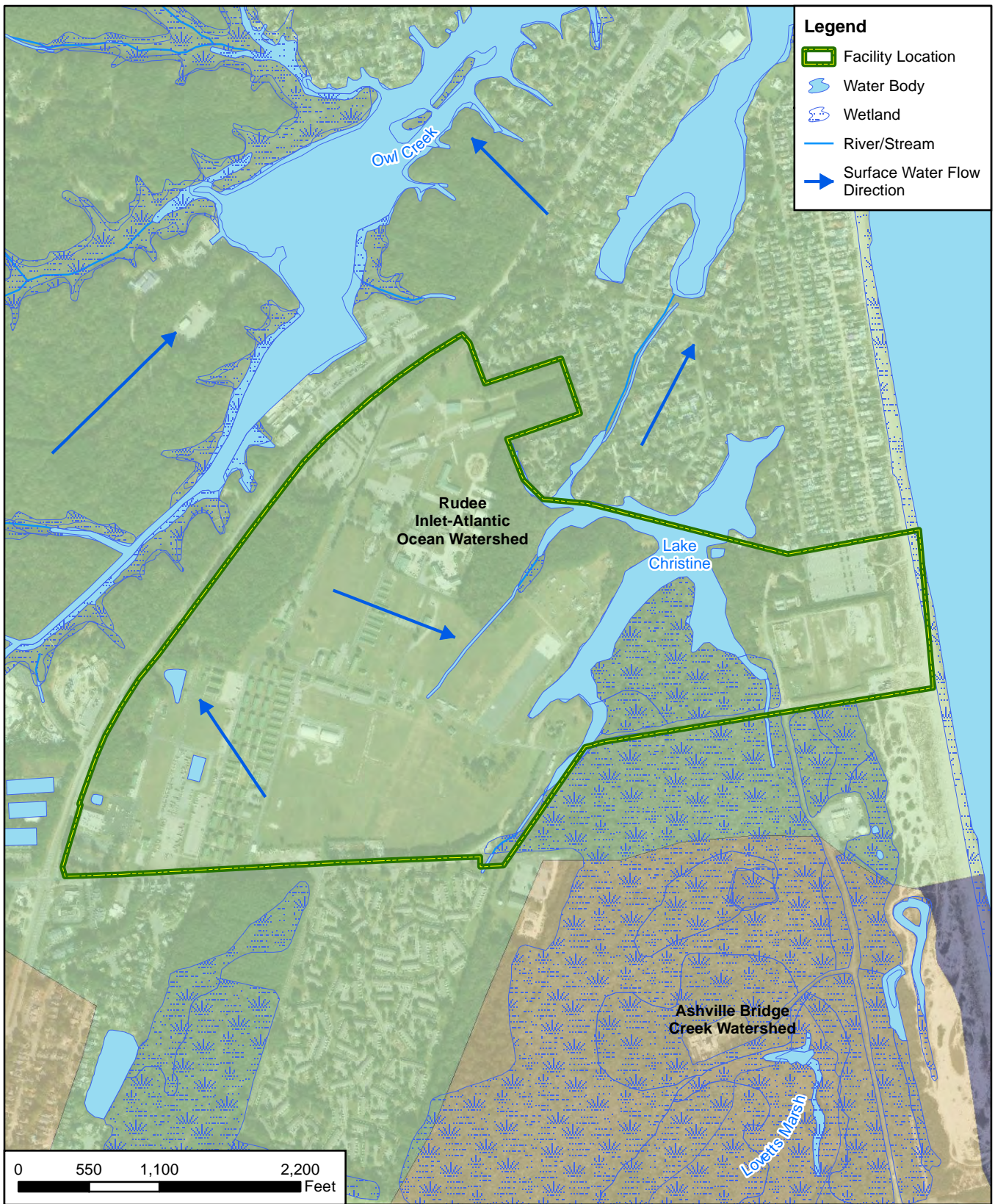


Groundwater Features

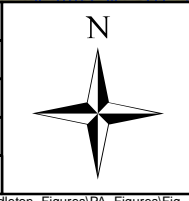
12420 Milestone Center Drive
Germantown, MD 20876

Figure 1-2

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXD\VA\Camp_Pendleton_Figures\PA_Figures\Fig_1-2_Camp_Pendleton_Groundwater.mxd



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Camp Pendleton, VA			
REVISED	5/19/2020	GIS BY	MS	5/19/2020
SCALE	1:13,200	CHK BY	AS	5/19/2020
		PM	RG	5/19/2020



Surface Water Features	
AECOM 12420 Milestone Center Drive Germantown, MD 20876	Figure 1-3

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PFAF_GIS_60552172\MXD\VA\Camp_Pendleton_Figures\PA_Figures\Fig_1-3_Camp_Pendleton_Surface_Water.mxd

2. Fire Training Areas

FTAs are considered a primary potential release area for PFAS because of common use of AFFF in training events. No FTAs were identified at Camp Pendleton during the PA through interviews, historical documentation, or the EDR™ Reports. Personnel interviewed have institutional knowledge spanning 1982-present. Historical aerial imagery included in the 2018 EDR™ report did not indicate that any areas were previously used as FTAs.

3. Non-Fire Training Areas

In addition to FTAs, the PA evaluated areas where PFAS-containing materials may have been broadly used, stored, or disposed. This may include buildings with fire suppression systems, paint booths, AFFF storage areas, and areas of compliance demonstrations. Information on these features obtained during the PA are included in Appendices A and B. Nine non-FTAs where AFFF was potentially stored and/or used were investigated during the PA. A description of each non-FTA is presented below, and they are shown on **Figure 3-1**, with photographs appearing in **Appendix C**.

3.1 VAANG Civil Engineer Unit Property

The VAANG occupies a 60.37-acre complex in the northern portion of Camp Pendleton (**Figure 3-1**). The VAANG leases property at the facility from the VAARNG (beginning in 1987). The VAANG has no aviation assets present at Camp Pendleton, but use the facility for equipment storage. According to VAANG staff, AFFF is not stored or used by VAANG at the facility. No evidence gathered during the PA indicates that AFFF has been released within the VAANG property at Camp Pendleton.

According to interviewees, a burn pit for wood and construction debris was used by the VAARNG in the 1970s and 1980s. The burn pit existed in what is now part of the VAANG Civil Engineering Unit property. The geographic coordinates for the center of the former burn pit are approximately 36°49'11.79"N; 75°58'42.51"W. The VAARNG discontinued use of the pit before the construction of the VAANG complex. There are no documented uses or releases of AFFF at the former burn pit, and interviewees stated that AFFF has never been used in association with the burn pit. The VAANG Civil Engineer Unit property is not considered a potential PFAS release area due to the lack of evidence indicating historical use or storage of AFFF.

3.2 Building 424

Building 424 is located within the VAANG Civil Engineer Unit property, adjacent to the fueling station on the northern side of Camp Pendleton (**Figure 3-1**). According to interviewees, Building 424 was burned down by the Virginia Beach Fire Department between 2010 and 2011 as part of a controlled burn. According to Virginia Beach Fire Department staff, no AFFF was used during the burn, and the Virginia Beach Fire Department has never used or stored AFFF at Camp Pendleton. The geographic coordinates for the building are 36°82'11.90"N; 75°97'91.08"W. The historical function and use of Building 424 prior to its demolition is unknown. Building 424 is not considered a potential PFAS release area due to the lack of evidence indicating historical use or storage of AFFF.

3.3 Fueling Station

The Fueling Station is located adjacent to the VAANG Civil Engineer Unit property, on the northern side of Camp Pendleton (**Figure 3-1**). The geographic coordinates are 36°82'12.31"N; 75°98'0.19"W. Various fire suppression systems and/or devices are often staged at fueling stations, which may include AFFF. According to VAARNG staff, no AFFF is staged at the Fueling Station; fire suppression systems at Camp Pendleton rely upon dry chemical extinguishers. Additionally, no accidents resulting in fire at the Fueling Station were recalled by staff during interviews. No buildings at Camp Pendleton are constructed with AFFF fire suppression systems. The Fueling Station is not considered a potential PFAS release area due to the lack of evidence indicating historical use or storage of AFFF.

3.4 Maintenance Building

The Maintenance Building is located adjacent to the Armory, in the southwest portion of Camp Pendleton (**Figure 3-1**). Maintenance buildings are common places for equipment storage, which may include AFFF concentrate. The geographic coordinates are 36°81'32.34"N; 75°98'74.73"W. There is no historical evidence indicating that AFFF has ever been stored or used at the Maintenance Building in Camp Pendleton. The Maintenance Building is not considered a potential PFAS release area due to the lack of evidence indicating historical use or storage of AFFF.

3.5 Readiness Center

The Readiness Center is located near the southwestern corner of Camp Pendleton (**Figure 3-1**). Readiness centers are commonly used for storage of equipment, which may include fire suppression system supplies. The geographic coordinates are 36°81'15.40"N; 75°98'53.02"W. Fire suppression at the Readiness Center consists only of dry chemical ABC fire extinguishers. According to interviewees, there has never been AFFF storage or use, nor any accidents requiring emergency fire suppression at the Readiness Center. The Readiness Center is not considered a potential PFAS release area due to the lack of evidence indicating historical use or storage of AFFF.

3.6 1970s Controlled Burn Area

The 1970s Controlled Burn Area is an approximately 15,000 ft long by 215 ft wide area located in the southwestern portion of Camp Pendleton, adjacent to the barracks (**Figure 3-1**). The geographic coordinates of the approximate center of the area are 36°81'33.02"N; 75°98'60.76"W. In the 1970s, approximately 80 buildings in the former barracks area were burned down for demolition purposes. According to interviewees, no AFFF was used in during the building demolitions. Interview documents appear in **Appendix B**. Due to the lack of historical evidence of the usage and storage of AFFF during the 1970s Controlled Burn, a potential PFAS release to the area is not suspected.

