Final
Preliminary Assessment Report
Vega Baja Readiness Center, Vega Baja, Puerto Rico

Perfluorooctane-Sulfonic Acid (PFOS) and Perfluorooctanoic Acid (PFOA) Impacted Sites
ARNG Installations, Nationwide

March 2020

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Acronyms and Abbreviations

°F	degrees Fahrenheit
AECOM	AECOM Technical Services, Inc.
AFFF	aqueous film forming foam
AOI	Area of Interest
ARNG	Army National Guard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CSM	conceptual site model
EDR	Environmental Data Resources, Inc.
FMS	Field Maintenance Shop
FTA	fire training area
HEMTT	Heavy Expanded Mobility Tactical Truck
NOAA	National Oceanic and Atmospheric Administration
OWS	Oil-water separator
PA	Preliminary Assessment
PFAS	per- and poly-fluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
PRARNG	Puerto Rico Army National Guard
SI	Site Inspection
US	United States
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USDOI	United States Department of the Interior
USGS	United States Geological Survey
VSI	visual site inspection
WWTP	Wastewater treatment plant

Executive Summary

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide*. 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 released as part of firefighting activities, although other PFAS sources are possible.

AECOM completed a PA for PFAS at Vega Baja Readiness Center (also referred to as the "facility"), in Vega Baja, Puerto Rico, to assess potential PFAS release areas and exposure pathways to receptors. The performance of this PA included the following tasks:

- Reviewed data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 21 May 2019
- Interviewed current Puerto Rico ARNG (PRARNG) Vega Baja Readiness Center personnel during the site visit, including the Battalion Executive Officer, the Field Maintenance Shop Supervisor, the Battalion Supply Sergeant, several Sergeants First Class, and the former Fire Station Chief.
- Completed visual site inspections at suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Area(s) of Interest (AOIs) and the facility (**Figure ES-1**)

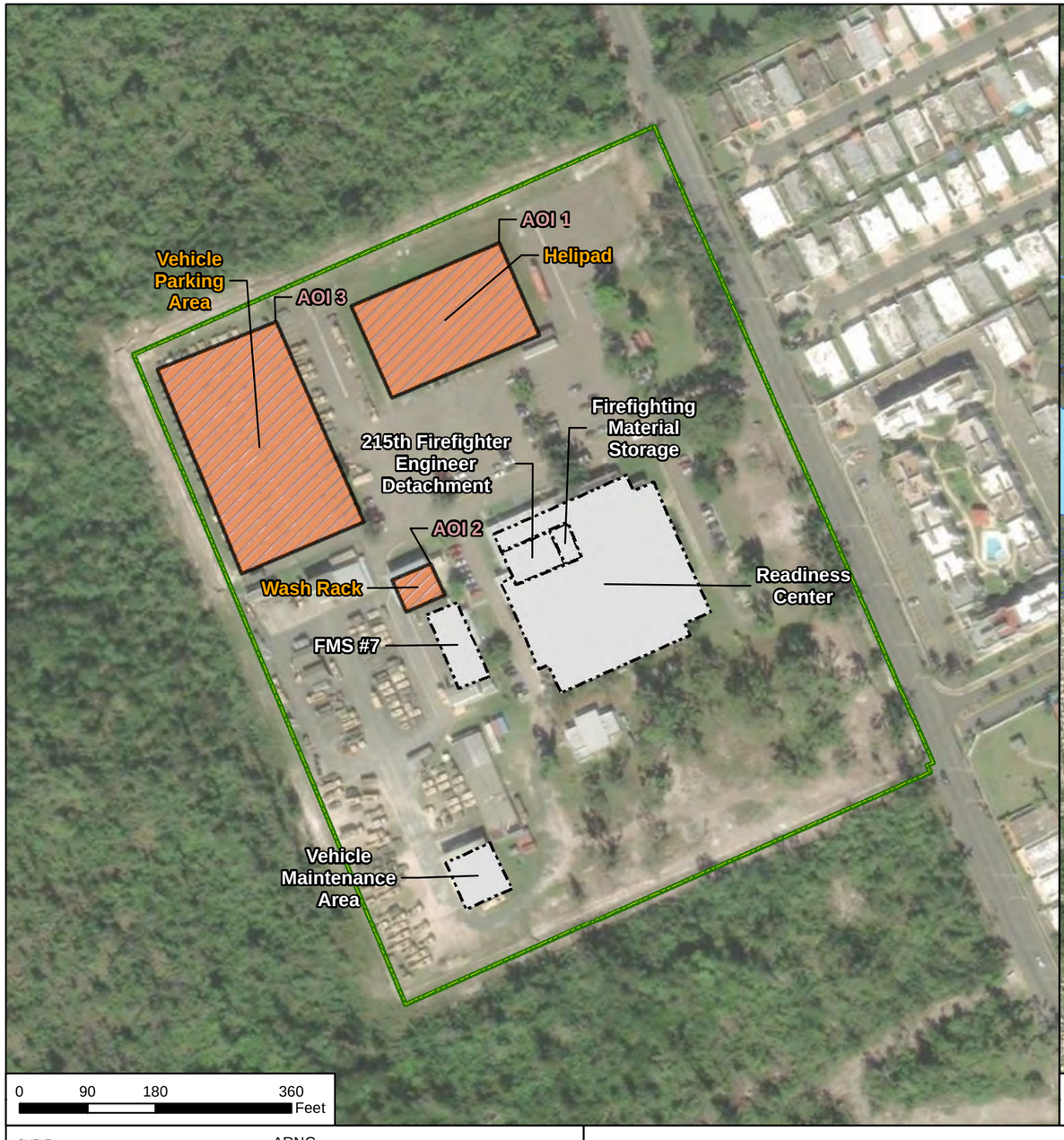
Three AOIs related to potential PFAS release were identified at Vega Baja Readiness Center based on PA data (**Figure ES-1**) and are summarized in **Table ES-1** below:

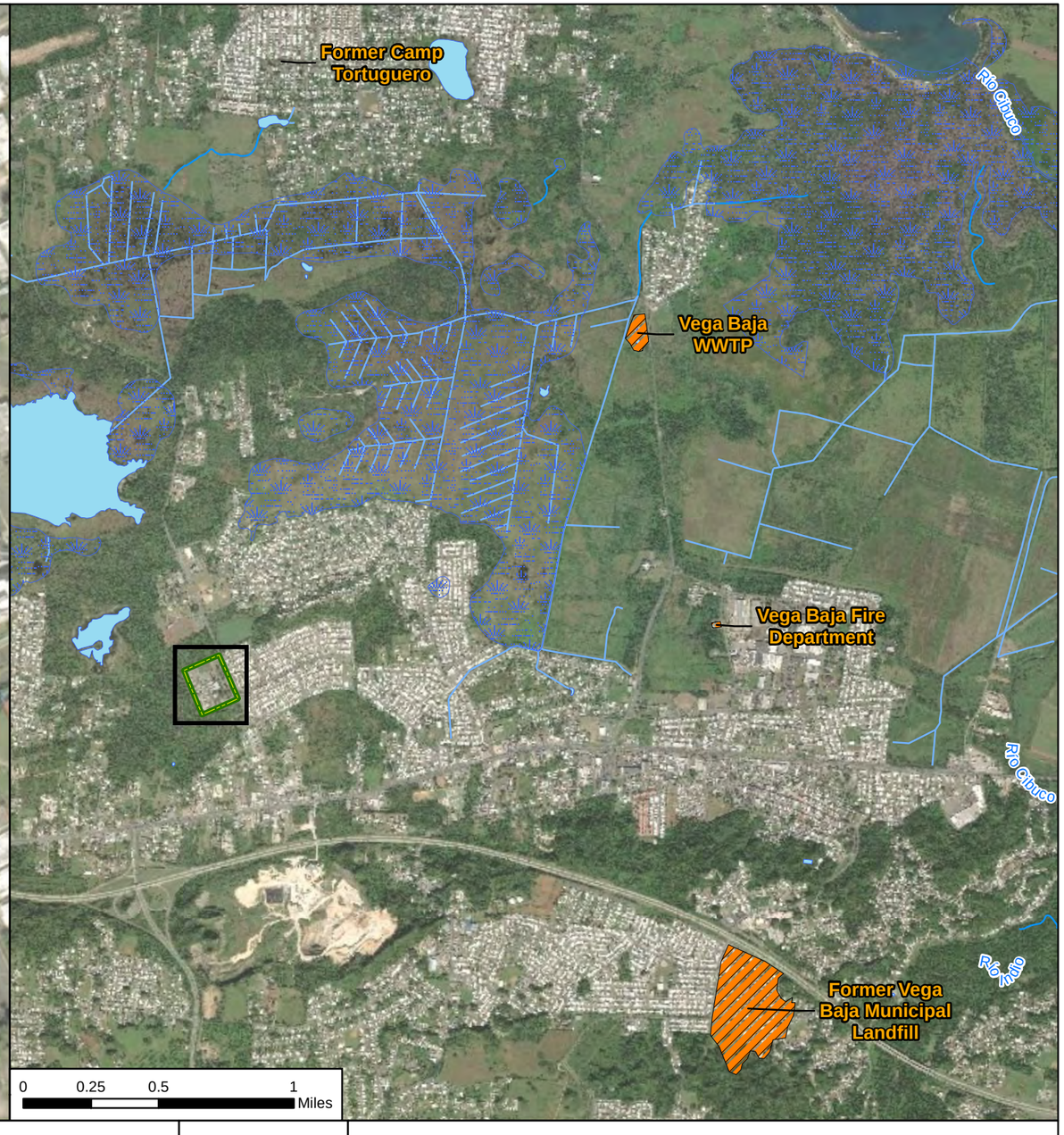
Table ES-1: AOIs at Buckley AASF

Area of Interest	Name	Used by	Potential Release Dates
AOI 1	Helipad	PRARNG	2010
AOI 2	Wash Rack	PRARNG	Unknown-Present
AOI 3	Vehicle Parking Area	PRARNG	2017

Based on the possible PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in surface soil to site workers, construction workers, and trespassers via ingestion and/or inhalation of dust; subsurface soil to construction workers via ingestion and/or inhalation; surface water to off-facility recreational users via ingestion; and groundwater to off-facility residents via ingestion. Several potential adjacent sources of PFAS releases to the environment outside of the VAARNG property boundary were also identified within a 4-mile radius of the facility. The preliminary CSM for Vega Baja Readiness Center is shown on **Figure ES-2**.

Based on the US Environmental Protection Agency (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 the facility.





