IMMEDIATE RESPONCE ACTION PLAN
Status Report 9

Cape Cod Gateway Airport
Hyannis, Massachusetts

RTN 4-26347

April 2021

Prepared for:
Cape Cod Gateway Airport
480 Barnstable Road Hyannis,
MA 02840

Prepared by:
Horsley Witten Group, Inc.
90 Route 6A
Sandwich, MA 02563

IMMEDIATE RESPONSE ACTION PLAN STATUS REPORT 9
CAPE COD GATEWAY AIRPORT
HYANNIS, MASSACHUSETTS
RTN 4-26347

TABLE OF CONTENTS

1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Cape Cod Gateway Airport (the "Airport"), formerly known as the Barnstable Municipal Airport, to develop this ninth Immediate Response Action (IRA) Plan Status Report for its property at 480 Barnstable Road, Hyannis, Massachusetts (Figure 1). HW has prepared this report in accordance with the Massachusetts Contingency Plan 310 CMR 40.0000 (MCP) on behalf of:

Ms. Katie Servis, Airport Manager
Cape Cod Gateway Airport
Hyannis, Massachusetts 02601
(508) 775-2020

The report describes IRA related activities conducted between October 2020 and April 2021.

2.0 SUMMARY OF IRA PLAN AND IRA MODIFICATION

An IRA was initiated in response to a Notice of Responsibility (NOR) for Release Tracking Number (RTN) 4-26347 dated November 10, 2016, issued to the Airport by the Massachusetts Department of Environmental Protection (MassDEP). The NOR requested that the Airport conduct additional field investigations to evaluate:

- The source(s) of Per- and Poly-Fluoroalkyl Substances (PFAS) including perfluorooctanesulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) previously detected in groundwater at the Airport and several adjacent properties;
- The source(s) of 1,4-dioxane, previously detected in a monitoring well downgradient of the Airport on the Maher wellfield property; and
- To identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields.

A proposed IRA plan was submitted for approval in response to the NOR. Subsequently, a meeting was held by MassDEP at the Airport that included other stakeholders including the Barnstable Department of Public Works, the Hyannis Water District and Barnstable County representatives (representing the Fire Training Academy). At the meeting, IRA plans were coordinated between the Airport and Fire Training Academy including sampling locations, type of analysis, groundwater modeling, goals and next steps. The IRA plan served as the guide for the soil and groundwater testing conducted since November 2016 to follow up on the results of the previous analyses.

In June 2019, the MassDEP issued a Request for Modified Immediate Response Action Plan/Interim Deadline dated June 18, 2019 (the "Modified IRA Request") to the Airport. The Modified IRA Request asked that the Airport propose response actions to *"reduce infiltration of precipitation through PFAS-impacted soil, such as temporarily capping the source areas; excavating and properly disposing of the PFAS-impacted soil; or some equivalent approach".*

The Airports response is documented in the report titled *Final Immediate Response Action Plan Modification,* prepared by HW and dated December 2019 (the "IRA Modification"). The IRA Modification included details for the installation of a cap in two select areas to reduce precipitation infiltration. The two areas are identified as the Deployment Area and the Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Building Area. The two capped areas total approximately 94,100-square feet and represent a majority of the known PFAS in soil source areas. Areas of PFAS in soil remaining above the applicable Method 1 soil standard located outside of the caped area are indicated on Figure 2. Evaluation of these areas will be included in future response actions and/or included as part of a future risk assessment.

2.1 Background

Prior to issuance of the NOR, the Airport had conducted investigations on both 1,4-dioxane and PFAS and provided the results to MassDEP. In July 2015, HW sampled groundwater from seven groundwater monitoring wells for 1,4-dioxane. This contaminant was detected in groundwater monitoring well OW-9DD located in the Maher wellfield at a concentration of 0.926 micrograms per liter (ug/L). This concentration is above the applicable Method 1 standard of 0.30 ug/L. This groundwater monitoring well is screened from 77 to 87 feet below the ground surface.

A potential source of 1,4-dioxane at the Airport is a historic release of 1,1,1-trichloroethane (1,1,1-TCA) from an oil/water separator associated with a floor drain in the former Provincetown Boston Airlines hangar (currently leased to Cape Air). Given the screen depth of monitoring well OW-9DD, the 1,4-dioxane may also be from an off-Airport source.

On August 4, 2016, MassDEP issued a Request for Information (RFI) to the Airport requiring investigation of PFAS. On July 1 and 5, 2016, HW collected samples from six groundwater monitoring wells and submitted the samples for laboratory analysis of PFOS and PFOA. These compounds were detected in each of the wells tested. At monitoring wells HW-3 and HW-5, the sum of PFOS and PFOA were 0.0931 and 0.151 ug/L respectively, above the EPA health advisory limit and applicable MassDEP standard. PFOS and PFOA were also detected above the EPA health advisory limit and applicable MassDEP standard in monitoring well HW-1, located at the upgradient, western boundary of the Airport. Additional details about 1,4-dioxane and PFAS are included in the Phase II Comprehensive Site Assessment Report submitted to the MassDEP in March 2021 (the "Phase II Report").

2.2 Actions Under the IRA Plan

A summary of the IRA activities conducted between November 2020 and April 2020 include:

- Installation of soil borings and groundwater monitoring wells;
- Soil sampling for PFAS;
- Soil sampling for total organic carbon (TOC);

- Sampling roofing material from the ARFF/SRE Building for PFAS
- Hydraulic conductivity testing;
- Groundwater Sampling for PFAS; and
- Groundwater sampling for 1,4-dioxane.

3.0 APPLICABLE MCP STANDARDS

Pursuant to 310 CMR 40.0900, the characterization of risk of harm to health, safety, public welfare, and the environment must be evaluated at each disposal site. This characterization includes the determination of site-specific soil and groundwater categories based on site location and use, and the comparison of laboratory results to these standards (310 CMR 40.0930).

In accordance with 310 CMR 40.0933, the applicable soil category is selected based upon the frequency, intensity of use, and accessibility of the Airport by adults and children. Based on these criteria, soil at the Airport is category S-1/GW-1 and S-1/GW-3.

Groundwater located within a Current Drinking Water Source Area is considered category GW-1. The Airport is located within several zones of contribution (Zone II) for Barnstable Village, the Hyannis Water District and the Town of Yarmouth. Zone IIs are considered current drinking water sources as defined in 310 CMR 40.0006; thus, category GW-1 is applicable.

Groundwater located within 30 feet of an occupied building that has an average annual depth of less than 15 feet is categorized as GW-2. This is primarily a concern because of the possibility of vapor impacts to indoor air. The average annual depth to groundwater at the Airport is greater than 15 feet; therefore GW-2 Standards do not apply. Also, all disposal sites shall be considered a potential source of discharge to surface water, and therefore categorized as GW-3. Based on these criteria, categories GW-1 and GW-3 are applicable to the Airport.

The soil and groundwater standards applicable to the Airport for PFAS and 1,4-dioxane as described in the document titled Final PFAS – Related Changes to the MCP – 2019-12-13 prepared by the MassDEP and promulgated December 27, 2019 are as follows:

PFAS Standards				
Analyte	Soil Standard (ug/kg)		Groundwater Standard (ug/l)	
	S-1/GW-1	SW-1/GW-3	GW-1	GW-3
Pefluorodecanoic Acid (PFDA)	0.3	300	N/A	40,000
Perfluoroheptanoic Acid (PFHpA)	0.5	300	N/A	40,000

PFAS Standards				
Analyte	Soil Standard (ug/kg)		Groundwater Standard (ug/l)	
	S-1/GW-1	SW-1/GW-3	GW-1	GW-3
Perfluorohexanesulfonic Acid (PFHxS)	0.3	300	N/A	500
Perfluorononanoic Acid (PFNA)	0.32	300	N/A	40,000
Perfluorooctanesulfonic Acid (PFOS)	2	300	N/A	500
Perfluorooctanoic Acid (PFOA)	0.72	300	N/A	40,000
PFAS Sum of Six*	N/A	N/A	0.02	N/A

* PFAS Sum of Six is the sum of PFDA, PFHpA, PFHxS, PFNA, PFOS, and PFOA

1,4-dioxane			
Soil Standard (ug/kg)		Groundwater Standard (ug/l)	
S-1/GW-1	SW-1/GW-3	GW-1	GW-3
200 ug/kg	20,000 ug/kg	0.3	50,000

4.0 HISTORIC FIELD INVESTIGATIONS

Historic field investigations conducted at the Airport since the November 2016 NOR and documented in prior status reports are summarized below:

- An initial round of three soil samples were collected on December 9, 2016. One sample was taken from each location where it was determined that AFFF had been used at the Airport. The areas included the MCI Drill Area, the Deployment Area, and the 1991 Drill Location. Refer to Table 1 for tabulated PFAS in soil results.
- The installation of groundwater monitoring wells at six locations in April 2017: in the vicinity of potential sources of PFAS at the ARFF/SRE Area, at the Deployment Area and at upgradient locations outside of the Airport to evaluate potential off-site sources of PFAS and 1,4-dioxane. Refer to Table 2 and 3 for tabulated groundwater results.
- Groundwater from the new wells was initially sampled for PFAS and 1,4-dioxane in April 2017. Additional groundwater samples and one surface water sample were collected for analysis of PFAS on June 20, 2017. Refer to Table 3 and 4 for tabulated groundwater results.
- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF/SRE Building and within the Deployment Area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third

round of sampling was designed to further delineate the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below ground surface (BGS). Refer to Table 1 for tabulated soil results.

- One sample of AFFF concentrate was analyzed for PFAS compounds to evaluate the foam. The analysis was inconclusive (only 225.5 ug/l of total PFAS was detected) and it is assumed that the sample was not homogeneous (i.e., had separated in the foam bucket) and that the addition of water to the concentrated may affect how precursor PFAS analytes transform into various other detectable PFAS compounds. Refer to Table 4 for tabulated AFFF results.

- Six PFAS soil samples were also analyzed for leaching potential using a synthetic precipitation leaching procedure (SPLP) test between September and October 2017. The chosen samples included four samples from within the boundaries of the PFAS sites at the Airport and two samples from runway reconstruction soils stockpiled at the Airport. Refer to Table 5 for tabulated SPLP results.

- In October 2017, 20 surface samples were collected both on and off Airport property to determine the background concentration of PFAS in the area not related to the application of AFFF. Refer to Table 6 for soil results.

- In October 2017, three composite soil samples were taken from piles of soil associated with the redevelopment of Runway 15/33. These piles were located on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if soil removed from the Airport as part of this redevelopment contained PFAS. Refer to Table 6 for tabulated soil results.

- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF/SRE Building Area and the Deployment Area. PFAS compounds were previously detected in these areas and additional samples were collected to determine the vertical extent of PFAS impacts in soil and to refine the soil disposal site boundary at the Airport. Refer to Table 1 for soil results.

- In October 2018, three soil borings (DL11, DL14 and HW-F) were advanced in the Deployment Area. One soil boring (ARFF3) was advanced, and one surface soil sample (HW-3) was collected near the ARFF/SRE Building in order to further delineate the extent of PFAS in soils both horizontally and vertically. All soil borings were advanced using direct push methods. Refer to Table 1 for soil results.

- In October 2018, six monitoring wells were installed at the Airport. A cluster of three wells (HW-G(s), HW-G(m), and HW-G(d)) was installed at an upgradient location to evaluate potential off-site sources of PFAS. Three additional wells (HW-H, HW-I, and HW-J) were installed southeast of the Deployment Area adjacent to the East Ramp. Refer to Table 2 for groundwater results.

- In November 2018, six groundwater samples were collected to evaluate PFAS concentrations in the Deployment Area. Four groundwater samples and one surface water sample from Mary Dunn Pond were also collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the four downgradient monitoring wells. The analysis was inconclusive in tracing the contribution of pond water in the downgradient monitoring wells. Refer to Tables 3, 7 and 8 for groundwater and surface water results.

- In December 2018, two soil samples were collected from the 1991 Drill Location to determine if PFAS detected in the area are related to background conditions. Refer to Table 1 for soil results.

- In December 2018, 12 groundwater samples were collected for analysis of PFAS and 13 groundwater samples were collected for analysis of oxygen and hydrogen isotopes to determine the contribution of pond water from Mary Dunn Pond to the 13 downgradient wells. Groundwater samples were also collected from four monitoring wells in the Maher Wellfield for analysis of 1,4-dioxane. Refer to Tables 2, 3 and 8 for groundwater water results and Table 7 for surface water results.