3.7 Building 4

Building 4 is located adjacent to the VAANG Civil Engineer Unit Property, in the northern portion of Camp Pendleton (**Figure 3-1**). The geographic coordinates are 36°81'92.16"N; 75°98'20.19"W. According to VAARNG interviewees, Building 4 was leased by the Navy from the late 1990s to 2010 and supported the Military Sea Lift Command. During its operation as a Navy building, a Halon fire suppression system was present within the building. The specific type of Halon foam product used by the suppression system is unknown, but its contents were never released, according to VAARNG staff. Halon is a fire extinguishing agent, almost universally used as an aircraft fire extinguisher, that contains bromochlorodifluoromethane. As a chlorofluorocarbon, Halon production has ceased, but many Halon products remain in circulation until used for their intended purpose. The Halon fire suppression system was removed in 2010, when the building was transferred to the VAARNG; it is unknown how the Navy disposed of their Halon after removal. Based on the prevalent use and storage of AFFF at Navy facilities and the lack of Navy interviewees available during this PA, it is possible that undocumented PFAS-containing materials were used or stored at Building 4. Building 4 is considered a potential PFAS release area.

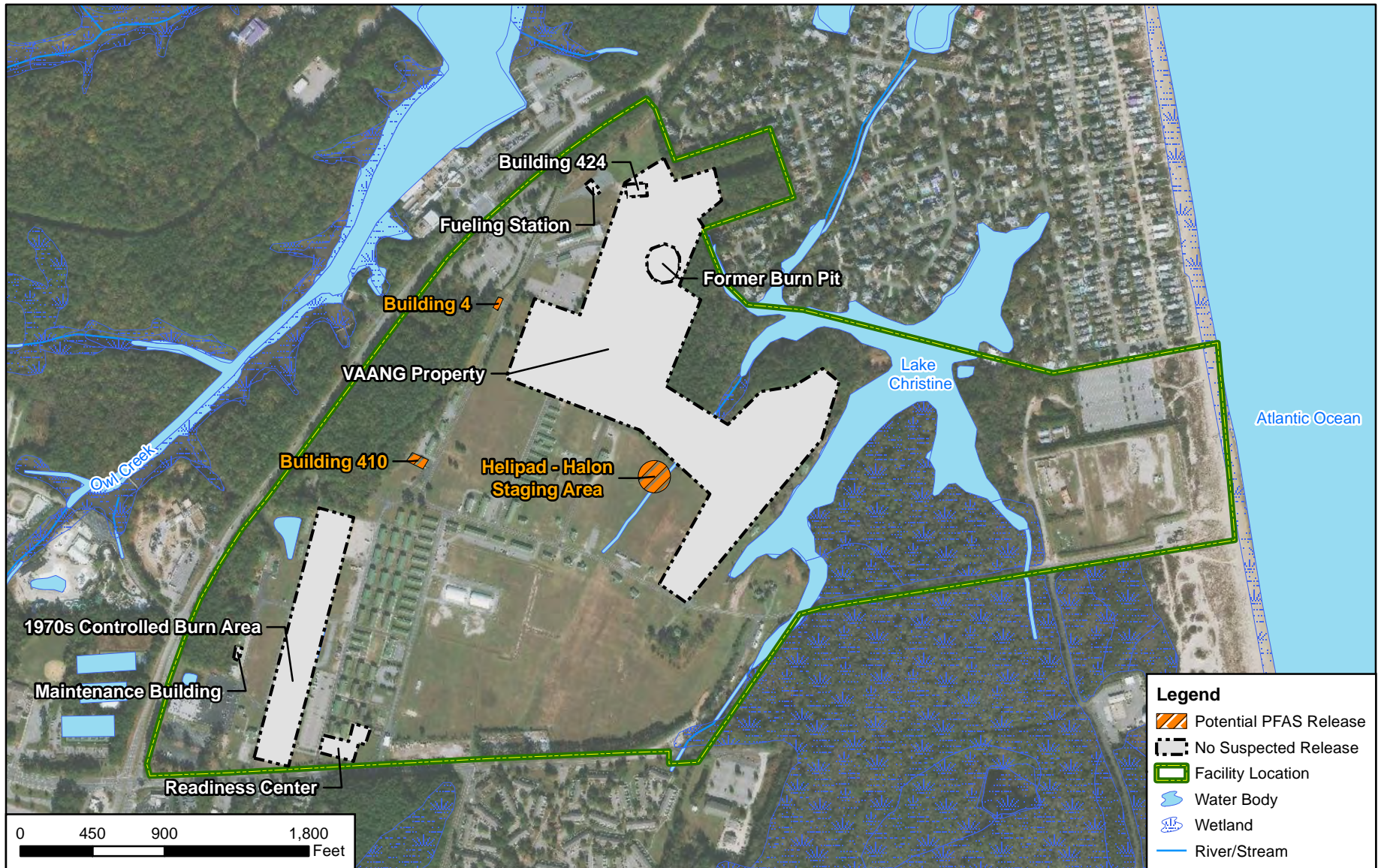
3.8 Helipad – Halon Staging Area

The Helipad is located directly south of the VAANG property in the northern portion of Camp Pendleton (**Figure 3-1**). The geographic coordinates for the approximate center of the Helipad are 36°81'61.42"N; 75°97'87.72"W. Similar to Building 4, a wheeled Halon fire extinguisher was

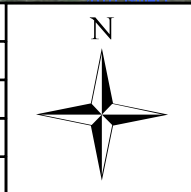
formerly staged at the Helipad. The unit described also resembles the AMEREX Halon 1211 wheeled fire extinguisher. According to interviewees, the Halon unit was never used for training or emergency response purposes and was disposed of in 2012. A copy of the 2012 disposal manifest is included in **Appendix A**, as is the safety data sheet for the AMEREX model Halon 1211 wheeled fire extinguisher. Based on the storage of Halon foam at the Helipad and its use by non-ARNG units, it is possible that undocumented use and storage of PFAS-containing materials occurred there. The Helipad is considered a potential PFAS release area.

3.9 Building 410

Building 410 served as the Camp Pendleton Fire Department prior to the 1970s and is currently used as a classroom and storage building. Building 410 is located in the central portion of Camp Pendleton (**Figure 3-1**), and its approximate geographic coordinates are 36°81'64.79"N; 75°98'36.06"W. According to interviewees, Building 410 has never been a place for storage or use of AFFF products, nor does it have an AFFF fire suppression system. During the site visit, hoses stamped in 1976 were observed at Building 410 and appeared to have function for water only; use of PFAS for firefighting purposes by the Department of Defense began in 1969. Based on the date stamped on firehoses, Building 410 may have been used as the Camp Pendleton Fire Department after the introduction of PFAS-containing materials to the ARNG. Although no evidence gathered for Building 410 indicates that AFFF was ever used or stored at the building, it is possible that undocumented storage or use of PFAS-containing materials occurred at the building based on its uncertain dates of use. Building 410 is considered a potential PFAS release area.



CLIENT	ARNG			
PROJECT	Preliminary Assessment for PFAS at Camp Pendleton, VA			
REVISED	5/19/2020	GIS BY	MS	5/19/2020
SCALE	1:10,800	CHK BY	AS	5/19/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community	PM	RG	5/19/2020	



TITLE	Non-Fire Training Areas	
AECOM	12420 Milestone Center Drive Germantown, MD 20876	Figure 3-1

C:\Users\stankevichm\OneDrive - AECOM Directory\ARNG_PPFAS_GIS_60552172\WXDs\VA\Camp_Pendleton_Figures\PA_Figures\Fig_3-1_Camp_Pendleton_Non-Fire_Training_Areas.mxd

4. Emergency Response Areas

VAARNG and City of Virginia Beach Fire Department staff stated that no crashes or emergencies have resulted in the use of AFFF at Camp Pendleton during their tenure (1982-present). Numerous crashes have occurred in the areas surrounding Camp Pendleton, including NAS Oceana. Emergency responses to crashes sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF. No emergency response locations involving the potential release of AFFF were identified within Camp Pendleton during the site visit, although there is little or no information available prior to 1982.

5. Adjacent Sources

Three off-facility potential PFAS release areas that are not under the control of the VAARNG were identified adjacent to the Camp Pendleton facility, during the PA site visit. A description of each adjacent source is presented below, and the adjacent sources are shown on **Figure 5-1**.

5.1 NAS Oceana

The NAS Oceana base is located approximately 2 miles west of Camp Pendleton (**Figure 5-1**). The base, including the NAS Oceana Dam Neck Annex located approximately 1.3 miles southwest of Camp Pendleton, was established in 1943 as a small auxiliary airfield. Since 1943, NAS Oceana has grown to 16 times its original size and is now 6,000 acres. NAS Oceana Range Control controls aviation operations at Camp Pendleton (CH2M, 2018).

According to interviewees, NAS Oceana has its own Fire Department that stores and uses AFFF during fire training exercises within the base. The NAS Oceana Fire Department has responded to numerous Navy crashes within the base and its vicinity using AFFF. Fire training practices and schedule, as well as firefighting equipment maintenance and disposal routines, are unknown. According to the 2018 CH2M NAS Oceana SI, only water is used during fire training at NAS Oceana; however, other releases are reported in the SI as listed in **Table 5-1** below.

Table 5-1: Suspected Releases at NAS Oceana

Known or Suspected NAS Oceana AFFF Releases	Nature of Release
1986 Plane Crash	A plane crashed off Oceana Boulevard. SI interviews indicated that AFFF was used in response to this crash.
1995 Plane Crash	A plane crashed in the woods on the installation, but SI interviewees could not recall whether there was an associated fire.
2007 Plane Crash	A civilian plane crashed during an air show practice off runway 5L. SI interviewees could not recall whether AFFF was used.
2012 Plane Crash	An F18 jet crashed into the nearby Mayview Apartments. AFFF was used on the subsequent fire. This source area is described in section 5.3.
1100 Area Training Release	During training near the Hush House an AFFF release was accidentally triggered by staff. The concrete area where AFFF was released was sprayed down to push AFFF into surrounding grass.
Building 145 Accidental Release	An AFFF release was accidentally triggered causing AFFF to spill out into the parking lot. Personnel were advised to cover the storm drains as well as they could, and spray water to wash the AFFF onto the grass. Remaining AFFF was vacuumed by and disposed of by a contractor.
Hangar 111 Accidental Release	An accidental release occurred during floor nozzle retrofitting.