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Preliminary Assessment for PFAS at Vega Baja Readiness Center, PR				
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SCALE	1:2,160	CHK BY	JW	1/21/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	1/21/2020

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

N

Summary of Findings

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Figure ES-1

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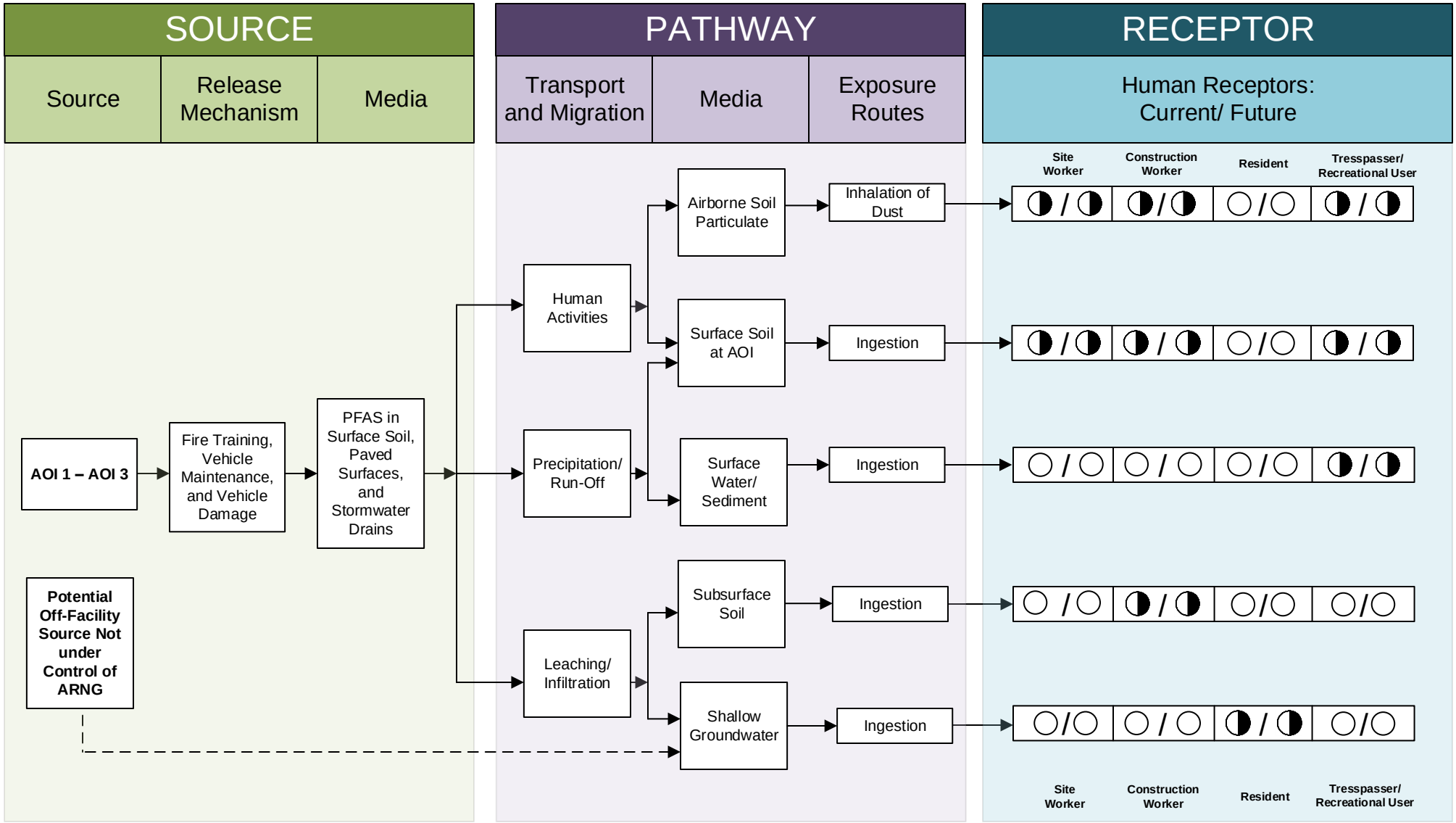

LEGEND

- 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. Dermal contact exposure pathway is incomplete for PFAS.

Figure ES-2
Preliminary Conceptual Site Model
Vega Baja Readiness Center

1. Introduction

1.1 Authority and Purpose

The United States (US) Army Corps of Engineers (USACE) Baltimore District on behalf of the Army National Guard (ARNG)-Installations & Environment Division, Cleanup Branch contracted AECOM Technical Services, Inc. (AECOM) to perform *Preliminary Assessments (PAs) and Site Inspections (SIs) for Perfluorooctanesulfonic acid (PFOS) and Perfluorooctanoic acid (PFOA) Impacted Sites at ARNG Facilities Nationwide* 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. In the absence of federal maximum contaminant levels, some states have adopted their own drinking water standards for PFAS. Puerto Rico does not currently have drinking water standards for PFAS.

This report presents the findings of a PA for PFAS at the Vega Baja Readiness Center (also referred to as the “facility”), in Vega Baja, Puerto Rico, 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 USACE requirements and guidance.

This PA documents locations where PFAS-containing materials may have been released into the environment at Vega Baja Readiness Center. 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 data resources to obtain information relevant to suspected PFAS releases
- Conducted a site visit on 21 May 2019
- Interviewed current Puerto Rico (PRARNG) Vega Baja Readiness Center personnel during the site visit, including the Battalion Executive Officer, the Field Maintenance Shop (FMS) Supervisor, the Battalion Supply Sergeant, several Sergeants First Class, and the former Fire Station Chief
- Completed visual site inspections (VSIs) at known or suspected PFAS release locations and documented with photographs
- Developed a preliminary conceptual site model (CSM) to outline the potential release and pathway of PFAS for the Area(s) of Interest (AOIs) and the facility

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 fire training areas (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** – **Preliminary 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

The Vega Baja Readiness Center is situated between residential areas, recreational fields, and a wildlife refuge area off State Road 687, in the Vega Baja Municipality of Puerto Rico (18°26′59.34″N; 66°25′11.28″W) (**Figure 1-1**). The facility currently hosts a PRARNG Engineer Battalion and a PRARNG Firefighter Engineer Detachment. The facility comprises approximately 15 acres and includes several parking areas, office space, a gym, FMS #7, a wash rack, additional vehicle maintenance areas, a fire department storage area, a helipad, and other improvements.

The US Army established Camp Tortuguero, which encapsulated the current Vega Baja Readiness Center property, in 1941 for basic training purposes. The full extent of the former Camp Tortuguero is unknown. The PRARNG licensed a portion of the former Camp Tortuguero including a small arms firing range between 1947 and 1976. It is unknown whether the Vega Baja Readiness Center was acquired by the PRARNG at the same time. Aerial imagery included in the facility Environmental Data Resources, Inc. (EDR) report (**Appendix A**) shows activity within the current property boundary as early as 1977. Real property documents for the facility, including a certificate of title, are included in **Appendix A**. The former Camp Tortuguero was transferred to the Puerto Rico Land Authority in 1980.

1.5 Facility Environmental Setting

This section presents information derived from several sources, including the US Department of the Interior (USDOI) 1959 Geological Survey Professional Paper 317-A (Kaye, 1959), the USDOI 1978 Geological Survey Professional Paper 1012 (Giusti, 1978), a 2000 Record of Decision document for a nearby environmental investigation (USEPA, 2000), the US Geological Survey (USGS) 2014 Scientific Investigations Map 3296 (Gomez-Gomez et. al, 2014), and the US Department of Agriculture Guide to the Ecological Systems of Puerto Rico (Miller, Gary L.; Lugo, Ariel E, 2009). The Vega Baja Readiness Center lies within the limestone uplands of north central Puerto Rico, approximately 2.5 miles southeast of the island's northern coast. The northern coast is lined with small bays and lagoons. The karst terrain of the North Coast Limestone Province generally consists of a northward-sloping limestone plateau. Topography across the Vega Baja Readiness Center is generally flat but slopes downward to the north in the northern portions of the facility.

1.5.1 Geology

The Municipality of Vega Baja is located within the North Coast Limestone geologic province. The north side of the island is underlain by limestones, marls, and some noncarbonate sediments of late Oligocene to early Miocene age (Kaye, 1959). The bedrock formations in this area comprise a series of early Miocene limestones consisting of the Aymamon Limestone; the Aguada Limestone, which is encountered in the subsurface below the Aymamon Limestone and in sinkholes; and the underlying Cibao formation. The upper member of the Cibao formation likely acts as a lower confining unit. The limestone sequence has a general east-to-west strike and dips gently to the north. Blanket deposits of reddish or sandy clays and sands overlie the limestones in some areas of the Northern Limestone Province. This overburden ranges in thickness from 0 to 100 feet. More recent alluvial deposits are also found along major river valleys (USEPA, 2000). Geologic units are shown on **Figure 1-2**.

1.5.2 Hydrogeology

The Vega Baja Readiness Center is located within the North Coast Limestone aquifer system of Puerto Rico, which comprises three regional hydrogeologic units: an upper aquifer, a middle confining unit, and a lower aquifer. The upper aquifer mainly consists of the Aymamon and underlying Aguada limestones and is confined in coastal areas, such as Vega Baja, by fine-grained surficial deposits (Giusti, 1978). The thickness of the upper aquifer in the regional vicinity of Vega Baja is up to approximately 1,000 feet thick. The base of the upper aquifer is defined by the upper members of the underlying Cibao Formation, which acts as a confining unit to the deeper Cibao aquifer (CDM Federal Programs Corporation, 2000). Three inactive USGS monitoring piezometers are located adjacent to the northern border of the Vega Baja Readiness Center, as indicated by the USGS National Water Information System and shown on **Figure 1-2**. The most recent data from the piezometers indicate that groundwater depth is approximately 24 to 26 feet below ground surface in piezometer USGS 182712066251700; data are included in **Appendix A**. Groundwater depth at the inactive piezometer was last recorded in 2008 (USGS, 2019). Groundwater is expected to flow northwest towards Laguna Rica, Laguna Tortuguero, and the Atlantic Ocean (**Figure 1-2**).

There are no drinking water wells at the Vega Baja Readiness Center; the facility is provided municipal water by the Puerto Rico Aqueducts and Sewers Authority. According to the facility EDR Report, several water wells are located within a 1-mile radius of the facility, including one public water supply well located approximately 0.6 miles to the east. 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 the Vega Baja Readiness Center.

1.5.3 Hydrology

The Vega Baja Municipality is located in the Rio Cibuco watershed, between the Rio Grande de Manatí and the Rio Cibuco. Both rivers originate in the Cordillera Central mountain range, flow north through the foothills, and ultimately discharge unto the Atlantic Ocean. Flooding may occur during periods of heavy rainfall (Gomez-Gomez et. al, 2014).

There are no surface water bodies located within the facility boundary. General surface water flow at the facility flows north/northeast towards stormwater drains and culverts along State Road 687. The freshwater lake Laguna Rica and its smaller surrounding wetlands are located approximately 0.2 miles west of the Vega Baja Readiness Center facility boundary. The Laguna Tortuguero, which is listed by the National Wetlands Inventory as an estuarine and marine deepwater habitat, is located approximately 0.8 miles northwest of the facility (**Figure 1-3**) (United States Fish and Wildlife Service, 2019). Laguna Tortuguero is a designated wildlife refuge area.

Surface water runoff at FMS #7, and the Wash Rack specifically, is captured by basins directing flow to an oil-water separator (OWS), which then discharges to stormwater drains. A wastewater treatment system that captures runoff and includes degreasing, chlorox treatment, and photonization components is also established at the Wash Rack. The wastewater is stored in a 3,000-gallon tank and collected by a private contractor for disposal as needed, approximately once per every two years. Information on the private contractor and location of disposal was not available for this PA.

1.5.4 Climate

Puerto Rico's maritime climate experiences warm sea breezes throughout the year, preventing major fluctuations in temperature. The average temperature in the summer in the nearby town of Manatí, which is located approximately 4 miles southwest of the facility, is 80.5 degrees Fahrenheit (°F), while the average temperature in the winter is 74.7 °F (National Oceanic and Atmospheric Administration [NOAA], 2019). The coastal plains endure the smallest temperature fluctuations. Seasonal variation in the temperate zone is very low; however, there is considerable variation in temperature and precipitation resulting from variable topography and prevailing winds. The east-west mountain chain intercepts the easterly trade winds and provides the north side of the island with an abundance of rain (Miller, Gary L.; Lugo, Ariel E, 2009). Rainfall is distributed throughout the year, with May through November considered as the rainy period. January to March is dryer than May through August, but may have cold fronts coming in from the temperate zone to the north that can produce rain. Annual precipitation in Manatí is approximately 61.64 inches (NOAA, 2019).

Puerto Rico is in the hurricane belt of the western Atlantic and Caribbean. Hurricanes are Puerto Rico's predominant weather problem because of the catastrophic high winds and waves, large volumes of rain, and the enormous structural change they can produce on natural ecosystems, and on human populations and their infrastructure. Typically, six to ten hurricanes develop yearly in the western North Atlantic region. Hurricanes have impacted Puerto Rico recently, most notably with Hurricane Maria in 2017 (Miller, Gary L.; Lugo, Ariel E, 2009).