- In February 2019, three additional surface soil samples were collected to further delineate the soil Disposal Site boundary around the ARFF/SRE building. Refer to Table 1 for soil results.

- In May and June 2019, HW installed nine groundwater monitoring wells to delineate the vertical and horizontal extent of PFAS and 1,4-dioxane at the Airport and on adjacent hydraulically upgradient properties. Refer to Tables 2 and 3 for groundwater results.

- In June 2019, eight groundwater samples were collected from newly installed groundwater monitoring wells HW-L, HW-K, HW-I (m), HW-I (d), HW-M, HW-D(d), HW-D (dd), and HW-N for PFAS. Refer to Table 2 for groundwater results.

- In July 2019, one groundwater sample was collected from the newly installed groundwater monitoring wells HW-O for PFAS. One groundwater sample was collected from HW-L for 1,4-dioxane. Refer to Tables 2 and 3 for groundwater results.

- In July 2019, two surface water samples were collected from Upper Gate and Lewis Ponds for PFAS analysis. Refer to Table 7 for surface water results.

- In August 2019, four groundwater samples were collected from monitoring wells HW-N, HW-A(d), HW-O, and HW-1 to evaluate potential sources of 1,4-dioxane entering the Airport from unknown upgradient sources(s). One groundwater sample was also collected from groundwater monitoring well HW-E for PFAS. Refer to Tables 2 and 3 for groundwater results.

- In August 2019, soil sample DL 11 (0-1) was collected from the Deployment Area. Refer to Tables 1 for soil results.

- In August 2019, six spray water samples were collected from discharge locations on a fire truck at the Airport. The samples were collected to verify that the valve mechanism that controls the mixing of AFFF with water was working appropriately. PFAS should not be detected in the spray water. PFAS was detected in each of the six samples collected above the GW-1 standard. Refer to Tables 9 for spray water results.

- On September 27, 2019, HW collected groundwater samples from six monitoring wells located on the Airport for 1,4-dioxane analysis. Refer to Table 3 for groundwater results.

- In November 2019, the Airport replaced the valve mechanism in the fire truck to ensure that AFFF was no longer mixing with the water despite the mechanism not being engaged. In December 2019, HW resampled the six discharge locations from the fire truck at the Airport. PFAS was detected at various concentrations at each location but all were below the GW-1 standard. Refer to Tables 9 for spray water results.
- Between May 5th and May 21st, 2020 HW collected 16 groundwater samples PFAS analysis. Refer to Table 2 for groundwater results.
- Between May 5th and May 13th, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis. Refer to Table 3 for groundwater results.
- Between September 14th and September 24th, HW and Desmond Well Drilling installed 13 monitoring wells. Soil boring logs and Analytical data packages were included in the Phase II Comprehensive Site Assessment Report Submitted in March 2021.
- On September 17, 2020 HW collected groundwater samples from the three Maher Wells (ME-1 through ME-3) for PFAS analysis. Analytical data packages were included in the Phase II Comprehensive Site Assessment Report Submitted in March 2021. Refer to Table 2 for groundwater results.
- Between September 14th and September 30th, 2020 HW collected 23 soil samples for PFAS analysis. Analytical data packages were included in the Phase II Comprehensive Site Assessment Report Submitted in March 2021. Refer to Table 1 for soil results.

Soil, surface water and groundwater sampling locations are indicated on Figures 2 through 4. Tabulated soil, groundwater, surface water and spray water data are included on Tables 1 through 9. Laboratory data packages and soil boring logs associated with historic field investigations have previously been submitted to MassDEP and are available in other IRA Status Reports or the Phase II Report.

5.0 FIELD INVESTIGATIONS CONDUCTED DURING THE CURRENT REPORTING PERIOD

Details concerning field investigations conducted between October 2020 and April 2021 are summarized below.

- Between October 1 and October 7, HW collected groundwater samples from 16 monitoring wells for PFAS. Analytical data packages were included in the Phase II Report. Refer to Table 2 for groundwater results.
- On October 2 and 7, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis. Analytical data packages were included in the Phase II Report. Refer to Table 3 for groundwater results.
- On November 9, 2020 HW collected four samples for PFAS analysis. Analytical data packages were included in the Phase II Report. Refer to Table 3 for groundwater results.
- On November 17, 2020 HW collected two roof samples (rubber membrane and asphalt shingle) from the ARFF/SRE building for SPLP PFAS. The testing was completed to determine if roofing materials were a potential source of PFAS in groundwater through stormwater infiltration. PFAS was detected in each of the samples collected. Although the leachate is not considered drinking water, the concentration of the MassDEP Sum of 6 were below the Method 1 GW-1 and GW-3 standards. Analytical data packages are attached, and tabulated analytical results are included in Table 5.
- On November 20, 2020 HW collected groundwater samples from two wells for PFAS analysis. Analytical data packages were included in the Phase II Comprehensive Site Assessment Report Submitted in March 2021. Refer to Table 3 for groundwater results.
- On February 18 and 19th, 2021 HW conducted hydraulic conductivity testing at three monitoring locations. Refer to the Phase II Report for additional details.

- Between March 17th and March 19, 2021 HW collected 21 groundwater samples from the following monitoring wells for PFAS analysis as part of the first round of post cap semiannual monitoring:

HW-R(s)	Hw-I(d)	HW-2	HW-S(m)	RB-1(m)	Hw-19(d)
HW-J	HW-E	HW-3	HW-P(s)	HW-K	
HW-I(s)	HW-F	HW-300	HW-P(m)	OW-19(s)	
HW-I(m)	HW-302	HW-S(s)	RB-1(s)	OW-19(m)	

At the time of this report, analytical results had not been provided by the laboratory. Analytical data packages and tabulated data will be included in the next MassDEP submission.

- Between April 5th and April 7th, 2021, HW and Desmond Well Drilling installed five monitoring wells at the locations indicated on Figure 3 in green. The monitoring wells are identified as follows:

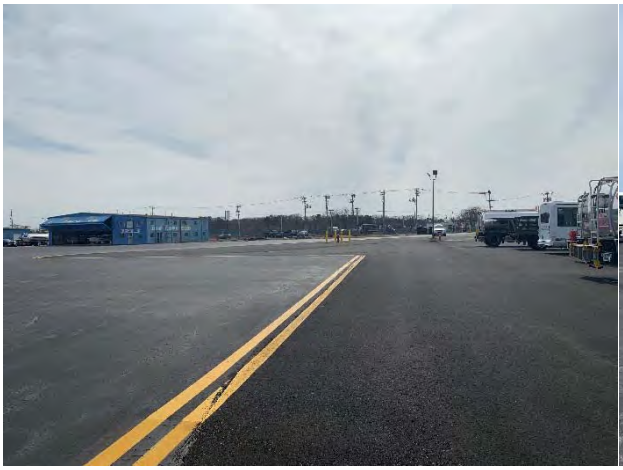
  HW-U(s) HW-U(m) HW-W (m) HW-W(d) HW-W(dd)

  In general, monitoring wells with an (s) after them indicate that a 10-foot well screen was installed five feet into the groundwater table. An (m) after the monitoring well indicates that in general, five feet of well screen was installed in 15-feet of groundwater and the riser was tremie-grouted. A (d) after the monitoring well indicates that in general, five feet of screen was installed deeper than 15 feet into the groundwater and the riser was tremie-grouted. Soil boring logs for the monitoring wells and analytical data will be included in the next status report.

- On April 6, 2021 HW collected 11 soil samples for TOC analysis from HW-W(dd). The TOC samples were collected from various depths between three and 65 feet below grade. The TOC data will be used to further refine the rate of migration of PFAS in groundwater.

6.0 BI-ANNUAL CAP INSPECTION AND CAP PERFORMANCE MONITORING

HW inspected the asphalt cap on March 24, 2021 in the vicinity of the ARFF/SRE Building. The asphalt cap was free of cracks and significant depressions as indicated in the photos below.



HW inspected the geomembrane cap on March 24, 2021 in the vicinity of the Deployment Area. The sand and loam protective layer over the geomembrane cap were intact with no signs of significant erosion as indicated in the photos below. The cap area is scheduled to be seeded with grass in late April or early May.


As indicated above, HW collected 21 groundwater samples as part of the semiannual cap inspection to determine the effectiveness of the cap. The groundwater analytical data was not available at the time of this report. Groundwater analytical data will be included in the next status report to MassDEP.

HW will continue to inspect the two cap areas every six months and collect groundwater samples from existing monitoring wells within proximity to the cap areas to document the effectiveness of the caps. The next cap inspection and groundwater sampling event will take place in September 2021.

7.0 GROUNDWATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

A full evaluation of groundwater contaminant fate and transport characteristics is included in the Phase II Report submitted to MassDEP in March 2021. Additional groundwater testing and forensic techniques will be utilized to further refine the groundwater contaminant fate and transport characteristics.

8.0 UPGRADES TO AFFF TESTING PROTOCOLS AT THE AIRPORT

The Airport has purchased two Ecologic Foam Test Systems to allow the Airport to test the AFFF delivery systems on its current fire trucks without having to discharge the foam into the environment. These new systems meet the Federal Aviation Administration requirements for the regular testing of AFFF usage. Therefore, it is anticipated that no further foam will be deployed at the Airport except during an emergency situation when its use is required.

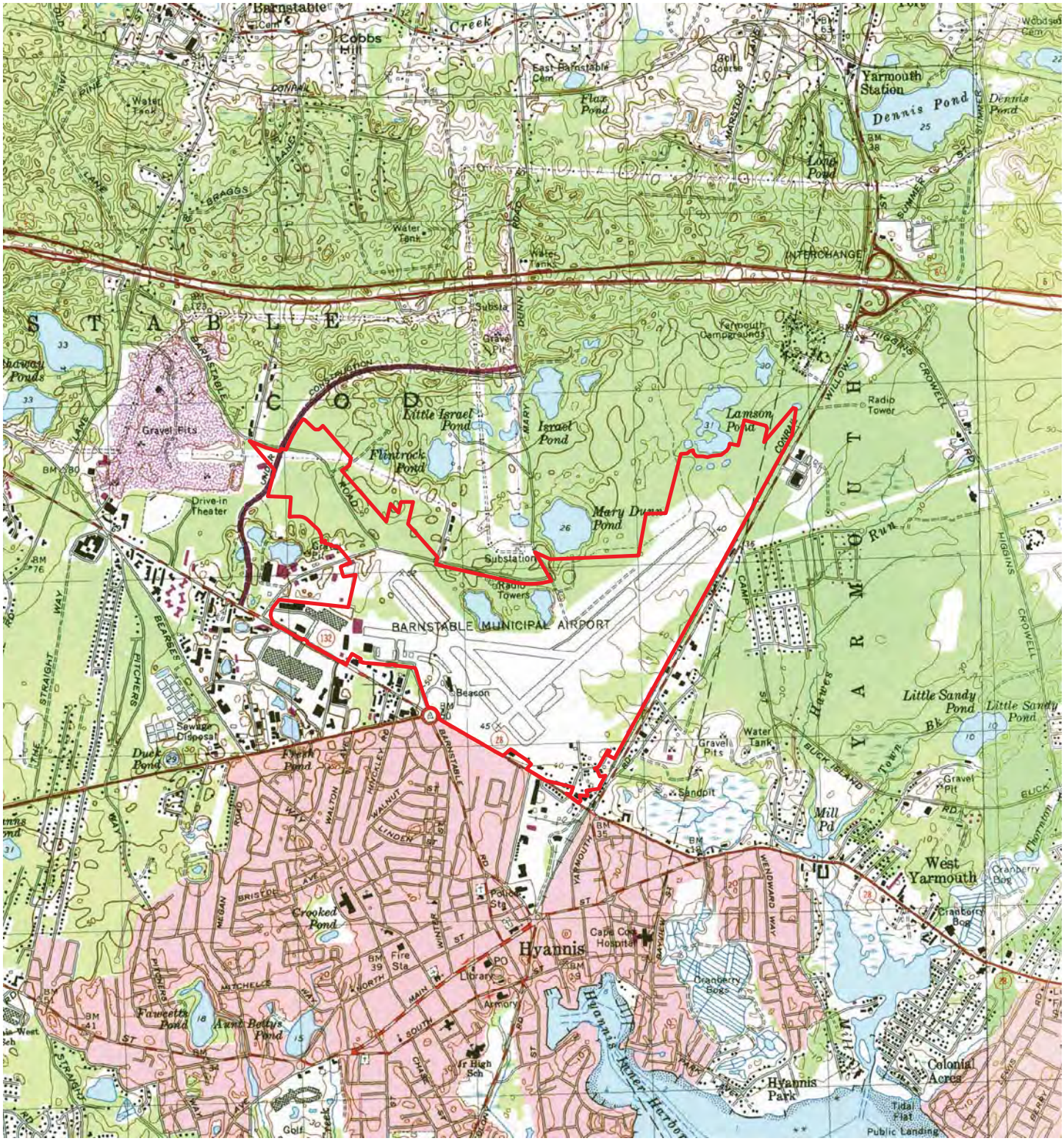
The Airport anticipates receiving a new fire fighting vehicle that deploys AFFF in August 2021. The FAA requires that AFFF be discharged from new equipment to verify the appropriate AFFF mixture. The information from the AFFF discharge test will also be used to calibrate the AFFF consistency for future testing using the ecological cart so that future AFFF deployment will not be necessary. Appropriate precautions will be initiated to limit the possibility of a release of AFFF to the environment during the required testing. These precautions will include

discharging AFFF into a closed vessel such as a fractank or other sealed container, the placement of polyethylene sheeting and visual monitoring by HW. The discharge container will be cleaned, and the contents disposed of by a licensed waste disposal company. Polyethylene sheeting will be placed in a 55-gallon drum for off-site disposal by a licensed waste disposal company. The testing event will be documented in a status report along with photographical documentation.

