FINAL WORK PLAN
FY 16 PHASE 1 REGIONAL SITE INSPECTIONS
PER- AND POLYFLUOROALKYL SUBSTANCES

105th AIRLIFT WING
NEW YORK AIR NATIONAL GUARD
STEWART AIR NATIONAL GUARD BASE
NEWBURGH, NY

Contract #: W9133L-14-D-002

Delivery Order 0006

Modification 002

Amec Foster Wheeler Project #: 2-9133-0006

September 20, 2017

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ACRONYMS

105th AWG	105th Airlift Wing
AFFF	Aqueous film forming foam
amsl	above mean sea level
ANG	Air National Guard
bgs	below ground surface
BB&E	BB&E, Incorporated
COCs	Constituents of Concern
COR	Contracting Officer's Representative
DO	Delivery Order
DoD	Department of Defense
DQO	Data Quality Objectives
ELAP	Environmental Laboratory Accreditation Program
FD	Fire Department
FM	Field Manager
FSP	Field Sampling Plan
ft	feet/foot
FTA	Fire Training Area
HASP	Health and Safety Plan
HEF	High Expansion Foam
IDW	Investigation-derived waste
NELAP	National Environmental Laboratory Accreditation Program
NFA	No Further Action
NGB	National Guard Base
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
OWS	Oil Water Separator
PA	Preliminary Assessment
PFAS	Per- and Polyfluoroalkyl Substances
PFHpA	Perfluoroheptanoic Acid
PFHxS	Perfluorohexane Sulfonate
PFOA	Perfluoroocatnoic Acid
PFOS	Perfluorooctanesulfonic Acid
PHAL	Provisional Health Advisory Level
PM	Project Manager
POC	Point of Contact
ppt	Parts per Trillion
PRL	Potential Release Locations
PVC	polyvinyl chloride
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
RP	Responsible Party
SANGB	Stewart Air National Guard Base
SI	Site Inspection
SOP	Standard Operating Procedures

ACRONYMS (continued)

USEPA	United States Environmental Protection Agency
USGS	United States Geologic Survey
WP	Work Plan

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1.0 INTRODUCTION

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) was contracted by the National Guard Bureau (NGB) under Contract # W9133L-14-D-002, Delivery Order (DO) 0006 to conduct Phase 1 Regional Site Inspections (SI) for Per- and Polyfluoroalkyl Substances (PFAS) at multiple Air National Guard (ANG) Installations. The scope of the DO includes preparation of this Work Plan (WP) to conduct Site Inspections (SIs) of Potential Release Locations (PRLs) identified at the 105th Airlift Wing (105 AWG), Stewart Air National Guard Base (SANGB), in the Town of Newburgh, New York. Based on the New York State Department of Environmental Conservation (NYSDEC) March 28, 2017 response to the Draft Final SIWP, the NGB issued a Modification 002 to Contract # W9133L-14-D-002, DO 0006 to install permanent monitoring wells in lieu of temporary monitoring wells, conduct a receptor evaluation, and conduct inspections for potential PFAS migration beyond the SANGB boundary. This Final SI WP has been prepared by Amec Foster Wheeler and presents site background information and findings from the Preliminary Assessment (PA) site visit conducted by BB&E, Inc. (BB&E) and previous investigations conducted under the direction of the NYSDEC, and describes the objectives, procedures, and activities to be conducted to execute the work.

Fifteen PRLs were identified based on locations where Aqueous Film Forming Foam (AFFF) was potentially used or stored. Thirteen of the 15 PRLs were recommended for further inspection. Two PRLs warranted no further action (NFA) based on the findings of no known AFFF release; therefore, those PRLs (PRL #9 - Building 108 and PRL #14 - Outfall 006) are not included in the scope of this SI. A list of the PRLs identified during the PA site visit is presented below.

List of PRLs		
Location	**Use**	**Recommendation**
1. Building 104	Current Fire Station	Soil and groundwater inspection
2. Nozzle Testing Area	Fire Truck Equipment Testing	Soil and groundwater inspection

List of PRLs		
Location	**Use**	**Recommendation**
3.Building 105	Former Fire station	Soil and groundwater inspection
4.Hangar 100	Hangar with AFFF Fire Suppression System (FSS)	Soil and groundwater inspection
5.Hangar 101	Hangar with AFFF FSS	Soil and groundwater inspection
6.Hangar 102	Hangar with AFFF FSS	Soil and groundwater inspection (downgradient)
7.Hangar 300	Hangar with AFFF FSS	Soil and groundwater inspection
8.Hangar 301	Hangar with AFFF FSS	Soil and groundwater inspection
9. Building 108	Pump House	No Further Action
10. Building 200	Fire Truck Maintenance	Soil and groundwater inspection
11. Apron	Fuel Emergency	Soil and groundwater inspection
12. Outfall 002	Storm-Water Outfall	Sediment, surface water and groundwater inspection
13. Outfall 003	Storm-Water Outfall	Sediment, surface water, and groundwater inspection
14. Outfall 006	Storm-Water Outfall	No Further Action
15. Retention Basin	Storm-Water Outfall	Sediment, surface water, soil and groundwater inspection

The following work will be conducted at the base boundary and downgradient of the base boundary in addition to the performance of SI activities at the above referenced PRLs:

- The base boundary will be evaluated through the sampling of a subset of existing monitoring wells;
- Recreation Pond and the tributary leaving Recreation Pond will be evaluated through installation and sampling of one monitoring well, and surface water and sediment sampling;
- Recreation Pond tributaries, Silver Stream and tributaries entering Lake Washington will be evaluated through the installation and sampling of a monitoring well array, and surface water and sediment sampling;
- A receptor evaluation will be conducted within the Towns of Newburgh and New Windsor.

1.1 Site Location

The SANGB is located at the Stewart International Airport, 2.5 miles west of the City of Newburgh, Orange County, New York (**Figures 1** and **2**). The SANGB facilities are located in both the Towns of Newburgh and New Windsor, New York and encompass approximately 280 acres. The SANGB facilities in the Town of Newburgh are zoned for Industrial usage, and are bounded on the west and northwest by Industrial Zones, and on the north and east by Interchange Business Zones. In the Town of New Windsor, the SANGB facilities are zoned for Airport usage, and are bounded by Airport Zones to the south and southwest, Planned Industrial Zones to the southeast, and Office and Light Industrial Zones to the east. The 15 PRLs are located across the SANGB facilities in the Town of Newburgh, as shown on the overview map of proposed sample locations (**Figure 3)**.

1.2 Site History

In 1930, Samuel L. Stewart donated a total of 1,552 acres to the City of Newburgh to develop the Stewart Municipal Airport. Prior to that time, most of the land was used for agricultural purposes. In 1941, a pilot training facility was constructed for cadets of West Point U.S. Military Academy and the field underwent runway extensions and barracks construction. In 1942, the facility was activated as the U.S. Army Air Force Basic-Advance flying school for West Point pilots. In 1947, Stewart Municipal Airport was turned over to the Air Force, who operated the facility as Stewart Air Force Base until 1969.

In 1970, Stewart Air Force Base was deactivated, and the aviation facilities were transferred to the State of New York and operated by the New York Metropolitan Transit Authority. The State of

New York added an additional 8,600 acres and a 4.7-mile long buffer zone to the original 1,552-acre facility to create Stewart International Airport.

In 1983, operation of the airport was transferred from the New York Metropolitan Transit Authority to the New York Department of Transportation. At that time, the SANGB 105th Tactical Air Support Group relocated from Westchester County Airport and occupied the 267-acre facility at Stewart International Airport. After various aircraft and mission changes (including conversion to the C-5 Galaxy), the unit assumed their current name of the 105th Airlift Wing in 1995.

The primary mission of the 105th Airlift Wing at SANGB is to provide peacetime and wartime inter-theater airlift operations using the Boeing C-17 Globemaster III, which replaced the C-5 Galaxy that phased out in 2011. Operations related to the aircraft maintenance include corrosion control, non-destructive inspection, minor painting, fuel cell maintenance, engine maintenance, avionics, repair, hydraulics, washing, and wheel and tire maintenance. Ground-vehicle maintenance operations include fluid changes (e.g., oil, transmission, antifreeze); filter changes (fuel, oil, transmission, air); brake repair; lube, grease and repair of axle and drive trains; body repair; welding; minor painting and washing.

To support the activities listed above, aircraft and vehicle maintenance facilities are active and involve the use, storage, and disposal of hazardous materials, including petroleum, oil, lubricants, acids, paints, thinners, strippers, and solvents (AECOM, 2015).

1.3 Project Purpose and Scope

The purpose of the on-base SI is to use the data collected during the PA process to develop a plan to determine the presence/absence of Constituents of Concern (COCs) in soil and/or groundwater at each of the PRLs, in sediment and surface water at PRLs #12, #13, and#15, and in groundwater at the base boundary to develop appropriate path(s) forward; either NFA or establishing data quality objectives (DQOs) for a Remedial Investigation (RI) phase.

The scope of the SI includes the following on-base field activities:

- Advance up to 32 soil borings to the water table interface at the PRLs (using rotosonic, auger, or drive and wash drilling methods) and collect up to four (4) soil samples from each boring;
- Advance up to 13 well borings downgradient of the PRLs and along the SANGB boundary (using rotosonic, auger, or drive and wash drilling methods) for the installation of permanent monitoring wells to collect groundwater samples at each location;
- Collect groundwater samples from eight (8) existing monitoring wells; and
- Collect up to a total of five (5) sediment and 5 surface water samples from the retention basin, Outfall 002 and the associated oil-water separator (OWS) diversion chamber, and Outfall 003.

The purpose of the off-base inspection is to determine the presence/absence of COCs in groundwater downgradient of the SANGB, and in sediment and surface water within Recreation Pond, Silver Stream and tributaries entering Washington Lake, to evaluate the potential for PFAS to impact public water supplies through these migration pathways. The scope of the off-base inspection includes the following field activities:

- Advance one (1) well boring immediately downgradient of Recreation Pond and five (5) well borings at locations between Recreation Pond and Lake Washington (using rotosonic, auger, or drive and wash drilling methods) for the installation of permanent monitoring wells to collect two (2) rounds of groundwater samples at each location. One round of samples will be collected during the dry season in late summer/early fall 2017, and one round will be collected during the wet season during spring 2018.
- Collect up to a total of 21 sediment and 12 surface water samples from Recreation Pond. One (1) surface water sample will additionally be collected from the tributary leaving Recreation Pond during both dry and wet weather flows.
- Collect up to a total of 9 sediment and 9 surface water samples downstream of Recreation Pond, and within Silver Stream and tributaries entering Lake Washington during dry weather flow in late summer/early fall 2017. Nine (9) surface water samples will additionally be collected at these locations during wet weather flow in the spring of 2018; and

- Conduct a receptor survey within the towns of Newburgh and New Windsor; this will consist primarily of the identification of properties not served by the municipal water utilities, as well as mapped ecological resources.

The scope is more definitively outlined in the following sections.

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2.0 PROJECT MANAGEMENT APPROACH

The general parties comprising the management structure of the SI include NGB, SANGB, the New York State Department of Environmental Conservation (NYSDEC) and NYS Department of Health (NYSDOH), BB&E, Amec Foster Wheeler, and Amec Foster Wheeler subcontractors. NGB is the contracting entity through which this project is being executed. The New York Department of Transportation is the current landowner. NYSDEC is the primary governing regulatory agency whose regulations must be satisfied during performance of the project.

Amec Foster Wheeler personnel that will be involved with the SI include the following:

- Mr. Jay Mullett, PE – Program Manager;
- Mr. Rob Singer, PE – Senior Project Manager;
- Mr. Stephen Posten, LSRP – Regional Base Lead;
- Ms. Ann Bernhardt, CQM – QA/QC Manager;
- Ms. Cynthia Sundquist, CIH, CSP – Health and Safety Manager;
- Ms. Denise King, EAC – Senior Chemist;
- Ms. Shalene Thomas, PMP – Project Technical Lead;
- Ms. Kerri Doyle – Base Task Manager; and
- Other supporting staff, as necessary.

Key NGB, SANGB, NYSDEC, and technical support personnel that will be involved with the SI include the following:

- Mr. Dennis Pinigis – Contracting Officer's Representative (COR)
- Ms. Jody Ann Murata – ANG Restoration Program Manager;
- Major Nicolas Caputo – SANGB Environmental Manager;
- Mr. George Heitzman – NYSDEC Point of Contact (POC);
- Ms. Wendy Keuhner – NYSDOH POC; and
- Ms. Cindy Lang – BB&E Technical Support Contractor.

Mr. Stephen Posten will serve as Amec Foster Wheeler's primary POC. Mr. Posten will ensure that objectives are addressed, and will be responsible to meet quality, cost, and schedule performance requirements. Supporting staff, as identified above, will include technical and

administrative support personnel involved with the completion of the various SI tasks.

Anticipated subcontractors include a driller and surveyor (soil borings and temporary monitoring well installation), and a laboratory (analysis). The selected laboratory will be Department of Defense (DoD) Environmental Laboratory Accreditation Program (ELAP) accredited, and maintain a National Environmental Laboratory Accreditation Program (NELAP) certification via reciprocity in the State of New York. Subcontractors utilized on this project will contract directly with Amec Foster Wheeler, will be pre-qualified by Amec Foster Wheeler, and will be monitored to document project performance.

On December 1, 2016, key NGB, SANGB, NYSDEC, and Amec Foster Wheeler personnel conducted a kick-off meeting at the SANGB to discuss the SI approach and conduct a reconnaissance of the PRLs at the site. During the meeting, Mr. George Heitzman, NYSDEC POC, presented the results of surface water and groundwater sampling for PFAS compounds, including Perfluorooctanesulfonic acid (PFOS), Perfluoroocatnoic acid (PFOA), and Perfluorohexane sulfonate (PFHxS), performed by the Department at the SANGB and off-base locations in March 2016, June 2016 and September 2016. The sampling results are discussed further in Section 3.0.

