



IMMEDIATE RESPONSE ACTION PLAN

Status Report 8

Barnstable Municipal Airport
Hyannis, Massachusetts

RTN 4-26347

October 2020



Prepared for:
Barnstable Municipal Airport
480 Barnstable Road
Hyannis, MA 02840

Prepared by:
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IMMEDIATE RESPONSE ACTION PLAN STATUS REPORT 8
BARNSTABLE MUNICIPAL AIRPORT
HYANNIS, MASSACHUSETTS
RTN 4-26347

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1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Barnstable Municipal Airport (the “Airport”) to develop this eighth 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
Barnstable Municipal Airport
Hyannis, Massachusetts 02601
(508) 775-2020

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

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. Design details of the caps are included in Appendix A. The capping area represents a majority of the PFAS soil impacts known at the time of IRA Modification. Areas of PFAS in soil remaining above the applicable Method 1 soil standard located outside of the capped 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.

2.2 Actions Under the IRA Plan

A summary of the IRA activities conducted between May 2020 and October 2020 include:

- Installation of soil borings and groundwater monitoring wells;
- Groundwater sampling for 1,4-dioxane;
- Soil Sampling for PFAS;
- Groundwater Sampling for PFAS;

- Laboratory testing of capping materials (geomembrane liner, sand and loam) for PFAS; and
- Construction of caps in the Deployment Area (geomembrane cap) and ARFF Building Area (asphalt cap).

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
Perfluorohexanesulfonic Acid (PFHxS)	0.3	300	N/A	500
Perfluorononanoic Acid (PFNA)	0.32	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
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:

- The installation of groundwater monitoring wells at six locations in April 2017: in the vicinity of potential sources of PFAS at the ARFF Building Area, at the Deployment Area adjacent to the East Ramp and at upgradient locations to evaluate potential off-site sources of PFAS and 1,4-dioxane.
- 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.
- An initial round of three soil samples were collected on December 6, 2016 as reported in the first status report. One sample was taken from each location where it was determined that aqueous film forming foam (AFFF) had been used at the Airport, including the site of an airplane crash in 1981, the Deployment Area, and the 1991 Drill Location along the dirt road adjacent to the Deployment Area.
- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF Building Area 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).

- In October 2017, three composite soil samples were taken from piles of sediment and topsoil 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 sediment removed from the Airport as part of this redevelopment contained PFAS.
- Two samples of AFFF concentrate were analyzed for PFAS compounds to evaluate the foam.
- 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.
- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF 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.
- 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 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.
- 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.
- 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.
- 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.
- 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.

- In February 2019, three additional surface soil samples were collected to further delineate the soil Disposal Site boundary around the ARFF building.
- 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.
- 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.
- 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.
- In July 2019, two surface water samples were collected from Upper Gate and Lewis Ponds for PFAS analysis.
- 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.
- In August 2019, soil sample DL 11 (0-1) was collected from the Deployment Area.
- In August 2019, six spray water samples were collected from discharge locations on a fire truck at the Airport. The samples were collected 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.
- On September 27, 2019, HW collected groundwater samples from six monitoring wells located on the Airport for 1,4-dioxane analysis. To date, 1,4-dioxane has only been detected in one monitoring well (HW-L) located at the Airport. The source of the 1,4-dioxane is still being evaluated to determine if it is attributable to the Airport or from an unknown off-site source.
- 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 not detected above the GW-1 standard in any of the samples collected.

- In December 2019, the Airport submitted an IRA Modification to MassDEP documenting the proposed PFAS cap. The IRA Modification was approved by the MassDEP in an email dated December 24, 2020.
- In March 2020, the Airport prepared the draft engineering design for the proposed caps described in the IRA Modification and included them in the April 2020 Status Report.

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 5. 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.