9.0 PLANS FOR NEXT REPORTING PERIOD

HW will continue to conduct inspections of the two cap areas and monitor groundwater. Further testing of soil and/or groundwater is planned to refine the disposal site boundaries in the Deployment Area and ARFF Building Area. Future analytical results and boring logs will be included in future status reports.

FIGURES



Document Path: H:\Projects\HYA\11072 (697 Barnstable Airport)\GIS_Maps\Maps\USGS_Locus_20130815.mxd

*Hyannis Topographic Quadrangle

Legend

Airport Property Line

N

Miles

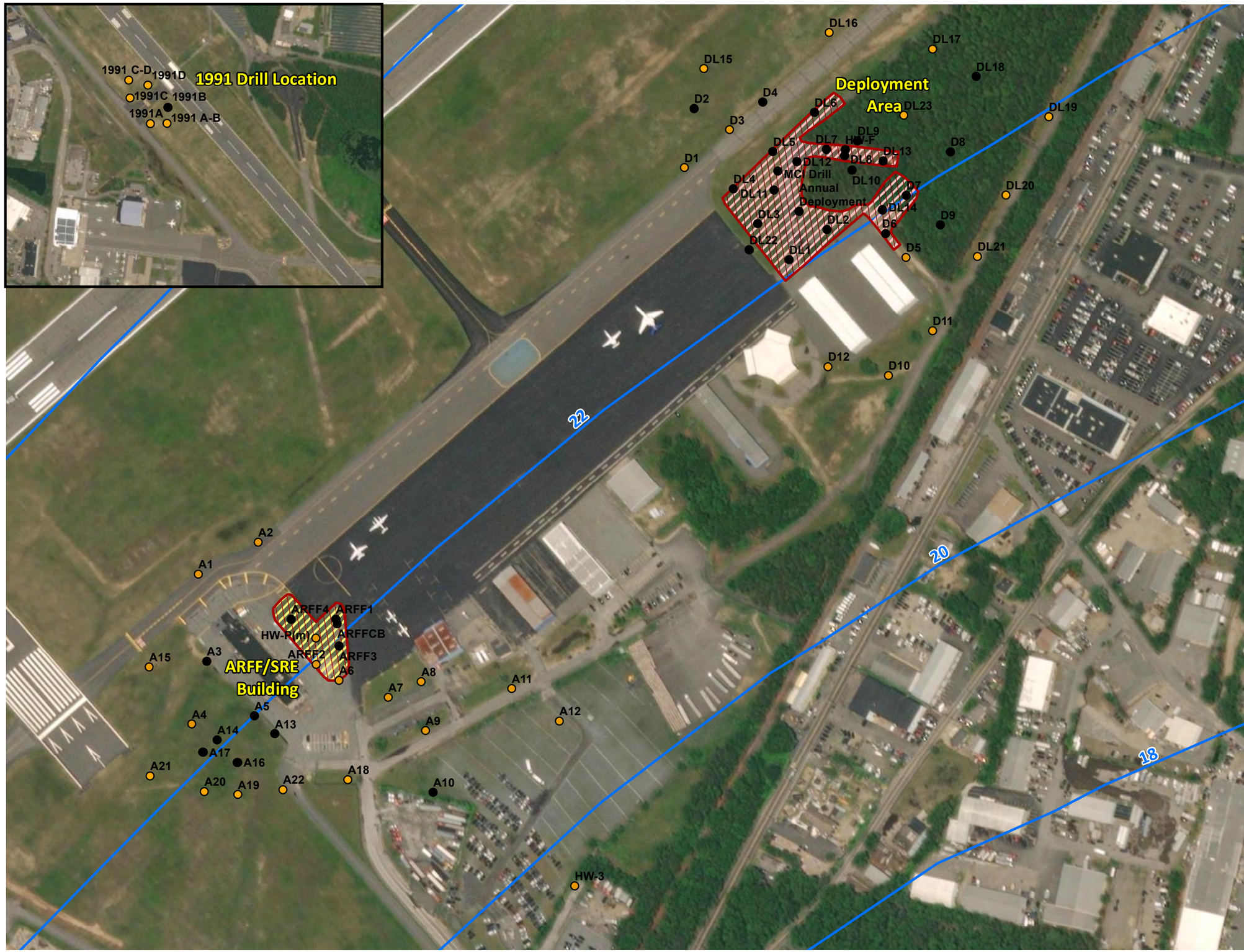
0.5

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Sandwich, MA • 02563
Tel: 508-833-6600 • Fax: 508-833-3150 • www.horsleywitten.com

USGS Locus
Cape Cod Gateway Airport
Hyannis, MA

Date: 4/17/2018

Figure 1



Legend

- Groundwater Contours*
- Deployment Area Liner Cap
- ARFF Asphalt Cap
- Soil Sample Location Below Method 1 S-1/GW-1 Standard for all Six PFAS Compounds
- Soil Sample Exceeds Method 1 S-1/GW-1 Standard for at least one of the six PFAS compounds

Method 1 S-1/GW-1 Standard
PFHpA = 0.5 ug/kg
PFHxS = 0.3 ug/kg
PFOA = 0.72 ug/kg
PFNA = 0.32 ug/kg
PFOS = 2 ug/kg
PFDA = 0.3 ug/kg

N

0 225

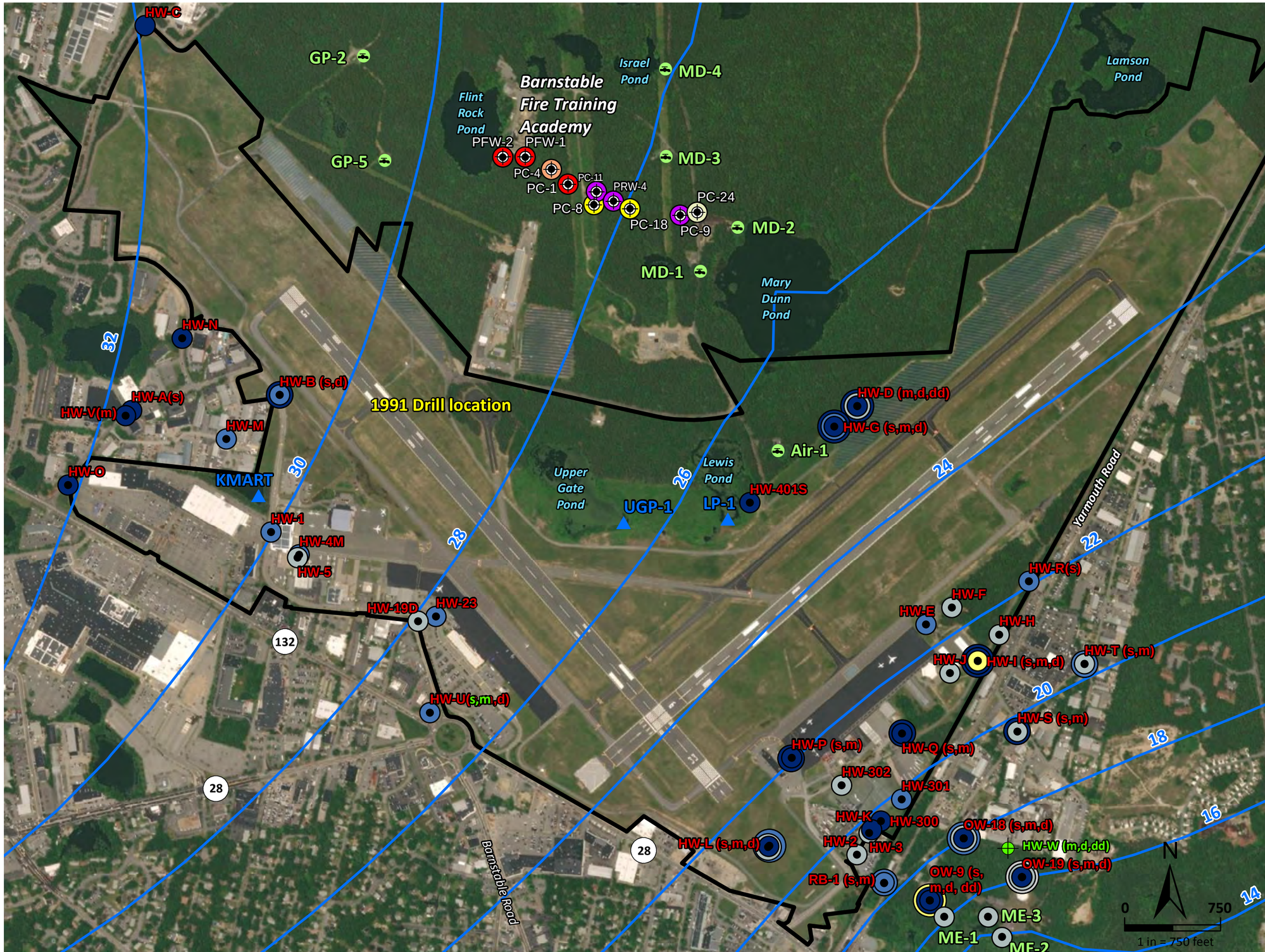
1 in = 225 feet

Horsley Witten Group
Sustainable Environmental Solutions
80 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

Soil Sample Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 11/18/2020 Figure 2

** Cape Cod Commission (CCC) Groundwater Contours*



Legend

- PFAS Monitoring Wells
- Barnstable Fire Training Academy Monitoring Wells
- April 2021 Groundwater Monitoring Well
- s,m April 2021 Groundwater Monitoring Well Added to Existing Well Cluster
- Samples exceeding MassDEP GW-1 Standard
- Surface Water Samples Completed by Airport
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours

Sum of Six PFAS Detected in Groundwater (ug/L)

- 0 - 0.05
- 0.05 - 0.1
- 0.1 - 0.5
- 0.5-1
- 1-5
- 5-15
- 15-50
- >50

Notes:

1. Multiple layers indicates samples at different depths. The larger the circle, the deeper the sample.

2. Sum of six PFAS result is the most recent concentration of PFAS detected and is the sum of the six MsssDEP regulated PFAS.