Known or Suspected NAS Oceana AFFF Releases	Nature of Release
Hangar 500 Accidental Releases	Accidental releases of AFFF occurred approximately monthly due to suppression system sensor malfunctions. The date range of the monthly activations is unknown.
Building 139 Accidental Release	In 2010 a spill occurred at the corrosion control facility. The AFFF was pushed outside to the grass swale on the southeast side of the building, and then cleaned up with a vacuum truck. Multiple releases have occurred at Building 139.
Hangar 122 Accidental Release	In 2011 a storm caused stormwater to back up and fill the overflow tanks in Hangar 122, releasing AFFF to the storm drain and storm ditch.

Groundwater samples collected during the SI indicate that PFOS and PFOA concentrations in groundwater beneath the base exceed the USEPA HA of 70 parts per trillion. One off-base potable well east of the facility showed detections of PFOA and PFOS, but did not exceed the USEPA HA. Groundwater flow at the base generally flows north on the northern side of the base, west-northwest at the eastern portion of the base, and south-southwest across the southern side of the base (CH2M, 2018). The 2018 SI for NAS Oceana is included in **Appendix A**.

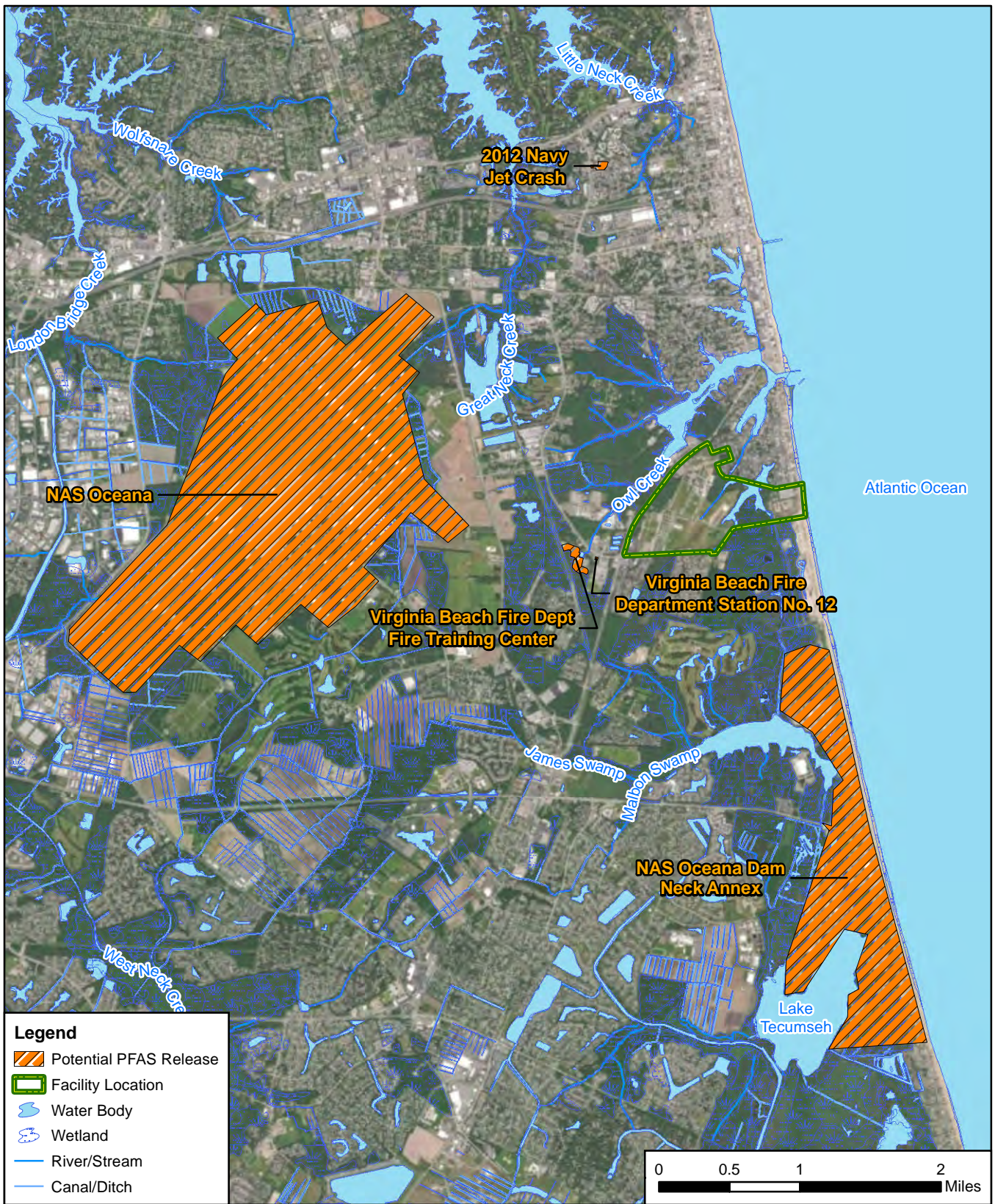
5.2 Virginia Beach Fire Training Center and Fire Station 12

The Virginia Beach Fire Training Center and Station 12 are located approximately 0.2 miles southwest of Camp Pendleton (**Figure 5-1**). The City of Virginia Beach Fire Department is responsible for emergency response at Camp Pendleton. Universal Gold 1%/3% AR-AFFF is stored in 5-gallon buckets within the vehicle maintenance bays at Fire Station 12. Universal Gold 1%/3% AR-AFFF is known to contain fluoroalkyl surfactants; its Safety Data Sheet (SDS) is included in **Appendix A**. National Foam Knockdown Class A Foam Concentrate (non-AFFF) is also stored at Station 12. Its SDS is also included in **Appendix A**. When needed, the Fire Department mixes AFFF from the concentrate with water for use at a response scene. According to City of Virginia Beach Fire Department staff, most of the City of Virginia Beach Fire Department fire stations have one AFFF-capable firetruck and two to three non-AFFF-capable response vehicles. No City of Virginia Beach Fire Department firetrucks have a history of maintenance issues related to AFFF. The City of Virginia Beach Fire Department Battalion Chief confirmed that AFFF is not used for washing spills or as a precaution for fuel spills, nor has it been used for emergency response at Camp Pendleton. No joint fire training with AFFF occurs between VAARNG and the Fire Department at Camp Pendleton. To the knowledge of both VAARNG and City of Virginia Beach Fire Department staff, AFFF has never been released at Camp Pendleton. Fire Department staff could not confirm whether AFFF is used during training operations at the neighboring Virginia Beach Fire Training Center.

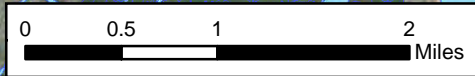
5.3 2012 Navy Jet Crash Site

The 2012 Navy Jet Crash Site is located approximately 2.2 miles north of Camp Pendleton, near the intersection of North Birdneck Road and Fleming Drive. The geographic coordinates are 36°85'11.92"N; 75°99'28.02"W (**Figure 5-1**). The crash destroyed three buildings, and two were damaged. According to VAARNG and City of Virginia Beach Fire Department interviewees, as well as the 2018 NAS Oceana SI Report, AFFF was used by the Navy Fire Department at the

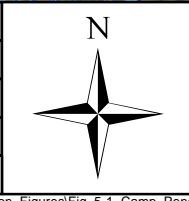
crash scene. The volume and type of AFFF used in response to the fire is unknown. Photo number 2 in **Appendix C** shows the discharged AFFF at the scene of the crash.



Legend	
	Potential PFAS Release
	Facility Location
	Water Body
	Wetland
	River/Stream
	Canal/Ditch



CLIENT	ARNG			
NOTES	Preliminary Assessment for PFAS at Camp Pendleton, VA			
REVISED	4/5/2019	GIS BY	MS	4/5/2019
SCALE	1:63,360	CHK BY	AS	4/5/2019
		PM	RG	4/5/2019



Adjacent Sources	
AECOM 12420 Milestone Center Drive Germantown, MD 20876	Figure 5-1

Q:\Projects\ENV\GEARS\GEO\ARNG PFAS\900-CAD-GIS\920-GIS or Graphics\MXD\VA\Camp_Pendleton_Figures\Fig_5-1_Camp_Pendleton_Adjacent_Source.mxd

6. Preliminary Conceptual Site Model

Based on the PA findings, three non-FTAs were identified where PFAS may have been stored or discharged to the ground surface. As such, these AOIs may be potential PFAS source areas. The AOIs and preliminary CSMs for the AOIs are shown on **Figure 6-1** and **Figure 6-2**, respectively, and the AOIs are summarized below.

The following AOIs were identified as a potential PFAS source area:

- AOI 1 – Building 4
- AOI 2 – Helipad
- AOI 3 – Building 410

The following sections describe the CSM components and the specific preliminary CSMs developed for each AOI. The CSM identifies the three components necessary for a potentially complete exposure pathway: (1) source, (2) pathway, (3) receptor. If any of these elements are missing, the pathway is considered incomplete.

Human exposure via the dermal contact pathway may occur, and current risk practice suggests it is an insignificant pathway compared to ingestion; however, exposure data for dermal pathways are sparse and continue to be the subject of PFAS toxicological study (National Ground Water Association, 2018). Receptors for Camp Pendleton include site workers, construction workers and recreational users. The preliminary CSMs for the AOIs indicate which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1: Building 4

AOI 1 includes Building 4, which was historically leased by the Navy (**Figure 6-1**). Although no historical evidence available during the PA indicates that PFAS releases have occurred at Building 4, unknown and undocumented releases may have occurred based on the prevalent use and storage of AFFF at Navy facilities and the lack of Navy interviewees available during this PA.

Potential PFAS releases at AOI 1 may have occurred within Building 4 or on the grassy areas surrounding the building. Ground-disturbing activities in these grassy areas as well as beneath the pavement may result in potential exposure to PFAS in surface soils via ingestion and inhalation of dust particles for site workers and construction workers. Because the facility is a fenced and guarded facility with controlled access, trespassers are not anticipated to be exposed to PFAS in site media. Ground-disturbing activities may result in potential exposure to subsurface soils and groundwater via ingestion for construction workers.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching, but there are no active drinking water wells at Camp Pendleton. Based on the topographic features, the inferred groundwater flow is to the northeast. According to Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources spatial data, two wells identified as public, municipal, or government wells are located downgradient of the identified AOI; however, they are located on the north side of Owl Creek, which is expected to act as a hydraulic barrier. As such, groundwater is not considered a potential pathway for PFAS exposure to site workers or off-facility residents. Groundwater depth at the facility is presumed to be shallow due to the proximity of the Atlantic Ocean, so PFAS exposure to construction workers via ingestion of groundwater during ground-disturbing activities is considered potentially complete.