5.0 FIELD INVESTIGATIONS CONDUCTED DURING THE CURRENT REPORTING PERIOD

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

- Between May 5th and May 21st, 2020 HW collected groundwater samples from the following monitoring wells for PFAS analysis:

HW-2	HW-I(s)	HW-H	OW-19D
HW-3	HW-I(m)	OW-9M	OW-18D
HW-K	HW-I(d)	OW-18S	HW-F
HW-D(m)	HW-E	OW-18M	HW-D(dd)

Tabulated analytical results are included on Table 1 and laboratory reports are located in Appendix B. The location of the monitoring wells is indicated on Figure 3.

- Between May 5th and May 13th, 2020 HW collected groundwater samples from the following monitoring wells for 1,4-dioxane analysis:

HW-L	OW-9D	OW-18D	OW-19D
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To date, 1,4-dioxane has only been detected in one monitoring well (HW-L) located at the Airport. The source of the 1,4-dioxane is still being evaluated to determine if it is attributable to the Airport or from an unknown off-site source. Tabulated analytical results are included on Table 2 and laboratory reports are located in Appendix B. The location of the monitoring wells is indicated on Figures 3 and 4.

- Between September 14th and September 24th, HW and Desmond Well Drilling installed 13 monitoring wells at the locations indicated on Figure 3. The monitoring wells are identified as follows:

HW-L(s)	HW-L(m)	HW-P(s)	HW-P(d)	HW-V(m)
HW-Q(s)	HW-Q(d)	HW-S(s)	HW-S(m)	

HW-T(s) HW-T(m) HW-R(s) HW-U(d)

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 Phase II report due to MassDEP in November 2020 and will also be discussed in the next status report.

- Between September 14th and September 30th, 2020 HW collected the following 21 soil samples for PFAS analysis:

A5 (2-4)	A19 (0-1)	DL15(0-1)	DL20(0-1)	HW-P(m) [18-20]
A13 (0-1)	A20 (0-1)	DL16(0-1)	DL21(0-1)	
A16 (0-1)	A20 (2-4)	DL17(0-1)	DL22 (2-4)	
A17 (0-1)	A21 (0-1)	DL18(0-1)	DL23 (0-1)	
A18 (0-1)	A22 (0-1)	DL19(0-1)	HW-P(m) [8-10]	

Analytical data for soil sample A16 (0-1), A17(0-1), HW-P(m) [8-10] and HW-P(m) [18-20] are included on Table 3 and laboratory reports are located in Appendix B. The location of the soil samples is indicated on Figure 2. Analytical data for the remaining locations will be included in the Phase II report due to MassDEP in November 2020 and will also be submitted with the next status report.

6.0 IRA MODIFICATION ACTIVITIES CONDUCTED DURING THE CURRENT REPORTING PERIOD

Details concerning IRA Modification activities conducted between May 2020 and October 2020 are summarized below.

- Prior to cap construction, HW evaluated the PFAS exposure to a construction worker at the Airport to verify the safety of the workers constructing the cap. The evaluation was completed using the MassDEP Method 3 Construction Worker Short Form and a reference dose of 5×10^{-6} milligrams per kilogram body weight per day (mg/kg-day). The reference dose was obtained from the MassDEP document titled *Interim Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated Under the Massachusetts Contingency Plan*, updated December 27, 2019. As a conservative measure, HW used the highest detected value of perfluoroheptanoic acid (PFHpA), perfluorohexanesulfonic acid (PFHxS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), perfluorooctane sulfonate (PFOS) and perfluorodecanoic acid (PFDA) in calculating the Hazard Index. The calculated Hazard Index is 0.06, which is substantially less than 1 indicating that the construction worker exposure scenario is at a level of no significant risk. A copy of the Method 3 Construction Worker Short Form is included in Appendix C.