1.5.5 Current and Future Land Use

According to PRARNG personnel, the land use at the Vega Baja Readiness Center is expected to remain the same.

CLIENT	ARNG			
Preliminary Assessment for PFAS at Vega Baja Readiness Center, PR				
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SCALE	1:18,000	CHK BY	JW	11/14/2019
Base Map: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI,		PM	RG	11/14/2019

Facility Location

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Figure 1-1

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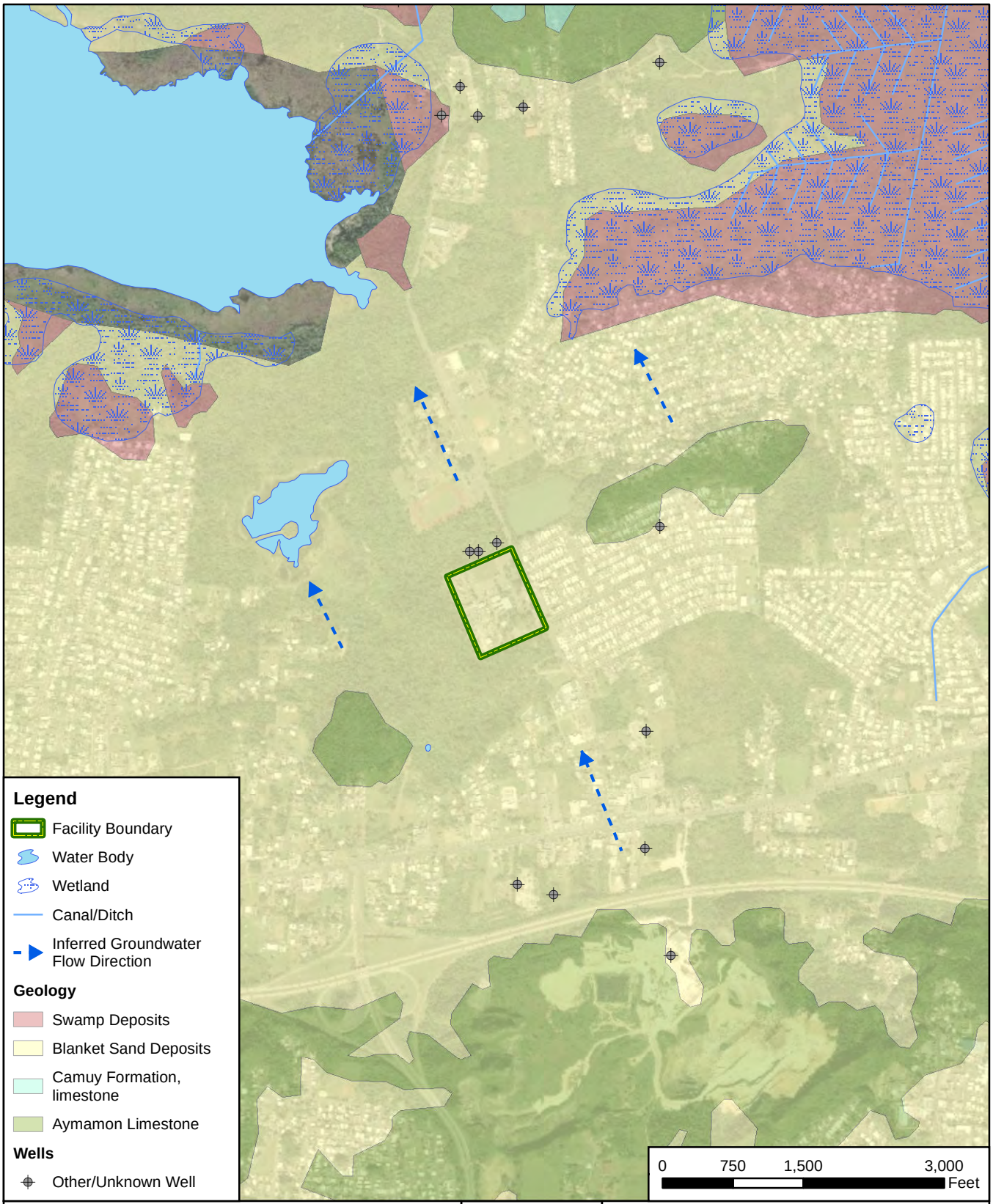

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Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	11/21/2019

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Groundwater Features

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Figure 1-2

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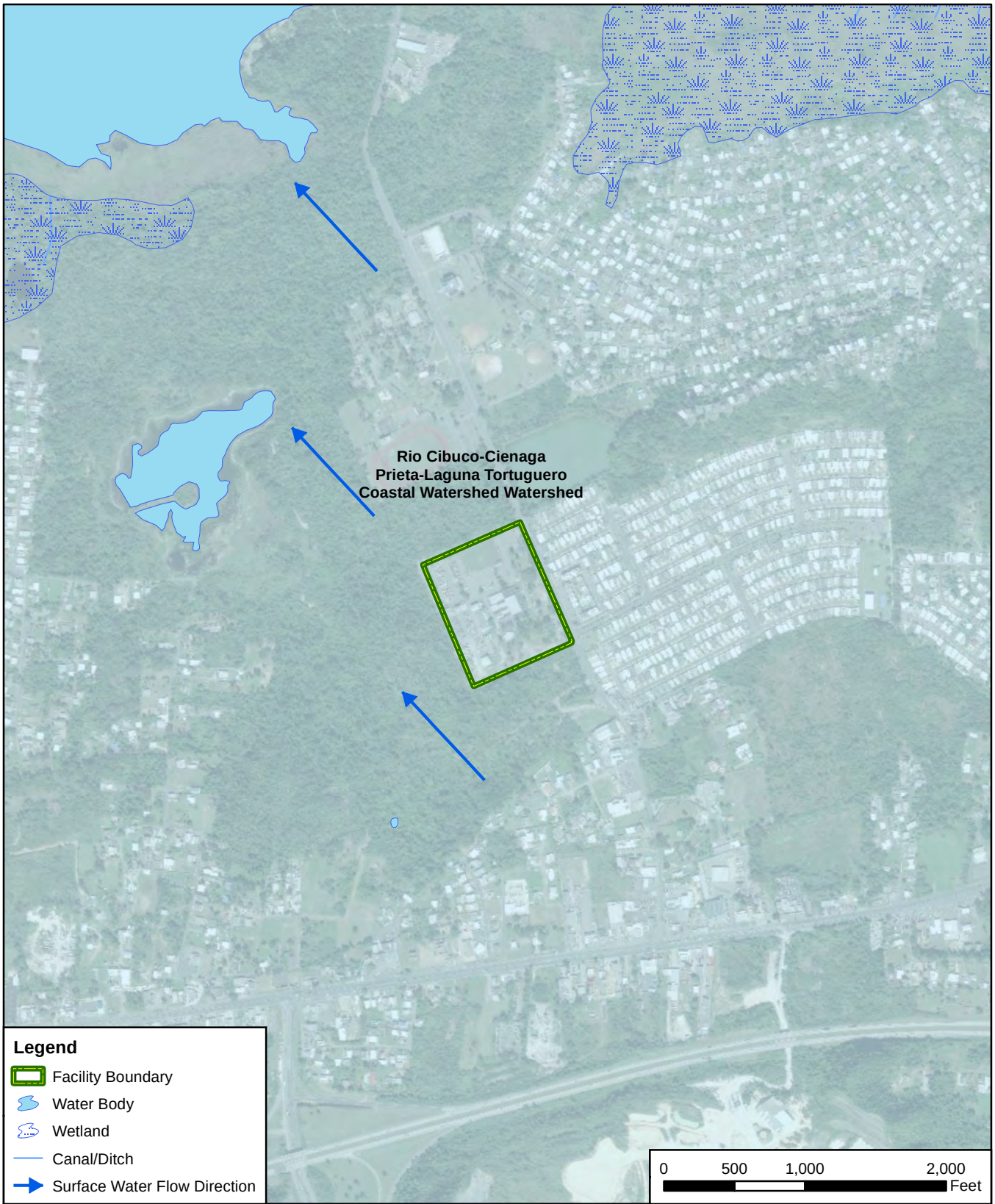

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Surface Water Features

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Figure 1-3

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2. Fire Training Areas

FTAs are considered areas where deliberate discharge of AFFF or other firefighting materials is performed for purposes of training personnel.

2.1 Helipad

The Firefighter Engineer Detachment's presence at the Vega Baja Readiness Center is largely administrative. The detachment occupies office and material storage space within the Readiness Center and stores firefighting vehicles at the facility. No formal fire training exercises occur at the facility, nor does any training by non-PRARNG units; however, a PRARNG interviewee stated that a one-time fire training event using only water occurred in 2010 at the helipad near the northern boundary of the facility property (**Figure 2-1**). No evidence indicates that AFFF has ever been used for training at the helipad. No other known fire training events have occurred at the facility. Regular fire training by the detachment occurs at Camp Santiago.

Two firefighting vehicles are occasionally stored at the facility. At the time of the visit, one Osh Kosh water tanker truck with a 50-gallon AFFF tank and a 2,500-gallon water tank was stored at the facility. PRARNG personnel stated that firefighting vehicle nozzles have experienced corrosion, but no AFFF leaks have ever occurred. The make and model of the second firefighting vehicle occasionally stored at the facility is unknown, but PRARNG staff stated during interviews that is it not capable of storing or using AFFF.

Because facility personnel stated that firefighting vehicle nozzles have experienced corrosion, it is possible that the integrity of firefighting vehicle tanks and lines may be compromised. As such, AFFF may potentially migrate into the vehicle bulk tanks, or remain present in vehicle nozzles during nozzle testing and fire training. Based on the reported corrosion of vehicle nozzles, the one-time fire training event at the helipad may have resulted in PFAS releases to the environment. The helipad is considered a potential PFAS release area.

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Preliminary Assessment for PFAS at Vega Baja Readiness Center, PR				
REVISED	1/21/2020	GIS BY	MS	1/21/2020
SCALE	1:2,160	CHK BY	JW	1/21/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	1/21/2020

Fire Training Area

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Figure 2-1

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3. Non-Fire Training Areas

Several non-FTAs where AFFF was potentially stored and/or released were investigated during the PA. A description of each non-FTA is presented below, and the non-FTAs are shown on **Figure 3-1**.

3.1 Readiness Center

The Readiness Center is the largest structure within the facility and comprises an indoor gym, dining facility, office areas, classroom training spaces, materials storage rooms for the PRARNG Engineer Battalion, and equipment storage room for the PRARNG Firefighter Engineer Detachment; it is located in the center of the PRARNG property (18°26'59.57"N; 66°25'11.49"W).

The fire suppression system within the Readiness Center consists of a water sprinkler system. According to PRARNG personnel, AFFF has never been used at the Readiness Center; however, AFFF is stored at the facility. The Firefighter Engineer Detachment stores Chemguard 3% AFFF in 5-gallon buckets within the firefighting materials storage area in Readiness Center. The Material Safety Data Sheet for Chemguard 3% AFFF is included in **Appendix A**. Facility personnel, whose collective tenure spans 2003-present, stated that an AFFF-containing Tri-Max™ mobile fire extinguisher was also formerly stored within the indoor gym area. The Tri-Max™ unit was disposed of in 2007. No evidence indicates that accidental releases have occurred as a result of storing AFFF within the Readiness Center. No known activities resulting in the release of PFAS-containing materials have occurred at the Readiness Center, and the Readiness Center is not considered a potential PFAS release area. Floor drains within the Readiness Center connect to municipal sanitary sewer systems.

3.2 FMS #7

FMS #7 is located adjacent to the Readiness Center to the west (18°26'58.40"N; 66°25'13.56"W). The FMS #7 comprises several maintenance bays and is used for the maintenance of PRARNG vehicles. According to the former Fire Station Chief at the facility, firefighting vehicles receive maintenance, which includes nozzle checks, at FMS #7. The nozzle checks are performed using only water. The Firefighter Engineer Detachment stores an Osh Kosh water tanker truck with a 50-gallon AFFF tank and a 2,500-gallon water tank at the Vega Baja Readiness Center. PRARNG personnel stated that no AFFF releases have occurred as a result of nozzle testing or general maintenance at the FMS or anywhere else on the facility.