Completion of the SI activities includes, but is not limited to, the following tasks:

- Preparation of a program wide Health and Safety Plan (HASP);
- Preparation of a program wide Quality Assurance Project Plan;
- Preparation of the Draft SI WP;
- Preparation of the Draft-Final SI WP;
- Preparation of the Final SI WP;
- Completion of SI field activities;
- Preparation of the Draft SI Report;
- Preparation of the Draft-Final SI Report; and
- Preparation of Final SI Report.

The site-specific Project Schedule is presented in **Appendix A**.

The Draft SI WP was completed by Amec Foster Wheeler on February 7, 2017, and was submitted to NGB, SANGB, and the Technical Support Contractor for review and comment. Amec Foster Wheeler incorporated NGB comments into the Draft-Final documents, and these documents were submitted to NYSDEC for regulatory agency review and comment. This Final WP incorporates revisions in response to NYSDEC comments. Copies of the Final SI WP will be provided to NYSDEC, NGB and other project stakeholders.

Following NGB approval, Amec Foster Wheeler will initiate performance of the SI field activities described in this Final SI WP. Amec Foster Wheeler and its subcontractors will mobilize to the site and complete the field activities. NGB will be verbally updated by the Amec Foster Wheeler POC, or appointee, of significant observations during the completion of field activities. Amec Foster Wheeler will document in writing (email, fax, or letter) any significant deviations from the planned activities.

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3.0 PRELIMINARY ASSESSMENT SITE VISIT AND BACKGROUND INFORMATION

BB&E conducted a PA site visit for NGB at SANGB on December 8, 2015, to identify potential locations of historic environmental releases of PFOS/PFOA, specifically from AFFF usage and storage. Briefly, the PA site visit process included a review of documented Fire Training Areas (FTAs) in operation since 1970, and any other use or release of AFFF, and the completion of a site reconnaissance. The goal of the PA site visit was to determine if a site poses a threat to human health and the environment and requires additional inspection. The PA site visit resulted in no evidence of FTAs used by NGB within the property boundaries of the SANGB. According to SANGB personnel, all fire training activities have been conducted at off-Base facilities. However, 15 PRLs where AFFF types Ansulite Mil-spec (3%) and Ansul Class A (1%) had been stored, used or released were identified at the SANGB, and included crash sites, hangars, fuel spill areas, hazardous waste storage facilities, and firefighting equipment testing areas (BB&E, 2016). Thirteen of the 15 PRLs were recommended for further inspection, and 2 PRLs warranted no further action. The findings of AFFF use and storage at each of the PRLs are documented in BB&E's March 2016, PA Site Visit Report, and summarized below.

3.1 Potential Release Locations

The following sections summarize the PRLs identified at the SANGB based on use and storage of AFFF:

1) Building 104 (Current Fire Station)
2) Nozzle Testing Area
3) Building 105 (Former Fire Station)
4) Hangar 100
5) Hangar 101
6) Hangar 102
7) Hangar 300
8) Hangar 301
9) Building 108 (Pump House)
10) Building 200 (AGE Maintenance)
11) Apron
12) Outfall 002
13) Outfall 003

14) Outfall 006
15) Recreation Pond

3.2 Operational History

The following sections summarize the operational history at each PRL. The PRLs and pertinent site features described below are depicted in overview on **Figure 3,** and by each specific PRL on **Figure 3A** through **Figure 3L.**

3.2.1 PRL 1: Building 104 (Current Fire Station)

According to the PA, Building 104 was constructed in 2007. Floor drains in Building 104 are connected to the storm water system through an OWS. Discharges from the OWS are typically routed to the recreation pond (off-site) through Outfall 002, but can be diverted to the retention basin through a diversion chamber. AFFF is stored in drums and totes, and pumped into Fire Department (FD) vehicles and a foam trailer, which carried approximately 1,000-gallons of AFFF at the time of the PA site visit. There are no known releases of AFFF at Building 104, and any accidental discharge would likely be captured by the floor drains. However, the potential exists for a release to the environment through cracks and joints in the concrete floor and entrance.

3.2.2 PRL 2: Nozzle Testing Area

During interviews conducted for the PA, SANGB personnel confirmed that the concrete area west of Building 104 had been used for FD vehicle nozzle testing annually dating back to 2007. Cracks in the concrete surface were observed at this PRL during the PA site visit, which suggests that AFFF was potentially released to the environment during testing.

3.2.3 PRL 3: Building 105 (Former Fire Station)

According to the PA, Building 105 was used as a fire station between 1988 and 2007. Floor drains were located on either end of the truck bays, near the overhead doors. There are no documented releases of AFFF at the former fire station, and it is unknown if nozzle testing was conducted outside; however, practices are presumed to be like those conducted at Building 104. Accidental discharge or spills within the building would have been captured in the floor drain system and discharged to the industrial waste line.

3.2.4 PRL 4: Hangar 100

AFFF was stored in supply tanks located in the boiler room and used in the fire suppression

system at Hangar 100 between 1987 and 2006, when the system was retrofitted for use of high expansion foam (HEF). As documented in the PA, AFFF releases would typically drain to the trench drain system, through the building's OWS and industrial waste system and into the retention basin (see PRL #15 below). It is unknown if, or how often, the fire suppression systems were tested. There was at least one reported accidental release during the time that AFFF was in use, which discharged directly to the New Windsor sanitary sewer system.

3.2.5 PRL 5: Hangar 101

Between 1987 and 2009, AFFF was used at Hangar 101 in the fire suppression system which included underwing and overhead foam generators. Historically, AFFF storage tanks were kept on the floor of the main hangar. Trench drains within the hangar drain through the building's OWS and industrial waste system into the retention basin (see PRL 15 below). It is unknown if, or how often, fire suppression systems were tested. The system was retrofitted in 2009 for use of HEF and existing overhead foam generators were retained for reuse. As documented in the PA, several accidental releases were reported by SANGB personnel.

3.2.6 PRL 6: Hangar 102

AFFF was used in the fire suppression system at Hangar 102 between 1988 and 2006, when the system was retrofitted for use of HEF. The existing overhead foam generators were retained for reuse with HEF. Trench drains within the hangar drain through the building's OWS and industrial waste system into the retention basin (see PRL #15 below). It is unknown if, or how often, fire suppression systems were tested. At the time of the PA site visit, two AFFF supply tanks (1,800- and 700-gallon capacity) were located in Room 115, with staining observed on the walls and floor. As documented in the PA, several accidental releases were reported by SANGB personnel. No floor drains were present in the room; however, the fire suppression system was located near an overhead door, potentially facilitating an outdoor release.

3.2.7 PRL 7: Hangar 300

AFFF was used in the fire suppression system at Hangar 300 between approximately 1988/1989 and 2004, when the system was retrofitted for use of HEF. During the PA site visit, one 1,800-gallon supply tank was located in the Mechanical Room. During the time that AFFF was in use, there were no known releases of AFFF. Trench drains within the hangar drain through the building's OWS and industrial waste system into the retention basin (see PRL #15 below). It is

not known if, or how often, fire suppression systems were tested.

3.2.8 PRL 8: Hangar 301

The USMC MAG 49, Det B uses Hangar 301 for maintenance of aircraft fuel cells and for the washing and corrosion control of aircraft. AFFF was used in the fire suppression system at Hangar 301 between 1992 and 2004, when the system was retrofitted for use of HEF. During the PA site visit, two 1,300-gallon supply tanks were located in the Mechanical Room. According to SANGB personnel, there was at least one accidental release during the time that AFFF was in use. Trench drains within the hangar drain through the building's OWS and industrial waste system into the retention basin (see PRL #15 below). It is not known if, or how often, fire suppression systems were tested.

3.2.9 PRL 9: Building 108 (Pump House)

Building 108 was constructed in 1988, and was historically used to store AFFF; however, the timeframe and quantities of AFFF storage are unknown. No records of accidental AFFF releases exist and according to SANGB personnel, there were no known spills. The floor drains within the building discharge via the storm sewer system to Outfall 006 (see PRL #14 below). Based on no known evidence of a release, NFA was recommended at this PRL.

3.2.10 PRL 10: Building 200 (AGE Maintenance)

Building 200 was constructed in 1988 and is used for vehicle maintenance, including fire trucks which may contain AFFF. A trench grate system is used to capture fluids, which are routed through an OWS and into the sanitary sewer. During interviews conducted for the PA, SANGB personnel indicated that spills may have occurred due to residual foam in the lines of the FD vehicles.

3.2.11 PRL 11: Apron

The Apron is located in the northwest corner of the Installation, and is used for parking, fueling, de-icing, and minor maintenance of C-17 and KC-130 aircraft. The area, approximately 75 acres in size, is completely paved and has a network of drain inlets that discharge storm water through the storm sewer system to Outfall 002 (see PRL #12 below). In the event of a spill, water (and contaminants) can be diverted into the retention basin (see PRL #15 below). Given the extensive storm drain network, and thickness of the concrete on the Apron, direct infiltration through the Apron is unlikely. However, the potential exists for storm water containing AFFF to run off the

Apron and impact the grassy areas on the margins.

3.2.12 PRL 12: Outfall 002

According to the PA, the SANGB drainage basins discharge through a network of in-ground conveyances and grass-lined ditches to recreation pond, or through several points along the eastern border of the Base. The industrial waste system discharges to ten drainage basins that generally slope from northwest to southeast, and each drainage basin has an associated outfall. Drainage basin 002 includes a portion of Buildings 101, Buildings 102, 104, 200, 301, 302, 400 and the Apron which drain to Outfall 002 (ANG, 2015). Because AFFF was used at these locations, the potential exists for PFOS/PFOA to be present in Outfall 002.

3.2.13 PRL 13: Outfall 003

As above, the industrial waste system discharges to a drainage basin associated with this outfall. Drainage basin 003 includes a portion of Buildings 101, 102, 105, 106, 107, 1107, 113, 202, 203, 204, 205, 206, 207, 208, 209, 211, 214, 300, 301, and 302 which drain to Outfall 003 (ANG, 2015). Because AFFF was used at these locations, the potential exists for PFOS/PFOA to be present in Outfall 003.

3.2.14 PRL 14: Outfall 006

As above, the industrial waste system discharges to a drainage basin associated with this outfall. Drainage Basin 006 includes Building 108 which drains to Outfall 006 (ANG, 2015). Because of no documented or reported AFFF use and storage at Building 108, NFA was recommended for this PRL.

3.2.15 PRL 15: Retention Basin

According to the PA, the retention basin is comprised of two lined depressions constructed in 1986 (eastern basin) and 1992 (western basin), both which were re-lined in 2011. All releases from SANGB buildings flow into an OWS, then into the industrial waste system which discharges to the retention basins. Additionally, storm water from the Apron can be diverted from Drainage Basin 002 (PRL #12) to the retention basin in the event of a spill. AFFF releases in the hangars were directed to the retention basin and either disposed of off-site, or slowly released to the sanitary sewer system. AFFF releases on the Apron may have been directed to the off-site recreation pond or the retention basins.

3.3 Pathway Evaluation and Hazard Assessment

Results of the PA evaluation for threats and targets of PFASs determined that ingestion of contaminated drinking water is the primary exposure pathway, based on the United States Environmental Protection Agency (USEPA) Provisional Health Advisory Levels (PHALs) established for PFOS and PFOA in soil (USEPA, 2014). Results of the pathway evaluation and hazard assessment as documented in BB&E's March 2016, PA Site Visit Report, are summarized below.

3.3.1 Soil

At the time of the PA site visit, no documentation was available showing that soils at the SANGB have been tested for PFOS/PFOA; therefore, it is unknown whether PFOS/PFOA are present in the soil. However, based on historical practices, evaluation of soil quality due to known or potential AFFF use was recommended at Building 104 (Current Fire Station), the Nozzle Testing Area, Building 105 (Former Fire Station), Hangar 100, Hangar 101, Hangar 102, Hangar 300, Hangar 301, Building 200 (AGE Maintenance), and the Apron, along with the potential for AFFF discharges to the retention basin, Outfall 002, and Outfall 003.

3.3.2 Groundwater

At the time of the PA site visit, no documentation was available for groundwater testing of PFOS/PFOA at the SANGB; therefore, evaluation of groundwater quality due to known or potential AFFF use was recommended at Building 104 (Current Fire Station), the Nozzle Testing Area, Building 105 (Former Fire Station), Hangar 100, Hangar 101, Hangar 102, Hangar 300, Hangar 301, Building 200 (AGE Maintenance), and the Apron, as well as in the vicinity of Outfalls 002 and 003. Updated groundwater testing information from the NYSDEC is provided in Section 3.5.

3.3.3 Water Wells

SANGB personnel indicated that no drinking water supply wells are located at the Base.

Review of a 2014 water well survey identified the following thirteen domestic water supply wells located within a one-mile radius of the SANGB boundary:

- One well at Newburgh Country Club, <0.1 mile west-southwest, upgradient, unknown depth;

- One well, unknown owner, 0.25-mile northwest, upgradient, 119 ft deep;
- One Unknown Owner, <0.1 mile south-southeast, downgradient, 119 ft deep;
- Two wells, Jones Motor Company, 0.25 mile east-southeast, downgradient, unknown depth;
- Five wells, Mount Airy Trailer Court, 0.25 mile south-southwest, upgradient, unknown depth; and
- Three wells, Newburgh City, 0.335 mile south-southwest, downgradient, unknown depth.

Based on review of a December 15, 2015, EDR Radius Map™ Report with Geocheck®, the following water supply wells were identified within a one-mile radius of the SANGB boundary:

- Three United States Geological Survey (USGS) wells, located to the northwest, south, and south-southwest;
- One public water system well located to the south-southwest of the SANGB; and
- Five private wells located east, east-northeast, and south-southwest.

Based on comments provided in NYSDEC's response to the Draft-Final SI WP, as of March 7, 2017, the NYSDOH has sampled 195 private supply wells in the area, of which 54 contained elevated levels of PFOS and/or PFOA. Additionally, the NYSDEC has identified 35 public supply wells within a four-mile radius, including the Town of New Windsor's Kroll Well, which has been shut down due to the presence of PFOS contamination.