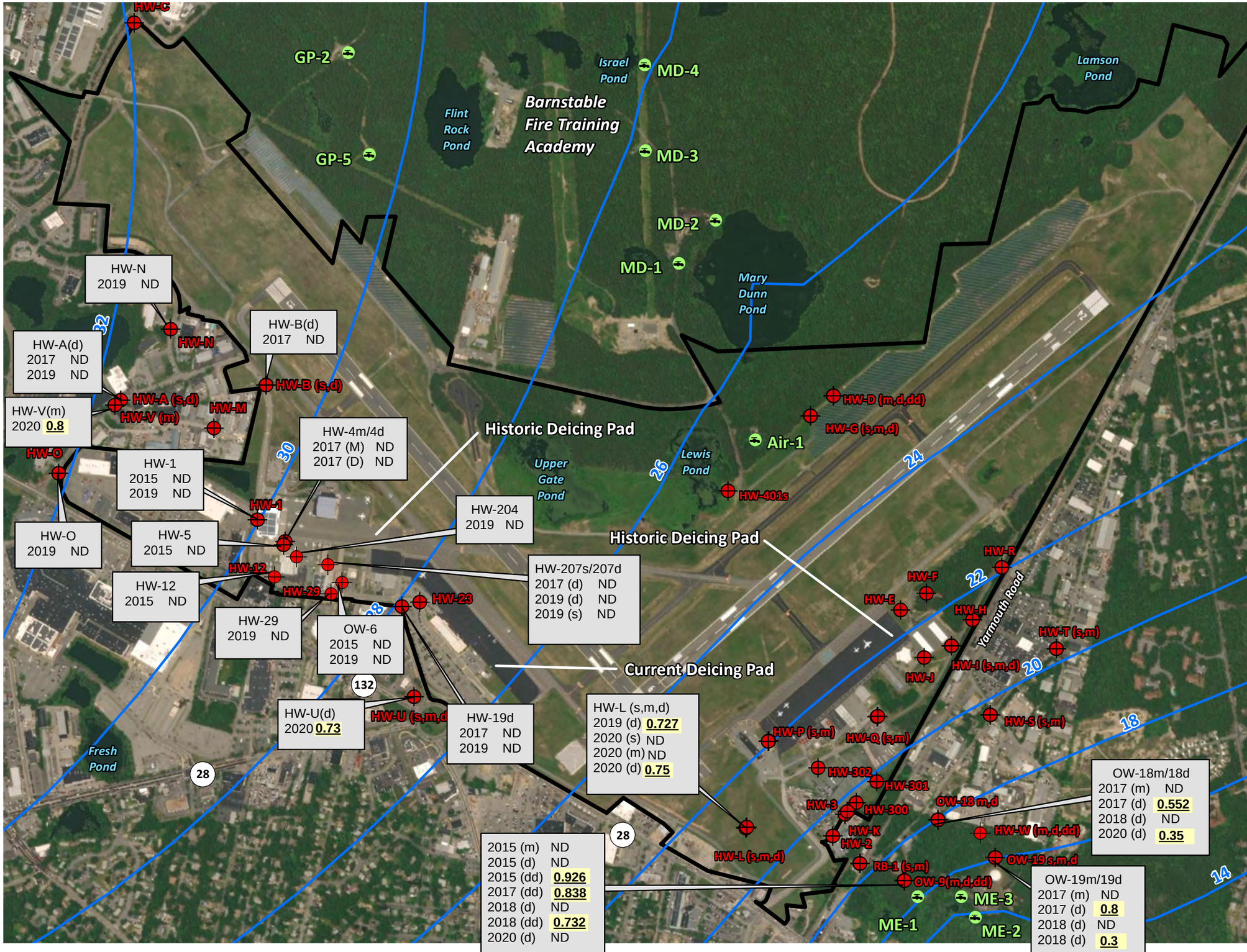
Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

Monitoring Well Locations and PFAS in Groundwater Results
Cape Cod Gateway Airport
Hy annis, MA

Date: 4/12/2021 Figure 3

* Cape Cod Commission (CCC) Groundwater Contours

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\210409_GWPFASrecentSoS IRA.mxd



Legend

- Monitoring Wells
- ND — Not detected by the laboratory above the reporting limit
- 0.2 — 1,4 Dioxane Below MassDEP Limit (0.3 ug/L)
- **0.8** — 1,4 Dioxane Above Method 1 GW-1 Standard (0.3 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary
- Groundwater Contours

N

0 750

1 inch = 750 feet

Horsley Witten Group
Sustainable Environmental Solutions
90 Route 6A • Unit 1 • Sandwich, MA 02563
508-833-6600 • horsleywitten.com

1,4 Dioxane Results In Groundwater Cape Cod Gateway Airport Hyannis, MA

Date: 4/12/2021

Figure 4

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\210409_DioxaneMap.mxd

TABLES

Table 1. Soil Results for PFAS Compounds ug/kg

Sample Location			ARFF Building																																				
Sample ID	Method 1 Standard		ARFF1 (0-1')	ARFF1 (2')	ARFF1 (4')	ARFF2 (0-1')	ARFF3 (0-1')	ARFF3 (10-12)	ARFF4 (0-1')	ARFFCB (0-1)	A1 (0-1')	A2 (0-1')	A3 (0-1')	A4 (0-1')	A5 (0-1')	A5 (2-4')	A6 (0-1')	A7 (0-1')	A8 (0-1')	A9 (0-1')	A10 (0-1')	A11 (0-1')	A12 (0-1')	A13 (0-1')	A13 (0-1')	A14 (0-1')	A14 (0-1')	A15 (0-1')	A15 (0-1')	A16 (0-1')	A17 (0-1')	A18 (0-1)	A19 (0-1)	A20 (0-1)	A20 (2-4)	A21 (0-1)	A22 (0-1)	HW-P(M) [8-10]	HW-P(M) [18-20]	DL1(0-1')
Sample Date	S-1/GW-1	S-1/GW-3	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	10/9/2018	9/26/2017	9/26/2017	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	9/24/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	2/27/2019	9/29/2020	2/27/2019	5/13/2020	2/27/2019	5/13/2020	9/17/2020	9/17/2020	9/29/2020	9/24/2020	9/24/2020	9/24/2020	9/29/2020	9/18/2020	9/18/2020	6/20/2017
Perfluoroheptanoic acid (PFHpA)	0.5	300	**0.82 J**	**1.8**	**0.66 J**	0.17 U	**0.60 J**	0.32 J	**0.75 J**	**0.60 J**	0.19 U	0.19 U	0.38 J	0.19 U	**1.1**	0.089 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	**<2.0**	0.396 J	**<1.9**	**0.51 J**	**<2.0**	0.21 U	0.067 J	**1.07**	0.076 J	0.101 J	0.09 U	0.09 U	0.045 U	0.096 J	0.044 U	0.043 U	0.30 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	**0.64 J**	0.24 U	0.23 U	0.23 U	0.24 U	0.24 U	0.24 U	0.24 U	0.12 U	0.12 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**<2.0**	0.058 U	**<1.9**	0.24 U	**<2.0**	0.21 U	0.085 J	0.058 U	0.054 U	0.059 U	0.121 U	0.121 U	0.06 U	0.055 U	0.059 U	0.058 U	0.23 U
Perfluorooctanoic acid (PFOA)	0.72	300	**0.75 J**	**2.6**	**0.75 J**	0.26 U	**0.78 J**	**1.9**	**0.97 J**	**0.90 J**	0.25 U	0.25 U	0.37 J	0.30 J	**1.9**	0.228 J	0.25 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	0.25 U	**<2.0**	0.67 J	**<1.9**	0.68 J	**<2.0**	0.14 U	0.088 J	**0.989**	0.111 J	0.129 J	0.196 J	0.147 J	0.042 U	0.069 J	0.089 J	0.046 J	0.26 U
Perfluorononanoic acid (PFNA)	0.32	300	**2.5**	**5.7**	**1.4**	0.20 J	**0.91 J**	**3.1**	**2.9**	0.17 U	0.22 U	0.22 U	**0.51 J**	0.22 U	**0.87 J**	0.148 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	**<2.0**	**1.2**	**<1.9**	**0.54 J**	**<2.0**	0.15 U	0.119 J	**0.774 J**	0.281 J	0.246 J	0.15 U	0.15 U	0.075 U	0.11 J	0.073 U	0.072 U	0.17 U
Perfluorooctane sulfonate (PFOS)	2	300	**4.5**	**2.7**	1.1	0.29 J	**4.4**	1.1	1.0	1.1	0.26 U	0.26 U	0.29 J	0.26 U	0.26 U	0.257 U	0.26 U	0.38 J	0.26 U	0.85 J	0.26 U	0.26 U	0.26 U	<2.0	1.3	<1.9	0.32 J	<2.0	0.29 J	**2.02**	0.573 J	1.15	0.611 J	0.259 U	0.26 U	0.276 J	0.559 J	0.0127 U	0.0124 U	0.40 J
Perfluorodecanoic Acid (PFDA)	0.3	300	**4.4**	**1.2**	**0.62 J**	0.13 U	**1.6**	0.28 U	**0.85 J**	0.13 U	0.28 U	0.28 U	**0.42 J**	0.28 U	**1.4**	0.133 U	0.28 U	0.28 U	0.28 U	0.28 U	**0.33 J**	0.28 U	0.28 U	<2.0	**0.34 J**	<1.9	**0.95 J**	<2.0	0.15 U	0.074 J	0.147 J	0.146 J	0.066 U	0.134 U	0.134 U	0.067 U	0.119 J	0.065 U	0.064 U	**0.63 J**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	0.93 J	0.74 J	1.0	0.23 U	0.61 J	4.2	0.65 J	2.2	0.26 U	0.26 U	0.26 U	0.26 U	18	0.355 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	<2.0	0.173 U	<1.9	0.25 U	<2.0	0.22 U	0.17 U	0.172 U	0.161 U	0.175 U	0.358 U	0.359 U	0.179 U	0.164 U	0.221 J	0.172 U	0.39 J
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Si																																							
Total PFAS	NA	NA	120.06	41.75	46.85	1.16	23.72	11.03	11.9	95.43	0	0	6.2	1.14	161.07	0.613	1.5	1.35	0.48	1.92	1.1	0.43	0	0.0	5.2	0	13.15	0.0	0.45	3.131	11.267	2.652	1.409	0.316	0.147	0.571	1.412	0.411	0.09	11.14
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	12.97	14	4.53	0.49	8.93	6.42	6.47	2.6	0	0	1.97	0.3	5.27	0.228	0	0.38	0	1.19	0.33	0	0	0	3.916	0	3	0	0.29	2.453	3.553	1.764	1.087	0.196	0.147	0.276	0.953	0.089	0.046	1.33