There is no affixed fire suppression system at FMS #7; dry chemical handheld fire extinguishers are staged throughout the FMS maintenance bays. Facility staff stated that three AFFF-containing Tri-Max™ mobile fire extinguishers were formerly stored within FMS #7. These fire extinguishers were disposed of in 2007, at the same time as the Tri-Max™ formerly stored in the Readiness Center indoor gym. The Tri-Max™ units formerly stored at the FMS were never used, and no emergencies requiring fire suppression have occurred at FMS #7.

No evidence indicates that accidental releases have occurred as a result of storing AFFF within Tri-Max™ units at the FMS or performing maintenance on firefighting vehicles. No known activities resulting in the release PFAS-containing materials have occurred at FMS #7, and it is not considered a potential PFAS release area. Floor drains at the FMS flow to an OWS and discharge to stormwater drains.

3.3 Wash Rack

The facility Wash Rack is located adjacent to FMS #7 to the north (18°26'59.16"N; 66°25'14.10"W). The Wash Rack is also used to perform maintenance on PRARNG vehicles, including firefighting vehicles. Despite the Wash Rack's use to perform maintenance on firefighting vehicles, PRARNG personnel stated during interviews that no AFFF releases have occurred as a result of nozzle testing or general maintenance at the Wash Rack. Based on the reported corrosion of firefighting vehicle nozzles however, it is possible that the integrity of tanks and lines in the vehicles has been compromised. As such, AFFF may potentially migrate into the vehicle bulk tanks, or remain present in vehicle nozzle during nozzle testing and fire training. Based on the reported corrosion of vehicle nozzles, vehicle maintenance at the Wash Rack may have resulted in PFAS releases to the environment. The Wash Rack is considered a potential PFAS release area.

There is no affixed fire suppression system at the Wash Rack, but the area includes staged dry chemical handheld fire extinguishers. PRARNG personnel stated during interviews that no accidents requiring the use of AFFF fire suppression have occurred at the Wash Rack. Floor drains at the Wash Rack flow to an OWS and discharge to stormwater drains.

3.4 Vehicle Maintenance Area

Another area near the southern corner of the property boundary is used for vehicle maintenance. The Vehicle Maintenance Area is flanked by vehicle parking areas to the north and west, and the facility boundary to the south. A material storage area is present east of the Vehicle Maintenance Area. The Vehicle Maintenance Area is used for similar purposes to the Wash Rack and FMS #7.

There is no affixed fire suppression system at the Vehicle Maintenance Area, and no AFFF has been stored in any capacity in the area during the tenure of PRARNG personnel interviewed. One of the firefighting vehicles typically stored at the Vega Baja Readiness Center has regularly been staged in front of the Vehicle Maintenance Area; however, facility staff stated that no known AFFF leaks have ever occurred. No accidents have occurred requiring the use of AFFF fire suppression at the Vehicle Maintenance Area. No known activities resulting in the release PFAS-containing materials are known to have occurred in the area, and the Vehicle Maintenance Area is not considered a potential PFAS release area.

3.5 Vehicle Parking Area

Several areas within the Vega Baja Readiness Center are used for PRARNG vehicle parking. The Vehicle Parking Area in the northwestern area is regularly used for the parking of firefighting vehicles. According to facility personnel, the water tank cracked on an Osh Kosh Heavy Expanded Mobility Tactical Truck (HEMTT) Model Number M1158 stored in the Vehicle Parking Area in 2017. The HEMTT based water tender is stored and maintained by the Firefighter Engineer Detachment. Photographs of the vehicle are included in **Appendix C**. The vehicle is equipped with a 50-gallon AFFF tank and a 2,500-gallon water tank. During repairs, a private contractor emptied AFFF from the vehicle in a controlled manner and repaired the broken tank. PRARNG personnel stated that no AFFF releases occurred as a result of the broken tank or the required maintenance. AFFF stored in the smaller tank can be mixed with water on the truck as designed, but has never been used at the Vega Baja Readiness Center.

If the vehicle tanks or lines have been compromised, it is possible that AFFF migrated from its tank into other parts of the vehicle. Based on the reported corrosion of vehicle nozzles, it is possible that PFAS was present in the water released from the vehicle's broken tank, or

during the vehicle repair. No AFFF solution was present in the Osh Kosh water tanker truck at the time of the PA site visit, but the Vehicle Parking Area is considered a potential PFAS release area.

Legend

- Potential PFAS Release
- No Suspected Release
- Facility Boundary

0 90 180 360 Feet

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CLIENT	ARNG			
Preliminary Assessment for PFAS at Vega Baja Readiness Center, PR				
REVISED	1/21/2020	GIS BY	MS	1/21/2020
SCALE	1:2,160	CHK BY	JW	1/21/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	1/21/2020

Non-Fire Training Areas

AECOM
12420 Milestone Center Drive
Germantown, MD 20876

Figure 3-1

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4. Emergency Response Areas

No emergency response areas were identified within the Vega Baja Readiness Center property boundary. PRARNG staff confirmed that no known incidents have occurred during their collective tenure (spanning 2003-present), and online research as well as the EDR report (**Appendix A**) also did not indicate that any incidents have occurred at the facility. Emergency responses to crashes sometimes require flame suppression, which may result in the release of PFAS to the environment in the form of AFFF.

The Vega Baja Fire Department provides emergency response for the Vega Baja Municipality, including the Vega Baja Readiness Center.

5. Adjacent Sources

Several potential off-facility sources of PFAS adjacent to the Vega Baja Readiness Center, not under the control of the PRARNG, were identified during the PA through interviews, review of the EDR report for a 1-mile radius surrounding the facility (**Appendix A**), and historical document review. A description of each potential adjacent source is presented below, and the sources are shown on **Figure 5-1**

5.1 Former Camp Tortuguero

The former Camp Tortuguero encapsulated the current Vega Baja Readiness Center property, and extended northeast towards the coast. Historical photos of the Camp were unavailable during this PA, so the exact boundary of Camp Tortuguero is unknown. The EDR report indicates that between 1940 and 1943, the US Army acquired 1383.9 acres for use as a basic training camp and other related military purposes (**Appendix A**). The PRARNG licensed a portion of the former Camp Tortuguero including a small arms firing range between 1947 and 1976. In 1952, the site became surplus and conveyed to the Commonwealth of Puerto Rico. PFAS use by ARNG in firefighting materials, such as AFFF, did not begin until 1969; however, other historical activities may have potentially used PFAS containing materials or resulted in PFAS releases to the environment. Industrial laundry facilities and metal plating activities are examples of potential historical operations capable of resulting in PFAS releases to the environment.

Due to the unknown nature of historical operations at Camp Tortuguero, the Camp is considered a potential PFAS release area as an adjacent source. Camp Tortuguero is located downgradient from the Vega Baja Readiness Center and is not expected to contribute PFAS to soil or groundwater at the PRARNG facility.

5.2 Vega Baja Fire Department

The Vega Baja Fire Department is located approximately 1.8 miles east of the Vega Baja Readiness Center, in the neighborhood of Las Flores in the city of Vega Baja (18°27'13.05"N; 66°23'30.32"W). The Vega Baja Fire Department responds to emergencies at the Vega Baja Readiness Center and surrounding areas; however, no emergencies requiring fire suppression emergency response have occurred at the facility during the tenure of interviewees (2003-present). According to Vega Baja Readiness Center personnel , the Firefighter Engineer Detachment renews a mutual aid agreement with the Vega Baja Fire Department annually. It is unknown whether the Vega Baja Fire Department stores AFFF at the fire station, trains with AFFF, or maintains firefighting vehicles capable of using AFFF.

Due to the unknown firefighting materials and practices by the Vega Baja Fire Department, its fire station is considered a potential PFAS release area as an adjacent source. The Vega Baja Fire Department is located cross-gradient of the Vega Baja Readiness Center and is not expected to contribute PFAS to soil or groundwater at the PRARNG facility.

5.3 Former Vega Baja Municipal Landfill

There are no landfills located within the Vega Baja Readiness Center, nor operating landfills within the vicinity of the PRARNG facility. The former Vega Baja Municipal Landfill is located approximately 2 miles southeast of the facility (18°26'3.06"N; 66°23'23.05"W). The 72-acre former landfill included an unlined and uncapped solid waste disposal and open burning area. The landfill was used for disposal and open burning of commercial, industrial, and domestic waste from about 1948 to 1979. More than 1.1 million cubic yards of waste were disposed of or burned at the landfill.

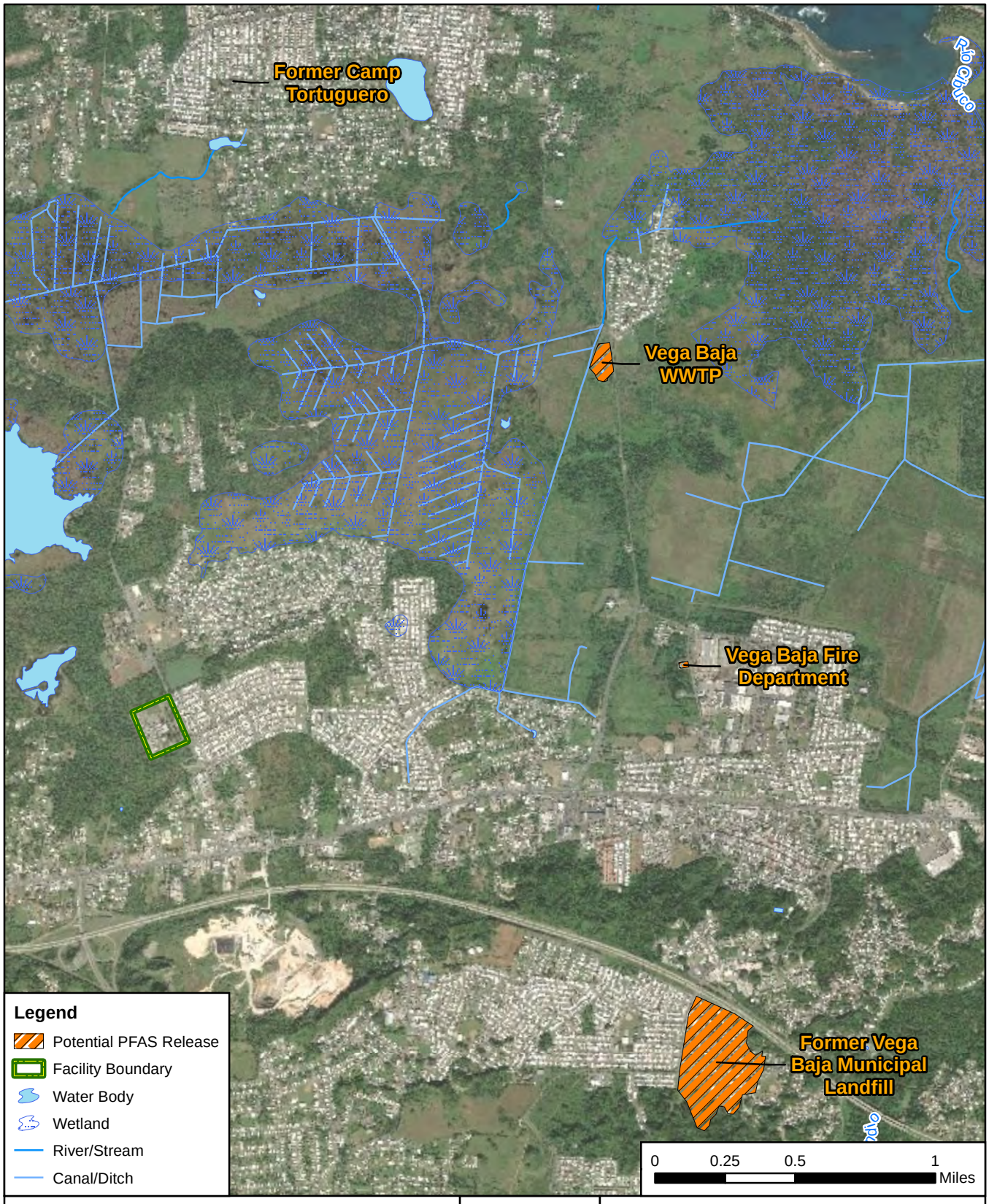
Residents began building homes on portions of the uncapped waste disposal area in the late 1970s (USEPA, 2010). A Record of Decision for the former landfill is included in **Appendix A**.