3.3.4 Sediment

At the time of the PA site visit, no documentation was available for sediment testing of PFOS/PFOA at the SANGB; therefore, evaluation of sediments was recommended based on PRLs that have received drainage from the storm sewer system (**Figure 3K**) and industrial waste line system, and surface releases that ultimately discharge to the Recreation Pond, Retention Basin, or one of several points along the eastern property line.

3.3.5 Surface Water

At the time of the PA site visit, no documentation was available for surface water testing of PFOS/PFOA at the SANGB; therefore, evaluation of surface water was recommended in PRLs that have received drainage from Building 104 (Current Fire Station), the Nozzle Testing Area,

Building, 105 (Former Fire Station), Hangar 100, Hangar 101, Hangar 102, Hangar 300, Hangar 301, Building 200 (AGE Maintenance), and the Apron. The drainage basins of the SANGB discharge through a network of in-ground conveyances and grass-lined ditches to the Retention Basin (PRL #15), Recreation Pond or through several points along the eastern border of the Base (**Figure 3K**). The following ten drainage basins, each with an associated outfall, contain the industrial activities of the Base, and generally slope from northwest to southeast:

- Drainage Basin 001: Buildings 401, 402, and 403
- Drainage Basin 002: Buildings 100, 101, 104, 200, 301, 302, 400 and Apron
- Drainage Basin 003: Buildings 101, 102, 105, 106, 107, 1107, 113, 202, 203, 204, 205, 206, 207, 208, 209, 211, 214, 300, 301, and 302
- Drainage Basin 004: Buildings 208 and 209
- Drainage Basin 005: Buildings 211 and 213
- Drainage Basin 006: Building 108
- Drainage Basin 007: Building 415
- Drainage Basin 008: Building 213, Roads, and Parking Lots
- Drainage Basin 009A/B: Landfill
- Drainage Basin 010: Recreation Pond

3.4 City of Newburgh Water Supply

Washington Lake has historically been the City of Newburgh, New York's primary drinking water supply, and includes the upper reaches of Patton Brook (through a diversion) and Silver Stream as supplemental sources (**Figure 2**). During May, 2015, water testing of Lake Washington, and subsequent testing of Recreation Pond and a tributary of Lake Washington reservoir water supply, resulted in detections of PFASs, specifically PFOS/PFOA. As a result, the City of Newburgh switched to an alternate drinking water source. Based on NYSDEC's preliminary site investigation, SANGB was identified as a possible source of the PFOS/PFOA detected in Lake Washington. On August 12, 2016, NYSDEC declared the SANGB a State Superfund site, and identified the U.S DoD, as a potential responsible party (RP) for the PFAS contamination detected in the public drinking water supply (NYDEC, 2016b).

3.5 NYSDEC Sampling Results

During a contract kick-off meeting held at SANGB on December 1, 2016, the NYSDEC provided results of surface water, sediment and groundwater sampling performed by the Department during March 2016, June 2016, and September 2016 at SANGB and off-base locations.

NYSDEC provided site maps showing sampling results for PFOS, PFOA, and PFHxS in groundwater collected from "TE" and "PFC" designated monitoring wells, and water collected from storm water catch basins throughout the SANGB. The results indicated groundwater detections of PFOS, PFOA, and PFHxS at the following locations:

- Well PFC-MW-3 (vicinity of Hangars 100, 101, and 102)
- Well TE#1 (southwest of Apron)
- Well TE#6 (northeast of Apron)
- Well TE#2 (southeast of Apron) (PFHxS only)

Based on these groundwater sampling results, the sampling plan was modified at PRL 2, PRL 6, and PRL 11, to collect additional soil samples and include sampling of wells PFC-MW2 and PFC-MW3. The sampling approach is described in greater detail in Section 7.0.

Results of surface water samples showed detections of PFOS, PFOA, and PFHxS at all catch basin sampling locations throughout the SANGB, with the exception of catch basin #4 (near northeast base boundary).

Detections of PFOS were shown at off-base locations in groundwater samples collected from a former FTA located in an upgradient direction to the northwest of SANGB, and a downgradient area located southeast of SANGB and adjacent to the New York Thruway. Results of sediment sampling from off-base surface water bodies indicated PFOS detections in Lake Washington, Brown's Pond and Silver Stream (NYSDEC, 2016c). Maps provided by NYSDEC indicating a portion of these sample data are contained in **Appendix E**.

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4.0 ENVIRONMENTAL SETTING

The following sections provide information on the environmental setting at SANGB. This information is summarized from the March 2015, Draft Final PA/SI Report (AECOM, 2015).

4.1 Climate

The climate in Newburgh is defined as humid continental and is characterized by four highly variable seasons, warm summers and no dry season. The temperature typically varies from 17 °F to 86 °F and is rarely below 10 °F or above 88 °F. The average cold season (1 December to 9 March) temperature is about 30 °F and average warm season (29 May to 16 September) temperature is 80 °F. Average annual precipitation is 51 inches with an average annual snowfall of 36 inches. The typical number of days with measurable precipitation is 121.

4.2 Topography

The installation is located in the Hudson-Champlain Lowland of the Valley and Ridge Province. The topography of SANGB is relatively flat with significant downward slopes to the south and east. Surface elevations range from 440 to 450 ft above mean seal level (amsl) throughout most the installation, to a low 340 ft amsl along the eastern property line, and 400 ft amsl along the southern property line (AFCEE, 2002).

4.3 Geology

The bedrock beneath SANGB is predominantly thinly bedded and fractured Martinsburg Shale, which is part of the Normanskill Formation, occurring at depths between 45 and 50 ft bgs near the Base. Overlying the shale is a weathered shale-rock zone. The unconsolidated deposits overlying the weathered rock zone are primarily a dense, gray, fine sand and silty glacial till, which contain a number pebbles, cobbles, and boulders (AFCEE, 2002). Soil types at SANGB have been mapped by the Natural Resources Conservation Service (NRCS, 2013). The soil type primarily present at the SANGB is the Udorthents, smoothed. These soils are well to moderately well-drained level areas consisting of gravelly, sandy loam, with the original soil surface altered by filling, excavation, or grading activities (AECOM, 2015). Stream channels and other features that create preferential flow pathways in the subsurface may be buried beneath the disturbed areas that were replaced by fill material.

4.4 Surface Water Hydrology

Surface water runoff flows in an east and southeast direction. Runoff is moderately high due to the large amount of impermeable surfaces (e.g., aircraft parking apron) and predominantly glacial till soil types. A retention basin composed of two lined depressions collects runoff from the installation and discharge to the Recreation Pond, which discharges to Silver Stream and Modna Creek that both lie in the Hudson River drainage basin. Additional runoff flows eastward to wetlands in the vicinity of Murphy's Gulch, which is a tributary of the Hudson River (AFCEE, 2002). Surface water features are depicted on **Figure 2**.

4.5 Hydrogeology

The surficial aquifer at SANGB consists of a uniform glacial till deposit over the shale bedrock. The shallow portion of the bedrock aquifer that lies beneath the installation is confined by the glacial till. The Normanskill Formation and underlying bedrock have very low permeability and yield low volumes of groundwater.

Groundwater at the site flows to the southeast and has been encountered in site monitoring wells at depths ranging between 20 to 30 ft bgs in upland areas of the base, and at a depth of approximately 10 ft bgs at the base boundary. Three possible modes of groundwater transport through two hydrogeologic units have been identified onsite:

- Perched water moving horizontally along the top of the bedrock, primarily through a weathered rock zone at a rate of about 1.6 ft/year;
- Vertical and horizontal movement through pores in the coarser-grained zones of the glacial till unit overlying the bedrock, at a rate of approximately 13 ft/year; and
- Vertical and horizontal movement along fractures in the glacial till unit.

4.6 Critical Habitat and Threatened/Endangered Species

Lake Washington, located to the southeast of SANGB, forms part of the reservoir system used by the City of Newburgh Water Department; Brown's Pond, located to the south-southwest of the SANGB, has been used as a backup source of water supply. Recreation Pond is adjacent to the south of SANGB and is connected to Silver Stream, a tributary of Lake Washington and Brown's Pond (**Figure 2**). Lake Washington is also used for recreation purposes, including fishing, and is

a habitat for trout, pickerel, and several varieties of pan fish.

As shown on the NYSDEC's Environmental Resource Mapper, the SANGB is within an area of one or more rare animals. The streams and lakes within this area serve as an essential habitat for species such as the wood turtle, which is a New York state species of special concern. Red maple hardwood swamp is a "significant natural community" identified to the north of SANGB. State regulated freshwater wetlands are located along the northern, western and southern boundaries of the airport, and are identified as Freshwater Forested/Shrub Wetland. Other wetlands may be located within the SANGB property.

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5.0 PERMITS

Amec Foster Wheeler will obtain Dig Safe Clearance with One Call two weeks prior to initiating SI exploration activities. After the Dig Safe Ticket has been obtained, Amec Foster Wheeler will work with the SANGB Environmental Manager to obtain work clearance approval (i.e., base dig permits, as necessary) for activities to be conducted at each of the PRLs.

Amec Foster Wheeler confirmed with the Base Civil Engineer that notice of construction or alteration must be filed with the Federal Aviation Administration (FAA) at least 45 days prior to construction. Amec Foster Wheeler completed and submitted the permit to the FAA for approval on March 21, 2017. Field activities will commence following approval of the FAA permit.

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6.0 SOIL AND GROUNDWATER STANDARDS

A soil or groundwater standard is an environmental and/or public health statute or rule used in identifying site contamination that may pose a risk to human health or the environment. Soil and groundwater standards are federal and state human health- and environment-based regulations and guidelines used to:

- Determine the appropriate levels of site clean-up;
- Define and formulate remedial action alternatives; and,
- Govern implementation and operation of the selected remedial action.

Currently, neither the USEPA nor NYSDEC have promulgated soil and groundwater remediation standards for PFOS/PFOA. However as described below, USEPA has recently issued a Health Advisory (HA) for PFOS and PFOA, and NYSDEC filed a Notice of Emergency Adoption and Proposed Rule to classify PFOS and PFOA as hazardous substances.

On May 19, 2016 USEPA issued drinking water HAs for two PFAS congeners, PFOS (EPA, 2016a) and PFOA (EPA, 2016b), based on an assessment of recent scientific data for these two chemicals. The HA established a concentration of 70 parts per trillion (ppt) for PFOS and PFOA (each or combined sum), below which adverse health effects are not expected to occur over a lifetime of exposure. The 70 ppt threshold concentration is not an enforceable regulatory limit; rather it is intended to provide information to drinking water system operators on the effects to human health so they can take appropriate actions if PFOS and/or PFOA are detected in a public drinking water supply.

On April, 25, 2016, NYSDEC filed a Notice of Emergency Adoption and Proposed Rule 6 New York Codes, Rules and Regulations (NYCRR) Part 597 to classify PFOS-acid, PFOS-salt, PFOA-acid, and PFOA-salt as hazardous substances. Second and third re-adoptions of 6 NYCRR Part 597 were filed on September 16, 2016 and November 14, 2016, each which extended the proposed rule for an additional 60-days. Handling and storage of hazardous substances are regulated by NYSDEC, who also has the authority to remediate sites contaminated with state-

listed hazardous substances. Provision 597.4(a)(3) allows fire-fighting agencies to store and use the foam until April 25, 2017, with use limited to fighting an active fire, but not allowed for any other purpose such as training (NYSDEC, 2016a). NYSDEC set the reportable quantity at 1 pound for each substance; however reportable concentrations (i.e. concentration in groundwater or soil) or remediation standards have not been established. Further, on August, 12, 2016 NYSDEC declared SANGB a State Superfund Site (NYSDEC, 2016b), and identified the DoD as a potential RP for the PFOS contamination detected in the City of Newburgh's public drinking water supply.

The SI will establish whether PFAS congeners are present in soil, sediment, groundwater, and surface water at SANGB. This assessment will be used to determine whether each PRL has achieved NFA or whether Remedial Investigations (RI) should be recommended. Although reportable concentrations and remediation standards for PFAS congeners have not been established by the USEPA or NYSDEC, laboratory analytical results will be compared to the screening criteria presented below to make further action determinations.

Screening Criteria Summary for Initial Assessment of PFAS

PFAS (U.S. EPA 537 [Modified]) Federal Screening Criteria for Media of Concern

Analyte[1]	CAS No.	Soil/ Sediment (mg/kg)	Groundwater/ Surface Water/ Drinking Water (µg/L)
Perfluorooctanoic Acid (PFOA)	335-67-1	1.26 [2]	0.07 [3]
Perfluorobutanesulfonic Acid (PFBS)	375-73-5	1,600 [4]	380 [4]
Perfluorooctane sulfonate Acid (PFOS)	1763-23-1	1.26 [2]	0.07 [3]
PFOA PFOS	1763-23-1 335-67-1	N/A	0.07 [3]
mg/kg = milligrams per kilogram µg/L = micrograms per liter CAS = Chemical Abstract Service			

Notes:

1. Only PFAS compounds with currently defined federal screening criteria are shown in the table. These established criteria provide guidance only, and no federal promulgated criteria currently exist. Screening criteria are derived from notes 2, 3, and 4 below.
2. Derived using the U.S. EPA RSL calculator.
3. Fact Sheet PFOA and PFOS Drinking Water Lifetime Health Advisories (LHAs). May 2016 (U.S. EPA, 2016a).

4. Regional Screening Levels (RSLs). May. https://www.epa.gov/risk/regional-screening-levels-rsls-users-guide-may-2016 (U.S. EPA, 2016b).