- Prior to cap construction, HW calculated a site-specific action level (SSAL) for dust at the Airport using a very conservative fluorine concentration of 1,000 mg/kg. Fluorine can be representative of various PFAS compounds. There is currently no Occupational Safety and Health Administration (OSHA) Permissible Exposure Level (PEL) for PFAS. The calculated SSAL was compared it to the National Ambient Air Quality Standard for PM₁₀ (150 micrograms per cubic meter, [ug/m³]). The SSAL is calculated as follows:

$$\frac{\text{Contaminant Concentration (mg/Kg)}}{\text{Million Parts of Soil}} = \frac{\text{PEL of Contaminant (mg/M}^3\text{)}}{\text{Airborne Concentration Needed to Attain PEL}} \Rightarrow$$

$$\frac{1000 \text{ mg/kg}}{1,000,000 \text{ parts of soil}} = \frac{0.2 \text{ mg/m}^3}{\text{Airborne Concentration Needed to Attain PEL}} \Rightarrow$$

$$= 200 \text{ mg/m}^3 \text{ or } 200,000 \text{ ug/m}^3$$

This calculation verifies that it is unlikely for exceedance of the PEL since visible dust generation is unlikely (dust mitigation has been incorporated into the cap design) and the dust concentration needed to achieve the PEL is significantly above the National Ambient Air Quality Standard of 150 ug/m³. As such, a SSAL for dust of 150 ug/m³ was established for the PFAS cap project.

- On May 11, 2020, the Airport finalized the engineering design for the caps described in the IRA Modification and put the project out for bidding consistent with the Town of Barnstable requirements. The design of the caps is documented in the plan set titled "HYA Soil Capping & Drainage for Per- and Poly-Fluoroalkyl Substances (PFAS) Mitigation Final Construction Plans" (Appendix A). The Airport provided the final design documents as an invitation to bid on the Town of Barnstable website on May 11, 2020. The cap construction contract was ultimately awarded to Cor Group consistent with the Town of Barnstable bidding requirements.
- On August 7, 2020, HW collected samples of loam and sand from the PA Landers pit located in Forestdale, Massachusetts for PFAS analysis. The purpose of the PFAS testing was to verify that the loam and sand planned for use as part of capping materials did not contain PFAS above regulatory values. Laboratory testing of the materials did not detect any PFAS analytes above the laboratory reporting limits or applicable Method 1 PFAS standards. Laboratory reports are located in Appendix B.
- On August 7, 2020, HW prepared a sample of the 30-mil geomembrane (Absolute Barrier Y30BAC) liner provided by Raven Industries (geomembrane liner supplier) for PFAS analysis. The purpose of the PFAS testing was to verify that the geomembrane liner did not contain PFAS above any regulatory limits. Laboratory testing of the material for SPLP PFAS analysis did not detect any PFAS analytes above the laboratory reporting limits or applicable Method 1 PFAS standards. Laboratory reports are located in Appendix B.

- On August 17, 2020, COR Group, the contractor awarded the PFAS cap project through the public bidding process began to mobilize the Barnstable Municipal Airport. Between August 17, 2020 and September 28, 2020, the Cor Group completed the following tasks associated with the PFAS Mitigation Cap Project:
 - Constructed the drainage system in proximity to the ARFF Building as indicated on Plan C-4, Appendix A.
 - Excavated approximately 850 cubic yards of soil from the ARFF Building Area and transported it to the Deployment Area for use in grading and shaping before placement of the geomembrane liner (Raven Industries Absolute Barrier Y30BAC). Soils were removed from the former grass area (12-inches below existing grade) adjacent to the ARFF building and from the new drainage system. At no time were soils from the grass area adjacent to the ARFF Building used to backfill areas under the asphalt or used in backfilling the drainage system.
 - Install and compact approximately 12-inches of stone subbase followed by an approximate 4-inch thick asphalt cap in the former grass area adjacent to the ARFF Building as indicated on Plan C-4, Appendix A.
 - Constructed the Deployment Area drainage system as indicated on Plan C-5, Appendix A.
 - Compacted and graded soil within the Deployment Area and verified that the area was free of any obstructions such as rocks or sticks before placing an additional 1.5-inches of sand.
 - Installed the geomembrane liner in the Deployment Area as indicated on plan C-5, Appendix A.
- HW provided daily field oversight during the entire PFAS cap project and conducted dust monitoring during all intrusive activities at three locations (one upwind and two downwind). Dust monitoring was completed using Dust Track II aerosol monitors that collected 15-minute time weighted averages. At no time was the dust action level of 150 ug/m3 exceeded. Photographic documentation of the PFAS Mitigation Cap Areas is included in Appendix D.