Sample Location			Deployment Area																																				
Sample ID	Method 1 Standard		DL2 (0-1')	DL2 2'	DL2 4'	DL3 (0-1')	DL3 2'	DL3 4'	DL4 (0-1')	DL4 2'	DL4 4'	DL5 (0-1')	DL5 2'	DL5 4'	DL6 (0-1')	DL7 (0-1')	DL8 (2')	DL8 (4')	DL9 (0-1')	DL10 (0-1')	DL11 (0-1')	DL 11 (0-1')	DL 11 (0-1')	DL11 (4-6')	DL11 (10-12')	DL11 (14-16')	DL12 (0-1')	DL13 (0-1')	DL14 (0-1')	DL14 (4-6')	DL14 (10-12')	DL14 (14-16')	DL15 (0-1)	DL16 (0-1)	DL17 (0-1)	DL18 (0-1)	DL19 (0-1)	DL20 (0-1)	DL21 (0-1)	DL22 (2-4)	DL22 (6-8)
Sample Date	S-1/GW-1	S-1/GW-3	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	9/26/2017	9/26/2017	6/20/2017	6/20/2017	6/20/2017	9/26/2017	6/20/2017	6/20/2017	9/26/2017	8/20/2019	10/4/2018	10/4/2018	10/4/2018	9/26/2017	9/26/2017	9/26/2017	10/4/2018	10/4/2018	10/4/2018	9/30/2020	9/30/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020	9/25/2020
Perfluoroheptanoic acid (PFHpA)	0.5	300	**1.9**	**1.2**	0.48 J	**0.84 J**	0.17 U	0.17 U	0.31 J	0.17 U	0.17 U	**2.5**	0.40 J	0.50 J	**5.0**	**2.5 J**	**2.9 J**	**4.7 J**	**0.66 J**	**1.3**	**2.1**	1.8	1.3	0.31 J	0.23 J	**1.2**	**1.6**	**4.9**	0.36 J	0.19 U	**1.4**	0.175 U	0.138 J	0.167 U	0.319 J	0.145 U	0.157 U	0.158 U	0.109 J	0.481 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	**1.8**	**1.3**	**0.59 J**	**0.34 J**	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	**0.49 J**	**0.49 J**	0.23 U	0.23 U	**2.3 U**	**2.3 U**	**2.3 U**	**0.35 J**	**0.94 J**	**0.82 J**	**<0.9**	0.24 U	0.24 U	0.24 U	0.23 U	0.23 U	**0.71 J**	0.24 U	0.24 U	**0.74 J**	0.235 U	0.057 U	0.224 U	0.159 J	0.194 U	0.21 U	0.212 U	0.057 U	0.07 J
Perfluorooctanoic acid (PFOA)	0.72	300	**1.6**	**4.1**	**0.74 J**	**0.80 J**	0.26 U	0.26 U	**0.83 J**	0.26 U	0.26 U	**3.7**	**1.6**	0.26 U	0.26 U	**4.2 J**	**25**	**22**	0.68 J	**1.7**	**4.7**	**5.2**	**2.9**	**1.9**	0.50 J	**4.6**	**2.4**	**23**	0.58 J	0.32 J	**2.9**	0.334 J	0.223 J	0.166 J	**0.979 J**	0.135 U	0.146 U	0.159 J	0.447 J	**1.32**
Perfluorononanoic acid (PFNA)	0.32	300	**0.81 J**	**2.5**	0.17 U	**0.55 J**	0.17 U	0.17 U	**2.7**	0.17 U	**3.7**	0.19 J	0.17 U	0.17 U	0.19 J	**9.6 J**	**46**	**1.7 U**	0.22 J	0.17 U	**16**	**2.4**	**2.5**	0.22 U	0.22 U	**7.3**	**1.5**	**10**	0.22 U	0.22 U	**10**	0.292 U	0.285 J	0.277 U	0.296 J	0.241 U	0.261 U	0.263 U	**5.46**	**2.66**
Perfluorooctane sulfonate (PFOS)	2	300	**12**	1.5	0.21 U	0.51 J	0.21 U	0.21 U	2.0	0.21 U	0.50 J	0.21 U	0.21 U	0.21 U	0.21 U	**3.9 J**	**14**	**2.1 U**	0.38 J	0.26 J	**29**	1.5	0.26 U	0.26 U	0.26 U	**23**	0.66 J	**7.6**	0.26 U	0.26 U	**2.3**	0.505 U	0.575 J	0.481 U	1.05 J	0.418 U	0.452 U	0.456 U	**20.3**	**8.85**
Perfluorodecanoic Acid (PFDA)	0.3	300	0.13 U	0.13 U	0.13 U	**1.4**	0.13 U	0.13 U	**1.3**	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	**1.3 U**	**1.3 U**	**1.3 U**	0.13 U	0.13 U	**1.8**	**8.7**	0.28 U	0.28 U	0.28 U	**0.66 J**	**7.4**	**9.6**	0.28 U	0.28 U	0.28 U	0.26 U	0.181 J	0.248 U	0.167 J	0.215 U	0.233 U	0.235 U	**0.834 J**	**0.383 J**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	0.23 U	0.23 U	0.57 J	3.1	1.5	1.0	0.24 J	0.23 U	1.7	0.23 U	0.23 U	0.23 U	2.0	290	1600	900	0.23 U	0.23 U	7.8	30	4.1	4.4	6.7	62	320	230	0.67 J	0.30 J	64	0.698 U	0.168 U	0.664 U	0.19 U	0.577 U	0.625 U	0.629 U	7.49	11.7
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Si																																							
Total PFAS	NA	NA	24.41	12.17	2.38	84.86	9.56	13.81	9.6	0.88	5.9	11.03	2.49	0.5	18.59	404.4	1727.2	949.6	6.38	9.1	85.22	91.5	11.07	6.82	7.63	108.56	521.26	598.24	50.11	21.22	116.64	4.523	2.269	0.628	4.84	0	0	0.68	66.813	41.988
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	18.11	10.6	1.81	4.44	0	0	7.14	0	4.2	6.88	2.49	0.5	5.19	20.2	87.9	26.7	2.29	4.2	54.42	19.6	6.7	2.21	0.73	36.76	13.56	55.81	0.94	0.32	17.34	0.334	1.402	0.166	2.97	0	0	0.159	27.15	13.764

Sample Location			Deployment Area																		
Sample ID	Method 1 Standard		DL22 (18-20)	DL23 (0-1)	D1 (0-1')	D2 (0-1')	D3 (0-1')	D4 (0-1')	D5 (0-1')	D6 (0-1')	D7 (0-1')	D8 (0-1')	D9 (0-1')	D10 (0-1')	D11 (0-1')	D12 (0-1')	HW-F (10-12')	HW-F (14-16')	HW-3 (0-1')	MCI Drill (0-1)	Annual Deployment (0-1)
Sample Date	S-1/GW-1	S-1/GW-3	9/25/2020	9/29/2020	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	8/14/2018	10/4/2018	10/4/2018	10/9/2018	12/9/2016	12/9/2016
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.073 J	0.24 J	0.19 U	0.21 J	0.19 U	**0.95 J**	0.22 J	0.25 J	**7.8**	**1.0**	**2.7**	0.19 U	0.19 U	0.19 U	0.32 J	**1.3**	0.19 U	**8.4**	**20**
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.059 U	0.134 J	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.31 J**	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	**0.5 J**	**4 U**
Perfluorooctanoic acid (PFOA)	0.72	300	0.176 J	0.471 J	0.25 U	0.33 J	0.25 U	**1.1**	0.25 U	0.28 J	**14**	**2.2**	**3**	0.25 U	0.25 U	0.25 U	0.25 U	**1.4**	0.25 U	**23**	**100**
Perfluorononanoic acid (PFNA)	0.32	300	**0.476 J**	0.176 J	0.22 U	**0.67 J**	0.22 U	**0.98 J**	0.22 U	0.22 U	**10**	**0.59 J**	**0.83 J**	0.22 U	0.22 U	0.32 J	0.22 U	0.22 U	0.22 U	**14**	**31**
Perfluorooctane sulfonate (PFOS)	2	300	1.18	0.725 J	0.26 U	0.66 J	0.38 J	**2.9**	0.26 U	0.26 U	**3.4**	**2.1**	0.67 J	0.54 J	0.91 J	0.44 J	0.26 U	0.26 U	0.26 U	**24**	1.9 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.065 U	0.266 J	0.28 U	0.28 U	0.28 U	**0.40 J**	0.28 U	**0.66 J**	**8.6**	**1.3**	**1.6**	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	**20**	**69**
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	2.67	0.181 U	0.26 U	0.26 U	0.26 U	0.26 U	0.78 J	1.2	12	0.26 U	6.6	0.26 U	0.26 U	0.26 U	24	140	0.26 U	270	4300
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Si																					
Total PFAS	NA	NA	11.352	4.053	0.74	1.87	0.94	11.42	3.01	9.06	151.24	24.61	43.41	0.83	1.62	1.47	25.27	146.5	0	1,524	5,972.9
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	1.905	2.012	0	1.87	0.38	6.33	0.22	1.19	43.8	7.5	8.8	0.54	0.91	0.76	0.32	2.7	0	89.9	221.9

Sample Location			1991 Drill Location					
Sample ID	Method 1 Standard		1991A (0-1')	1991B (0-1')	1991C (0-1')	1991D (0-1')	1991A-B (3-4')	1991C-D (2-3')
Sample Date	S-1/GW-1	S-1/GW-3	8/14/2018	8/14/2018	8/14/2018	8/14/2018	12/14/2018	12/14/2018
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.24 U	**0.66 J**	0.24 U	0.24 U	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	0.72	300	0.25 U	0.26 J	0.25 U	0.25 U	0.25 U	0.25 U
Perfluorononanoic acid (PFNA)	0.32	300	0.22 U	0.22 U	0.22 U	0.30 J	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	2	300	0.49 J	1.1	0.55 J	0.36 J	0.30 J	0.42 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	NA	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Si								
Total PFAS	NA	NA	0.49	3.18	0.55	0.66	0.3	0.42
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	0.49	2.02	0.55	0.66	0.3	0.42

Notes:
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the proposed Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).

Table 2. Groundwater Results for PFAS ug/L

Sample Location	North Ramp											Lewis Pond Area
Sample ID	HW-1	HW-1	HW-1	HW-4M	HW-5	HW-5	HW-5	HW-23	HW-23	HW-19D	HW-19D	HW-401S
Sample Date	7/1/2016	6/20/2017	11/1/2018	4/5/2017	7/1/2016	4/7/2017	11/1/2018	6/20/2017	11/1/2018	6/20/2017	11/7/2018	4/7/2017
TOC Elevation	51.51	51.51	51.51	54.02	54.98	54.98	54.98	50.65	50.65	49.10	49.10	41.58
Depth to Groundwater	21.63	25.00	21.83	26.20	24.94	26.75	25.27	22.70	24.01	21.29	22.19	17.95
Groundwater Elevation	29.88	26.51	29.68	27.82	30.04	28.23	29.71	27.95	26.64	27.81	26.91	23.63
Total Well Depth	30.84	30.84	30.84	32.32	27.80	27.80	27.80	28.11	28.11	41.30	41.30	23.60
Perfluoroheptanoic acid (PFHpA)	0.01	0.0042 J	0.013 J	0.007 J	0.0041	0.0084 J	0.0074 U	0.0045J	0.0098 J	0.0052 J	0.0080 J	0.0043 J
Perfluorohexanesulfonic acid (PFHxS)	0.018	0.065	0.018 J	0.02	0.011	0.018 J	0.0056 U	0.021	0.023	0.046	0.045	0.011 J
Perfluorononanoic acid (PFNA)	<0.002	0.0057 J	0.0087 U	0.0046 U	<0.002	0.0046 U	0.0088 J	0.0038 U	0.0087 U	0.0065 J	0.0087 U	0.0046 U
Perfluorooctanoic acid (PFOA)	0.017	0.022	0.031	0.011 J	0.12	0.020 J	0.011 J	0.0046 U	0.011 J	0.017 J	0.014 J	0.0046 U
Perfluorooctane sulfonate (PFOS)	0.033	0.24	0.028	0.043	0.031	0.052	0.12	0.0079 J	0.015 J	0.061	0.069	0.012 J
Perfluorodecanoic Acid (PFDA)	NA	0.0040 U	0.0061 U	0.0040 U	NA	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U	0.0061 U	0.0040 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0032 U	0.0066 U	0.0038 J	NA	0.0037 J	0.0066 U	0.0032 U	0.0066 U	0.0032 U	0.0066 U	0.004 J
Total PFAS	0.078	0.4247	0.15	0.1162	0.1661	3.0021	0.1507	0.0745	0.0858	0.1758	0.16	0.0313
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.078**	**0.3369**	**0.09**	**0.081**	**0.1661**	**0.0984**	**0.1398**	**0.0334**	**0.0588**	**0.1357**	**0.136**	**0.0273**

Sample Location	Airport Road/Iyannough Road Area											
Sample ID	HW-A(S)	HW-B(S)	HW-B(S)	HW-B(D)	HW-C	HW-M	HW-N	HW-O	HW-U(d)	HW-V(m)	HW-L (s)	HW-L (m)
Sample Date	4/7/2017	4/7/2017	10/26/2018	10/26/2018	4/7/2017	6/24/2019	6/24/2019	7/2/2019	10/2/2020	10/2/2020	10/7/2020	6/19/2019
TOC Elevation	55.34	51.84	51.84	51.95	69.25	53.69	49.49	43.46	48.80	53.83	39.07	38.98
Depth to Groundwater	24.62	22.26	21.59	21.66	38.50	20.32	15.48	3.62	24.66	22.90	21.96	21.88
Groundwater Elevation	30.72	29.58	30.25	30.29	30.75	33.37	34.01	39.84	24.14	30.93	17.11	17.10
Total Well Depth	32.00	30.23	30.23	57.20	42.15	26.92	22.33	14.10	62.30	36.15	27.33	37.33
Perfluoroheptanoic acid (PFHpA)	0.0048 J	0.049	0.012 J	0.0074 U	0.0033 U	0.007	0.0034	<0.002	0.01	0.0033	0.00053 U	0.0064
Perfluorohexanesulfonic acid (PFHxS)	0.0079 J	0.044	0.047	0.0056 U	0.0034 U	0.016	0.033	0.0043	0.018	0.0032	0.0013	0.023
Perfluorononanoic acid (PFNA)	0.0046 U	0.0046 U	0.0087 U	0.0087 U	0.0046 U	<0.002	<0.002	<0.002	0.0016 J	0.0017 J	0.00063 U	0.0025
Perfluorooctanoic acid (PFOA)	0.0026 U	0.0094 J	0.020 J	0.012 J	0.0026 U	0.027	0.0088	0.0039	0.01	0.0063	0.00071 U	0.01
Perfluorooctane sulfonate (PFOS)	0.0046 U	0.026	0.019 J	0.010 J	0.0046 U	0.0074	0.004	0.017	0.023	0.0059	0.0014	0.07
Perfluorodecanoic Acid (PFDA)	0.0040 U	0.0040 U	0.0061 U	0.0061 U	0.0040 U	<0.002	<0.002	0.0021	<0.002	<0.002	0.00062 U	0.00062 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	0.0032 U	0.0032 U	0.0066 U	0.0066 U	0.0034 J	0.002 U	0.002 U	0.002 U	0.0012	0.00039 U	0.00039 U	0.022
Total PFAS	0.0779	0.4561	0.186	0.0465	0.0034	0.0927	0.0727	0.0585	0.0889	0.0543	0.0027	0.18375
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0127	**0.1284**	**0.098**	**0.022**	<0.0046	**0.0574**	**0.0492**	**0.0273**	**0.0588**	**0.0204**	0.0027	**0.1119**