It is unknown whether Building 4 contains floor drains, and if so, where those drains connect. If floor drains in Building 4 connect to sanitary system sewers, then PFAS may have migrated offsite to a wastewater treatment plant (WWTP). There are no WWTPs at Camp Pendleton. Stormwater

runoff from AOI 1 is expected to flow northwest towards a stormwater pond at the northern end of Camp Pendleton and ultimately to Owl Creek. Runoff may also flow into wetlands in the wooded area west of AOI 1. It is possible that PFAS migrated to Owl Creek and may result in potential exposure via ingestion of surface water and/or sediment to recreational users of Owl Creek and its tributaries, and to site and construction workers entering the stormwater pond or other wetlands within Camp Pendleton. The preliminary CSM for AOI 1 is shown on **Figure 6-2**.

6.2 AOI 2: Helipad

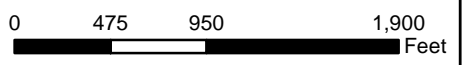
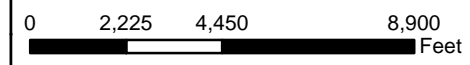
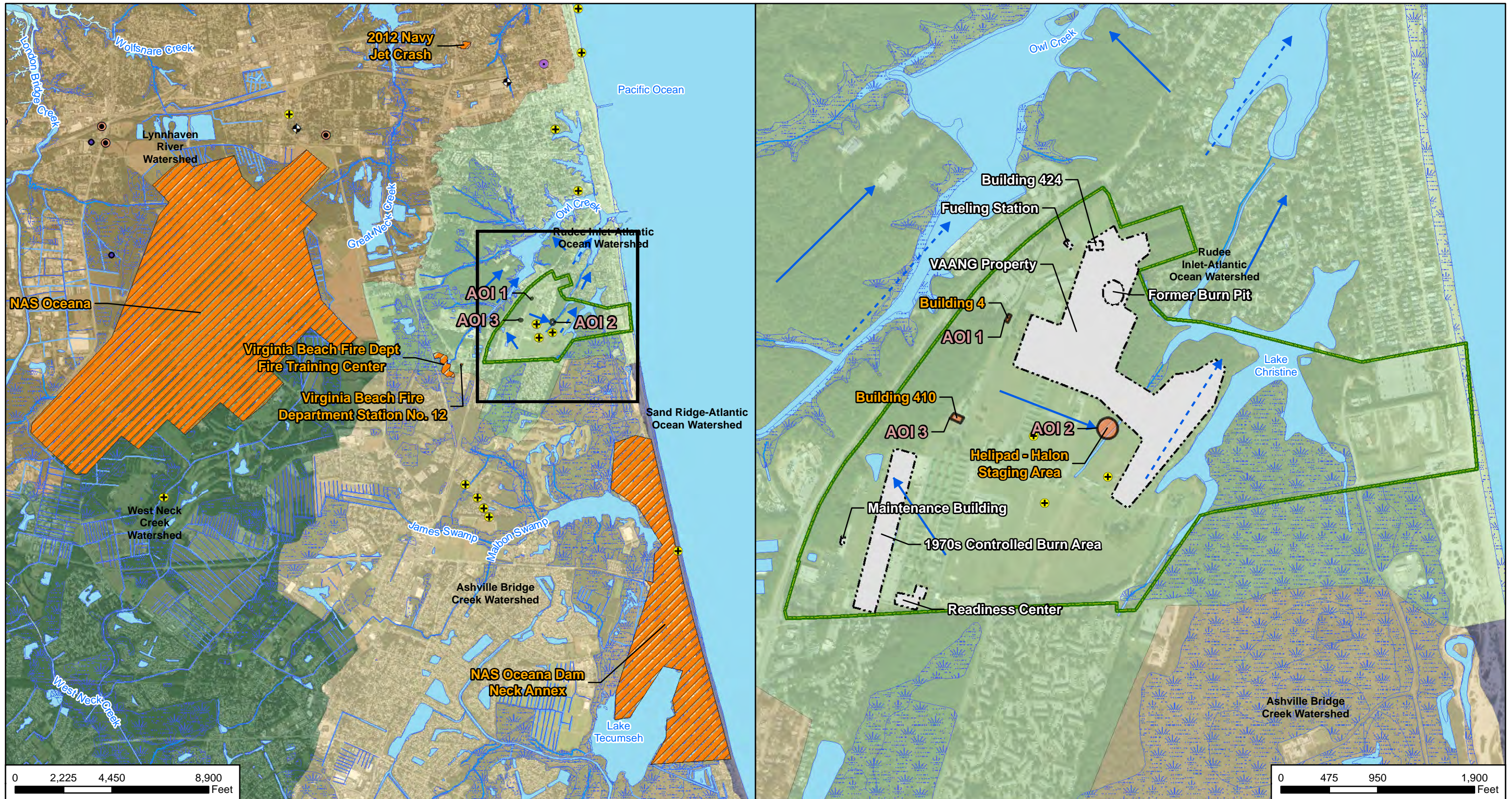
AOI 2 is the Camp Pendleton Helipad. Although there are no documented AFFF releases from the Helipad, undocumented use of the Helipad by non-ARNG units presents a data gap in which AFFF may have been stored or used at the Helipad.

Any release of PFAS-containing materials at the Helipad would have occurred on grassy surfaces. As such, ground-disturbing activities at the AOI may result in potential exposure to PFAS in surface soils via ingestion and inhalation of dust particles for site workers and construction workers. Subsurface soil and groundwater may also expose construction workers to PFAS via ingestion during ground-disturbing activities. Groundwater and surface water at AOI 2 flows towards the northeast along a drainage channel and drains to Lake Christine. As such, recreational users of Lake Christine as well as site and construction workers entering the drainage ditch may be exposed to PFAS in surface water and sediment via ingestion. The pathways and receptors for AOI 2 are the same as described in **Section 6.1**. The preliminary CSM for AOI 2 is shown on **Figure 6-2**.

6.3 AOI 3: Building 410

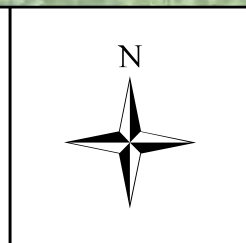
AOI 3 is Building 410, the former Camp Pendleton Fire Department. Although there are no documented AFFF releases from the fire station building, the dates of use for the Fire Department indicate that it is possible that AFFF could have been used or stored at the AOI.

Any released AFFF may have occurred within Building 410 or on the grassy areas surrounding the building. Stormwater runoff at Building 410 drains to Owl Creek and its tributaries. The pathways and receptors for AOI 3 are the same as described in **Section 6.1**. The preliminary CSM for AOI 3 is shown on **Figure 6-2**.



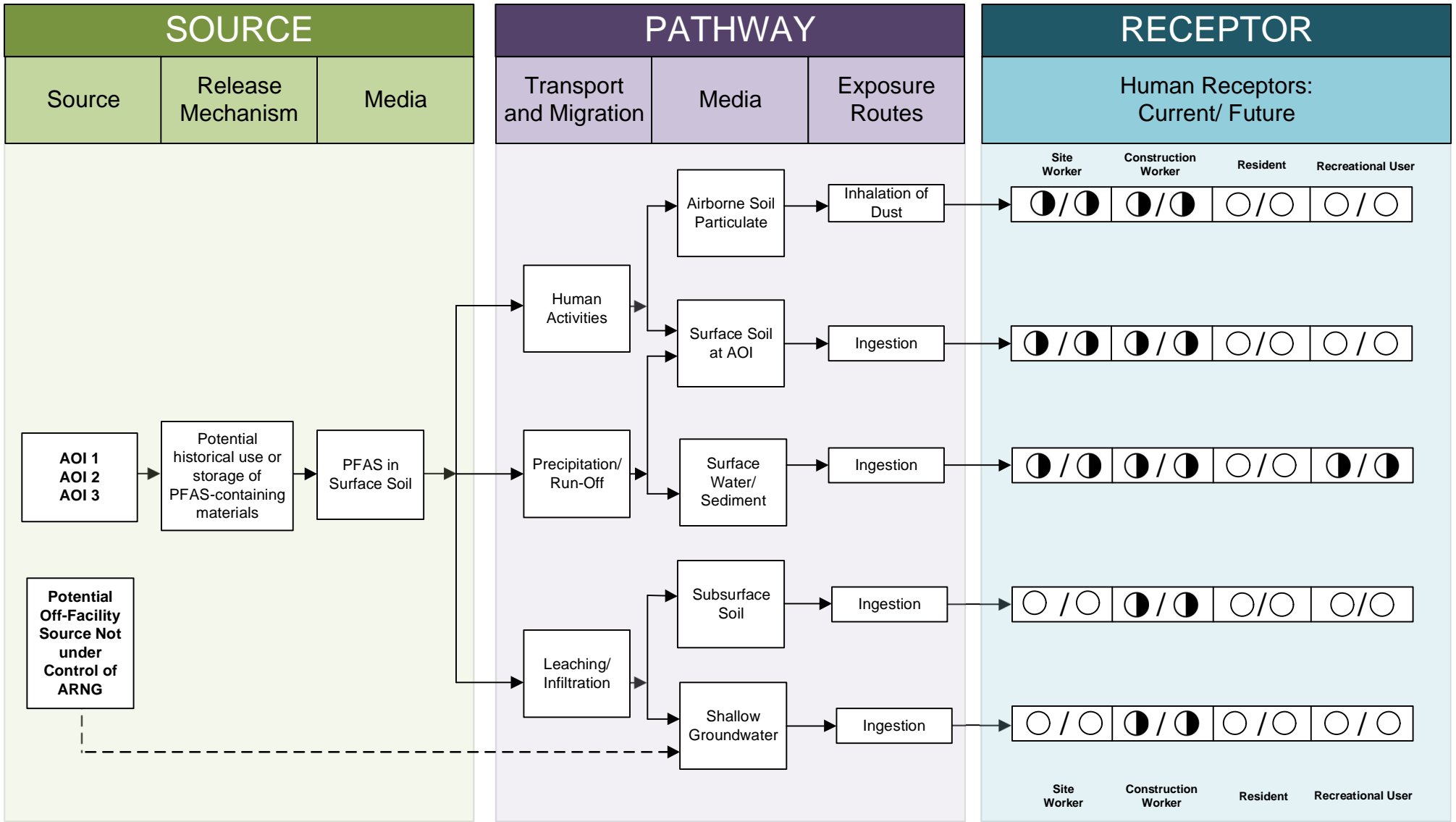
CLIENT	ARNG				
PROJECT	Preliminary Assessment for PFAS at Camp Pendleton, VA				
REVISED	5/19/2020	GIS BY	MS	5/19/2020	
SCALE	1:53,400	CHK BY	AS	5/19/2020	
Base Map:	Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	5/19/2020