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7.0 INVESTIGATIVE APPROACH

7.1 Work Plan Objectives

The objective of the WP is to define field activities needed to perform the SI at the 13 PRLs recommended for further inspection at SANGB, for groundwater along the base boundary, and within surface water, sediment and groundwater at selected off-base locations. The overall objective of the SI and off-base sampling is to confirm the presence/absence of PFAS congeners included on the UCMR 3 list, through successful performance of the following:

On-Base Field Activities

- Advance up to 32 soil borings to the water table interface and collect a minimum of two (2) soil samples from each boring; surface sample between 0-2 feet and sample at the water table interface. Additional soil samples [up to a maximum of four (4) from a boring] may be collected from select PRLs based on field screening and/or the nature and history of AFFF use;
- Advance up to 13 borings for the installation of up to 13 monitoring wells to collect groundwater samples at locations hydraulically downgradient from each PRL and at the downgradient base boundary;
- Re-develop up to eight (8) existing monitoring wells and collect groundwater samples from each; and
- Collect up to five (5) collocated sediment and surface water samples from within the retention basin, Outfall 002 and associated OWS diversion chamber, and Outfall 003.

Off-Base Field Activities

- Advance one (1) boring immediately downgradient of Recreation Pond and five (5) borings at locations between Recreation Pond and Lake Washington (using rotosonic, auger, or drive and wash drilling methods) for the installation of permanent monitoring wells to collect two (2) rounds of groundwater samples at each location. One round of samples will be collected during the dry season in late summer/early fall 2017 and one round will be collected during the wet season in spring 2018.
- Collect up to a total of 21 sediment and 12 surface water samples from Recreation Pond during the dry season in late summer/early fall 2017. One (1) surface water

sample will additionally be collected from the tributary leaving Recreation Pond during the wet season in spring 2018.

- Collect up to a total of 9 sediment and 9 surface water samples downstream of Recreation Pond, and within Silver Stream and tributaries entering Lake Washington during dry weather flow in late summer/early fall 2017. Nine (9) surface water samples will additionally be collected at these locations during wet weather flow in spring 2018.
- Conduct a receptor survey within the towns of Newburgh and New Windsor; this will consist primarily of the identification of properties not served by the municipal water utilities, as well as mapped ecological resources.

7.2 General Approach

Existing data, site history, and process information have been used, where possible, to design the SI. The work will be conducted in accordance with the Health and Safety Plan (HASP), Field Sampling Plan (FSP), and Quality Assurance Project Plan (QAPP) presented in **Appendices B, C,** and **D**, respectively.

The on-base SI approach for each of the PRLs and groundwater at the base boundary is summarized in **Table 1** below and the ensuing text.

Table 1
Site Inspection Summary
105th Airlift Wing, New York Air National Guard
Stewart Air National Guard Base, Newburgh, New York

Area of Inspection	Location Type	Confirmed (C) or Suspected (S) Release	No. SBs	No. Wells		No. Samples				Comments
				EW	MW	S	GW	SW	SD	
1. Building 104 Current Fire Station	Fire Station	C	2	0	1	4	1	0	0	Floor drains connect to storm sewer system—no nearby outfall.
2. Nozzle Testing Area	Fire Truck Equip. Testing	C	3	0	1	10	1	0	0	Testing occurred annually since 2007.
3.Bldg 105 Former FS	Fire Station	S	3	0	1	6	1	0	0	Trench drains discharge to the industrial waste line.

Table 1 Site Inspection Summary 105th Airlift Wing, New York Air National Guard Stewart Air National Guard Base, Newburgh, New York										
Area of Inspection	Location Type	Confirmed (C) or Suspected (S) Release	No. SBs	No. Wells		No. Samples				Comments
				EW	MW	S	GW	SW	SD	
4.Hangar 100	Hangar with AFFF Fire Suppression System (FSS)	C	3	0	1	6	1	0	0	Trench drains discharge to the industrial waste system, then Retention Basin.
5.Hangar 101	Hangar with AFFF FSS	C	2	0	1	4	1	0	0	Trench drains discharge to industrial waste system, then retention basin.
6.Hangar 102	Hangar with AFFF FSS	C	3	2	0	10	0	0	0	Trench drains discharge to industrial waste system, then retention basin. Includes shared downgradient wells from PRL #s 3 and 5, and existing well PFC-MW-3.
7.Hangar 300	Hangar with AFFF FSS	S	3	0	1	6	1	0	0	Trench drains discharge to industrial waste system, then retention basin.
8.Hangar 301	Hangar with AFFF FSS	C	3	0	1	6	1	0	0	Trench drains discharge to industrial waste system, then retention Basin.
10. Building 200 (Vehicle Maintenance)	Fire Truck Maintenance	S	3	0	1	6	1	0	0	Floor drains discharge to the sanitary sewer system.
11.Apron	Fuel Emergency	S	5	0	1	14	1	0	0	Includes MW to west of Apron, shared downgradient wells from PRL #s 3, 4, 5, 6, 7, 8 and 10, and existing well PFC-MW-4.
12.Outfall 002	Storm-Water Outfall	C	0	0	1	0	1	2	2	Industrial waste system discharges to a drainage basin associated with this outfall.
13.Outfall 003	Storm-Water Outfall	C	0	0	0	0	0	1	1	Industrial waste system discharges to a drainage basin associated with this outfall. Share downgradient well with Outfall 002.

Table 1
Site Inspection Summary
105th Airlift Wing, New York Air National Guard
Stewart Air National Guard Base, Newburgh, New York

Area of Inspection	Location Type	Confirmed (C) or Suspected (S) Release	No. SBs	No. Wells		No. Samples				Comments
				EW	MW	S	GW	SW	SD	
15. Retention Basin	Storm-Water Outfall	C	2	0	1	4	1	2	2	May have been impacted by AFFF discharges from any of the above buildings or Apron.
Base Boundary Monitoring Wells	Base Boundary		0	6	2	0	8	0	0	Assess PFAS in groundwater at base boundary.
TOTAL			32	7	13	76	19	5	5	

Notes:
No further action was recommended for PRLs #9 and #14 in the PA

Explanation:
SB= Soil Boring
EW = Existing Well
MW = Proposed Monitoring Well

S = Soil
GW = Groundwater
SW= Surface Water
SD = Sediment

7.2.1 PRL 1: Building 104 (Current Fire Station)

To assess the potential for a release to the environment through cracks and joints in the concrete floor and entrance, up to two (2) soil borings will be advanced to the water table interface near the bay doors on the eastern and western sides of the building. Soil borings will be biased towards likely infiltration areas (i.e. cracks and joints) through the concrete surface. Additionally, one monitoring well will be installed for the collection of a groundwater sample downgradient of the PRL. The locations of soil borings and the monitoring well are shown on **Figure 3A**.

7.2.2 PRL 2: Nozzle Testing Area

To assess the potential for a release to the environment through cracks and joints in the concrete west of Building 104, where annual testing occurred, and confirm whether PFAS are present in soil and groundwater, three (3) soil borings will be advanced to the water table interface to enable collection of up to 10 soil samples (2-4 per boring). Additionally, one monitoring well will be installed at the water table and a groundwater sample collected to assess groundwater quality

within the nozzle testing area. The locations of soil borings and the monitoring well are shown on **Figure 3B**.

7.2.3 PRL 3: Building 105 (Former Fire Station)

There are no documented releases; however, it is likely that nozzle testing was conducted at this PRL, similar to the current fire station. To determine if AFFF was spilled during transfer or discharged during presumed nozzle testing, three (3) soil borings will be advanced to the water table interface outside the bay doors. Boring locations will be biased towards areas of degraded concrete where nozzle testing may have been performed and/or within immediately adjacent grassy areas. Additionally, one monitoring well will be installed at the water table and a groundwater sample collected to assess groundwater quality immediately downgradient from the nozzle testing area. The locations of soil borings and the monitoring well are shown on **Figure 3C**.

7.2.4 PRL 4: Hangar 100

To assess whether soil and groundwater were impacted by the reported accidental release to the floor drain system, up to three (3) soil borings and one monitoring well will be installed. The borings will be advanced to the water table interface on the eastern and western sides of the building, downslope from hangar doors. Boring locations will be biased toward the grass (if present) on the margin of the asphalt surface where surface runoff would most likely infiltrate. One monitoring well will be installed at the water table southeast of Hanger 100, and a groundwater sample collected to assess groundwater quality downgradient from the Hangar. The locations of soil borings and the monitoring well are shown on **Figure 3D**. Existing monitoring well PFC-MW3 is located directly south of Hanger 100 (refer to **Appendix E**).

7.2.5 PRL 5 – Hangar 101

To assess whether soil and groundwater were impacted by reported releases to the floor drain system, up to two (2) soil borings and one temporary monitoring well will be installed. The borings will be advanced to the water table interface on the northeastern side of the building, downslope from the hangar doors. Borings will be biased to the grass (if present), on the margin of the asphalt surface where surface runoff would most likely infiltrate. Because Hangar 101 is adjacent to Hangar 100, potential overland flow of AFFF to the north will be assessed at PRL 4. One monitoring well will be installed at the water table and a groundwater sample collected to assess

groundwater quality immediately downgradient from Hangar 101. The locations of soil borings and the monitoring well are shown on **Figure 3E**.

7.2.6 PRL 6 – Hangar 102

To assess whether soil was impacted by reported releases to the floor drain system, up to three (3) soil borings will be installed. Potential groundwater impacts will be evaluated through sampling results from adjacent existing base monitoring well, PFC-MW3 and downgradient monitoring wells associated with adjacent PRLs. Two borings will be advanced to the water table interface on the west and southwest sides of the building, downslope from hangar doors. These borings will be biased to the grass (if present) on the margin of the asphalt surface where surface runoff would most likely infiltrate. A third boring will be advanced east of Hangar 102, near the bay door at Room 115. This boring will be biased towards areas of degraded asphalt, or grass if present. A total of 10 soil samples will be obtained from the three borings located at this PRL (2-4 samples per boring). Existing base monitoring well PFC-MW-3 is located adjacent to Hanger 102 (refer to **Appendix E**); downgradient monitoring wells are associated with PRLs 3, 5 and 6 (refer to **Figure 4**). The locations of soil borings are shown on **Figure 3F**.

7.2.7 PRL 7 – Hangar 300

There are no documented releases; however, to assess potential releases to the floor drain system, up to three (3) soil borings and one monitoring well will be installed. The borings will be advanced to the water table interface on the north, northwest, and southeastern sides of the building. Two borings will be placed downslope from hangar doors, in the grass (if present), on the margin of the asphalt surface where surface runoff would most likely infiltrate. A third boring will be placed near the exterior door leading into the Mechanical Room. One monitoring well will be installed at the water table and a groundwater sample collected to assess groundwater quality immediately downgradient from Hangar 300. The locations of soil borings and the monitoring well are shown on **Figure 3G**.

7.2.8 PRL 8 - Hangar 301

To assess whether soil and groundwater were impacted by the reported release to the floor drains system, up to three (3) soil borings and one monitoring well will be installed. The borings will be advanced to the water table interface on the north, northwest, and south sides of the building; two in grassy areas (if present) downslope from hangar doors, and a third near the exterior door

leading into the Mechanical Room. One monitoring well will be installed at the water table and a groundwater sample collected to assess groundwater quality immediately downgradient from Hangar 301. The locations of soil borings and the monitoring well are shown on **Figure 3H**.

7.2.9 PRL 9 – Building 108 Pump House (NFA)

The PA recommended NFA for Building 108; therefore PRL 9 is not included in the SI.

7.2.10 PRL 10 – Building 200 (AGE Maintenance)

To assess potential releases to the trench grate system, up to three (3) soil borings will be advanced to the water table interface, and one monitoring well will be installed. Soil borings will be advanced on the east and west sides of the AGE maintenance building, and will be biased towards grassy areas (if present) on the margin of the asphalt or concrete surface to capture potential flow pathways from the bay doors, where appropriate. If no obvious flow path exists, then borings will be placed in low points or areas of degraded asphalt or concrete. One monitoring well will be installed at the water table and a groundwater sample collected to assess groundwater quality immediately downgradient from Building 200. The locations of soil borings and the monitoring well are shown on **Figure 3I**.

7.2.11 PRL 11 - Apron

To assess the potential for AFFF-impacted storm water runoff, up to five (5) soil borings will be advanced to the water table interface on the north, south, east, and west sides of the Apron. A total of 14 soil samples will be obtained from this PRL (2-4 samples per boring). The Apron is located directly upgradient from seven PRLs; therefore, groundwater impacts associated with the Apron (PRL #11) will be assessed primarily through sampling of existing monitoring well PFC-MW4 and proposed monitoring well locations downgradient of PRLs #3 through #8, and PRL #10. However, to investigate the presence of elevated PFAS concentrations measured by NYSDEC in existing base monitoring well TE#1, located off the southwestern corner of the Apron (**Appendix E**), one monitoring well (MW-110) will be installed between soil borings 11SB05 and 11SB04. This area is midway between PRL #2 (Nozzle Testing Area) and TE#1. The locations of soil borings and monitoring wells are shown on **Figure 3J**.

7.2.12 PRL 12 – Outfall 002

Because AFFF was stored or used at SANGB locations that drain to Outfall 002 and because

Outfall 002 is a critical migration pathway into Silver Stream, a tributary to Lake Washington (public water supply), the PA recommended further inspection. As a result, a surface water and sediment sample will be obtained from this location. Additionally, storm water and sediments will be collected from the OWS diversion chamber west of Building 105, which is a likely accumulation point for AFFF discharged to the storm drain system. One monitoring well will be installed near Outfalls 002 and 003 downgradient of the base boundary to assess groundwater just upgradient from Recreation Pond. Soil samples will not be collected at PRL #12 as part of this SI. The locations of sampling points and the monitoring well are shown on **Figure 3K**.

7.2.13 PRL 13 – Outfall 003

Because AFFF was stored or used at SANGB locations that drain to Outfall 003, and because Outfall 003 is a critical migration pathway, as described above for Outfall 002, the PA recommended further inspection. As a result, one surface water and sediment sample will be obtained from this location. One monitoring well will be installed near Outfalls 002 and 003 downgradient of the base boundary to assess groundwater just upgradient from Recreation Pond. Soil samples will not be collected at PRL #13 as part of this SI. The locations of sampling points are shown on **Figure 3K**.

7.2.14 PRL 14 – Outfall 006 (NFA)

The PA recommended NFA for Outfall 006; therefore PRL #14 is not included in the SI.