7.0 BI-ANNAUL CAP INSPECTION AND ENVIRONMENTAL MONITORING

HW plans to inspect the two cap areas every six months and collect groundwater data from existing monitoring wells within proximity to the cap areas to document the effectiveness of the caps. The first cap inspection and groundwater monitoring event will take place in March 2020.

8.0 GROUNDWATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

MassDEP requested that the Airport evaluate if potential sources on the western portion of the Airport could be upgradient of the Mary Dunn Wellfield. To answer this question, HW is using and modifying an existing U.S. Geological Survey groundwater model to evaluate groundwater flow under current and recent historical pumping conditions. This work is ongoing and will be finalized in the Phase II Comprehensive Site Assessment due to MassDEP in November 2020. The model will be used to document what areas of the Airport are upgradient of the Mary Dunn Wellfield. It will also be used to evaluate groundwater flow and contaminant transport from potential source areas on Airport property, as well as groundwater flow from the Fire Training Academy across the Airport to the southeast.

9.0 MANAGEMENT OF REMEDIAL WASTE

As indicated above, approximately 850 cubic yards of PFAS impacted soil obtained from the grass area adjacent to the ARFF Building was used for grading and shaping the Deployment Area prior to placement of the geomembrane cap. Consistent with the IRA Modification, no PFAS impacted soil was transported off-site or used in any other area.

10.0 UPGRADES TO AFFF TESTING PROTOCOLS AT THE AIRPORT

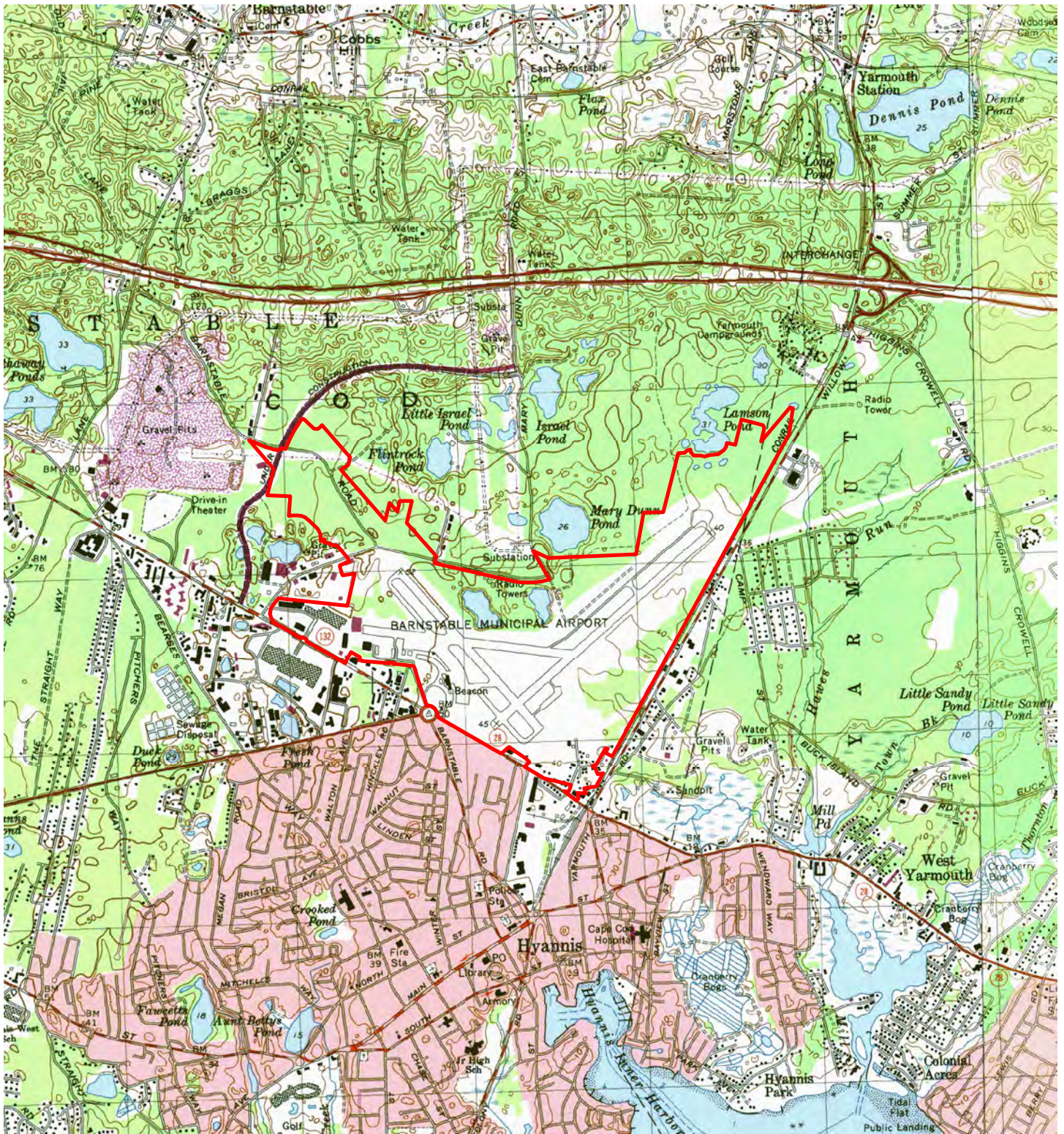
The Airport has purchased two Ecologic Foam Test Systems to allow the Airport to test the AFFF delivery systems on its fire trucks without having to discharge the foam into the environment. These new systems meet the Federal Aviation Administration requirements for the regular testing of AFFF usage.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