Sample Location	ARFF Building Area											
Sample ID	HW-L (d)	HW-L (d)	HW-P (s)	HW-P (m)	HW-Q (s)	HW-Q (s)	HW-Q (m)	HW-P (d)	HW-Q (d)	HW-Q (d)	HW-Q (d)	HW-Q (d)
Sample Date	7/2/2019	10/7/2020	10/1/2020	10/1/2020	10/1/2020	11/6/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020
TOC Elevation	39.15	39.15	40.51	40.64	37.89	37.89	37.90	45.20	45.20	45.08	45.08	45.08
Depth to Groundwater	19.75	16.93	17.82	17.84	16.44	15.85	16.49	26.37	26.86	26.09	26.85	24.45
Groundwater Elevation	19.35	22.22	22.69	22.80	21.45	22.04	21.41	18.83	18.34	18.99	18.23	20.60
Total Well Depth	70.55	70.55	27.60	38.30	26.60	26.60	36.79	30.32	30.32	44.94	44.94	65.05
Perfluoroheptanoic acid (PFHpA)	0.078	0.0065	0.026	0.003	0.0018 J	0.0021	<0.002	0.0033 U	<0.002	0.021	0.017	<0.002
Perfluorohexanesulfonic acid (PFHxS)	0.033	0.015	0.0018 J	0.00085	0.013	0.0087	0.0019 J	0.0089 J	<0.002	0.062	0.039	0.0092
Perfluorononanoic acid (PFNA)	0.0033	0.0022	0.0061	0.0011 J	<0.002	<0.002	0.00075 J	0.0046 U	<0.002	0.015	0.019	0.0041
Perfluorooctanoic acid (PFOA)	0.025	0.018	0.0084	0.0018 J	0.0049	0.0062	0.00095 J	0.0046 U	<0.002	0.0088	0.0076	<0.002
Perfluorooctane sulfonate (PFOS)	0.049	0.039	0.00097	0.0011 J	0.0041	0.0075	0.0049	0.022	0.0011	0.095	0.12	0.013
Perfluorodecanoic Acid (PFDA)	<0.002	0.0019	0.00085	<0.002	<0.002	<0.002	<0.002	0.0040 U	<0.002	<0.002	<0.002	<0.002
6:2 Fluorotelomer sulfonate (6:2 FTS)	0.0021	0.00078	0.011	0.00092	0.00039 U	0.00039 U	0.00039 U	0.0032 U	0.00039 U	0.0022	0.00039 U	0.002 U
Total PFAS	1.1823	0.12348	0.2478	0.02967	0.0307	0.0346	0.00944	0.0309	0.0011	0.2768	0.24993	0.0263
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.1181**	**0.0826**	**0.04412**	0.00785	**0.0238**	**0.0245**	0.0085	**0.0309**	0.0011	**0.2018**	**0.2026**	**0.0263**

Sample Location	Solar Field								
Sample ID	HW-D (m)	HW-D (m)	HW-D (d)	HW-D (d)	HW-D (dd)	HW-D (dd)	HW-G(S)	HW-G(M)	HW-G(D)
Sample Date	4/7/2017	5/13/2020	6/24/2019	5/13/2020	6/24/2019	5/13/2020	12/3/2018	12/3/2018	12/3/2018
TOC Elevation	45.20	45.20	45.08	45.08	45.05	45.05	44.99	45.11	44.93
Depth to Groundwater	18.83	18.34	18.99	18.23	20.60	19.97	20.69	20.75	20.71
Groundwater Elevation	26.37	26.86	26.09	26.85	24.45	25.08	24.30	24.36	24.22
Total Well Depth	30.32	30.32	44.94	44.94	65.05	65.05	28.45	38.25	48.28
Perfluoroheptanoic acid (PFHpA)	0.0033 U	<0.002	0.021	0.017	<0.002	<0.002	0.0074 U	0.0074 U	0.0074 U
Perfluorohexanesulfonic acid (PFHxS)	0.0089 J	<0.002	0.062	0.039	0.0092	0.008	0.0056 U	0.012 J	0.0056 U
Perfluorononanoic acid (PFNA)	0.0046 U	<0.002	0.015	0.019	0.0041	0.0029	0.0087 U	0.011 J	0.0087 U
Perfluorooctanoic acid (PFOA)	0.0046 U	<0.002	0.0088	0.0076	<0.002	<0.002	0.0033 U	0.0033 U	0.0033 U
Perfluorooctane sulfonate (PFOS)	0.022	0.0011	0.095	0.12	0.013	0.013	0.0060 U	0.036	0.0060 U
Perfluorodecanoic Acid (PFDA)	0.0040 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0061 U	0.0061 U	0.0061 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	0.0032 U	0.00039 U	0.0022	0.00039 U	0.002 U	0.00039 U	0.0066 U	0.0066 U	0.0066 U
Total PFAS	0.0011	0.2768	0.24993	0.0263	0.02444	0	0.059	0	
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0011	**0.2018**	**0.2026**	**0.0263**	**0.0239**	0.0087 U	**0.059**	0.0087 U	

Sample Location	Deployment Area											
Sample ID	HW-I (s)	HW-I (s)	HW-I (m)	HW-I (m)	HW-I (d)	HW-I (d)	HW-J	HW-E	HW-E	HW-E	HW-E	HW-F
Sample Date	11/7/2018	5/8/2020	6/24/2019	5/8/2020	6/24/2019	5/8/2020	11/7/2018	4/5/2017	11/7/2018	8/19/2019	5/5/2020	4/5/2017
TOC Elevation	36.08	36.08	36.27	36.27	36.02	36.02	37.10	38.45	38.45	38.45	38.45	36.32
Depth to Groundwater	18.35	15.39	16.33	15.61	16.20	15.49	19.18	19.05	19.38	17.82	16.16	19.60
Groundwater Elevation	17.73	20.69	19.94	20.66	19.82	20.53	17.92	19.40	19.07	20.63	22.29	16.72
Total Well Depth	25.10	25.10	34.80	34.80	41.67	41.67	24.30	26.22	26.22	26.22	26.22	26.89
Perfluoroheptanoic acid (PFHpA)	0.2	0.54	0.0032	0.0012	0.0053	0.0046	0.025	0.15	0.0074 U	0.0053	0.044	0.34
Perfluorohexanesulfonic acid (PFHxS)	0.18	0.22	0.019	0.0091	0.057	0.018	0.0056 U	0.042	0.0056 U	0.0021	0.011	0.019J
Perfluorononanoic acid (PFNA)	0.16	0.082	<0.002	0.00078	<0.002	<0.002	0.028	0.0087 J	0.0087 U	<0.002	0.0052	0.0046 U
Perfluorooctanoic acid (PFOA)	0.26	0.29	0.0061	0.0018	0.0047	0.0028	0.026	0.053	0.0033 U	0.0047	0.027	0.075
Perfluorooctane sulfonate (PFOS)	0.066	0.04	0.014	0.014	0.012	0.02	0.13	0.047	0.0060 U	<0.002	0.0037	0.0026 U
Perfluorodecanoic Acid (PFDA)	0.012 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0061 U	0.0040 U	0.0061 U	<0.002	<0.002	0.0040 U
6:2 Fluorotelomer sulfonate (6:2 FTS)	11	13	0.002 U	0.00039 U	0.002 U	0.0016	0.68	2	0.0066 U	0.069	0.86	5.7
Total PFAS	13.346	15.5383	0.0718	0.03308	0.1367	0.08985	1.074	3.2257	0	0.14	1.04526	12.96
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.866**	**1.172**	**0.0423**	**0.02688**	**0.079**	**0.0454**	**0.209**	**0.3007**	0.0087 U	0.0121	**0.0909**	**0.434**

Sample Location	Deployment Area											
Sample ID	HW-F	HW-F	HW-H	HW-H	HW-R	HW-S (s)	HW-S (m)	HW-T (s)	HW-T (m)	OW-9S	OW-9S	OW-9S
Sample Date	11/7/2018	5/5/2020	11/7/2018	5/8/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	10/1/2020	7/5/2016	12/3/2018	5/8/2020
TOC Elevation	36.32	36.32	38.47	38.47	35.72	31.60	31.59	28.97	29.11	23.25	23.25	23.25
Depth to Groundwater	20.08	16.82	20.39	17.37	18.33	16.88	17.01	13.41	13.58	12.23	10.80	10.14
Groundwater Elevation	16.24	19.50	18.08	21.10	17.39	14.72	14.58	15.56	15.53	11.02	12.45	13.11
Total Well Depth	26.89	26.89	27.09	27.09	23.56	22.10	32.04	18.54	28.96	21.35	21.35	21.35
Perfluoroheptanoic acid (PFHpA)	0.0074 U	0.23	0.077	0.28	0.021	0.11	0.00096 J	0.0039	0.022	0.014	0.048	0.0064
Perfluorohexanesulfonic acid (PFHxS)	0.0056 U	0.005	0.0056 U	0.0031	0.02	0.055	0.0064	0.17	0.019	<0.003	0.023	0.011
Perfluorononanoic acid (PFNA)	0.0087 U	0.00081	0.0087 U	<0.002	0.0031	0.1	<0.002	0.00074 J	0.0032	0.0077	0.0087 U	0.0033
Perfluorooctanoic acid (PFOA)	0.0033 U	0.02	0.0050 J	0.002	0.014	0.062	0.0013 J	0.0067	0.011	0.0074	0.032	0.0043
Perfluorooctane sulfonate (PFOS)	0.0060 U	0.00086	0.0060 U	<0.002	0.016	0.1	0.0058	0.21	0.025	0.007	0.024	0.0058
Perfluorodecanoic Acid (PFDA)	0.0061 U	<0.002	0.0061 U	<0.002	<0.002	<0.002	<0.002	<0.002	0.0014	NA	0.0061 U	<0.002
6:2 Fluorotelomer sulfonate (6:2 FTS)	0.0066 U	1.5	1.5	0.13	0.037	3.7	0.0065	0.00039 U	0.00039 U	NA	0.0066 U	0.00039 U
Total PFAS	0.084	2.65637	4.452	1.26666	0.2171	4.8958	0.02471	0.44114	0.3254	0.0361	0.618	0.06678
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0087 U	**0.25667**	**0.082**	**0.2851**	**0.0741**	**0.427**	0.01446	**0.39134**	**0.0816**	**0.0361**	**0.127**	**0.0308**

Sample Location	Maher Wells											
Sample ID	OW-9D	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD	OW-9DD	ME-1*	ME-2**	ME-3***	RB-1 (s)
Sample Date	7/5/2016	12/3/2018	5/5/2020	4/11/2017	12/3/2018	10/2/2020	9/17/2020	9/17/2020	11/5/2020	11/5/2020		
TOC Elevation	23.22	23.22	23.22	23.81	23.81	23.81	NA	NA	NA	NA		
Depth to Groundwater	12.48	10.82	10.15	12.10	11.30	13.04	3.60	6.50	6.00	17.87		
Groundwater Elevation	10.74	12.40	13.07	11.71	12.51	10.77	NA	NA	NA	NA		
Total Well Depth	68.63	68.63	68.63	86.75	86.75	86.75	81.20	54.20	50.30	27.83		
Perfluoroheptanoic acid (PFHpA)	0.0028	0.033	0.044	0.034	0.015 J	0.0085	0.011	0.0055	0.0036	0.0042		
Perfluorohexanesulfonic acid (PFHxS)	0.012	0.12	0.18	0.12	0.042	0.019	0.03	0.04	0.018	0.0084		
Perfluorononanoic acid (PFNA)	0.0036	0.1	0.15	0.059	0.038	0.018	0.017	0.003	0.004	0.0047		
Perfluorooctanoic acid (PFOA)	0.041	0.057	0.088	0.055	0.020 J	0.01	0.016	0.0077	0.012	0.007		
Perfluorooctane sulfonate (PFOS)	0.0052	0.52	0.72	0.5	0.14	0.049	0.11	0.095	0.072	0.038		
Perfluorodecanoic Acid (PFDA)	NA	0.0061 U	<0.002	0.0040 U	0.0061 U	<0.002	<0.002	<0.002	<0.002	<0.002		
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0066 U	0.00039 U	0.64	0.0049	NA	0.19	0.23	0.13	0.062		
Total PFAS	1.7141	0.0816	0.0646	1.217	1.5845	1.02	0.39	0.169	0.2873	0.2009		
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.2141**	**0.0266**	**0.0646**	**0.83**	**1.182**	**0.768**	**0.255**	**0.1045**	**0.184**	**0.1512**		