7.2.15 PRL15 – Retention Basin

To address potential releases from SANGB's industrial waste system, sanitary sewer system, and storm water runoff, soil, groundwater, sediments, and surface water will be assessed in the vicinity of the retention basin. Sediment and surface water will be collected from within each of the two lined structures. Two soil borings will be advanced to the water table interface on the downgradient side of the retention basins. These borings are intended to capture a potential overflow from the retention basin. One monitoring well will be installed to the southeast of the retention basin to assess groundwater quality downgradient of the structure. The locations of the sampling points, soil borings, and the monitoring well are shown on **Figure 3L**.

7.2.16 Base Boundary Monitoring Wells

SANGB is located approximately 1/3mile northeast (hydraulically upgradient) from Lake

Washington, which is the public water supply for Newburgh, New York. This SI includes a component to assess groundwater quality at the base boundary to determine if PFAS are present in groundwater which may result in off-site migration. This assessment includes collecting groundwater samples from 6 existing monitoring wells and 13 monitoring wells that will be installed at the previously discussed PRLs. Seventeen existing wells were previously installed at the former SANGB landfill as part of IRP Site 3 (formerly named Site 1). A subset of these wells was selected for sample collection due to the well screens intercepting groundwater flow through both the overburden and bedrock water bearing zones along the most direct flow path between the SANGB and Lake Washington. Additionally, two monitoring wells will be installed along the eastern property boundary to assess shallow groundwater conditions at the water table. Two additional water table monitoring wells will be installed along and downgradient of the southern property boundary as dual-purpose wells; they are intended to assess groundwater quality associated with PRLs 12 and 13 and upgradient of Recreation Pond, and downgradient of PRL 15 and at the southern base boundary. The locations of the existing monitoring wells and proposed monitoring wells are shown on **Figure 4**.

Off-base sampling at Recreation Pond, the tributary leaving Recreation Pond, Silver Stream and tributaries entering Lake Washington is summarized in **Table 2** below, and described in the ensuing text.

Table 2
Off-Base Inspection Summary
105th Airlift Wing, New York Air National Guard
Stewart Air National Guard Base, Newburgh, New York

Area of Inspection	Location Type	No. Wells	No. Samples			Comments
		MW	GW	SW	SD	
RP	Pond surface water and sediment; spillway stream; groundwater	1	2	13*	21	Assess potential source concentrations of PFAS in Recreation Pond and in surface water and groundwater immediately downgradient of the Pond.
RPT, SS, & LW	Tributary stream surface water and sediment; groundwater	5	10	18**	9	Assess PFAS migration from RP and SANGB in surface water and groundwater.
TOTAL		6	12	31	30	

Notes:
* 12 samples during late summer early fall 2017; 1 sample during spring 2018
** 9 samples during late summer early fall 2017; 9 samples during spring 2018

Explanation:

RP= Recreation Pond
RPT = Recreation Pond Tributary
SS = Silver Stream
LW = Lake Washington
MW = Monitoring Well
GW = Groundwater
SW= Surface Water
SD = Sediment

7.2.1 Off-Base Monitoring Wells

A total of six (6) monitoring wells will be installed at and downgradient of Recreation Pond and SANGB to evaluate off-base groundwater migration pathways. One round of groundwater samples will be collected during the dry season in late summer/early fall 2017, and one round will

be collected during the wet season in spring 2018. The locations of the off-base monitoring wells are shown on **Figures 5 and 6**.

7.2.2 Recreation Pond

To assess potential source concentrations of PFAS in Recreation Pond and in surface water, sediment and groundwater immediately downgradient of the Pond, a total of 21 sediment samples and 12 surface water samples will be collected from Recreation Pond and the spillway stream during late summer/early fall 2017. One additional surface water sample will be collected from the spillway stream during spring 2018. The Recreation Pond sediment and surface water sample locations are shown on **Figure 5**.

7.2.3 Lake Washington Tributaries

To assess whether PFAS within Recreation Pond are migrating to Lake Washington via surface water pathways, a total of nine (9) sediment and nine (9) surface water samples will be collected during late summer/early fall 2017 downstream of Recreation Pond, and within Silver Stream and tributaries entering Lake Washington. An additional round of 9 surface water samples will be collected from the same locations during the wet season in spring 2018. Approximate surface water and sediment sample locations downstream of Recreation Pond, in Silver Stream, and within tributaries entering Lake Washington are shown on **Figure 6**.

7.2.4 Receptor Evaluation

A receptor survey (primarily domestic water-supply wells) will be conducted within the Towns of Newburgh and New Windsor to evaluate properties within and outside of municipal water utility service areas as follows:

- Compile/review municipal water utility records to determine service areas;
- Conduct field reconnaissance (as needed) to verify service areas; and
- Prepare a tax block/lot map indicating location of properties within and outside of municipal water utility service areas.

Ecological receptors will be mapped through information available from the U.S Fish and Wildlife Service National Wetland Inventory maps, and available supplemental mapped information from NYSDEC (e.g., freshwater wetlands mapping).

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8.0 FIELD INVESTIGATION PROCEDURES

Field investigation procedures to be utilized are presented in the following sections.

8.1 Site Access and Restrictions

Prior to mobilization to the Site, a list of field personnel and vehicles will be provided to SANGB in order to coordinate access. Upon arriving at the installation each morning, field personnel will check in with the SANGB POC. Field personnel and vehicles will access the installation using the main drive and gate. Anticipated work hours are from 7:00 AM to 5:00 PM local time on weekdays.

8.2 Utility Location and Clearance

Prior to commencement of SI activities, Amec Foster Wheeler will review available site information, such as As-Built drawings, to verify locations of subsurface utilities. In addition, Amec Foster Wheeler will schedule a site walk to mark out proposed on-base ground disturbance locations with assistance from the SANGB POC and a geophysical surveyor. The SANGB POC will review and approve the locations with respect to avoidance of subsurface utilities and structures and determine locations that require additional subsurface clearance. The geophysical surveyor will scan those areas and mark the locations of any identified subsurface utilities and structures to be avoided. Amec Foster Wheeler will conduct a site walk of off-base locations with the geophysical surveyor to scan each proposed off-base location for subsurface utilities and obstructions which, if identified, will be marked along with the proposed off-base locations. After the locations have been pre-marked, Amec Foster Wheeler will contact “Dig Safely New York” the New York one-call utility clearance hotline. Next, Amec Foster Wheeler will coordinate with the SANGB POC to complete a base dig permit and/or utility clearance checklist, as required. Finally, non-destructive excavation methods (“soft-dig” or hand auger methods) will be used to clear on-base and off-base subsurface utilities and structures at the specified sampling locations.

8.3 Soil Boring Installation and Soil Sampling

Soil boring installation and soil sampling activities will be completed as summarized in the following sections. Soil boring locations are illustrated on the **Figure 3,** and **Figures 3A** through **3L**.

8.3.1 Soil Boring Installation

Soil boring locations are based on site use and physical characteristics to target the most probable release areas. Up to 32 soil borings will be advanced in and around the 13 PRL areas using rotosonic, auger, or drive and wash drilling methods. The soil borings will be advanced from the ground surface to an approximate depth of 30 ft bgs, unless groundwater or refusal is encountered at a shallower depth. Soil cores will be collected continuously for field screening at 4- to 5-foot intervals in new, dedicated poly-vinyl chloride (PVC) liners. Drilling rods/tools will be decontaminated between borings in accordance with Section 8.7**.** Investigation-derived waste (IDW) generated during drilling activities will be containerized in 55-gallon steel drums and labeled for disposal in accordance with Section 8.9.

8.3.2 Soil Sampling

Soil samples will be collected in accordance with Section 2.1 of the FSP (**Appendix C**). Samples will be analyzed to determine if PFAS are present in soil at each PRL as outlined in Table 3 of the FSP.

8.3.3 Soil Boring Abandonment

Following completion of drilling activities, each boring will be backfilled with cuttings (and hydrated bentonite chips as necessary) to grade in order to seal the boring. Surface completions will be patched with like materials (i.e., asphalt, concrete, or topsoil/seed) in accordance with SANGB specifications.

8.4 Monitoring Well Installation and Groundwater Sampling

Monitoring well installation and groundwater sampling activities will be completed as summarized in the following sections. Monitoring well locations are illustrated on **Figures 3, 3A** through **3L**, **4, 5, and 6**.

8.4.1 Monitoring Well Installation

Up to a total of 19 well borings will be advanced using rotosonic, auger, or drive and wash drilling methods. The primary purpose of installing the monitoring wells is to assess groundwater quality hydraulically downgradient of the PRLs; therefore, PFAS compounds are not expected to be present in shallow soil (i.e. above the water table). As such, soil cores will be collected only to verify soil lithology within the screened interval and verify the depth of the water table (the water

table has been encountered in existing site wells around the base at depths ranging between approximately 20 to 30 ft bgs, and at the base boundary at depth of approximately 10 ft bgs). To accomplish this, soil cores will be collected at regular intervals (i.e. every 5 feet) starting at 5 ft bgs. Soil cores will be logged and field screened in accordance with Section 2.1.1 of the FSP. The monitoring wells will be installed in accordance with Amec Foster Wheeler's PFAS-specific Standard Operating Procedure (SOP) for installation of monitoring wells (AFW-04), which is included as Attachment E of the QAPP (**Appendix D**).

Following monitoring well completion, static water levels will be collected with an electronic water level indicator and recorded on a field data sheet. Well development will be conducted as described below and in accordance with Amec Foster Wheeler's Well Development SOP (AFW-05) included as Attachment E of the QAPP.

8.4.2 Monitoring Well Development

The monitoring wells will be developed using a surge block and submersible pump to develop the entire screened interval and remove fine particles that have accumulated. Water quality parameters will be monitored and recorded at periodic intervals. Monitoring wells will be considered adequately developed when water quality parameters have stabilized (see Section 2.2.1 of the FSP) and turbidity is low (i.e., <10 NTU). Additionally, 6 existing monitoring wells may be re-developed if Teflon® tubing is known to have been used in the past, or if the well has not been purged within the past two years.

Well development water will be containerized in steel 55-gallon drums and managed in accordance with Section 8.9. The surge block and submersible pump will be decontaminated following each use in accordance with Section 8.7. A well development log will be prepared for each well and contain the following information:

- Project
- Date
- Well number
- Condition of the well
- Geologist/Scientist
- Depth to water prior to development

- Depth to bottom of well prior to development
- Type of pump
- Pumping rate
- Purge volumes (containerized for disposal)
- Characteristics of purge water (color, particulates, clarity, and odor)
- Field measurements (temperature, pH, dissolved oxygen [DO], specific conductance, redox potential, turbidity)
- Estimated recharge rate
- Development time
- Depth to water following development
- Depth to bottom of well following development
- General remarks

8.4.3 Groundwater Sampling

In accordance with Section 2.2 of the FSP, groundwater samples will be collected from a total of 19 monitoring wells on base and upgradient of Recreation Pond [13 proposed and six (6) existing] and a total of six (6) proposed monitoring wells off-base. Dedicated sampling equipment, including tubing, will be changed between well locations. Re-usable equipment will be decontaminated in accordance with Section 8.7. Samples will be analyzed for PFOS/PFOA at each PRL areas, as outlined in Table 3 of the FSP.

8.5 Sediment Sampling

Sediment samples will be collected in accordance with Section 2.3 of the FSP. Sediment sampling locations are shown on **Figures 3K, 3L, 5, and 6**. Re-usable sampling equipment will be decontaminated in accordance with Section 8.7. Sediment samples will be analyzed for the appropriate PFAS congeners as outlined in Tables 3 and 4 of the FSP.

8.6 Surface Water Sampling

Surface water samples will be collected in accordance with Section 2.4 of the FSP. Surface water sampling locations are shown on **Figures 3K, 3L, 5, and 6**. Re-usable sampling equipment will be decontaminated in accordance with Section 8.7. Samples will be analyzed for the appropriate PFAS congeners as outlined in Tables 3 and 4 of the FSP.

8.7 Decontamination Procedures

Decontamination procedures will be conducted in accordance with Section 2.7.5 of the FSP. Equipment (including sampling probes, rods, and tools) will be cleaned prior to initiating and following the completion of field activities. Non-dedicated sampling equipment will be decontaminated after each use during field activities. Decontamination fluids will be containerized in steel 55-gallon drums and managed in accordance with Section 8.9.

8.8 Site Survey

The horizontal and vertical position of all monitoring wells, and the horizontal position of sediment and surface water locations within streams and tributaries will be surveyed by a professional land surveyor using a Global Positioning System (GPS) unit programmed to North American Datum 1983 (NAD83). Recreation Pond sediment and surface water sample coordinates will be estimated.

8.9 Management of IDW

IDW (including soil cuttings, purge water, development water, and decontamination fluids) will be collected and contained in labeled, secured, steel 55-gallon drums. IDW that is generated at off-base locations will be transported to the SANGB by the end of each day, and staged in an area designated by the SANGB POC, pending the results of laboratory testing. Drums will remain on-site in an area designated by the SANGB POC, pending the results of laboratory testing. Waste characterization sampling is detailed in Section 2.5 of the FSP. Appropriate disposal methods for these drums will be determined after reviewing the waste characterization analytical results. Disposal of drums will be completed in a timely manner and in accordance with ANG policy for IDW.

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9.0 PROJECT SCHEDULE AND DELIVERABLES

The estimated project schedule is presented in **Appendix A**. It is anticipated that the initial round of off-base Inspection activities (dry season) will be performed concurrent with or immediately following the SI of SANGB PRLs, with analytical results included in the SI Report. Due to the timeframe to complete the second round of off-base sampling in the spring of 2018, Amec Foster Wheeler will prepare an addendum to the SI Report to document the second round of off-base sampling. The deliverables and field efforts presented in the schedule below are expected to occur as noted. However, these dates are tentative and may be revised based upon agreements reached among all parties during the project execution. The scheduled due dates for the project deliverables are presented in the table below.