Landfills are also not usually a primary potential release area of PFAS, but materials disposed of in landfills may create a secondary source of contamination. Such materials may include sludge from a wastewater treatment plant (WWTP) that processes PFAS-laden water or products associated with waterproofing clothes and materials. Due to the heavy use of the landfill, it is considered a potential PFAS release area as an adjacent source.

5.4 Vega Baja Wastewater Treatment Plant

There are no WWTPs located at the Vega Baja Readiness Center. The Vega Baja WWTP is the nearest WWTP and is located approximately 2 miles northeast of the PRARNG facility; it is a publicly owned treatment work that treats sanitary wastewater through secondary treatment of the domestic sewage from Vega Baja. The WWTP provides secondary treatment and discharges its effluent to the Chico River. The sanitary wastewater is processed via grit removal, anaerobic and aerobix reactors, secondary sedimentation, aerobic digestion, and ultraviolet disinfection. Sludge generated at the landfill is disposed in an unknown landfill. The WWTP operates under permit number PR0021679, and a USEPA Fact Sheet for the WWTP is included in **Appendix A**.

WWTPs are not usually a primary potential release area of PFAS, but sludges and liquids from areas of potential release that are treated at WWTPs may create a secondary source of contamination. The Vega Baja WWTP is located cross-gradient of the Vega Baja Readiness Center, and it is not expected to contribute to PFAS in soil or groundwater at the PRARNG facility.



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Preliminary Assessment for PFAS at Vega Baja Readiness Center, PR				
REVISED	12/2/2019	GIS BY	MS	12/2/2019
SCALE	1:31,680	CHK BY	JW	12/2/2019
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS,		PM	RG	12/2/2019

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Adjacent Sources

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Figure 5-1

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6. Preliminary Conceptual Site Model

Based on the PA findings, three areas of interest (AOIs) were identified at Vega Baja Readiness Center: the Helipad, the Wash Rack, and the Vehicle Parking Area. The AOI locations are shown on **Figure 6-1**. 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.

In general, the potential PFAS exposure pathways are ingestion and inhalation. 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 is sparse and continues to be the subject of PFAS toxicological study (National Ground Water Association, 2018). The preliminary CSM for the facility (**Figure 6-2**) indicates which specific receptors could potentially be exposed to PFAS.

6.1 AOI 1 Helipad

AOI 1 comprises the Helipad located near the northern boundary of the facility. The AOI was used for a one-time fire training event using only water in 2010; however, PFAS may have migrated into other parts of the equipment used as a result of AFFF-related corrosion.

Potential PFAS-tainted water was released at AOI 1 on grassy surfaces and may have infiltrated subsurface soil beneath the helipad or via cracks in pavement surrounding the helipad. As a result, PFAS may be present in surface soil and subsurface soil at the AOI.

PFAS are water soluble and can migrate readily from soil to groundwater via leaching; however, drinking water at Vega Baja is resourced from the Puerto Rico Aqueducts and Sewers Authority. No drinking water wells exist at the facility. One public water supply well is located approximately 0.6 miles east of the facility. It is possible that unregistered, private, domestic wells exist downgradient of the AOI in addition to the known public water supply well. Accidental ingestion of groundwater during construction activities at the Helipad is not expected due to the depth to groundwater.

Surface water runoff at AOI 1 generally flows north/northeast towards stormwater drains and culverts along State Road 687. Surface water runoff may also migrate to lake Laguna Rica and its smaller surrounding wetlands located approximately 0.2 miles west of the Vega Baja Readiness Center facility boundary. Laguna Tortuguero is also located approximately 0.8 miles northwest of the facility. There are no surface water bodies within the PRARNG property.

Potential PFAS exposure pathways resulting from releases at AOI 1 are described in **Table 6-1**:

Table 6-1 Exposure Pathways at AOI 1

Pathway	Receptor
Surface Soil	Considered a potentially complete pathway to site workers, construction workers and trespassers via ingestion or inhalation of dust
Subsurface Soil	Considered a potentially complete pathway to construction workers via ingestion or inhalation of dust
Surface Water and Sediment	Considered a potentially complete pathway to off-facility recreational users of nearby water bodies via ingestion
Groundwater	Considered a potentially complete pathway to off-facility residents via ingestion

6.2 AOI 2 Wash Rack

AOI 2 is the Wash Rack located near the center of the facility. Based on the reported corrosion of firefighting vehicle nozzles, it is possible that vehicle maintenance performed at the Wash Rack may have resulted in PFAS-laden water releases to the environment.

Potential PFAS-laden water releases at AOI 2 may have occurred on paved surfaces or on grassy surfaces surrounding the Wash Rack. If PFAS has been released at the AOI, it may have infiltrated subsurface soil beneath the grassy surfaces or via cracks in pavement and joints between areas paved with different materials. As a result, PFAS may be present in surface soil and subsurface soil at the AOI.

Surface water runoff at AOI 2 is captured by basins directing flow to an OWS, which discharges to stormwater drains. Additionally, wastewater is captured in a treatment system at the AOI that includes degreasing, chlorox treatment, and photonization components. The wastewater is stored in a tank and disposed of by a private contractor as needed. Surface water runoff not captured by the catch basins presumably flows north/northeast towards stormwater drains and culverts along State Road 687, and may migrate similarly to surface water runoff at AOI 1.

Potential PFAS exposure pathways resulting from releases at AOI 2 are described in **Table 6-1**:

Table 6-2 Exposure Pathways at AOI 2

Pathway	Receptor
Surface Soil	Considered a potentially complete pathway to site workers, construction workers and trespassers via ingestion or inhalation of dust
Subsurface Soil	Considered a potentially complete pathway to construction workers via ingestion or inhalation of dust
Surface Water and Sediment	Considered a potentially complete pathway to off-facility recreational users of nearby water bodies via ingestion
Groundwater	Considered a potentially complete pathway to off-facility residents via ingestion

6.3 AOI 3 Vehicle Parking Area

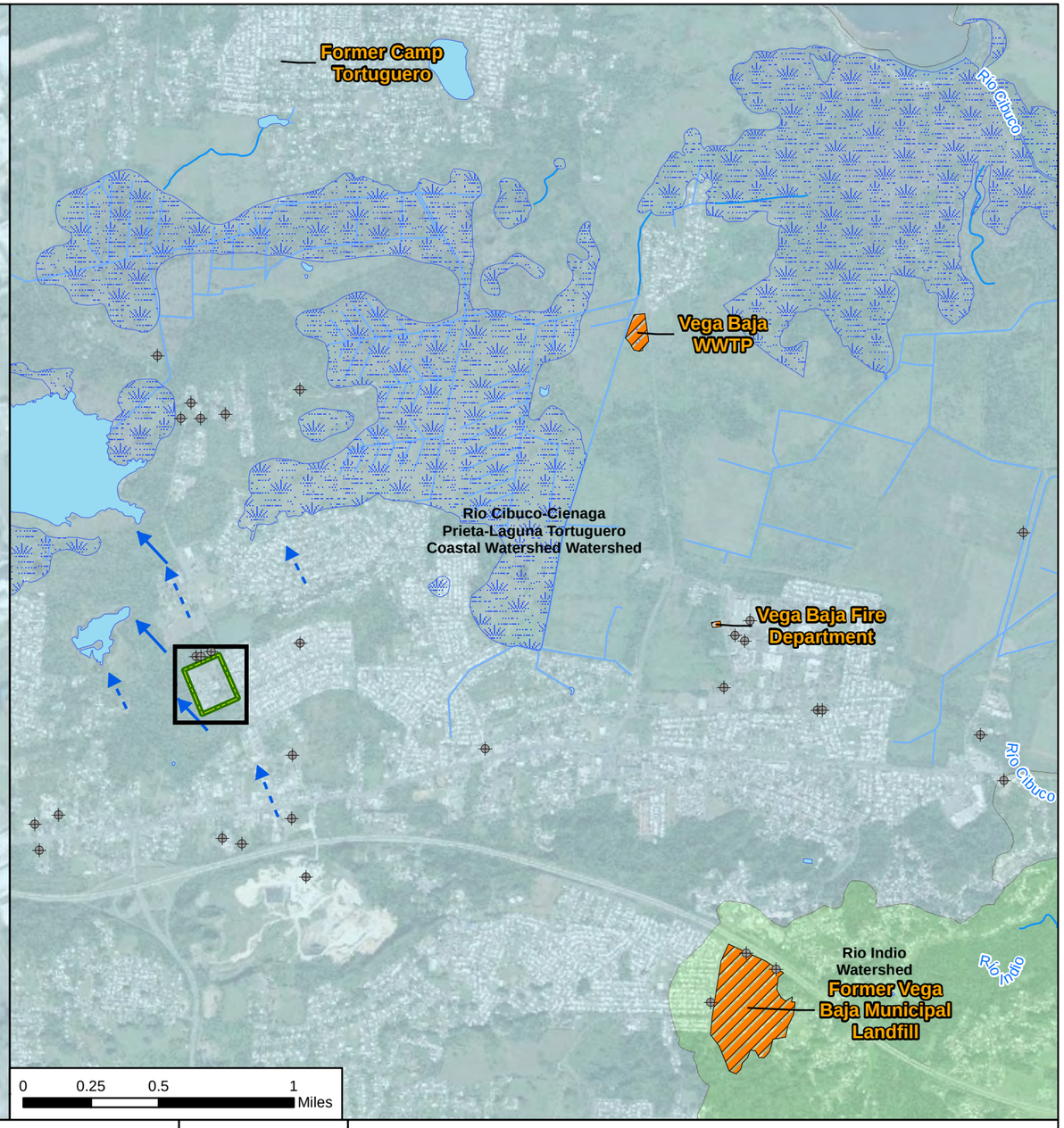
AOI 3 is the Vehicle Parking Area located near the northwestern boundary of the facility. The AOI is used to store facility vehicles, including a HEMTT based water tender that required maintenance in 2017 due to a crack in the vehicle water tank. It is possible that PFAS-tainted water was released from the vehicle as a result of the crack, or during the transferal of AFFF contents from the vehicle during maintenance.

Potential PFAS-tainted water releases at AOI 3 may have occurred on paved surfaces or on grassy surfaces surrounding the Vehicle Parking Area. If PFAS has been released at the AOI, it may have infiltrated subsurface soil via cracks in pavement and joints between areas paved with different materials, or via the soil in the surrounding grassy areas. As a result, PFAS may be present in surface soil and subsurface soil at the AOI.

Surface water runoff at AOI 3 generally flows north/northeast towards stormwater drains and culverts along State Road 687 similarly to runoff at AOI 1. Surface water runoff may migrate to lake Laguna Rica and its smaller surrounding wetlands located off-facility.