Area of Interest	River/Stream	Domestic Well
Potential PFAS Release	Canal/Ditch	Industrial Well
No Suspected Release	Surface Water Flow Direction	Public/Municipal/Government Well
Facility Location	Inferred Groundwater Flow Direction	Monitoring/Observation Well
Water Body		
Wetland		



Areas of Interest	
AECOM	12420 Milestone Center Drive Germantown, MD 20876
Figure 6-1	

C:\Users\stankevich\OneDrive - AECOM\Directory\ARNG_PFAIS_GIS_60552172\MXDs\VA\Camp_Pendleton_Figures\PA_Figures\Fig_6-1_Camp_Pendleton_AOIs.mxd



LEGEND

- □ Flow-Chart Stops
- > Flow-Chart Continues
- - -> Partial / Possible Flow
- Incomplete Pathway
- ◐ Potentially Complete Pathway
- Complete Pathway

Notes:

1. The resident and recreational user receptors refer to an off-site resident and recreational user.
2. The site worker and construction worker receptors refer only to Camp Pendleton site and construction workers.
3. Dermal contact exposure pathway is incomplete for PFAS.

Figure 6-2
 Preliminary Conceptual Site Model
 AOI 1 Building 4, AOI 2 Helipad, and AOI 3 Building 410 26

7. Conclusions and Data Uncertainty

This report presents a summary of available information gathered during PA efforts on the use and storage of AFFF and other PFAS-related activities at the VAARNG Camp Pendleton. The PA findings are based on the personnel interviews, environmental investigations and reports, historical documents, and the VSI (**Appendices A, B, and C**).

7.1 Findings

Three AOIs related to potential PFAS releases were identified at Camp Pendleton based on PA data (**Figure 7-1**) and is summarized in **Table 7-1** below:

Table 7-1: AOIs at Camp Pendleton

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Building 4	VAARNG, Navy	1990s-2010
AOI 2	Helipad	VAARNG, non-ARNG units	Unknown
AOI 3	Building 410	VAARNG	1969-1976

Based on potential PFAS releases at these AOIs, there is potential for exposure to PFAS contamination in media at or near the facility. The preliminary CSM for the Camp Pendleton are shown on **Figure 6-2**, which presents the potential receptors and media impacted. It is possible that a potential PFAS release at one of the adjacent sources identified may have contributed to PFAS within environmental media at Camp Pendleton. Potential adjacent sources are shown on **Figure 7-1**.

The NAS Oceana base was identified as an off-facility potential PFAS source. The base has its own Fire Department that stores and uses AFFF and has responded to numerous Navy crashes within the base and its surrounding areas using AFFF. The 2018 CH2M SI for NAS Oceana indicates that PFAS is present in groundwater beneath the base at levels exceeding the USEPA HA of 70 parts per trillion and is detectable in water from a potable source east of the base.

The City of Virginia Beach Fire Training Center was identified as an off-facility potential PFAS source. AFFF is stored at Fire Station 12 but is only formulated as necessary at the scene of an accident. No trucks have historical records of leakages, and according to interviewees, AFFF has not been used in any capacity at Camp Pendleton.

The 2012 Navy Jet Crash Site at the Mayview Apartments complex was identified as an off-facility potential PFAS source. According to interviewees, AFFF was used by the Navy Fire Department in response to the crash.

The following areas discussed in **Section 3** were determined to have no suspected PFAS releases to the environment (**Table 7-2**):

Table 7-2: No Suspected Release Areas

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
VAANG Civil Engineer Unit Property	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.
Building 424	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.
Fueling Station	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.
Maintenance Building	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.
Readiness Center	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.
1970s Controlled Burn Area	VAARNG	Readily available information indicates no evidence of the use of storage of PFAS-containing materials at this location.

7.2 Uncertainties

A number of information sources were investigated during this PA to determine the potential for PFAS-containing materials to have been present, used, or released at the facility. Historically, documentation of PFAS use was not required because PFAS were considered benign. Therefore, records were not typically kept by the facility or available during the PA on the use of PFAS in training, firefighting, or other non-traditional activities, or on its disposition.

The conclusions of this PA are based on all available information, including: previous environmental reports, EDRs™, observations made during the VSI, and interviews. Interviews of personnel with direct knowledge of a facility generally provided the most useful insights regarding a facility's historical and current PFAS-containing materials. Sometimes the provided information was vague or conflicted with other sources, such as the wells listed by the Virginia Department of Mines, Minerals and Energy. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge due to staffing changes, the time passed since PFAS was first used (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS release locations, dates of release, volume of releases, and the concentration of AFFF used. There is also a possibility the PA has missed a source of PFAS, as the science of how PFAS may enter the environment continually evolves.

In order to minimize the level of uncertainty, readily available data regarding the use and storage of PFAS were reviewed, retired and current personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

Table 7-3 summarizes the uncertainties associated with the PA:

Table 7-3: Sources of Uncertainty

Location	Source of Uncertainty
Camp Pendleton VAANG Civil Engineer Unit Property	During the interview process, no VAANG personnel were available to be interviewed. VAANG aviation assets have never been present, but it is unclear what materials may have historically been stored at the facility. The frequency of use of 1970s burn pit is unclear. The burn pit is believed to have been used by the VAARNG for burning wood and construction debris, which is usually extinguished with water, not AFFF.
Helipad	It is unknown how long the Halon wheeled fire extinguisher was staged at the helipad. Although no leakages were reported, it is unknown if corrosion could have jeopardized the soundness of the tank. Documented use of the Helipad by non-ARNG units is unavailable.
1970s Controlled Burn Area	No personnel with first-hand knowledge of the burn area were available to interview during this PA.
Building 4	The method of disposal for the Halon formerly charged in the Building 4 fire suppression system is unknown. Building 4 fire suppression system maintenance activities are also unknown.
Building 410	No former firefighters from the Fire Station located on Camp Pendleton were available for interview. The specific date range of operation for the Fire Station at Camp Pendleton is unknown. The routine practices (training, maintenance of equipment) of the former firefighters, and inventory of equipment at the fire station is unknown.
Non-VAARNG Use at Camp Pendleton	Although VAARNG staff stated that no known AFFF releases have occurred, it is unclear whether non-VAARNG units have ever brought AFFF onto Camp Pendleton as a precautionary measure during airfield operations.
NAS Oceana	The frequency of use and/or maintenance activities at NAS Oceana that may result in AFFF releases is unknown. Although release locations are specified in the 2018 CH2M SI report, the volumes of releases are not always specified. Because groundwater flow direction is unclear, it is unknown if this release affects media at Camp Pendleton.
City of Virginia Beach Fire Station and Training Center	It is unknown if training or maintenance activities that may result in AFFF release occur at the adjacent City of Virginia Beach Fire Training Center. Because groundwater flow direction is unclear, it is unknown if potential releases at the Fire Training Center affect media at Camp Pendleton.
2012 Navy Jet Crash Site	The type and volume of AFFF used in response to the Navy jet crash are unknown.