11.0 PLANS FOR NEXT REPORTING PERIOD

Further testing of soil and 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

- 1- USGS Locus
- 2- ARFF/SRE and Deployment Area Soil Sample Locations
- 3- PFAS Groundwater Sampling Locations
- 4- 1,4-Dioxane Results in Groundwater

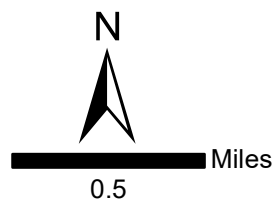


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*Hyannis Topographic Quadrangle

Legend

 Airport Property Line



Horsley Witten Group
Sustainable Environmental Solutions

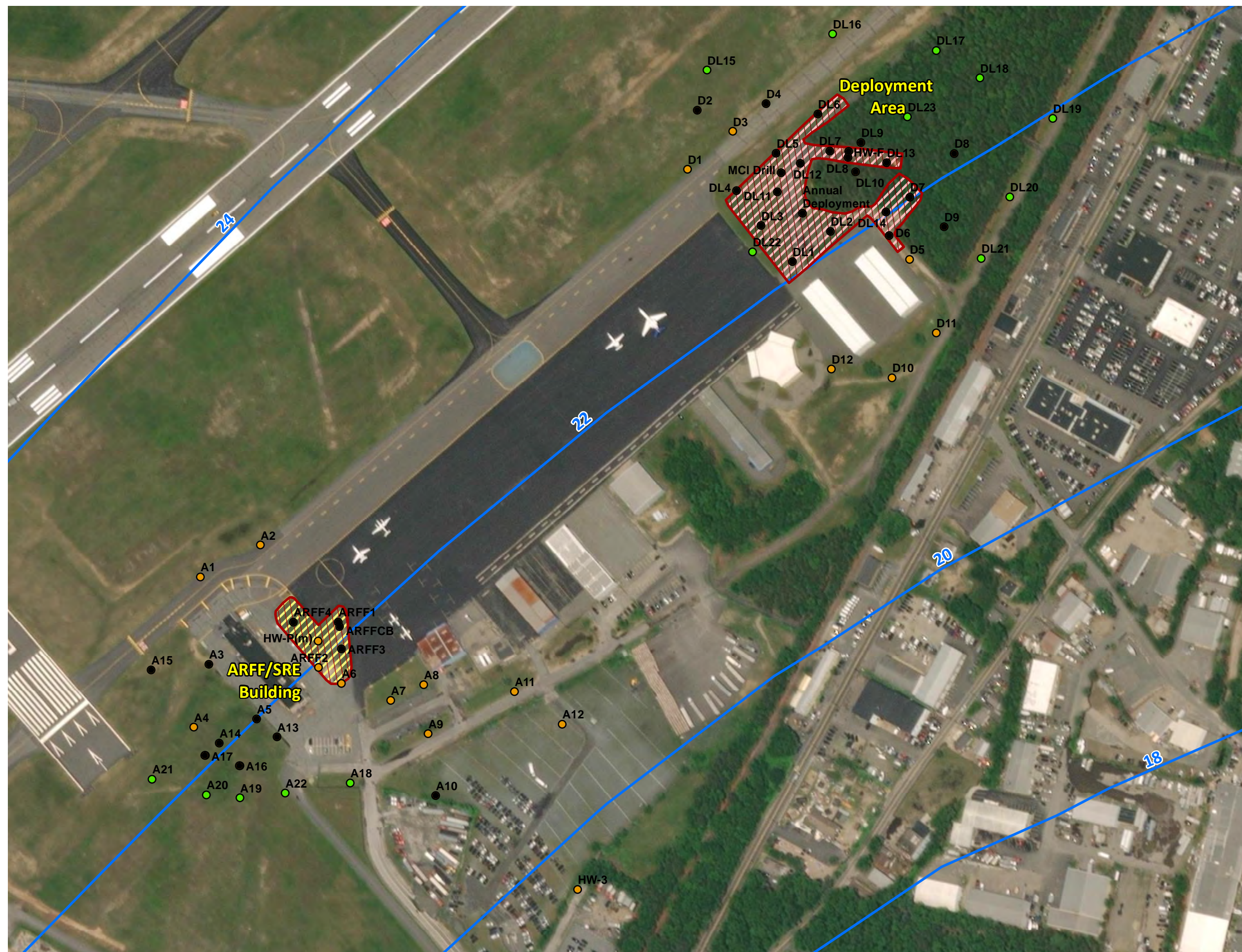
30 Route 5A • Sandwich, MA • 02563
Tel: 508-833-8800 • Fax: 508-833-3150 • www.horsleywitten.com









USGS Locus
Barnstable Municipal Airport
Hyannis, MA

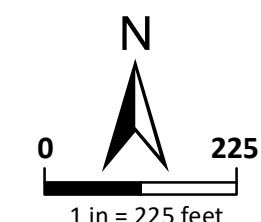
Date: 4/17/2018

Figure 1



Legend

-  Groundwater Contours*
-  Deployment Area Liner Cap
-  Asphalt Cap
-  Soil Sample Location
-  Soil Sample Location - Pending Analytical Results
-  Soil Sample exceeding MassDEP S-1/GW-1 Standard