Table 6-3 Exposure Pathways at AOI 3

Pathway	Receptor
Surface Soil	Considered a potentially complete pathway to site workers, construction workers and trespassers via ingestion or inhalation of dust
Subsurface Soil	Considered a potentially complete pathway to construction workers via ingestion or inhalation of dust
Surface Water and Sediment	Considered a potentially complete pathway to off-facility recreational users of nearby water bodies via ingestion
Groundwater	Considered a potentially complete pathway to off-facility residents via ingestion



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SCALE	1:2,160	CHK BY	JW	1/21/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	1/21/2020

- Area of Interest
- Potential PFAS Release
- No Suspected Release
- Facility Boundary
- Water Body
- Wetland
- River/Stream
- Canal/Ditch
- Surface Water Flow Direction
- Inferred Groundwater Flow Direction
- Other/Unknown Well

N

Areas of Interest

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Figure 6-1

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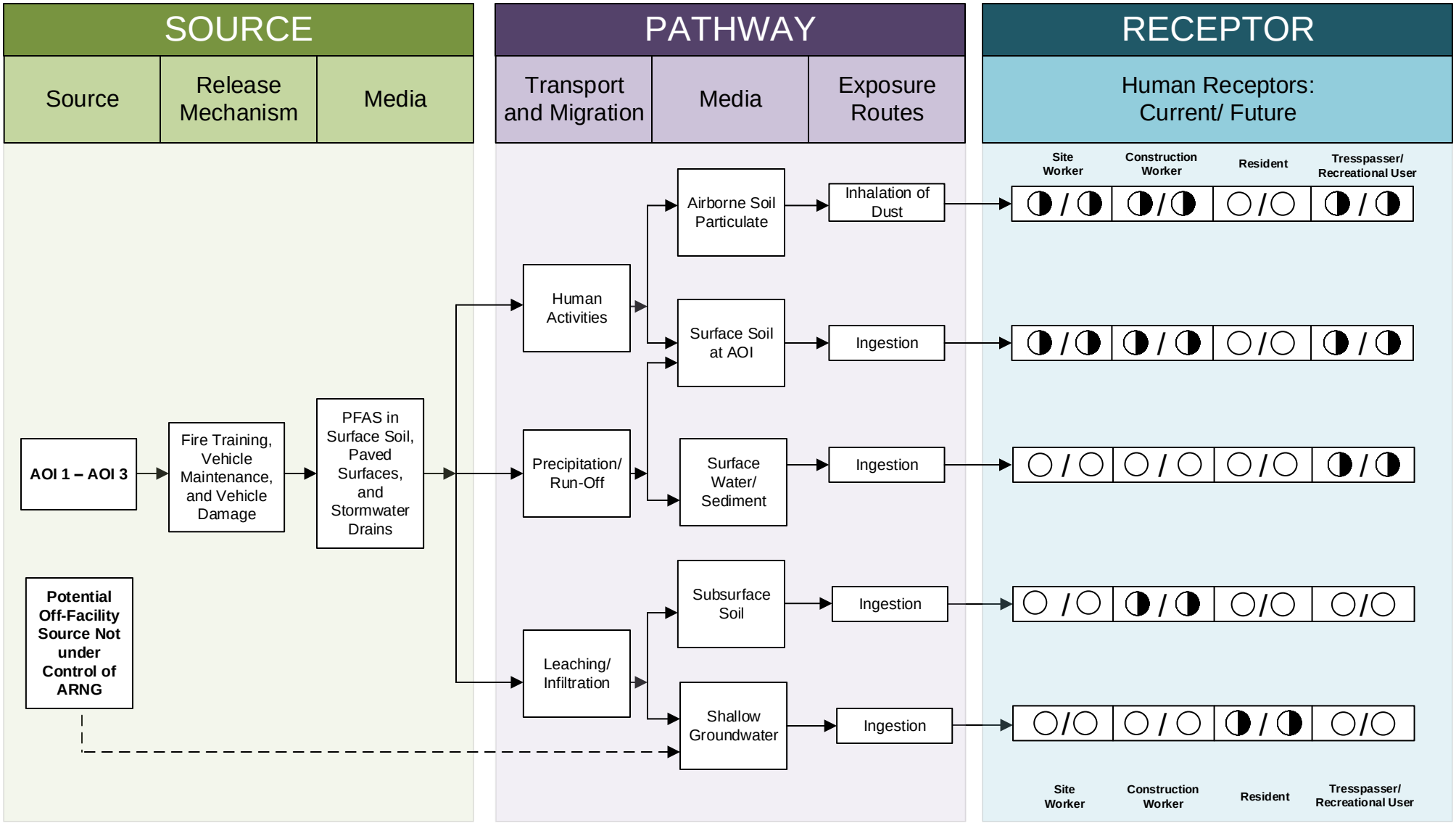


LEGEND

- 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. Dermal contact exposure pathway is incomplete for PFAS.

Figure 6-2
Preliminary Conceptual Site Model
AOI 1 – AOI 3

7. Conclusions

This report presents a summary of available information gathered during the PA on the potential use and storage of AFFF and other PFAS-related activities at the Vega Baja Readiness Center. The PA findings are based on personnel interviews, environmental investigations and reports, historical documents, and the VSI (**Appendix A** and **Appendix B**).

7.1 Findings

Three AOIs related to potential PFAS release were identified at Vega Baja Readiness Center based on PA data (**Figure 7-1**) and are summarized in **Table 7-1** below.

Table 7-1: AOIs at Fort Pickett

Areas of Interest	Name	Used by	Potential Release Dates
AOI 1	Helipad	PRARNG	2010
AOI 2	Wash Rack	PRARNG	Unknown-Present
AOI 3	Vehicle Parking Area	PRARNG	2017

Based on the possible PFAS releases at the AOIs, there is potential for exposure to PFAS contamination in surface soil to site workers, construction workers, and trespassers via ingestion and/or inhalation of dust; subsurface soil to construction workers via ingestion and/or inhalation; surface water to off-facility recreational users via ingestion; and groundwater to off-facility residents via ingestion. Several potential adjacent sources of PFAS releases to the environment outside of the COARNG property boundary were also identified within a 4-mile radius of the facility. The preliminary CSM for Vega Baja Readiness Center is shown on **Figure 6-2**.

The following areas discussed in **Section 2** through **Section 5** were determined to have no suspected PFAS releases to the environment (**Table 7-1**):

Table 7-2: No Suspected Release Areas

No Suspected Release Area	Used by	Rationale for No Suspected Release Determination
Readiness Center	PRARNG	According to PRARNG interviewees, no AFFF has been used within the Readiness Center, and no accidental releases have occurred as a result of storing AFFF within the building.
FMS #7	PRARNG	According to PRARNG interviewees, no AFFF has been released at the FMS as a result of performing maintenance on firefighting vehicles.
Vehicle Maintenance Area	PRARNG	According to PRARNG interviewees, no AFFF has ever been used or released at the Vehicle Maintenance Area. Despite storing a firefighting vehicle in the area, no releases have occurred.

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 Vega Baja Readiness Center. Historically, documentation of PFAS use was not required because PFAS were

considered benign. Therefore, records were not typically kept by the PRARNG on the use, storage, or disposition of AFFF.

The conclusions of this PA are predominantly based on the information provided during interviews with personnel who had direct knowledge of PFAS use at the facility. Sometimes, the provided information was vague. Gathered information has a degree of uncertainty due to the absence of written documentation, the limited number of personnel with direct knowledge, the time passed since PFAS were first used by the ARNG (1969 to present), and a reliance on personal recollection. Inaccuracies may arise in potential PFAS storage and potential release locations. 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 storage of PFAS were reviewed, tenured personnel were interviewed, multiple persons were interviewed for the same potential source area, and potential source areas were visually inspected.

Table 7-2 summarizes the uncertainties associated with the PA:

Table 7-3: Sources of Uncertainty

Location	Source of Uncertainty
Readiness Center	A Tri-Max™ unit was formerly stored in the Readiness Center indoor gym. The type of extinguishant contained by the Tri-Max™ is unknown. No documents for the disposal of the Tri-Max™ were available. PRARNG interviewees stated that disposal may have occurred through the Defense Logistics Agency. No current members of the Firefighter Engineer Detachment were available to interview during the PA site visit. Acquisition and disposal practices regarding AFFF by the detachment are unknown. Interviewees' collective tenure span 2003-present; routine practices by the detachment prior to 2003 are unknown.
FMS #7 and Wash Rack	Three Tri-Max™ units were formerly stored at the FMS. The type of extinguishant used by the Tri-Max™ units is unknown. No documents were available for the disposal of the Tri-Max™ units. PRARNG interviewees stated that disposal of Tri-Max™ units may have occurred through the Defense Logistics Agency. PRARNG interviewees stated that nozzle testing occurs with only water at the FMS and Wash Rack; the frequency of nozzle testing is unknown. One staff member stated that vehicle nozzles have experienced corrosion. The severity of corrosion is unknown, and it is unclear whether it may lead to AFFF migrating from the vehicles during the spraying of water.
Vehicle Maintenance Area	It is unknown whether any firefighting vehicles that have been stored at the Vehicle Maintenance Area have ever contained AFFF.
Vehicle Parking Area	No records for the AFFF removal from the Osh Kosh water tanker truck in 2017 were available during the PA. The specific method of controlling and removing the AFFF from the vehicle is unknown. The contractor that performed the repairs are unknown. The type and concentration of AFFF stored within the vehicle is unknown. It is unclear whether AFFF may have migrated into the water tank and vehicle hose lines as a result of corrosion.
Helipad	No personnel who performed the 2007 fire training with water at the Helipad were available during PA efforts for interview. No records were available documenting the fire training event. The equipment used to perform the fire training is unknown, and it is unclear whether corrosion of parts may have resulted in PFAS-tainted water being released during this event.