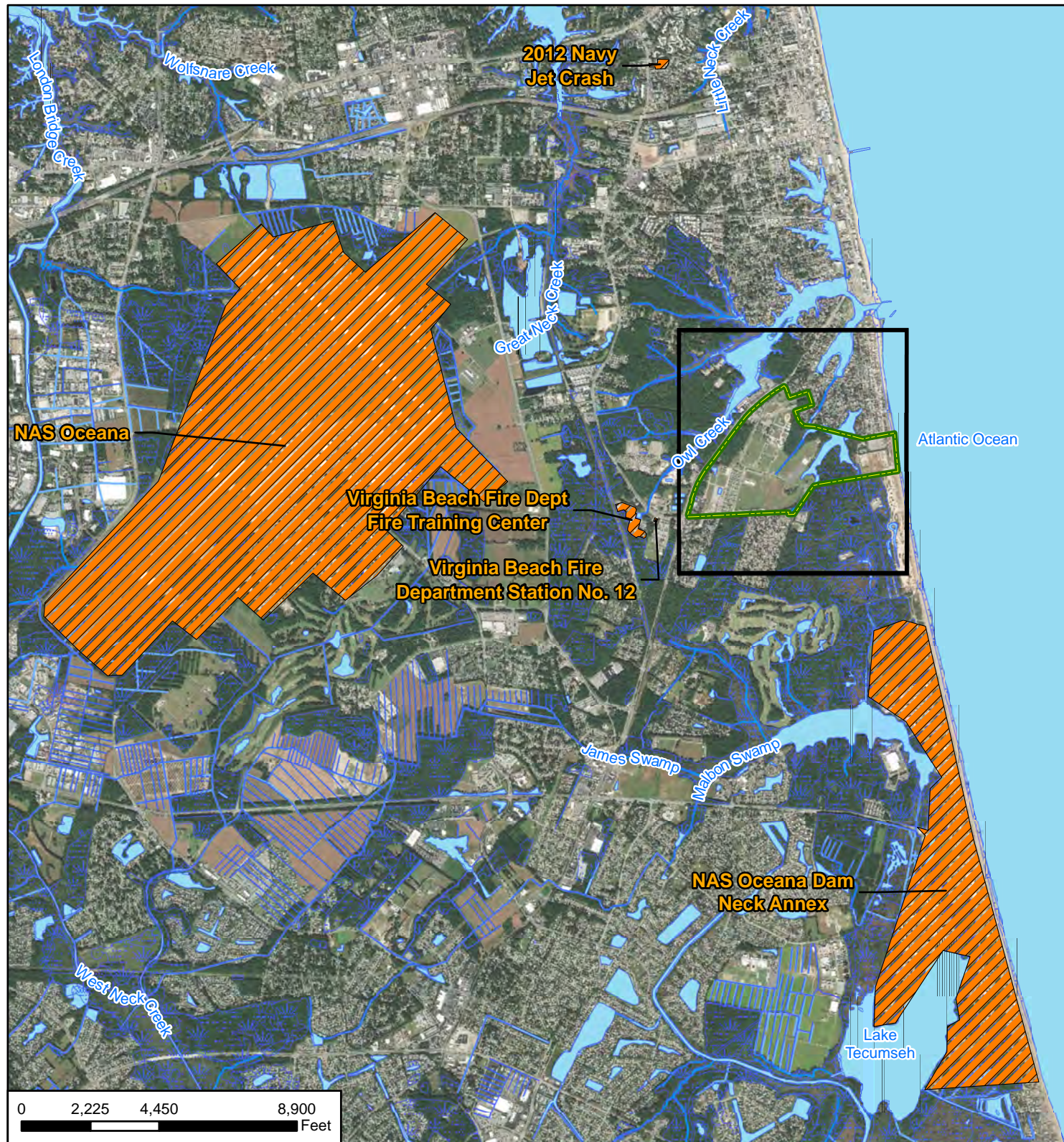
7.3 Potential Future Actions

Interviews with VAARNG facility staff and City of Virginia Beach Fire Department staff whose first-hand knowledge at their positions span 1982-present indicate that no AFFF use has occurred at the facility. Based on data gaps and uncertainties surrounding Building 4, the Helipad, and Building 410 however, it is possible that unknown and undocumented use and storage of PFAS-containing materials may have resulted in PFAS releases. These areas have been identified as AOIs. Based on the preliminary CSM developed for the AOIs, there is potential for PFAS to be exposed to human receptors (see **Section 7.1**). **Table 7-4** summarizes the rationale used to determine if the AOIs should be considered for further investigation under the CERCLA process and undergo an SI.

Table 7-4: PA Findings Summary

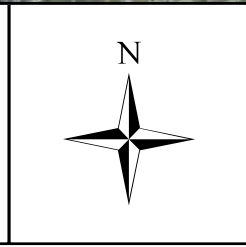
Area of Interest	AOI Location	Rationale	Potential Future Action
AOI 1 Building 4	36°81'92.16"N; 75°98'20.19"W	Uncertainties surrounding use by the Navy	Proceed to an SI, focus on soil, surface water, sediment and groundwater.
AOI 2 Helipad	36°81'61.42"N; 75°97'87.72"W	Uncertainties surrounding use by non-ARNG units	Proceed to an SI, focus on soil, surface water, sediment and groundwater.
AOI 3 Building 410	36°81'64.79"N; 75°98'36.06"W	Uncertainties surrounding use as a Fire Department	Proceed to an SI, focus on soil, surface water, sediment and groundwater.

ARNG will evaluate the need for an SI at Camp Pendleton based on the potential receptors, the potential migration of PFAS contamination off the facility, and the availability of resources.



CLIENT	ARNG				
PROJECT	Preliminary Assessment for PFAS at Camp Pendleton, VA				
REVISED	5/19/2020	GIS BY	MS	5/19/2020	
SCALE	1:53,400	CHK BY	AS	5/19/2020	
Base Map:	Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community				
		PM	RG	5/19/2020	

Area of Interest	River/Stream
Potential PFAS Release	Canal/Ditch
No Suspected Release	
Facility Location	
Water Body	
Wetland	



Summary of Findings	
AECOM	12420 Milestone Center Drive Germantown, MD 20876
Figure 7-1	

C:\Users\stankevich\OneDrive - AECOM Directory\ARNG_PFAS_GIS_60552172\MXD\VA\Camp_Pendleton_Figures\PA_Figures\Fig_7-1_Camp_Pendleton_Summary.mxd

8. References

CH2M HILL, Inc. (CH2M). 1991. Interim RCRA Facility Investigation, Naval Air Station, Oceana, Virginia Beach, Virginia. August 1991.

CH2M Hill Inc. (CH2M). 2018. Basewide Per-and Polyfluoroalkyl Substances, Naval Air Station, Oceana, Virginia Beach, Virginia, August 2018.

City of Virginia Beach, 2017. City of Virginia Beach's Online Mapping Service; 2015 Updated FEMA Flood Insurance Rate Maps.

<https://www.vbgov.com/government/departments/planning/environment/Pages/Flood-Zone-Maps.aspx>. Accessed June 2019.

Joint Legislative Audit and Review Commission of the Virginia General Assembly (JLARC). 1998. The Feasibility of Converting Camp Pendleton to a State Park, Virginia Beach, Virginia, November 1998.

Meng, Andrew A. and Harsh, John F. 1984. Hydrogeologic Framework of the Virginia Coastal Plain, Open-File Report 84-728, U.S. Geological Survey.

National Park Service, 2013. National Register of Historic Places Evaluation/Return Sheet for Camp Pendleton State Military Reservation Historic District. December 20, 2013.

Navy, 2017. Integrated Natural Resources Management Plan, Naval Air Station Oceana and Naval Auxiliary Landing Field Fentress, Cities of Virginia Beach and Chesapeake, Virginia. April

Stantec Consulting Services Inc. 2016. Comprehensive Stormwater Management Plan, SMR Camp Pendleton, Virginia beach, Virginia, August 2016

United States Environmental Protection Agency (USEPA). 1991. *Guidance for Performing Preliminary Assessments under CERCLA*. September 1991.

United State Geological Survey (USGS), 1993. Digital Representation of the 1993 "Geologic Map of Virginia, 2003, CD ROM (ISO-9660).

<https://mrdata.usgs.gov/geology/state/state.php?state=VA>. Accessed June 2019.

United States Geological Survey (USGS), 2006. The Virginia Coastal Plain Hydrogeologic Framework. May 2006.

Virginia Department of Mines, Minerals and Energy, Division of Geology and Mineral Resources (DMME), 2018. <https://www.dmme.virginia.gov/dgmr/mapspubs.shtml>. Accessed June 2019.

Web Soil Survey, Natural Resources Conservation Service, 2019. websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed April 2019.

Appendix A

Data Resources

Data resources will be provided separately on CD. Data resources for Camp Pendleton include:

Camp Pendleton Real Property Documents

- 1992 Department of the Army License for National Guard Purposes DACA65-3-93-11
- 2001 Supplemental Agreement No. 2 to License Contract No. DACA-65-3-92-08
- 2014 Supplemental Agreement No. 3 to License DACA65-3-92-08

Environmental Data Resources

- 1985 Soil Survey of City of Virginia Beach, Virginia by the United States Department of Agriculture
- 2016 State Military Reservation / Camp Pendleton Comprehensive Stormwater Management Plan, Virginia Beach, VA
- 2017 State Military Reservation / Camp Pendleton Spill Prevention, Control and Countermeasure Plan

Camp Pendleton EDR Report

- 2019 Camp Pendleton Environmental Data Resource Report

Adjacent Facility PFAS Reports

- 2018 Basewide Per-and Polyfluoroalkyl Substances Report for Naval Air Station Oceana

Firefighting Material Documents

- 2012 Halon Disposal Record
- 2018 Safety Data Sheet for Knockdown Class A Foam Concentrate
- 2019 Safety Data Sheet for AMEREX Halon 1211
- 2019 Safety Data Sheet for National Foam Universal Gold 1%/3% AR-AFFF

Appendix B

Preliminary Assessment Documentation

Appendix B.1

Interview Records

PA Interview Questionnaire – Fire Station

Facility: Camp Pendleton
 Interviewer: [Redacted]
 Date/Time: 2/6/2019

<p>Interviewee: [Redacted] Title: Battalion Chief/Special Ops Hazmat Team Phone Number: [Redacted] Email: [Redacted]</p>	<p>Can your name/role be used in the PA Report? Y or N Can you recommend anyone we can interview? Y or N _____</p>
<p>1. Roles or activities with the Facility/years working at the Facility.</p> <p>15 years with the Virginia Beach Fire Department (2003/4 – Present) 3 Years as Battalion Chief BC [Redacted] spoke with District Chief [Redacted] for his recollection for the purpose of this interview.</p>	
<p>2. What can you tell us about the history of AFFF at the Facility? Was it used for any of the following activities, circle all that apply and indicate years of active use, if known? Identify these locations on a facility map.</p> <p>Maintenance (e.g., ramp washing) Truck maintenance occurs at the City Vehicle Maintenance shop at Princess Anne Rd and Seaboard Rd Fire Training Areas – Fire training has occurred at Camp Pendleton but never with AFFF Firefighting (Active Fire) – No AFFF use in firefighting at Camp Pendleton Crash – Numerous crashes around Camp Pendleton, but none at Camp Pendleton Fire Suppression Systems (Hangers/Dining Facilities) – No AFFF at Camp Pendleton Fire Protection at Fueling Stations – Unknown by FD staff Non-Technical/Recreational/ Pest Management – No creative uses</p>	
<p>3. Are any current buildings constructed with AFFF dispensing systems or fire suppression systems? What are the AFFF/suppression system test requirements? What is the frequency of testing at the AFFF/suppression systems?</p> <p>Fire Station 12 (adjacent to Camp Pendleton) has a water sprinkler system. No AFFF suppression system, but AFFF is stored at the Fire Station.</p> <p>FD staff did not know the historic capability of the former Camp Pendleton Fire Department.</p>	
<p>4. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam?</p> <p>No, AFFF is not charged in suppression system at Fire Station No. 12, nor any buildings at Camp Pendleton.</p>	
<p>5. How is AFFF procured? Do you have an inventory/procurement system that tracks use?</p> <p>Universal Gold AFFF is procured by the City of Virginia Beach Fire Department. It is procured through the city.</p>	

PA Interview Questionnaire – Fire Station

Facility: Camp Pendleton
Interviewer: [REDACTED]
Date/Time: 2/6/2019

6. What type of AFFF has been/is being used (3%, 6%, Mil Spec Mil-F-24385, High Expansion)?
Manufacturer (3M, Dupont, Ansul, National Foam, Angus, Chemguard, Buckeye, Fire Service Plus)?