PROJECT SCHEDULE AND DELIVERABLES SUMMARY

Deliverable	Scheduled Due Date	Distribution
Draft Site Investigation (SI) WP	December 30, 2016	Contracting Officer Representative (COR), ANG
Draft-Final SI WP	February 28, 2017	COR, ANG and Regulatory Stakeholders
Final SI WP	September 20, 2017	COR, ANG and Regulatory Stakeholders
SI Field Activities	September 25, 2017	N/A
Off-Base Field Activities (Dry Weather)	September 25, 2017	N/A
Off-Base Field Activities (Wet Weather)	April 9, 2018	N/A
Draft SI Report	January 12, 2018	COR, ANG
Draft-Final SI Report	April 13, 2018	COR, ANG and Regulatory Stakeholders
Final SI Report	June 22, 2018	COR, ANG and Regulatory Stakeholders
Draft SI Report Addendum	June 15, 2018	COR, ANG
Draft-Final SI Report Addendum	August 10, 2018	COR, ANG and Regulatory Stakeholders
Final SI Report Addendum	October 13, 2018	COR, ANG and Regulatory Stakeholders

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10.0 REFERENCES

Amec Foster Wheeler, 2017a. *FY 16 Phase 1 Regional Site Inspections for Per-fluorinated Compounds Final Field Sampling Plan, 105th Airlift Wing, New York Air National Guard, Stewart Air National Guard Base.* September, 2017.

Amec Foster Wheeler, 2017b. *FY 16 Phase 1 Regional Site Inspections for Per-fluorinated Compounds Final Quality Assurance Project Plan*, *Multiple Air National Guard Installations.* July, 2017.

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EPA, 2014. Emerging Contaminants – Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA) Fact Sheet, United States Department of Environmental Protection, March 2014.

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Conservation, April 25, 2016.

NYSDEC, 2016c. DEC Declares Stewart Air National Guard Base a State Superfund Site, http://www.dec.ny.gov/press/107321.html, New York Department of Environmental Conservation, August 12, 2016.

NYSDEC, 2016d. Environmental Site Remediation Database Search Details, SANGB Site Record, http://www.dec.ny.gov/, New York Department of Environmental Conservation, November 17, 2016.

FIGURES

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SITE LOCATION MAP

Stewart Air National Guard Base
Newburgh, New York

Legend

Installation Area (approximate)

Location of Site

Notes & Sources

Sources: Installation Area datalayer obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 1

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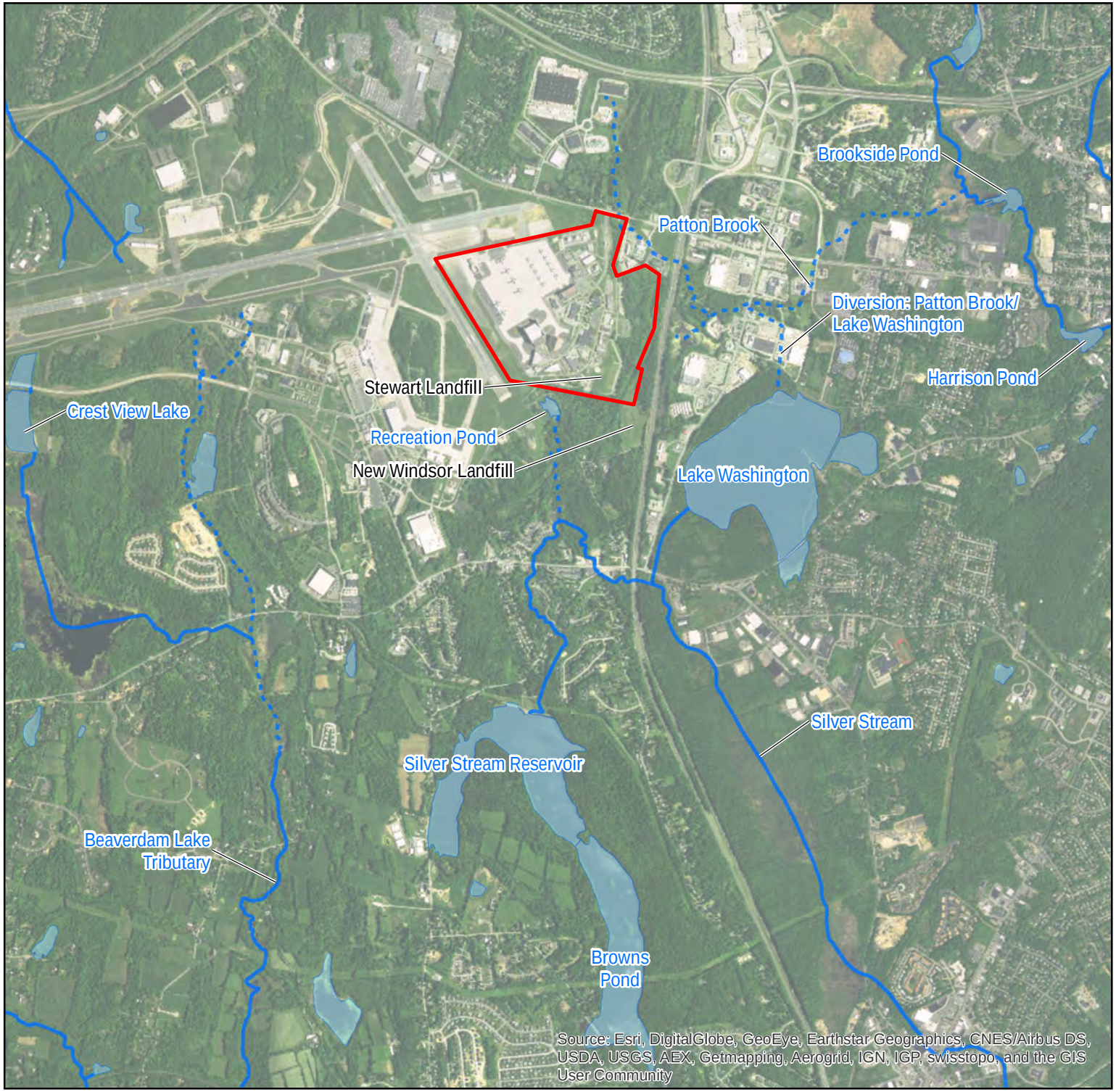

SITE & AREA FEATURES

Stewart Air National Guard Base
Newburgh, New York

Legend

- Installation Area (approximate)
- Lakes and Ponds
- Rivers and Streams
- Inferred Intermittent Streams

Location of Site

Notes & Sources

Sources: Installation Area datalayer obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016. Lakes and Ponds and Rivers and Streams datalayer obtained from NYS GIS Clearinghouse website (updated 2008).

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FIGURE 2

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PROPOSED SAMPLE LOCATIONS

Stewart Air National Guard Base
Newburgh, New York

Legend

- Existing Monitoring Well
- Existing Well Proposed Groundwater Sample
- Temporary Well
- Soil Sample
- Surface Water/Sediment Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 3

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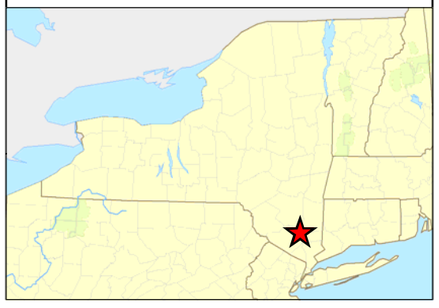
PROPOSED SAMPLE LOCATIONS PRL 1

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site



Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 3A

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PROPOSED SAMPLE LOCATIONS PRL 2

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

* 02SB03/MW-102 is both a proposed soil boring and monitoring well location.

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 3B

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PROPOSED SAMPLE LOCATIONS PRL 3

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3C

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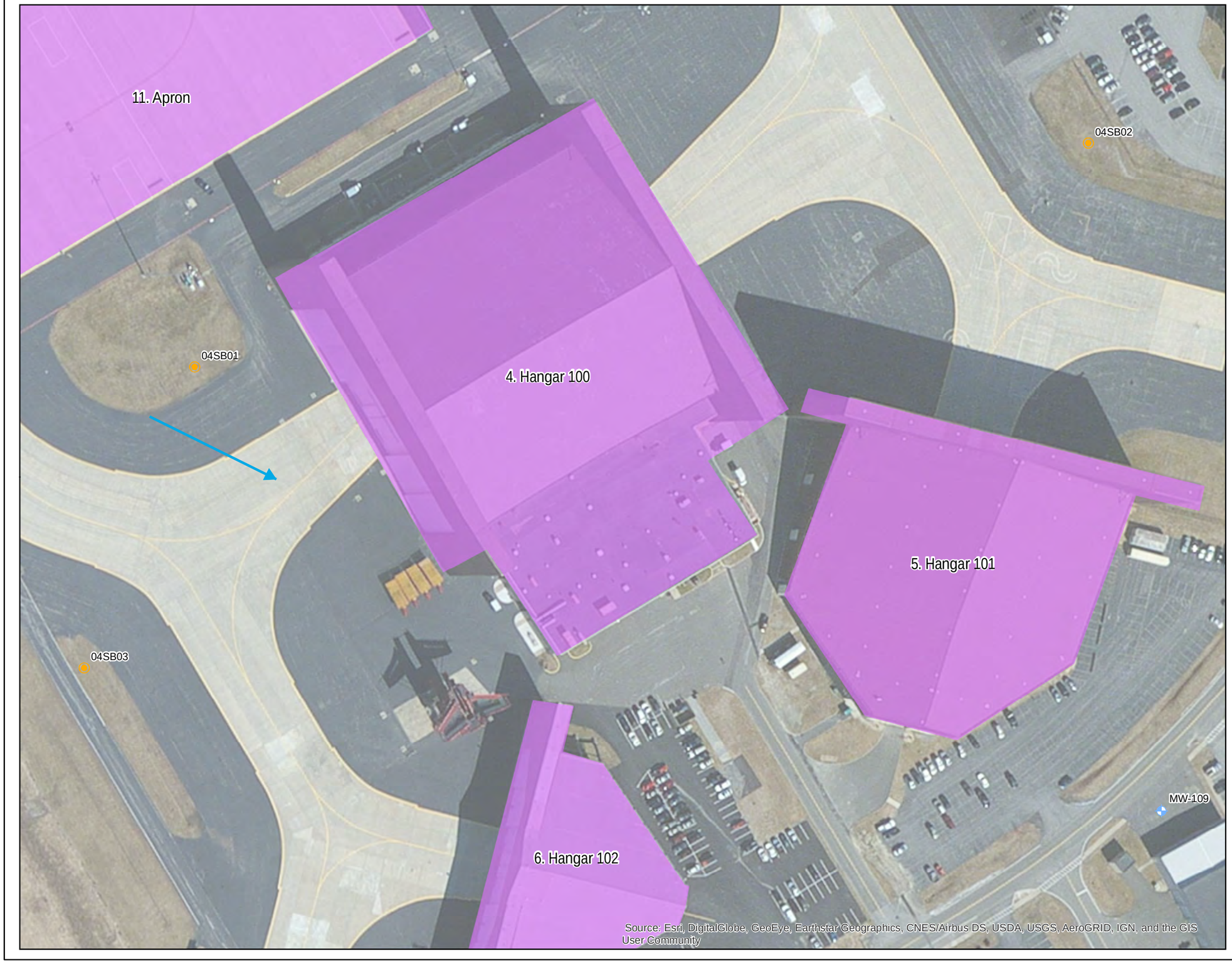

PROPOSED SAMPLE LOCATIONS PRL 4

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3D

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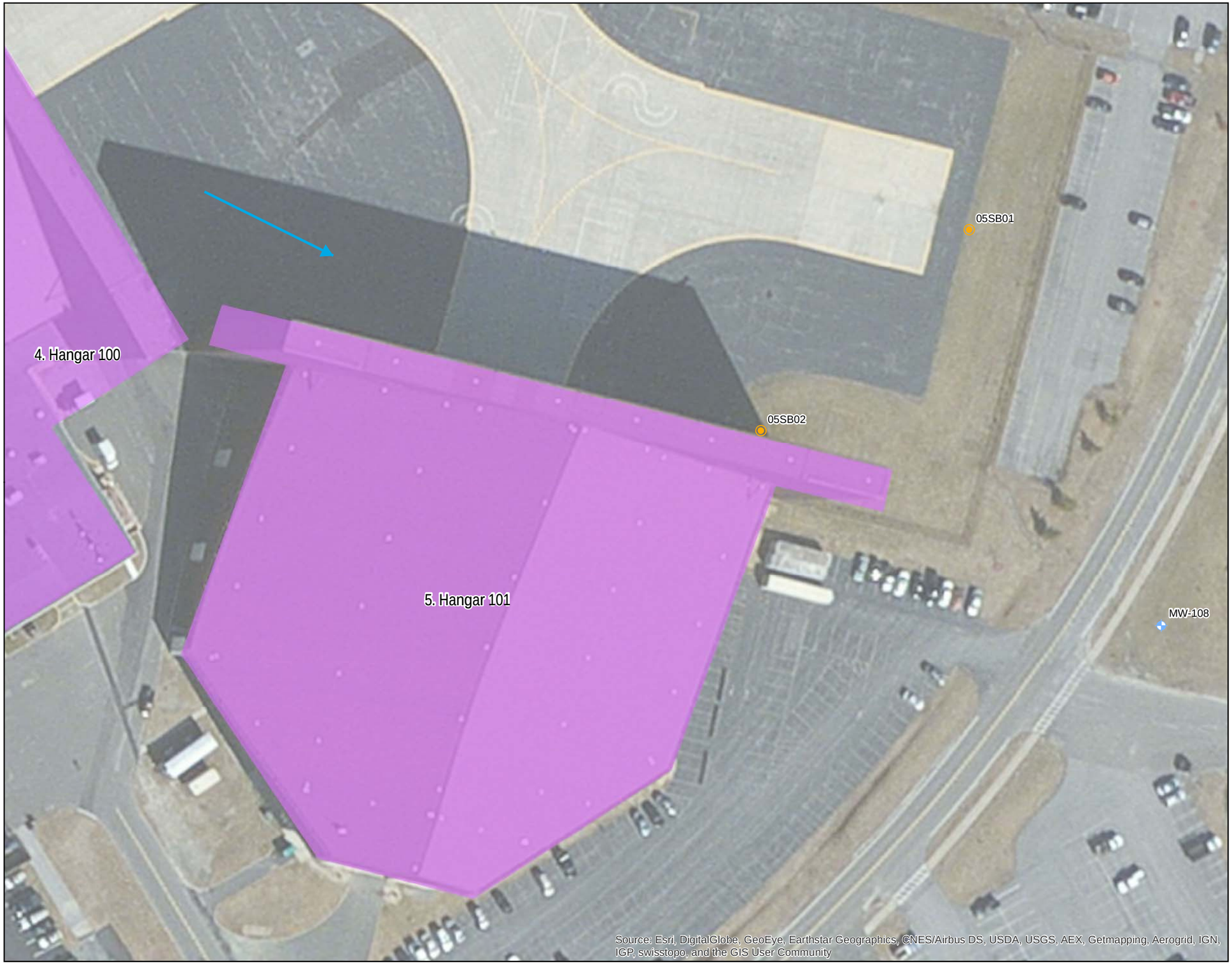