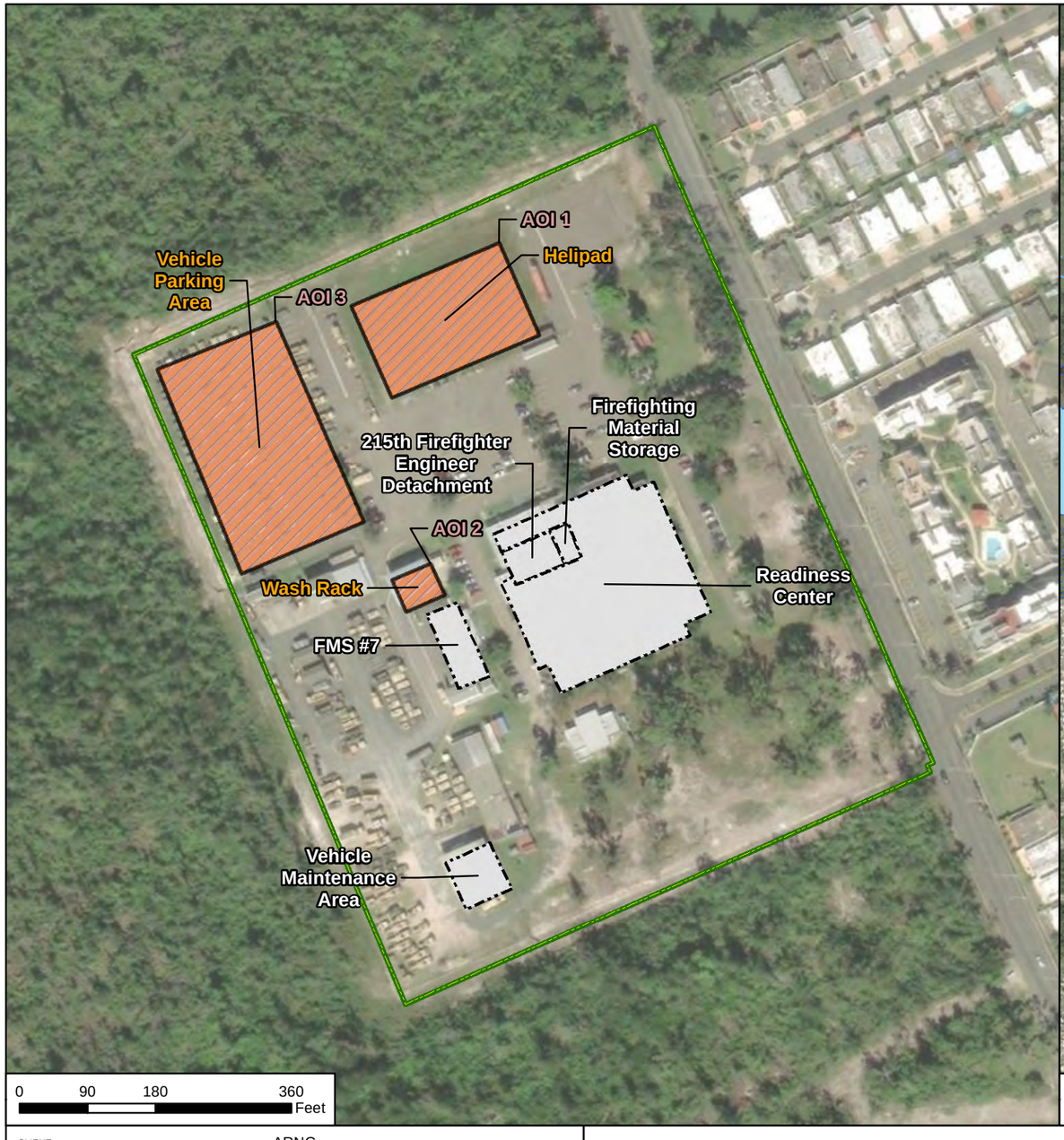
7.3 Potential Future Actions

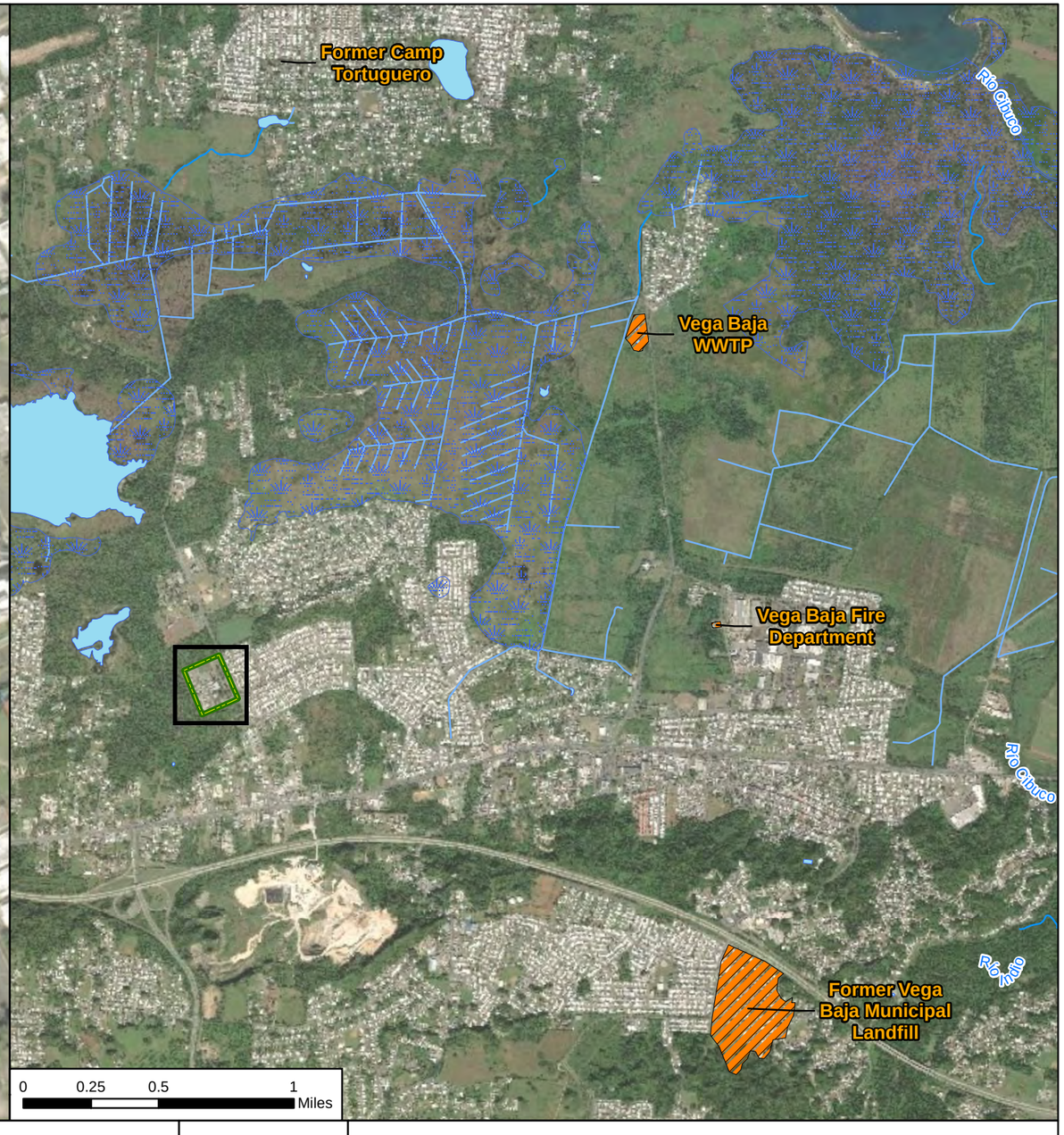
Interviews with Vega Baja Readiness Center personnel , whose first-hand knowledge of the facility span 2003 to present, indicate that current and former ARNG activities may have resulted in PFAS releases at three AOIs identified at the Vega Baja Readiness Center. Based on the preliminary CSM developed for the AOI, 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 AOI 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 Helipad	18°27'2.51"N; 66°25'13.66"W	Potential release of PFAS-tainted water during fire training.	Proceed to an SI, focus on soil and groundwater
AOI 2 Wash Rack	18°26'59.06"N; 66°25'14.06"W	Potential release of PFAS-tainted water during vehicle maintenance	Proceed to an SI, focus on soil and groundwater
AOI 3 Vehicle Parking Area	18°27'0.51"N; 66°25'16.15"W	Potential release of PFAS-tainted water during vehicle tank maintenance	Proceed to an SI, focus on soil and groundwater

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





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SCALE	1:2,160	CHK BY	JW	1/21/2020
Base Map: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community		PM	RG	1/21/2020

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

N

Summary of Findings

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Figure 7-1

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Appendix A
Data Resources

Data Resources will be provided separately on CD. Data Resources for the Vega Baja Readiness Center includes:

Vega Baja Readiness Center EDR Report

- 2019 Vega Baja Readiness Center EDR Report 5714997

Environmental Information Sources

- 1959 USDOI Geological Survey Professional Paper 317: Coastal Geology of Puerto Rico
- 1978 USDOI Geological Survey Professional Paper 1012: Hydrogeology of the Karst of Puerto Rico
- 2000 USEPA Record of Decision for the V&M/Albaladejo Farms Site
- 2014 USGS Hydrogeology of Puerto Rico and the Outlying Islands of Vieques, Culebra, and Mona

Vega Baja Readiness Center Firefighting Material Information

- 2006 Chemguard 3% AFFF C-303 Material Safety Data Sheet

Adjacent Sources Information

- 2010 EPA Superfund Record of Decision: Vega Baja Solid Waste Disposal Operable Unit 2 Soils; EPA ID: PRD980512669
- USEPA Fact Sheet: Vega Baja WWTP NPDES Permit No. PR0021679

Real Property Documents

- 1973 License DACA 17-3-67-3001, Camp Tortuguero and Vega Baja
- 1975 Certificate of Title for Camp Tortuguero
- 1975 Facility Expansion Memo Report Number 75-9-PG 326
- Certificate of Title for Lands Referred to in Agreement No. DAHA70-79-L-0002

Appendix B
Preliminary Assessment Documentation

Appendix B.1
Interview Records

PA Interview Questionnaire – Fire Station

Facility: Vega Baja
Interviewer: J. Witte
Date/Time: 5/24/2019

Interviewee: [redacted] **Title:** Fire Chief **Phone Number:** [redacted] **Email:** [redacted]	Can your name/role be used in the PA Report? **Y** or N Can you recommend anyone we can interview? Y or **N**

1. Roles or activities with the Facility/years working at the Facility.

Formerly the station chief at Vega Baja (2003-2017); MilTech at Camp Santiago (2010-present). Became Fire Chief in 2018.

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.

   Maintenance (e.g., ramp washing) – Truck maintenance occurrs at Vega Baja, including nozzle checks (with only water), at wash rack at FMS.
   Fire Training Areas – No FTAs at Vega Baja
   Firefighting (Active Fire) – AFFF was used off-facility at the 2009 Fort Buchanan Capeco Fire. No other AFFF uses.
   Crash – No known crashes requiring AFFF response.
   Fire Suppression Systems (Hangers/Dining Facilities) – No AFFF in a fire suppression system
   Fire Protection at Fueling Stations – No AFFF suppression/protection systems.
   Non-Technical/Recreational/ Pest Management – None

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?

No

4. Are fire suppression systems currently charged with AFFF or have they been retrofitted for use of high expansion foam?

No

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

AFFF procurement is unclear, but it was procured first in 2006 after the first AFFF capable fire truck was received.

PA Interview Questionnaire – Fire Station

Facility: Vega Baja
Interviewer: J. Witte
Date/Time: 5/24/2019

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)?

Chemguard 3%

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

AFFF is formulated at the scene of its use within the AFFF-capable truck. It is not mixed at Vega Baja.

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?

AFFF is stored on trucks and in the 215th Firefighter Engineer Department storage room within Vega Baja

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 stored in buckets that would be poured into the AFFF tank on a truck. The truck currently stored at Vega Baja is an Osh Kosh water tanker truck with a 50-gal AFFF tank and a 2500-gal water tank.

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

At Vega Baja one truck is stationed there currently, as described above.

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?

The water tanker truck had a cracked water tank. Prior to maintenance on the tank, AFFF was drained from the AFFF tank by a contractor. A request will be made for the AFFF draining record by the private contractor.

PA Interview Questionnaire – Fire Station

Facility: Vega Baja
Interviewer: J. Witte
Date/Time: 5/24/2019

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 FTAs.

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

Diesel, lubricating oils.

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?

AFFF is not known to have ever been used at Vega Baja.

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?

If available, these have been requested.

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?

No fire training occurs at Vega Baja, nor have any outside units come to Vega Baja for hands-on training.

PA Interview Questionnaire – Fire Station

Facility: Vega Baja
Interviewer: J. Witte
Date/Time: 5/24/2019

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

The 215th Firefighter Engineer Department trains at Camp Santiago, and has trained at Ft Buchanan.

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?

2009 Capeco fuel fire at Ft Buchanan required response from the Vega Baja 215th Fire Department. 25 5-gallon buckets of AFFF was used by the fire department in response to that fire.

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 records of fuel spill logs that AFFF was used in response to.

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

Vega Baja is not prone to forest fires. Forest fires at Fort Allen and Camp Santiago are responded to the by the fire department, but only with water and only when they are accessible. Some fires occur in mountainous, remote areas as a result of live fire training on downrange.

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 capable trucks are/have been stored at Vega Baja, Fort Allen, and Camp Santiago:
Vega Baja – 1 Osh Kosh Water Tanker Truck (50-gal AFFF [empty])
Fort Allen – 1 Rosenbauer R-1 Airwolf Firetruck (40-gal AFFF)
Camp Santiago – 2 Humvee Skid Units (1 can carry 10-gal AFFF, the other only water); 1 E-One Pumper Truck (carries 50 gallons of 3% AFFF [unknown if it is full]). 1 more truck – information has been requested.

PA Interview Questionnaire – Fire Station

Facility: Vega Baja
Interviewer: J. Witte
Date/Time: 5/24/2019

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 of AFFF.

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?

AFFF has not been disposed of since it has been received, except in the case that it was used during the 2009 fuel fire at Fort Buchanan.

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

The former fire chief passed away.