Universal Gold 1% / 3% AR-AFFF (National Foam brand).
Fire Station No. 12 also stores National Foam Knockdown Class A Foam Concentrate (non-AFFF)

7. Is AFFF formulated on base? If so, where is the solution mixed, contained, transferred, etc.?

For Fire Department purposes, AFFF is formulated at the scene of the response from 5 gallon buckets.
Most fire stations have 1 AFFF-capable truck, and 2-3 non-AFFF trucks.

8. Where is the AFFF stored? How is it stored (tanks, 55-gallon drums, 5-gallon buckets)? What size are the storage tanks? Is the AFFF stored as a mixed solution (3% or 6%) or concentrated material?

In the truck bays at each fire station.

9. How is the AFFF transferred to emergency response vehicles, suppression systems, flightline extinguishers? Is/was there a specified area on the facility where vehicles are filled with AFFF and does this area have secondary containment in case of spills? How and where are vehicles storing AFFF cleaned/decontaminated?

AFFF is mixed at the scene of emergency and mixed directly from 5 gallon buckets.

10. Provide a list of vehicles that carried AFFF, now and in the past, and where are/were they located?

See response to question 7.

11. Any vehicles have a history of leaking AFFF? Do you/did you test the vehicles spray patterns to make sure equipment is working properly? How often are/were these spray tests performed and can you provide the locations of these tests, now and in the past?

No fire trucks have a history of leaking.

PA Interview Questionnaire – Fire Station

Facility: Camp Pendleton
Interviewer: ██████████
Date/Time: 2/6/2019

12. How many FTAs are/were on this facility and where are they? Locate on a map. How many FTAs are active and inactive? For inactive FTAs, when was the last time that fire training using AFFF was conducted at them?

No confirmed fire training areas at Camp Pendleton by the Virginia Beach Fire Department.

13. What types of fuels/flammables were used at the FTAs?

NA

14. What was the frequency of AFFF use at each location? When a release of AFFF occurs during a fire training exercise, now and in the past, how is/was the AFFF cleaned and disposed of? Were retention ponds built to store discharged AFFF? Was the AFFF trickled to the sanitary sewer or left in the pond to infiltrate?

NA. Virginia Beach Fire Department has not used AFFF at Camp Pendleton. The 2012 Navy Jet Crash at Birdneck Rd and Laskan Rd was responded to with AFFF by the Navy Fire Department. The Navy has their own Fire Department that responds to accidents at NAS Oceana, and Navy related incidents in the surrounding areas.

15. Are there mutual aid/use agreements between county, city, local fire department? Please list, even if informal. If formalized, may we have a copy of the agreement? Can you recall specific times when city, county, state personnel came on-post for training? If so, please state which state/county agency, military entity? Do you have any records, including photographs to share with us?

The City of Virginia Beach Fire Department has a mutual aid agreement with other military entities in the surrounding area, as well as Camp Pendleton.

16. Did individual units come on-post with their own safety personnel, did they also bring their own AFFF? Was training with AFFF part of these exercises? How were emergencies handled under these circumstances?

Virginia Beach FD has trained on Camp Pendleton but never with AFFF.

PA Interview Questionnaire – Fire Station

Facility: Camp Pendleton
Interviewer: [REDACTED]
Date/Time: 2/6/2019

17. Did military routinely or occasionally fire train off-post? List units that you can recall used/trained at various areas.

No known Camp Pendleton staff training off-post.

18. Are there specific emergency response incident reports (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

Yes, a Navy jet crashed in the area in 2012 and was responded to with AFFF. Numerous navy incidents have occurred.

19. Do you have records of fuel spill logs? Was it common practice to wash away fuel spills with AFFF? Is/was AFFF used as a precaution in response to fuel releases or emergency runway landings to prevent fires?

No

20. Was AFFF used for forest fires or fire management on-post/off-post? If so, please describe what happened and who was involved?

No

21. Can you provide any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste water treatment plants, and AFFF ponds)?

AFFF is stored at other Virginia Beach Fire Departments in the city, but no known locations at Camp Pendleton. AFFF is also stored/used at NAS Oceana.

PA Interview Questionnaire – Fire Station

Facility: Camp Pendleton
Interviewer:
Date/Time: 2/6/2019

22. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved?

No known creative uses.

23. How is off-spec AFFF disposed (used for training, turned in, or given to a local Fire Station)? If applicable, do you know the name of the vendor that removes off-spec AFFF? Do you have copies of the manifest or B/L?

Unknown.

24. Do you recommend anyone else we can interview? If so, do you have contact information for them?

No other Fire Department staff recommended.

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

<p>Interviewee: <u>[REDACTED]</u> Title: <u>Buildings and Grounds Supervisor</u> Phone Number: <u>[REDACTED]</u> Email: <u>[REDACTED]</u></p>	<p>Can your name/role be used in the PA Report? Y or N Can you recommend anyone we can interview? Y or N _____</p>
<p>1. Roles or activities with the Facility/years working at the Facility.</p> <p>Grounds Supervisor; 1982-Present</p>	
<p>2. Where can I find previous facility ownership information?</p> <p>1988 Virginia Guard Post provides some information. VARRNG HQ could probably provide ownership information.</p>	
<p>3. What can you tell us about the history of PFAS including aqueous film forming foam (AFFF) at the Facility? Was it used for any of the following activities, circle all that apply and indicate years of active use, if known? Identify these locations on a facility map.</p> <p>Maintenance – No VAARNG AFFF use at maintenance areas Fire Training Areas – No VAARNG FTAs Firefighting (Active Fire) – no VAARNG firefighting activities using AFFF at Camp Pendleton Crash – Numerous off-facility crash locations using AFFF; most of them at or near NAS Oceana Fire Suppression Systems (Hangers/Dining Facilities) – Dry chemical fire suppression in kitchen hoods; Navy Building 4 had Halon Fire Protection at Fueling Stations – No AFFF at fueling station Non-Technical/Recreational/ Pest Management – No AFFF use by VAARNG, or known AFFF use by other entities Metals Plating Facility – None known Waterproofing Uniforms (Laundry Facilities) – None known Other</p>	
<p>4. Fill out CSM Information worksheet with the Environmental Manager.</p>	
<p>5. Are any current buildings constructed with AFFF dispensing systems or fire suppression systems? What are the AFFF/suppression system test requirements? What is the frequency of testing the AFFF/suppression system? Do you have “As Built” drawings for the buildings?</p> <p>No, no buildings constructed with AFFF fire suppression systems</p>	

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

6. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam? If retrofitted, when was that done?

No AFFF fire suppression systems. Old Fire Department (Building 410 or T-140) is now a classroom/storage building. Hoses from the old Fire Department stamped in 1976 do not indicate AFFF use. Only water known to have been used.

7. How is AFFF procured? Do you have an inventory/procurement system that tracks use?

AFFF is not procured at Camp Pendleton by VAARNG; however, other military entities use Camp Pendleton for training and other activities. Their use of AFFF is unknown.

8. What type of AFFF has been/is being used (3%, 6%, Mil Spec Mil-F-24385, High Expansion)? Manufacturer (3M, Dupont, Ansul, National Foam, Angus, Chemguard, Buckeye, Fire Service Plus)?

No AFFF. A wheeled Halon extinguisher was taken off-facility in July 2012. It was previously stored at Cottage 100 (former Motor Pool), now used as a helipad.

9. Where is the AFFF stored? How is it stored (tanks, 55-gallon drums, 5-gallon buckets)? What size are the storage tanks? Is the AFFF stored as a mixed solution (3% or 6%) or concentrated material?

No AFFF is stored at Camp Pendleton by VAARNG.

10. How many FTAs are/were on this facility and where are they? Locate on a map. How many FTAs are active and inactive? For inactive FTAs, when was the last time that fire training using AFFF was conducted at them?

A former Burn Pit for wood and construction debris was used in the 1970s and 1980s exists in what is now VAANG engineering property. VAANG has no aviation assets at Camp Pendleton. Air Guard construction began in 1986, after burn pit use.

Other controlled burns have occurred at Camp Pendleton. 80 buildings in the former barracks area in the southwestern portion of the facility was burned in the 1970s, using no AFFF in response.

NAS Oceana has performed fire training with AFFF at their facility.

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

11. When a release of AFFF occurs during a fire training exercise, now and in the past, how is the AFFF cleaned and disposed of? Were retention ponds built to store discharged AFFF? Was the AFFF trickled to the sanitary sewer or left in the pond to infiltrate?

No AFFF releases by VAARNG, none known by other entities.

12. Can you recall specific times when city, county, and/or state personnel came on-post for training? If so, please state which state/county agency or military entity? Do you have any records, including photographs to share with us?

Camp Pendleton is regularly used by other military entities. NAS Oceana range control controls aviation operations at Camp Pendleton. Records for the use of Camp Pendleton by other entities are not available. AFFF is not suspected, but unknown.

13. Did military routinely or occasionally fire train off-post? List the units that you can recall used/trained at various areas.

No regular training off-post by VAARNG.

14. Did individual units come with their own safety personnel, did they also bring their own AFFF? Was training with AFFF part of these exercises? How were emergencies handled under these circumstances?

Yes, see answer to question 12. Other entities brought their own safety personnel and equipment when training/operating at Camp Pendleton.

15. Are there specific emergency response incident reports (i.e., aircraft or vehicle crash sites and fires)? If so, may we please copy these reports? Who (entity) was the responder?

Virginia Beach Fire Department would have emergency response records, if available. They are responsible for emergency response at Camp Pendleton, and have a fire station and fire training center located off-facility nearby to the southwest.

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

16. Do you have records of fuel spill logs? Was it common practice to wash away fuel spills with AFFF? Is/was AFFF used as a precaution in response to fuel releases or emergency runway landings to prevent fires?

No

17. Was AFFF used for forest fires or fire management on-post/off-post? If so, please describe what happened and who was involved?

No

18. Are there mutual aid/use agreements between county, city, and local fire department? Please list, even if informal. If formalized, may we have a copy of the agreement?