Sample Location	Maher Wells								Steamship Parking Lot						
Sample ID	OW-18S	OW-18S	OW-18S	OW-18M	OW-18M	OW-18M	OW-18D	OW-18D Duplicate	OW-18D	OW-18D	OW-18D	OW-19(S)	OW-19(M)	OW-19D	OW-19D
Sample Date	7/5/2016	12/7/2018	5/8/2020	7/5/2016	12/7/2018	5/8/2020	7/5/2016	7/5/2016	4/11/2017	12/7/2018	5/13/2020	11/6/2020	11/6/2020	4/11/2017	5/13/2020
TOC Elevation	39.03	39.03	39.03	39.30	39.30	39.30	38.84	38.84	38.84	38.84	38.84	NA	NA	39.06	39.06
Depth to Groundwater	24.40	24.29	23.45	25.82	24.72	23.93	25.95	25.95	25.55	24.28	23.47	27.38	27.57	26.73	25.64
Groundwater Elevation	14.63	14.74	15.58	13.48	14.58	15.37	12.89	12.89	13.29	14.56	15.37	NA	NA	12.33	13.42
Total Well Depth	31.23	31.23	31.23	74.44	74.44	74.44	123.36	123.36	123.36	123.36	123.36	34.56	76.28	110.42	110.42
Perfluoroheptanoic acid (PFHpA)	0.0071	0.0074 U	0.0039	0.0029	0.0074 U	0.0074	0.0071	0.0063	0.015J	0.014 J	0.012	0.0042	0.03	0.0051 J	0.011
Perfluorohexanesulfonic acid (PFHxS)	0.0068	0.0056 U	0.0085	0.016	0.073	0.07	0.01	0.011	0.13	0.13	0.03	0.0031	0.027	0.029	0.11
Perfluorononanoic acid (PFNA)	<0.002	0.0087 U	0.0032	0.0076	0.0087 U	0.0027	0.0065	0.0058	0.0046 U	0.0087 U	0.0028	0.0024	0.002	0.006 J	0.0017
Perfluorooctanoic acid (PFOA)	0.0083	0.012 J	0.01	0.044	0.0060 J	0.0096	0.018	0.019	0.025	0.019 J	0.0095	0.011	0.011	0.0046 U	0.023
Perfluorooctane sulfonate (PFOS)	0.018	0.028	0.016	0.0058	0.24	0.18	0.0059	0.0059	0.22	0.32	0.041	0.025	0.047	0.029	0.31
Perfluorodecanoic Acid (PFDA)	NA	0.0061 U	<0.002	NA	0.0061 U	<0.002	NA	NA	0.0040 U	0.0061 U	<0.002	0.0027	<0.002	0.0040 U	<0.002
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0066 U	0.00039 U	NA	0.0066 U	0.00039 U	NA	NA	0.0032 U	0.0066 U	0.00039 U	0.00039 U	0.00095	0.0032 U	0.00039 U
Total PFAS	0.0402	0.0573	0.05953	0.0763	0.3891	0.4357	0.0475	NA	0.506	0.5504	0.1832	0.0707	0.37335	0.0936	0.5463
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.0402**	**0.04**	**0.0416**	**0.0763**	**0.319**	**0.2697**	**0.0475**	**0.048**	**0.39**	**0.483**	**0.0953**	**0.0484**	**0.117**	**0.0691**	**0.4657**

Sample Location	Steamship Parking Lot											
Sample ID	HW-2	HW-2	HW-3	HW-3	HW-3	HW-3	HW-300	HW-301	HW-302	HW-302	HW-K	HW-K
Sample Date	7/1/2016	5/5/2020	7/1/2016	4/5/2017	10/26/2018	5/5/2020	7/1/2016	7/1/2016	7/1/2016	12/3/2018	6/19/2019	5/21/2020
TOC Elevation	40.41	40.41	38.74	38.74	38.74	38.74	36.09	39.46	41.17	41.17	37.70	37.70
Depth to Groundwater	27.48	25.33	25.81	25.70	26.06	23.64	22.52	25.05	23.52	22.65	20.88	20.56
Groundwater Elevation	12.93	15.08	12.93	13.04	12.68	15.10	13.57	14.41	17.65	18.52	16.82	17.14
Total Well Depth	32.01	32.01	30.08	30.08	30.08	30.08	30.33	30.42	30.45	30.45	44.18	44.18
Perfluoroheptanoic acid (PFHpA)	0.0071	0.035	0.016	0.1	0.10	0.1	0.0096	0.002	0.019	0.015 J	0.0051	0.0028
Perfluorohexanesulfonic acid (PFHxS)	0.0035	0.0066	0.0043	0.020 J	0.012 J	0.0087	0.012	0.038	0.0063	0.016 J	<0.002	0.001
Perfluorononanoic acid (PFNA)	<0.002	0.016	0.0063	0.027	0.023	0.021	<0.002	<0.002	0.054	0.0097 J	<0.002	0.0012
Perfluorooctanoic acid (PFOA)	0.012	0.039	0.084	0.065	0.057	0.054	0.017	0.011	0.014	0.03	0.0041	0.0019
Perfluorooctane sulfonate (PFOS)	0.0063	0.053	0.0091	0.15	0.053	0.1	0.0052	0.0037	0.033	0.031	<0.002	0.0016
Perfluorodecanoic Acid (PFDA)	NA	<0.002	NA	0.0040 U	0.0061 U	0.0014	NA	NA	NA	0.0061 U	<0.002	<0.002
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.15	NA	0.47	0.12	0.13	NA	NA	NA	0.13	0.002 U	0.00039 U
Total PFAS	0.0289	0.42678	0.1197	1.603	0.952	0.96981	0.0438	0.0547	0.1263	0.3427	0.0348	0.0275
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.1496**	**0.1197**	**0.362**	**0.245**	**0.2851**	**0.0438**	**0.0547**	**0.1263**	**0.1017**	0.0092	0.0085	

Sample Location	Yarmouth Road	
Sample ID	RB-1 (m)	
Sample Date	11/5/2020	
TOC Elevation	NA	
Depth to Groundwater	17.79	
Groundwater Elevation	NA	
Total Well Depth	49.85	
Perfluoroheptanoic acid (PFHpA)	0.011	
Perfluorohexanesulfonic acid (PFHxS)	0.01	
Perfluorononanoic acid (PFNA)	0.0068	
Perfluorooctanoic acid (PFOA)	0.013	
Perfluorooctane sulfonate (PFOS)	0.049	
Perfluorodecanoic Acid (PFDA)	0.00075 J	
6:2 Fluorotelomer sulfonate (6:2 FTS)	0.038	
Total PFAS	0.2015	
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.09055**	

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
J = Estimated concentration between the method detection limit and reporting limit
Results in ug/L, micrograms per liter.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above Method 1 GW-1 standard (0.02 ug/L).
Sum of six includes estimated values and does not include non-detects (U or <).
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
NA = Not Applicable.
* = ME-1 is screened from 37 to 47 and 70 to 80 feet below grade.
** = ME-2 is screened from 44 to 54 feet below grade.
*** = ME-3 is screened from 40 to 50 feet below grade.
The Method 1 GW-3 Standard for the individual analytes in the Sum of Six ranges from 500 to 40,000 ug/l

Table 3 - Groundwater Results for 1,4 Dioxane ug/L

Sample Location	North Ramp														
Sample ID	HW-1	HW-1	HW-5	HW-12	OW-6	OW-6	HW-4M	HW-4D	HW-204	HW-29	HW-207S	HW-207D	HW-207D	HW-19D	HW-19D
Sample Date	5/7/2015	8/5/2019	5/7/2015	5/7/2015	5/7/2015	9/27/2019	4/5/2017	4/5/2017	9/27/2019	9/27/2019	9/27/2019	4/5/2017	9/27/2019	4/5/2017	9/27/2019
1,4-Dioxane	<0.152	<0.25	<0.150	<0.150	<0.150	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25

Sample Location	Airport Road/Iyannough Road Area							ARFF Building			
Sample ID	HW-A(D)	HW-A(D)	HW-B(D)	HW-N	HW-O	HW-U(d)	HW-V(m)	HW-L(s)	HW-L(m)	HW-L(d)	HW-L(d)
Sample Date	4/5/2017	8/5/2019	4/5/2017	8/5/2019	8/5/2019	10/2/2020	10/2/2020	10/7/2020	10/7/2020	7/2/2019	5/13/2020
1,4-Dioxane	<0.25	<0.25	<0.25	<0.25	<0.25	**0.73**	**0.8**	<0.2	<0.2	**0.727**	**0.75**

Sample Location	Maher Well Field														
Sample ID	OW-9M	OW-9D	OW-9D	OW-9D	OW-9DD	OW-9DD	OW-9DD	OW-18M	OW-18D	OW-18D	OW-18D	OW-19M	OW-19D	OW-19D	OW-19D
Sample Date	5/28/2015	5/28/2015	12/3/2018	5/5/2020	5/28/2015	4/11/2017	12/3/2018	4/11/2017	4/11/2017	12/7/2018	5/13/2020	4/11/2017	4/11/2017	12/7/2018	5/13/2020
1,4-Dioxane	<0.141	<0.141	<0.25	<0.19	**0.926**	**0.838**	**0.732**	<0.25	**0.552**	<0.25	**0.35**	<0.25	**0.800**	<0.25	**0.3**

Notes:
Results in ug/L, micrograms per liter.
< = Not detected by the laboratory above the reporting limit. Reporting limit shown.
Bold results above Method 1 GW-1 standard (0.3 ug/L).
The Method 1 GW-2 standard for 1,4-dioxane is 6,000 ug/l.
The Method 1 GW-3 standard for 1,4-dioxane is 50,000 ug/l.

Table 4. ARFF Concentrate Analytical Results ug/L

Sample ID	Foam Mix
Sample Date	12/9/2016
Perfluoroheptanoic acid (PFHpA)	3.4 J
Perfluorohexanesulfonic acid (PFHxS)	2.1 J
Perfluorononanoic acid (PFNA)	93
Perfluorooctanoic acid (PFOA)	19
Perfluorooctane sulfonate (PFOS)	5 U
Perfluorodecanoic Acid (PFDA)	2.8 J
6:2 FTS	33
Total PFAS	222.5
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	120.3

Notes:

1. U = Not detected by the laboratory above the Method Detection Limit. Method Detection Limit shown.
2. Results in ug/L, micrograms per liter.
3. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U).
4. Sample is AFFF concentrate.
5. J = Estimated concentration between the Method Detection Limit and the Laboratory Reporting Limit.

Table 5. SPLP Results ug/L

Sample ID	DL4 4'	DL5 2'	DL8 (4')	DL14(0-1')	Stockpile West	Stockpile East	ARFF Rubber Roof	ARFF Asphalt Roof
Sample Date	9/26/2017	9/26/2017	9/26/2017	9/26/2017	10/10/2017	10/10/2017	11/17/2020	11/17/2020
Perfluoroheptanoic acid (PFHpA)	0.011 U	0.011 U	0.065 J	0.17	0.011 U	0.011 U	0.00279	0.0002 U
Perfluorohexanesulfonic acid (PFHxS)	0.0072 U	0.0072 U	0.036 U	0.01 J	0.0072 U	0.0072 U	0.00034 U	0.00036 U
Perfluorononanoic acid (PFNA)	0.16	0.0032 U	0.052 J	0.37	0.0032 U	0.0032 U	0.00068 J	0.00028 U
Perfluorooctanoic acid (PFOA)	0.012 J	0.042	0.6	0.87	0.0037 U	0.0037 U	0.0073	0.00021 U
Perfluorooctane sulfonate (PFOS)	0.013 J	0.0072 U	0.036 U	0.19	0.0072 U	0.0072 U	0.00045 U	0.00202
Perfluorodecanoic Acid (PFDA)	0.0052 U	0.0052 U	0.026 U	0.34	0.0052 U	0.0052 U	0.000364 J	0.000271 U
6:2 FTS	0.067	0.0072 U	25	7.13	0.034 J	0.024 J	0.0154 J	0.0017 J
Total PFAS	0.195	0.042	26.25	20.195	0.034	0.024	0.072723	0.07957
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.185	0.042	0.717	1.95	0.011 U	0.011 U	0.011133	0.00202

Notes:

1. U = Not detected by the laboratory above the Method Detection Limit. Method Detection Limit shown.
2. Results in ug/L, micrograms per liter.
3. Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U).