PA Interview Questionnaire - Environmental Manager

Facility: Vega Baja / FMS 7
Interviewer: J. Witte
Date/Time: 5/21/2019 0830

Interviewee: Multiple (see below) **Title:** Multiple **Phone Number:** Multiple **Email:** Multiple	Can your name/role be used in the PA Report? (Y) or N Can you recommend anyone we can interview? (Y) or N SGT [redacted]

1. Roles or activities with the Facility/years working at the Facility.

MAJ [redacted] (2016-present)
CW2 [redacted] (2007-present)
SSG [redacted] (2017-present)
SFC [redacted] (2007-present)
SFC [redacted] (2004-present)

* emails and phone numbers on attached page

2. Where can I find previous facility ownership information?

CFMO, [redacted]

- Camp Tortuguero (ARMY) established in 1941 for basic training. At some unknown time, it transitioned into Vega Baja RC. Camp Tortuguero was much larger.

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.

Maintenance – AFFF storage & truck washing/nozzle testing (w/ only water)
Fire Training Areas – None here
Firefighting (Active Fire) – None here. At Camp Santiago & Ft. Buchanon
Crash – None
Fire Suppression Systems (Hangers/Dining Facilities) – Water / dry chemicals
Fire Protection at Fueling Stations – Dry chemical
Non-Technical/Recreational/ Pest Management – none
Metals Plating Facility – none
Waterproofing Uniforms (Laundry Facilities) – none
Other – none

4. Fill out CSM Information worksheet with the Environmental Manager.

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? Water fire suppression system in the gym. Handheld dry chemical extinguishers are staged at the FMS. DFAC uses water sprinkler system.

* AFFF trimax units used to be staged at the FMS (x3), and indoor gym/basketball court (x1).

* The 130th Engineering Battalion has a Fire Department at Vega Baja. AFFF in 5-gal buckets is stored in the FD storage area.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

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.

No suppression system or extinguishers use AFFF.

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

No AFFF has been procured during the tenure of our interviewees, unless done so by the FD. AECOM will inquire with Sgt. [redacted] during Camp Santiago visit.

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)?

Chemguard 3% is stored in buckets in the FD storage area.
AFFF stored in previously existing Trimat units is unknown.

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? Chemguard 3% in 5-gallon buckets. The FD occassionally stores 2 fire trucks at the RC. One is capable of storing AFFF in an on-board 50-gal tank. No AFFF was in the tank when observed. The solution is mixed on the truck as necessary during use, but never at Vega Baja.

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? No FTA's at Vega Baja. The FD presence at Vega Baja is administrative. Nozzle testing does occur as well as some truck washing and maintenance, but AFFF is never released as a result. Nozzle checks using only water occur at wash rack.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

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?

AFFF has never been released at Vega Baja. The FD ~~uses it~~ trains at Camp Santiago and Ft. Buchanon. Trucks are sprayed down after use at these locations, then returned to Vega Baja for maintenance as necessary.

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?

No local FDs, police, etc. train at Vega Baja.
The PRARNG FD renews local mutual aid agreements annually.

* The FD consists of 7 soldiers (doublecheck this for accuracy).

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

Yes, the FD routinely trains at Camp Santiago & Ft. Buchanon.
Forest fire fighting also occurs at Camp Santiago.

* Ft. Buchanon is an ARMY facility, which is also used by Navy, marines, NG, etc.

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?

NA - no units come to train at Vega Baja. FD training at Vega Baja includes only classroom training.

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? No.

* Interviewees recalled a dollar store ("always 99¢") arson fire in the community following Hurricane Maria in 2017 that the FD responded to but only water was sprayed.

* Additionally, the fire truck tank was cracked in 2017. A private contractor removed AFFF from the tank so that repairs could be made.

* 2009 - October 23: Fuel fire at Camp Santiago (or Ft. Buchanon?) required Vega Baja FD assistance. The FD sprayed an unknown volume of AFFF.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

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. AFFF not used in response to fuel spills.
No runway present.

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

At Camp Santiago, but not at Vega Baja AC.
*FD fights fires at Camp Santiago. Use of AFFF is unknown.

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?

Yes, shown during interview. Copies requested. The agreements include local support for ARNG from local FD and reciprocal support.

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)?

Known storage locations: FD storage room, gym & wash rack (former trimax's), and fire truck parking areas.

20. Are you aware of any other creative uses of AFFF? If so, how was AFFF used? What entities were involved? No known creative uses.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

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?

CFMO may be able to provide.
As-built drawings, SDSs, and SWPPP requested.

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

Historical information on Camp Tortuguero, FD records potentially kept by SGt [redacted] (Camp Santiago).

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?

Trimaxes disposed of in ~~2012~~ 2007. Disposal included tank content removal (AFFF) and recycling. Potentially through DLA.

PA Interview Questionnaire - Environmental Manager

Facility:_____
Interviewer:_____
Date/Time:_____

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

- Sgt. [redacted]
- [redacted] (Historian at CFMO)

Additional Notes:

- Runoff at the facility flows N/NW towards street culverts / stormwater drains Laguna Tortuguero wildlife refuge exists to the north.
- Runoff from the FMS/wash rack flows through an OWS then discharges as stormwater.
- A wastewater treatment system also captures wash rack runoff. The treatment process includes degreasing (microbes), chlorox treatment, and photonization. Wastewater is stored in a tank and collected for disposal ~2 yrs. (wastewater tank is 3,000 gal)
- No landfill exists on the property.
- The former trimaxes at Vega Baja are never known to have been used.
- [redacted] (1st Sgt) FSC-130:
  - ↳ 30 yrs w/ 130th Battalion, 10 yrs w/ Vega Baja
    - ↳ The fire trucks have never had a breakdown or leak, but ~~to~~ have had corroded nozzles.
- Municipal water is used for drinking water
- The AFFF-capable fire truck is a 1984 OshKosh ~~truck~~ Water Tanker Truck with a 50-gal AFFF tank and a 2,500 water tank.

Appendix B.2
Visual Site Inspection Checklists

Visual Site Inspection Checklist

Names(s) of people performing VSI: J. Witte, CPT Hess, T. Peck, C. Sandoval

Recorded by: C. Sandoval

ARNG Contact: CPT Hess

Date and Time: 21-May-19 0800-

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

Source/Release Information

Site Name / Area Name / Unique ID: AASF Vega Baja and FMS #7

Site / Area Acreage:

Historic Site Use (Brief Description): AASF (ARNG)
Camp Tortuguero (Army)

Current Site Use (Brief Description): AASF (ARNG)

Physical barriers or access restrictions: Gate / Fence with ID check.

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):

Potentially used during firefighting exercises prior to ARNG acquisiti

2. Has usage been documented? Y (N)

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

3. What types of businesses are located near the site? **Industrial / Commercial / Plating / Waterproofing / Residential**

3a. Indicate what businesses are located near the site

Mostly Residential

4. Is this site located at an airport/flightline? Y (N)

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

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:

Chemguard 3% Stored in buckets

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

Fire Suppression System is mainly water.

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

Uncertain - fire department info is needed.

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

Yes, the drains lead to city stormwater.

Transport / Pathway Information

Migration Potential:

1. Does site/area drainage flow off installation? (Y) / N

1a. If so, note observation and location:

Water flows north off facility.

2. Is there channelized flow within the site/area? (Y) / N

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

Drainage culverts and storm drains w/ direct flow north.

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

3a. If so, please note the location:

4. Are surface water intakes located near the site? (Y) / N

4a. If so, please note the location:

Laguna Tortuguero to the north.

5. Can wind dispersion information be obtained? Y / (N)

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

6. Does an adjacent non-ARNG PFAS source exist? Y / (N)

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

6b. Will off-site reconnaissance be conducted? (Y) / N

Will inquire w/ staff at Camp Santiago

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):

Relatively the same since ARNG acquisition.

2. Is the site/area vegetated? (Y) / N

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

Some grassy patches on base, forest/lake surrounding the area.

3. Does the site or area exhibit evidence of erosion? Y / (N)

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

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:

Receptor Information

1. Is access to the site restricted? (Y) / N

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

Perimeter Fence / Gate w/ ID Check

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:

3. Are residential areas located near the site? (Y) / N

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

A few miles / Closer proximity to Camp Caimost across the street

4. Are any schools/day care centers located near the site? Y / (N)

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

5. Are any wetlands located near the site? (Y) / N

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

Protected forest/Park "Laguna Tortuguero" less than a mile away. Due North/northwest of facility.

Appendix B.3
Conceptual Site Model Information

Preliminary Assessment – Conceptual Site Model Information

Site Name: Vega Baja Readiness Center / FMS 7, Vega Baja, Puerto Rico

Why has this location been identified as a site?

The site includes an FMS, houses a firefighting company, and may have stored or used AFFF in the past

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

Former landfill/WWTP/former Army installation

Training Events

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

If so, how often? NA

How much material was used? Is it documented? None

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? North

Average rainfall? 61.64 inches per year

Any flooding during rainy season? None at Vega Baja

Direct or indirect pathway to ditches? Yes

Direct or indirect pathway to larger bodies of water? Indirect path to Laguna Tortuguero and Laguna Rica

Does surface water pond any place on site? No

Any impoundment areas or retention ponds? No

Any NPDES location points near the site? Unknown, information unavailable

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

Preliminary Assessment – Conceptual Site Model Information

Groundwater:

Groundwater flow direction? Expected to flow northwest Unknown, but the city is on municipal water

Depth to groundwater? 24-26 ft bgs

Uses (agricultural, drinking water, irrigation)? Not used

Any groundwater treatment systems? No

Any groundwater monitoring well locations near the site? Yes, former monitoring wells.

Is groundwater used for drinking water? No

Are there drinking water supply wells on installation? No

Do they serve off-post populations? NA

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? No

Do we understand the fate of sludge waste? No

Is surface water from potential contaminated sites treated? No

Equipment Rinse Water

1. Is firefighting equipment washed? Where does the rinse water go?

Firefighting equipment is washed and runoff flows into floor drains at the Wash Rack, and FMS.

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?

Yes, at the Wash Rack and FMS. Testing uses only water.

3. Other?

Preliminary Assessment – Conceptual Site Model Information

Identify Potential Receptors:

Site Worker Yes

Construction Worker Yes

Recreational User Yes

Residential Yes

Child Yes

Ecological Yes

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

The facility is surrounded by recreational/wildlife refuge area, residential area, and commercial area

Documentation

Ask for Engineering drawings (if applicable).

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

Appendix C
Photographic Log

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Vega Baja - FMS #7	Vega Baja, Puerto Rico

Photograph No. 1

Date 5/21/2019

Time 9:30

Description:

AFFF tank cap on the 1984 Osh Kosh Water Tanker Truck

Orientation:

NA

Photograph No. 2

Date 5/21/2019

Time 9:25

Description:

1984 Osh Kosh Water Tanker Truck with a 50-gallon AFFF tank parked in the vehicle parking area at the Vega Baja ARNG facility

Orientation:

North

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Vega Baja - FMS #7	Vega Baja, Puerto Rico

Photograph No. 3

Date 5/21/2019

Time 9:20

Description:

Wash rack at the Vega Baja ARNG facility

Orientation:

East

Photograph No. 4

Date 5/21/2019

Time 9:15

Description:

Vehicle maintenance area at the ARNG Vega Baja facility. Firetrucks have been maintenanced in this location.

Orientation:

Southeast

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Vega Baja - FMS #7	Vega Baja, Puerto Rico

Photograph No. 5

Date 5/21/2019

Time 9:10

Description:

Former firetruck parking area at the Vega Baja ARNG facility

Orientation:

West

Photograph No. 6

Date 5/21/2019

Time 9:05

Description:

Part of the FMS #7 at the Vega Baja ARNG facility

Orientation:

East

Appendix C - Photographic Log

Army National Guard, Preliminary Assessment for PFAS	Vega Baja - FMS #7	Vega Baja, Puerto Rico

Photograph No. 7

Date 5/21/2019

Time 9:00

Description:

Chemguard 3% AFFF stored within the Vega Baja ARNG facility firefighting materials storage area

Orientation:

NA