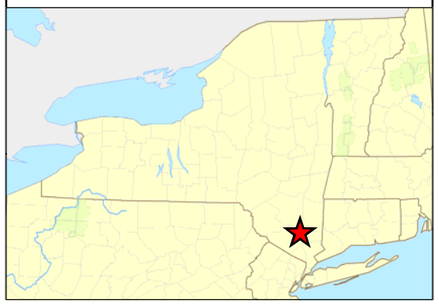
PROPOSED SAMPLE LOCATIONS PRL 5

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site



Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3E

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PROPOSED
SAMPLE LOCATIONS
PRL 6

Stewart Air National Guard Base
Newburgh, New York

Legend

- Existing Well Proposed Groundwater Sample
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3F

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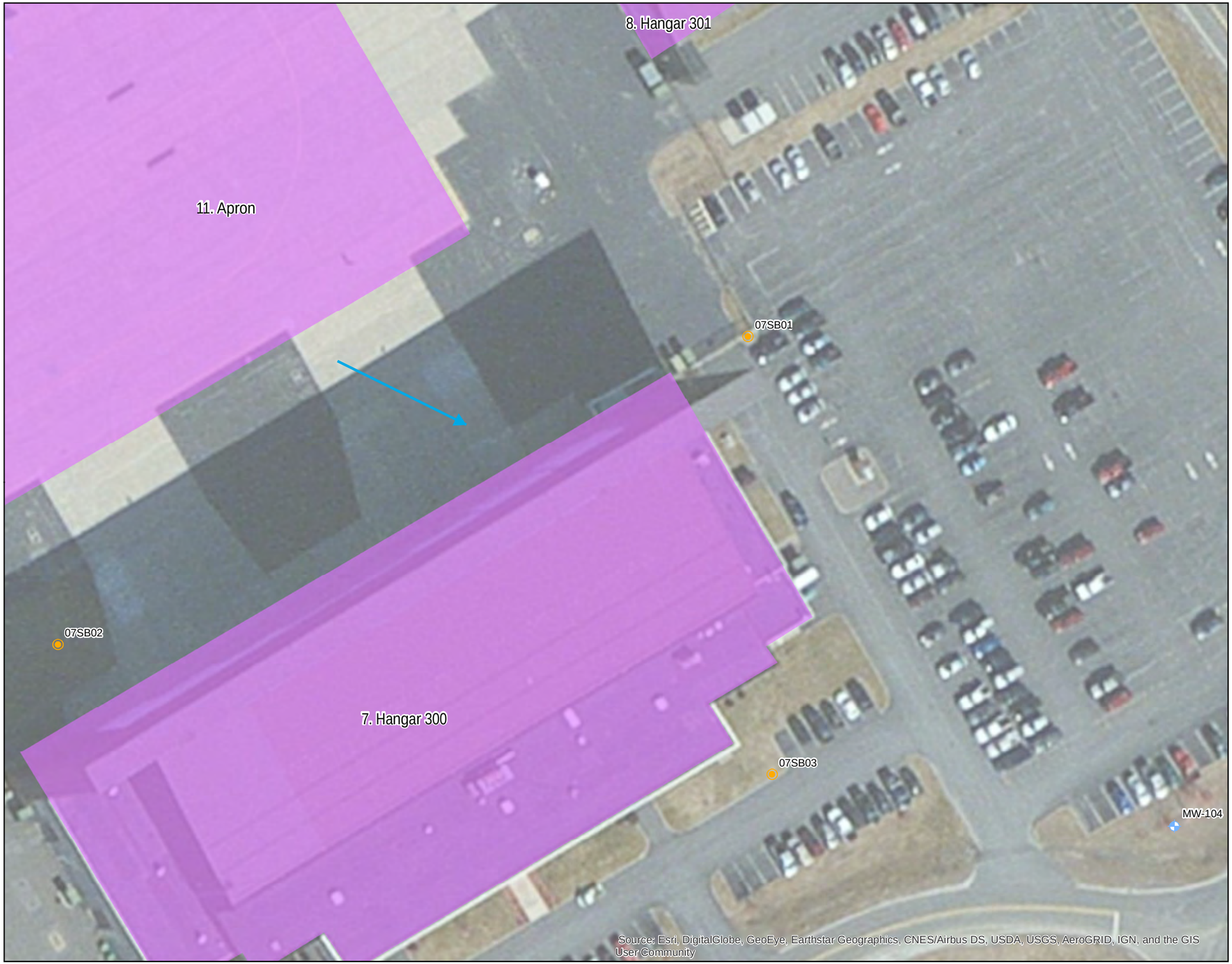

PROPOSED SAMPLE LOCATIONS PRL 7

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3G

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PROPOSED SAMPLE LOCATIONS PRL 8

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3H

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PROPOSED SAMPLE LOCATIONS PRL 10

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3I

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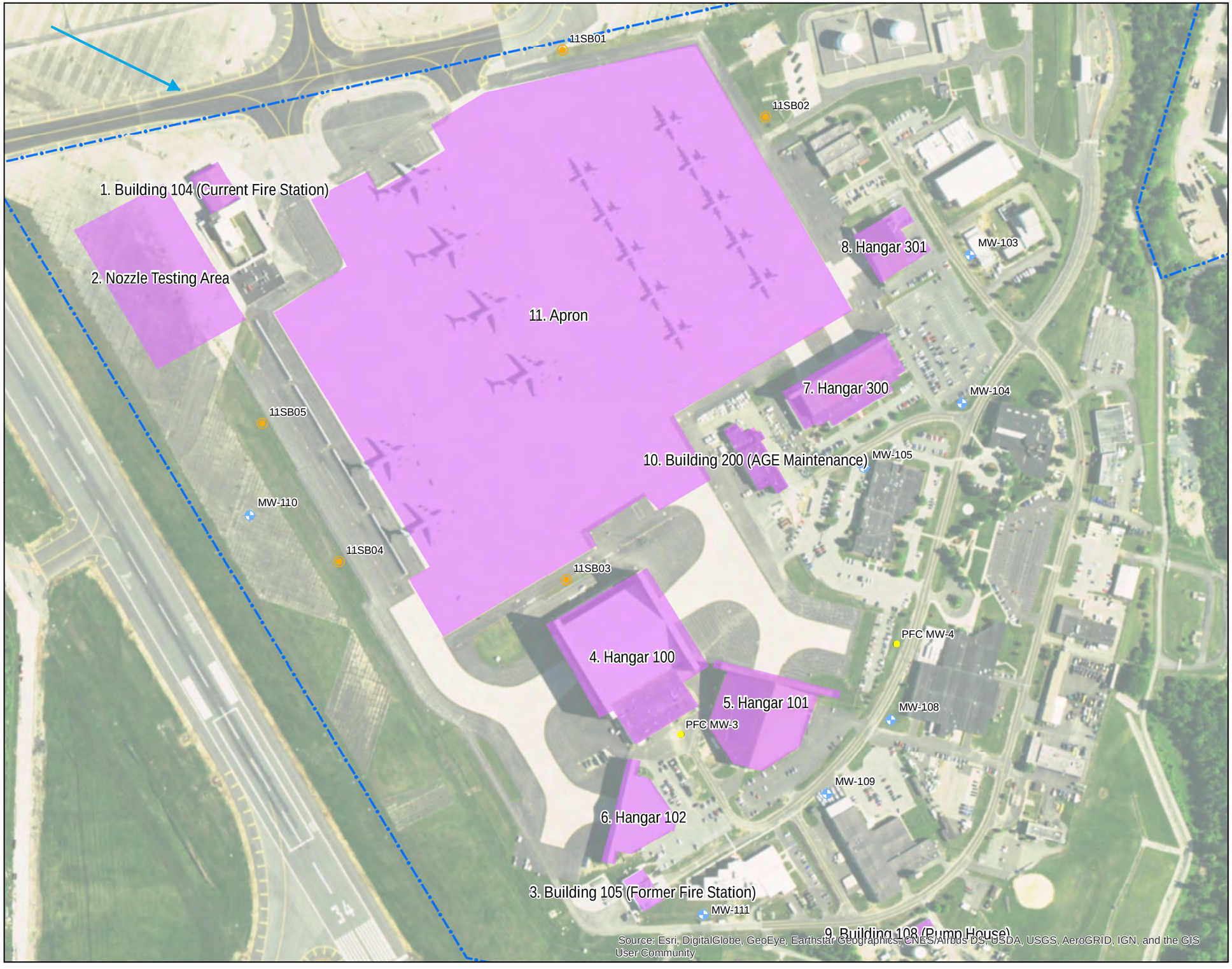
PROPOSED SAMPLE LOCATIONS PRL 11

Stewart Air National Guard Base
Newburgh, New York



Legend

- Existing Well Proposed Groundwater Sample
- Proposed Monitoring Well
- Soil Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE
3J

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STORM DRAIN SYSTEM

Stewart Air National Guard Base
Newburgh, New York

Legend

- Surface Water/Sediment Sample
- Proposed Monitoring Well
- Groundwater Flow Direction (East to Southeast)
- Stormwater System (approximate)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds

Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016. Stormwater System datalayer obtained from Figure 1 (Facility Response Plan) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated January 2013.

0 230 460
Feet

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FIGURE
3K

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

H:\ANG\Newburgh_NY\Task1\MXD\Report\Fig3K_StormDrainSystem.mxd September 07, 2017 DWN: emily.gardiner CHKD: AKN

PROPOSED SAMPLE LOCATIONS PRL 15

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Soil Sample
- Surface Water/Sediment Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 3L

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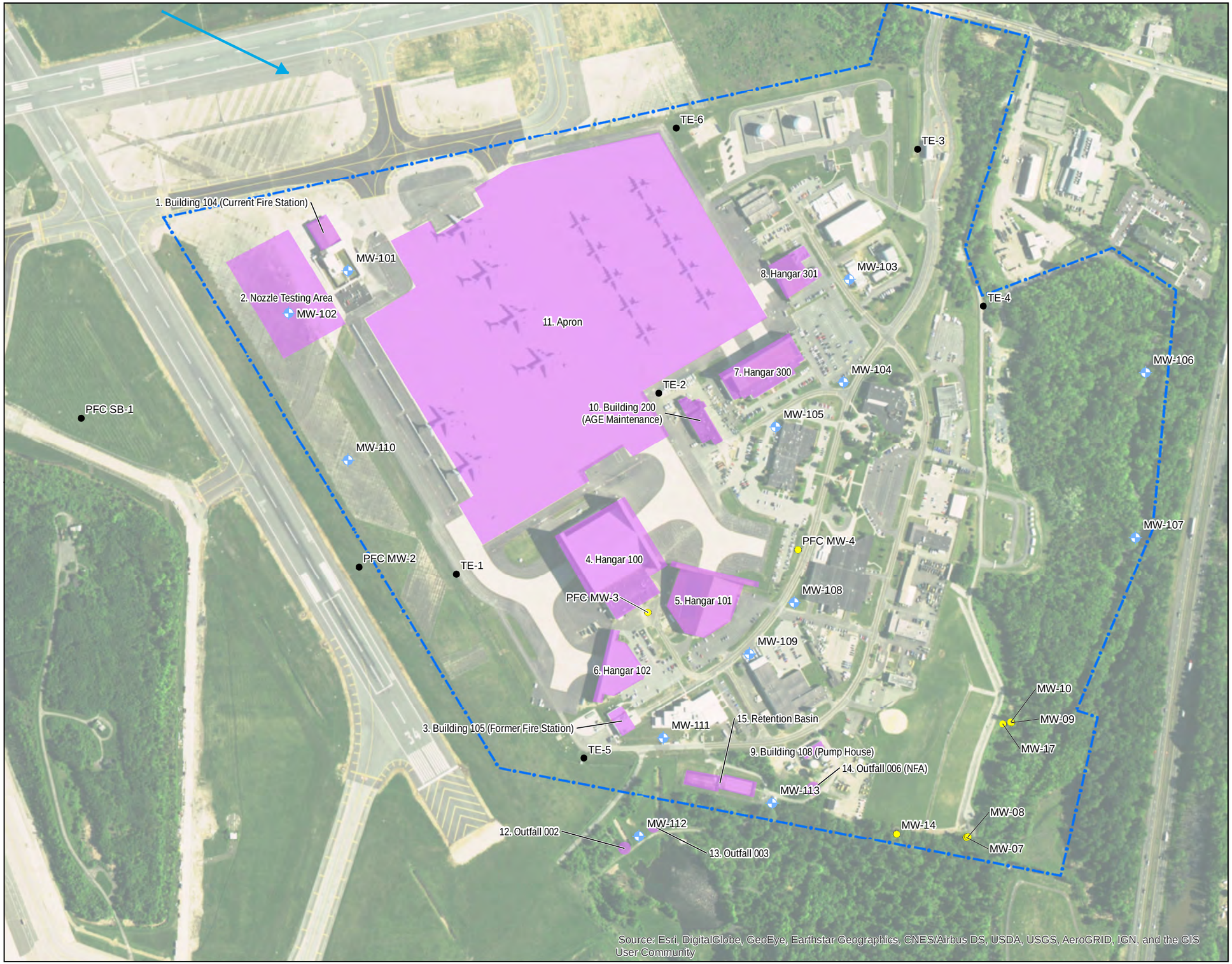
PROPOSED GROUNDWATER SAMPLE LOCATIONS