Mutual Aid Agreement may be available through Virginia Beach Fire Department.

19. Can you provide any other locations where AFFF has been stored, released, or used (i.e. hangars, buildings, fire stations, firefighting equipment testing and maintenance areas, emergency response sites, storm water/surface water, waste treatment plants, and AFFF ponds)?

AFFF may has been used in response to a Navy jet crash at the Birdneck Rd and Laskin Rd. Probably used for training at NAS Oceana, and in response to numerous Navy crashes. The Fire Department may also store/use AFFF.

20. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved?

No

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

21. Are there past studies you are aware of with environmental information on plants/animals/ groundwater/soil types, etc., such as Integrated Cultural Resources Management Plans or Integrated Natural Resources Management Plans?

If available, they are available through VAARNG headquarters.

22. What other records might be helpful to us (environmental compliance, investigation records, admin record) and where can we find them?

1988 Virginia Guardpost issue.

23. Do you have or did you have a chrome plating shop on base? What were/are the years of operation of that chrome plating shop?

No.

24. Do you know whether the shop has/had a foam blanket mist suppression system or used a fume hood for emissions control? If foam blanket mist suppression was used, where was the foam stored, mixed, applied, etc.?

NA

25. How is off-spec AFFF disposed (used for training, turned in, or given to a local Fire Station)? If applicable, do you know the name of the vendor that removes off-spec AFFF? Do you have copies of the manifest or B/L?

NA

PA Interview Questionnaire

Facility: Camp Pendleton

Interviewer: [REDACTED]

Date/Time: 2/6/2019

26. Do you recommend anyone else we can interview? If so, do you have contact information for them?

Fire Department. NAS Oceana.

Appendix B.2

Visual Site Inspection Checklists

Visual Site Inspection Checklist

Names(s) of people performing VSI: _____

Recorded by: _____

ARNG Contact: _____

Date and Time: February 6, 2019

Method of visit (walking, driving, adjacent): Walking

Source/Release Information

Site Name / Area Name / Unique ID:

Virginia Beach Fire Department Number 12

Site / Area Acreage:

Approximately 0.25 acres

Historic Site Use (Brief Description):

Fire Station

Current Site Use (Brief Description):

Fire Station

Physical barriers or access restrictions:

access is unrestricted

1. Was PFAS used (or spilled) at the site/area?

Y / N

1a. If yes, document how PFAS was used and usage time (e.g., fire fighting training 2001 to 2014):

AFFF is stored at the station, but has never been used there or trained with at
Camp Pendleton. The adjacent fire training center has likely had AFFF use.

2. Has usage been documented?

Y / N

2a. If yes, keep a record (place electronic files on a disk):

Unknown, reports requested for the FTC

3. What types of businesses are located near the site?

Industrial / Commercial / Plating / Waterproofing / Residential

3a. Indicate what businesses are located near the site

Camp Pendleton, Birdneck Elementary School, Seatak Elementary School, Owl
Creek Municipal Tennis Center, residential areas, Ocean Breeze Waterpark

4. Is this site located at an airport/flightline?

Y / N

4a. If yes, provide a description of the airport/flightline tenants:

No, it is located adjacent to Camp Pendleton

Visual Survey Inspection Log

Other Significant Site Features:

1. Does the facility have a fire suppression system?

Y / N

1a. If yes, indicate which type of AFFF has been used:

No AFFF suppression system exists at the Fire Station but AFFF is stored there in 5 gallon buckets

1b. If yes, describe maintenance schedule/leaks:

Truck maintenance occurs at the City of Virginia Beach Maintenance Shop near Seaboard Rd and Princess Anne Rd

1c. If yes, how often is the AFFF replaced:

AFFF replacement is unknown

1d. If yes, does the facility have floor drains and where do they lead? Can we obtain an as built drawing?

Channelized drainage is unknown, but wetlands and ocean inlets surround the local area

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation?

Y / N

1a. If so, note observation and location:

Area drainage is unknown.

2. Is there channelized flow within the site/area?

Y / N

2a. If so, please note observation and location:

Channelized flow is unknown but NWI indicates wetlands are present near the fire station

3. Are monitoring or drinking water wells located near the site?

Y / N

3a. If so, please note the location:

No known monitoring wells on the fire station property. Camp Pendleton monitoring wells are unknown.

4. Are surface water intakes located near the site?

Y / N

4a. If so, please note the location:

See previous answers

5. Can wind dispersion information be obtained?

Y / N

5a. If so, please note and observe the location.

No

6. Does an adjacent non-ARNG PFAS source exist?

Y / N

6a. If so, please note the source and location.

Oceana NAS has used AFFF in response to emergencies in the area and at NAS Oceana.

6b. Will off-site reconnaissance be conducted?

Y / N

Visual Survey Inspection Log

Significant Topographical Features:

1. Has the infrastructure changed at the site/area?

Y / N

1a. If so, please describe change (ex. Structures no longer exist):

No changes known

2. Is the site/area vegetated?

Y / N

2a. If not vegetated, briefly describe the site/area composition:

Grassy yard on several sides of the fire station

3. Does the site or area exhibit evidence of erosion?

Y / N

3a. If yes, describe the location and extent of the erosion:

None observed

4. Does the site/area exhibit any areas of ponding or standing water?

Y / N

4a. If yes, describe the location and extent of the ponding:

See previous answer

Receptor Information

1. Is access to the site restricted?

Y / N

1a. If so, please note to what extent:

No, access is unrestricted

2. Who can access the site?

**Site Workers / Construction Workers / Trespassers / Residential / Recreational
Users / Ecological**

2a. Circle all that apply, note any not covered above:

Fire station staff

3. Are residential areas located near the site?

Y / N

3a. If so, please note the location/distance:

Residences located approximately 0.3 miles east of the fire station

4. Are any schools/day care centers located near the site?

Y / N

4a. If so, please note the location/distance/type:

Closest daycare on google is approximately 2.25 miles southwest, but two elementary school exist within 0.1 mile.

5. Are any wetlands located near the site?

Y / N

5a. If so, please note the location/distance/type:

See previous responses

Visual Survey Inspection Log

Additional Notes

Photographic Log

Photo ID/Name	Date & Location	Photograph Description

Appendix B.3

Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Camp Pendleton, VA

Why has this location been identified as a site?

Facility is a training site with an aviation support area, runway, fire station, and vehicle maintenance areas. There are confirmed releases in the runway areas. AFFF is currently stored or used at the facility.

Are there any other activities nearby that could also impact this location?

The NAS Oceana Base, VA Beach Fire Training Center, VA Beach Fire station #12

Training Events

Have any training events with AFFF occurred at this site? NO

If so, how often? n/a

How much material was used? Is it documented? n/a

Identify Potential Pathways: Do we have enough information to fully understand over land surface water flow, groundwater flow, and geological formations on and around the facility? Any direct pathways to larger water bodies?

Surface Water:

Surface water flow direction? Northeast, towards Owl Creek

Average rainfall? 4.4 inches

Any flooding during rainy season? No

Direct or indirect pathway to ditches? Direct

Direct or indirect pathway to larger bodies of water? Indirect pathway to Owl Creek and Lake Christine

Does surface water pond any place on site? Unknown

Any impoundment areas or retention ponds? No

Any NPDES location points near the site? Unknown

How does surface water drain on and around the flight line? No

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Generally to the north in the north of the base, and to the south-southwest at the southern half of the base

Depth to groundwater? 4-10 ft

Uses (agricultural, drinking water, irrigation)? Unknown

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? Yes (3)

Is groundwater used for drinking water? No

Are there drinking water supply wells on installation? No

Do they serve off-post populations? No

Are there off-post drinking water wells downgradient ? Unknown

Waste Water Treatment Plant:

Has the installation ever had a WWTP, past or present? No

If so, do we understand the process and which water is/was treated at the plant?

Do we understand the fate of sludge waste? No

Is surface water from potential contaminated sites treated? Unknown

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go? n/a – No fire fighting equipment is washed at Camp Pendleton

2. Are nozzles tested? How often are nozzles tested? Where are nozzles tested? Are nozzles cleaned after use? Where does the rinse water flow after cleaning nozzles?

n/a – No fire fighting equipment is washed at Camp Pendleton

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker: n/a

Construction Worker: n/a

Recreational User: n/a – potentially complete pathways may exist as a result of tire training at the adjacent VA Beach fire training center

Residential: n/a – potentially complete pathways may exist as a result of tire training at the adjacent VA Beach fire training center

Child: n/a – potentially complete pathways may exist as a result of tire training at the adjacent VA Beach fire training center

Ecological: Potentially (Depending on adjacent source releases)

Note what is located near by the site (e.g. daycare, schools, hospitals, churches, agricultural, livestock)?
Recreational area, Housing complex

Documentation

Ask for Engineering drawings (if applicable).

Has there been a reconstruction or changes to the drainage system? When did that occur?

None known

Appendix C Photographic Log

Appendix C - Photographic Log

Army National Guard, Preliminary
Assessment for PFAS

Camp Pendleton

Virginia Beach, VA

Photograph No. 1

Date 2/6/2019

Time 11:45

Description:

Building 410; former fire
station at Camp Pendleton



Orientation:

West

Photograph No. 2

Date 2/6/2019

Time 12:14

Description:

Historical photo of AFFF use
in response to an off-facility
Navy jet crash circa 2013.
Photo shows an aerial image
of damaged apartment build-
ings, an active jet of foam at
the left, and white foam
residue covering much of the
ground pictured.





Orientation:

East

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Camp Pendleton	Virginia Beach, VA
---	-----------------------	---------------------------

Photograph No. 3	
Date 2/6/2019 Time 12:26	
Description: Class A foam stored at the off-facility Virginia Beach Fire Station Number 12	
Orientation: South	

Photograph No. 4	
Date 2/6/2019 Time 12:27	
Description: National Foam Universal Gold AFFF stored at the off-facility Virginia Beach Fire Station Number 12	
Orientation: South	

Appendix C - Photographic Log

Army National Guard, Preliminary
Assessment for PFAS

Camp Pendleton

Virginia Beach, VA

Photograph No. 5

Date 2/6/2019

Time 12:33

Description:

Off-facility Virginia Beach
Fire Department Fire Training
center

Orientation:

Southwest