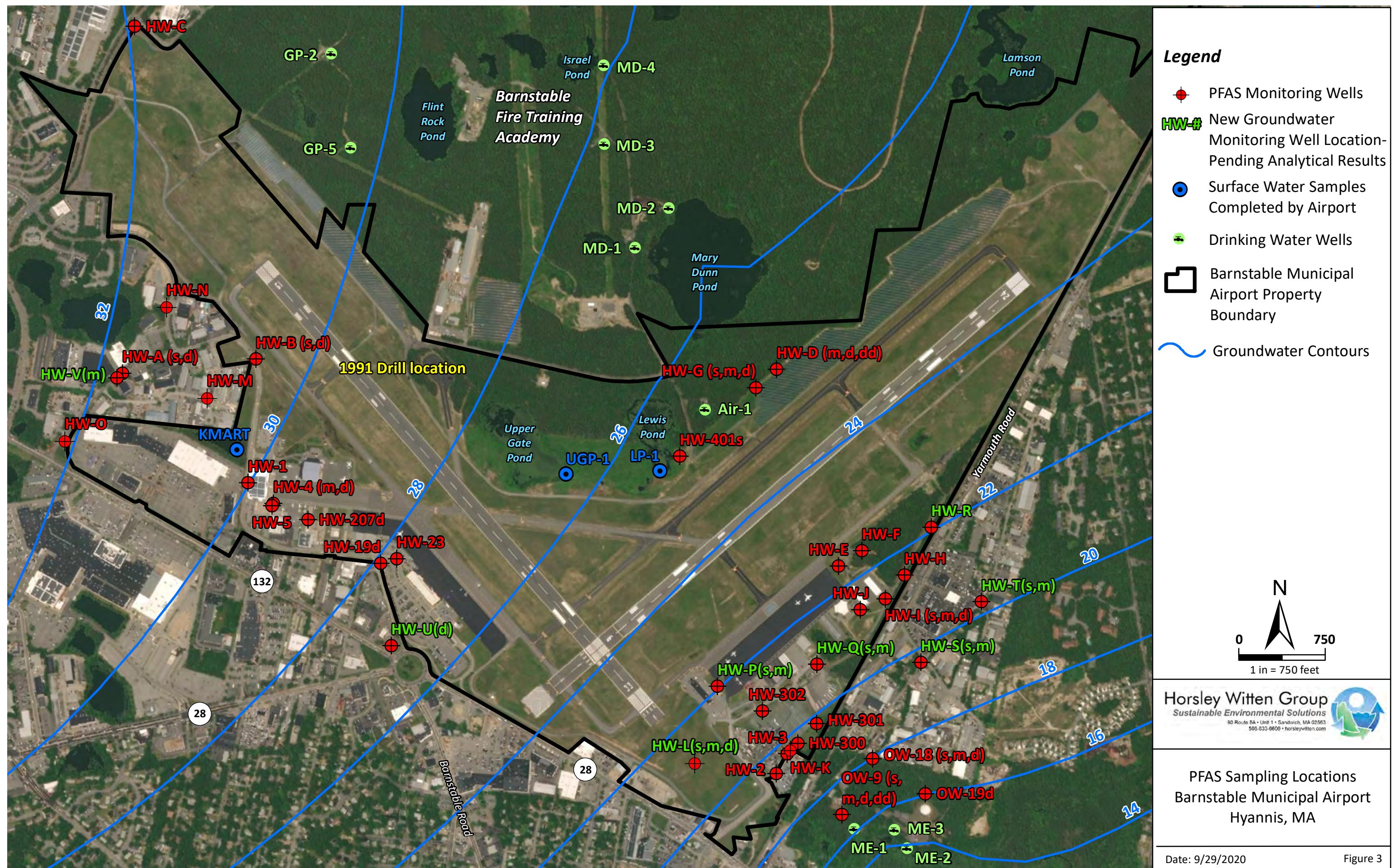
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ARFF/SRE and Deployment Area
Soil Sample Locations
Barnstable Municipal Airport
Hyannis, MA