Stewart Air National Guard Base
Newburgh, New York



Legend

- Existing Monitoring Well
- Existing Well Proposed Groundwater Sample
- Proposed Monitoring Well
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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FIGURE 4

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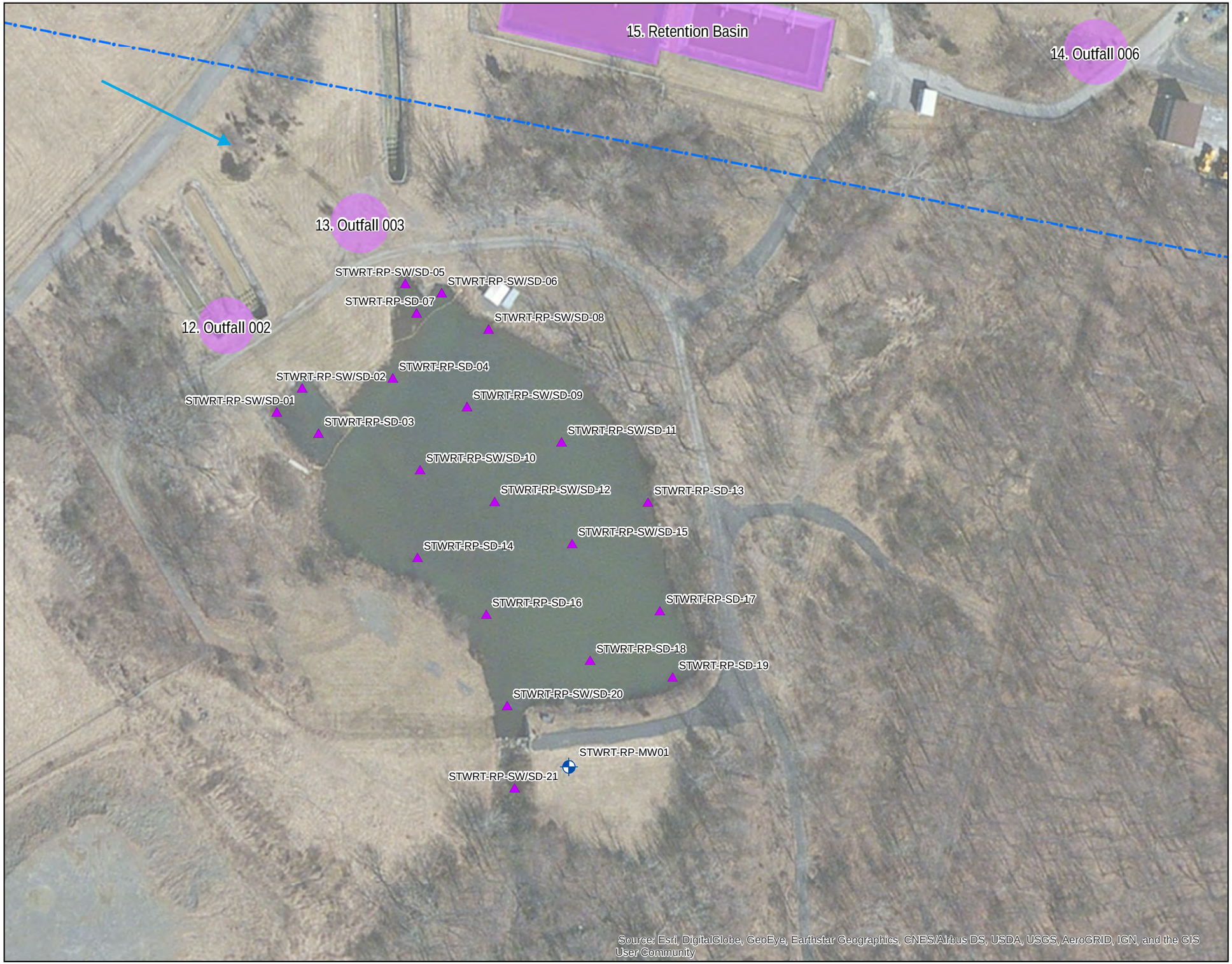

RECREATION POND PROPOSED SAMPLE LOCATIONS

Stewart Air National Guard Base
Newburgh, New York

Legend

- Proposed Monitoring Well
- Surface Water/Sediment Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

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Feet

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FIGURE
5

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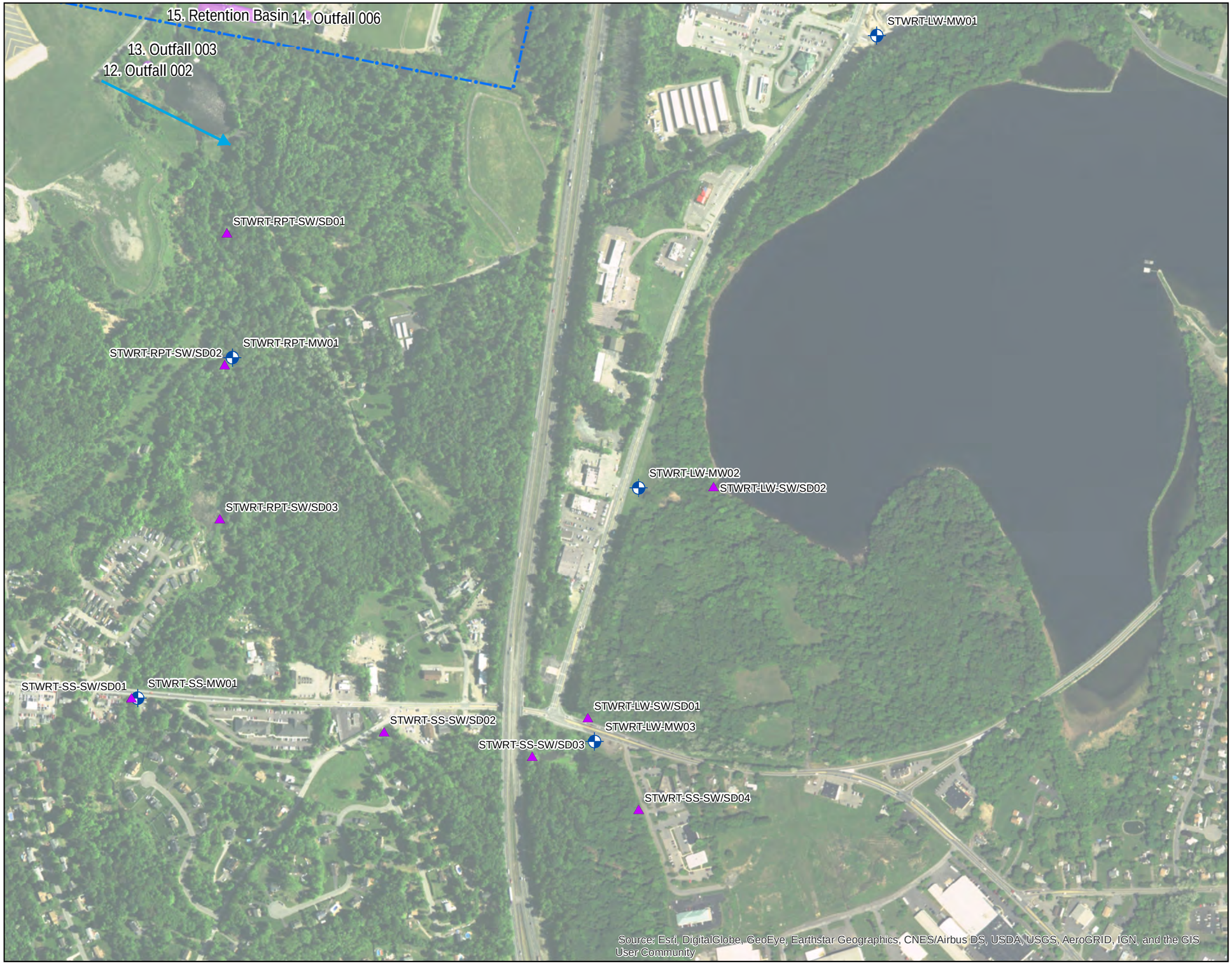
RECREATION POND TRIBUTARY, SILVER STREAM, AND LAKE WASHINGTON PROPOSED SAMPLE LOCATIONS

Stewart Air National Guard Base
Newburgh, New York



Legend

- Proposed Monitoring Well
- Surface Water/Sediment Sample
- Groundwater Flow Direction (East to Southeast)
- AFFF PFC PRL (approximate)
- Installation Area (approximate)

Location of Site

Notes & Sources

Notes: AFFF - aqueous film forming foam. PRL - potential release location. PFC - perfluorinated compounds
Sources: AFF PFC PRL and Installation Area datalayers obtained from Figure 2 (Site Features and Potential AOCs) of the Final Perfluorinated Compounds Preliminary Assessment Site Visit Report prepared by BB&E and dated March 2016.

0 275 550 Feet

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FIGURE 6

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APPENDIX A

PROJECT SCHEDULE

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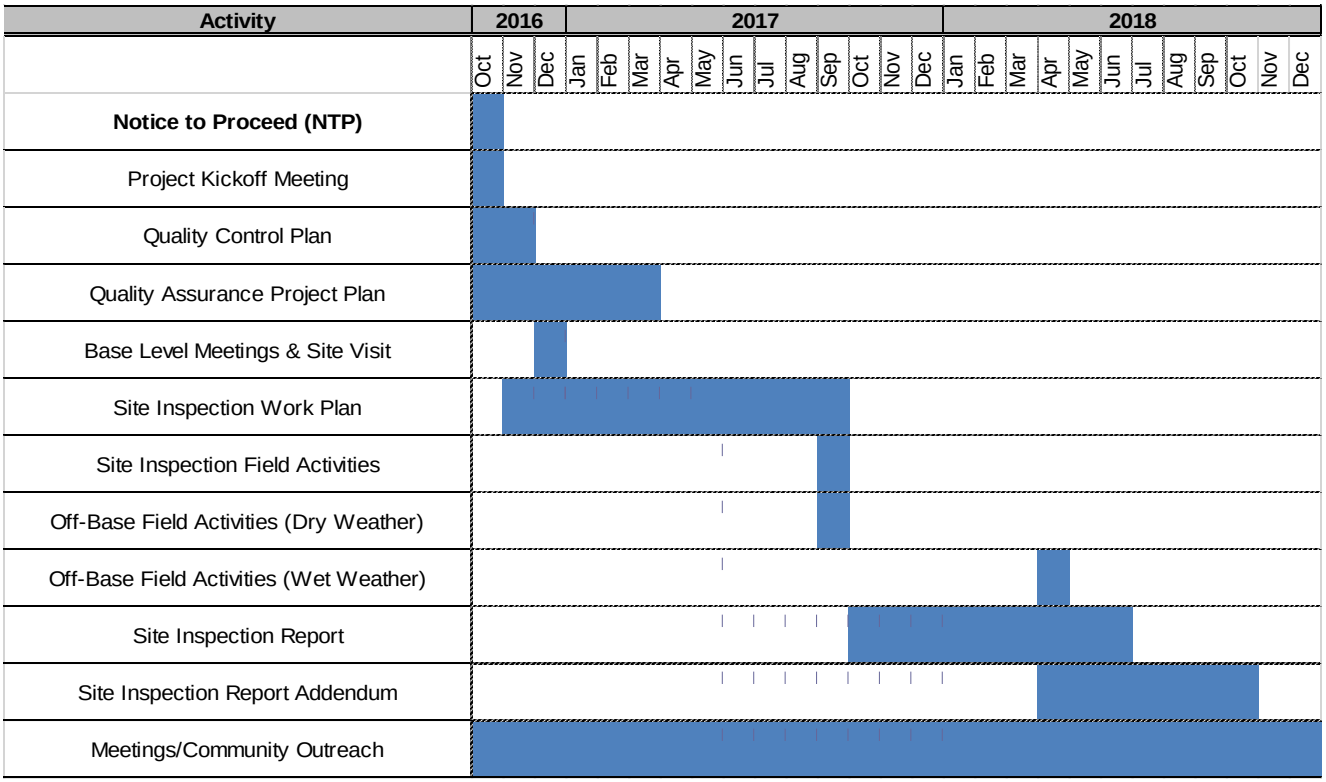
Appendix A
Project Schedule and Deliverables Summary
105th Airlift Wing, New York Air National Guard
Stewart Air National Guard Base, Newburgh, New York

PROJECT SCHEDULE



DELIVERABLES SUMMARY

Deliverable	Scheduled Due Date	Distribution
Draft Site Investigation (SI) WP	December 30, 2016	Contracting Officer Representative (COR), ANG
Draft-Final SI WP	February 28, 2017	COR, ANG and Regulatory Stakeholders
Final SI WP	September 8, 2017	COR, ANG and Regulatory Stakeholders
SI Field Activities	September 25, 2017	N/A
Off-Base Field Activities (Dry Weather)	September 25, 2017	N/A
Off-Base Field Activities (Wet Weather)	April 9, 2018	N/A
Draft SI Report	January 12, 2018	COR, ANG
Draft-Final SI Report	April 13, 2018	COR, ANG and Regulatory Stakeholders
Final SI Report	June 22, 2018	COR, ANG and Regulatory Stakeholders
Draft SI Report Addendum	June 15, 2018	COR, ANG
Draft-Final SI Report Addendum	August 10, 2018	COR, ANG and Regulatory Stakeholders
Final SI Report Addendum	October 13, 2018	COR, ANG and Regulatory Stakeholders

APPENDIX B

SITE HEALTH AND SAFETY PLAN

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APPENDIX C

FIELD SAMPLING PLAN

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APPENDIX D

QUALITY ASSURANCE PROJECT PLAN

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APPENDIX E

NYSDEC SUMMARY PFAS SAMPLE DATA MAPS

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