Table 6: Background PFAS Levels in Soil and Soil Stock Pile Samples

			Background Sample Locations																							
Sample ID	Method 1 Standard		Stockpile West	Stockpile East	Loam Pile	BG-1 0-1'	BG-2 0-1'	BG-3 0-1'	BG-4 0-1'	BG-5 0-1'	BG-6 0-1'	BG-7 0-1'	BG-8 0-1'	BG-9 0-1'	BG-10 0-1'	BG-11 0-1'	BG-12 0-1'	BG-13 0-1'	BG-14 0-1'	BG-15 0-1'	BG-16 0-1'	BG-17 0-1'	BG-18 0-1'	BG-19 0-1'	BG-20 0-1'
Sample Date	S-1/GW-1	S-1/GW-3	10/10/2017	10/10/2017	10/10/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	10/26/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017	12/14/2017
Sample Location			On-Airport	On-Airport	On-Airport	Off-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	On-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport	Off-Airport
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.18 J	0.17 U	0.18 J	0.17 U	0.17 U	0.23 J	0.17 U	0.17 U	0.19 U	0.19 U	0.19 U	0.19 U	0.44 J	0.19 U	0.19 U	0.35 J	0.19 U	0.46 J
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.23 U	0.24 U	**0.39 J**	0.24 U	0.24 U	**0.57 J**	**0.47 J**	0.24 U	**0.49 J**	0.24 U	0.24 U
Perfluorooctanoic acid (PFOA)	0.72	300	0.26 U	0.26 U	0.26 U	0.58 J	0.26 U	0.26 U	0.16 U	0.47 J	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	**0.75 J**	0.67 J	0.33 J	0.25 U	0.46 J	0.37 J	0.36 J	0.5 J	0.25 U	**0.86 J**
Perfluorononanoic acid (PFNA)	0.32	300	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.17 U	0.22 U	0.29 J	0.22 U	0.22 U	**0.53 J**	0.22	**0.67 J**	**0.41 J**	0.22 U	0.22 U
Perfluorooctane sulfonate (PFOS)	2	300	0.38 J	0.39 J	0.81 J	0.21 U	0.7 J	0.38 J	**2.3**	0.41 J	0.32 J	0.33 J	0.31 J	1.3	0.62 J	0.41 J	0.76 J	0.99	0.26 U	**3.1**	2	0.36 J	**2.3**	0.41 J	0.44 J
Perfluorodecanoic Acid (PFDA)	0.3	300	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.13 U	0.28 U	0.28 U	**0.36 J**	0.28 U	**0.31 J**	**0.41 J**	0.28 U	**0.41 J**	0.28 U	0.28 U
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six																									
Total PFAS	NA	NA	1.78	0.91	0.81	1.47	0.7	0.56	3.21	1.31	0.32	0.3	0.84	1.3	0.62	1.16	2.73	1.68	0	6.79	3.77	5.09	5.45	0.41	2.43
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	NA	NA	0.38	0.39	0.81	0.58	0.7	0.56	2.3	1.06	0.32	0.33	0.54	1.3	0.62	1.16	2.11	1.68	0	5.41	3.47	1.39	4.46	0.41	1.76

Notes:
J = Estimated concentration between the method detection limit and reporting limit.
Results in ug/kg, micrograms per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.
Bold results above the proposed Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).

Table 7. Surface Water Results for PFAS ug/L

	Surface Water		
Sample ID	Kmart	LP-1	UGP-1
Sample Date	6/20/2017	7/11/19	7/11/19
Perfluoroheptanoic acid (PFHpA)	0.0033 U	<0.01	<0.02
Perfluorohexanesulfonic acid (PFHxS)	0.0034 U	<0.01	<0.02
Perfluorononanoic acid (PFNA)	0.0043 J	<0.01	<0.02
Perfluorooctanoic acid (PFOA)	0.0026 U	<0.01	<0.02
Perfluorooctane sulfonate (PFOS)	0.0046 U	<0.01	<0.02
Perfluorodecanoic Acid (PFDA)	0.0040 U	<0.01	<0.02
Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six			
Total PFAS	0.0174	0.018	0.047
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0043	<0.01	<0.02

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

J = Estimated concentration between the method detection limit and reporting limit.

Results in ug/L, micrograms per liter.

U= Not detected by the laboratory above the method detection limit. Method detection limit shown.

Sum of six includes estimated values and does not include non-detects (U or <).

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

Currently MassDEP has not issued a surface water standard for PFAS.

The Method 1 GW-1 Standard for the Sum of Six is 0.02 ug/l.

The Method 1 GW-3 Standard for the individual analytes in the Sum of Six range from 500 to 40,000 ug/l.

Table 8: Ratio of Stable Isotopes Oxygen-18 and Hydrogen-2 Laboratory Results

Sample Date	Lab Sample ID	HW Sample ID	Stable Isotope Oxygen-18			Stable Isotope Hydrogen-2		
			δ18O (V-SMOW)	Atm %	Expected Values	δ18O (V-SMOW)	Atm %	Expected Values
11/7/2018	1811299-2	HW-I	-6.92	0.20	-	-40.41	0.01494	-
			-6.77	0.20	-	-40.17	0.01495	-
	1811299-4	HW-E	-6.79	0.20	-	-38.56	0.01497	-
			-6.85	0.20	-	-38.87	0.01497	-
	1811299-5	HW-F	-6.9	0.20	-	-38.28	0.01498	-
			-6.88	0.20	-	-38.15	0.01498	-
	1811299-7	SW-2	-2.67	0.20	-	-18.65	0.01528	-
			-2.61	0.20	-	-20.42	0.01526	-
						-23.04	0.01521	-
12/3/2018	1812198-1	HW-G(S)	-6.74	0.20	-	-38.19	0.01498	-
			-6.93	0.20	-	-37.87	0.01498	-
	1812198-2	HW-G(M)	-7.53	0.20	-	-44.34	0.01498	-
			-7.57	0.20	-	-44.39	0.01498	-
	1812198-3	HW-G(D)	-7.18	0.20	-	-44.15	0.01489	-
			-7.45	0.20	-	-44.56	0.01488	-
	1812198-4	OW-9S	-7.29	0.20	-	-41.86	0.01492	-
			-7.41	0.20	-	-42.94	0.0149	-
	1812198-5	OW-9D	-7.76	0.20	-	-47.91	0.01483	-
			-7.71	0.20	-	-46.82	0.01484	-
					-	-47.20	0.01484	-
	1812198-6	OW-9DD	-7.52	0.20	-	-45.58	0.01486	-
			-7.57	0.20	-	-45.48	0.01487	-
	1812198-7	OW-9M	-7.13	0.20	-	-41.44	0.01493	-
			-7.24	0.20	-	-43.40	0.0149	-
12/7/2018	1812232-1	OW-18S	-7.58	0.20	-	-49.29	0.01481	-
			-7.54	0.20	-	-49.66	0.0148	-
	1812232-2	OW-18M	-6.95	0.20	-	-42.64	0.01491	-
			-6.89	0.20	-	-42.57	0.01491	-
	1812232-3	OW-18D	-7.28	0.20	-	-44.76	0.01488	*
			-7.36	0.20	-	-41.61	0.01493	*
QA/QC	IAEA OH-14	-	-5.64	0.20	-5.6	-37.45	0.01499	-37.70
	IAEA OH-15	-	-9.59	0.20	-9.41	-77.89	0.01436	-78
	IAEA OH-16	-	-15.72	0.20	-15.41	-	-	-113.8
	Antarc IC	-	-29.83	0.19	-30	-	-	-239.69

Table 9. Fire Truck Spray Water PFAS Results ug/L

	Fire Truck Spray Water Spray											
Sample ID	Hose		Roof		Bumper		Officer Side Handline		Driver side-Rear		Officer side-Rear	
Sample Date	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019	8/22/2019	11/12/2019
Perfluoroheptanoic acid (PFHpA)	0.073	<0.002	0.0045	<0.002	0.0039	<0.002	0.027	<0.002	0.0055	<0.002	0.081	0.0021
Perfluorohexanesulfonic acid (PFHxS)	0.0059	<0.002	0.0033	<0.002	0.0039	<0.002	0.004	<0.002	0.0048	<0.002	0.0043	<0.002
Perfluorononanoic acid (PFNA)	0.011	<0.002	0.0026	<0.002	0.0031	<0.002	0.013	<0.002	0.003	<0.002	0.016	<0.002
Perfluorooctanoic acid (PFOA)	0.088	0.0062	0.0087	<0.002	0.01	<0.002	0.039	<0.002	0.011	<0.002	0.076	0.0041
Perfluorooctane sulfonate (PFOS)	0.009	0.0021	0.0068	<0.002	0.006	<0.002	0.0087	<0.002	0.0093	<0.002	0.0086	<0.002
Perfluorodecanoic Acid (PFDA)	0.014	<0.002	0.004	<0.002	0.0045	<0.002	0.032	<0.002	0.0049	<0.002	0.032	<0.002
Total PFAS	5.7017	0.3391	0.9195	0.0205	0.7817	0.0167	4.1098	0.0481	0.8302	0.0087	5.4701	0.086
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	**0.2009**	0.0083	**0.0299**	<0.002	**0.0314**	<0.002	**0.1237**	<0.002	**0.0385**	<0.002	**0.2179**	0.0041

Notes:

< = Not detected by the laboratory above the reporting limit. Reporting limit shown.

Results in ug/L, micrograms per liter.

Bold results above proposed MassDEP GW-1 standard (0.02 ug/L)

Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).

APPENDIX A

Laboratory Analysis Report

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene, Naphthalene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
EPA TO-12 Non-methane organics
EPA 3C Fixed gases
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, Sb**,** As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

1/18/20 L2051224

CHAIN OF CUSTODY

PAGE OF

ALPHA ANALYTICAL

Westborough, MA
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd in Lab: ~~11/20/20~~ KL

ALPHA Job #: ~~120~~ EC

Project Information

Project Name: Barnstable Municipal Airport

Project Location: Hyannis, MA

Project #: 20102

Project Manager: Bryan Massa

ALPHA Quote #:

Client Information

Client: Horsley Witten

Address: 90 Route 6A

Sandwich MA, 02563

Phone: 781-243-1527

Fax:

Email: bmassa@horsleywitten.com

☐ These samples have been Previously analyzed by Alpha

Turn-Around Time

☒ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: Time:

Report Information Data Deliverables

☐ FAX ☒ EMAIL

☒ ADEx ☐ Add'l Deliverables

Billing Information

☒ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program

Criteria: MCP S1

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☒ Yes ☐ No Are MCP Analytical Methods Required?

☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS

SAMPLE HANDLING
Filtration
☐ Done
☐ Not Needed
☐ Lab to do
Preservation
☐ Lab to do
(Please specify below)

Sample Specific Comments

TOTAL # BOTTLES

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	* SPLP PFAS		Sample Specific Comments	TOTAL # BOTTLES
51224-01	ARFF Rubber Roof	11/17/20	5:30 pm	Rubber	BM	☒	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
-02	ARFF Asphalt Roof	11/17/20	5:40 pm	Asphalt	↓	☑	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		
						☐	☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐		

Container Type	- P	-	-	-	-	-	-	-	-	-	-	-
Preservative	- N/A	-	-	-	-	-	-	-	-	-	-	-

PLEASE ANSWER QUESTIONS ABOVE!

* analyze for standard PFAS analysis (Isotope dilution) if matrix allows. otherwise do SPLP PFAS by isotope dilution.

IS YOUR PROJECT MA MCP or CT RCP?

FORM NO: 01-01(I) (rev. 5-JAN-12)

Relinquished By:	Date/Time	Received By:	Date/Time
Brown	11/18/2020	Mirit Muia AAL	11/18/20 1349
MCM	11/18/20 1530		11/18/20 1530

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.