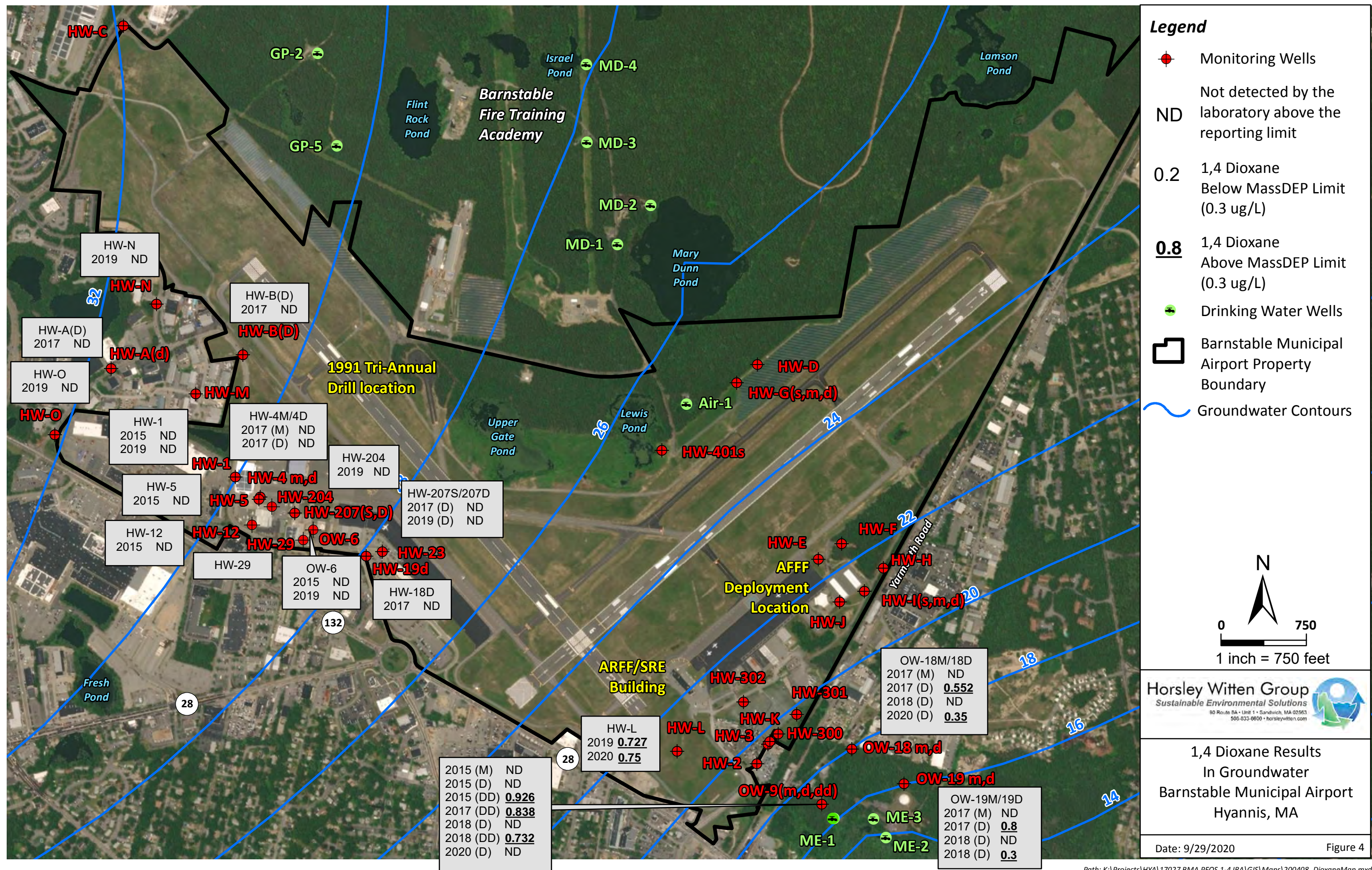
Date: 9/29/2020

Figure 2

* Cape Cod Commission (CCC) Groundwater Contours



PFAS Sampling Locations
Barnstable Municipal Airport
Hyannis, MA



2015 (M)	ND
2015 (D)	ND
2015 (DD)	<u>0.926</u>
2017 (DD)	<u>0.838</u>
2018 (D)	ND
2018 (DD)	<u>0.732</u>
2020 (D)	ND

HW-L	2019	<u>0.727</u>
	2020	<u>0.75</u>

OW-18M/18D	2017 (M)	ND
	2017 (D)	<u>0.552</u>
	2018 (D)	ND
	2020 (D)	<u>0.35</u>

OW-19M/19D	2017 (M)	ND
	2017 (D)	<u>0.8</u>
	2018 (D)	ND
	2018 (D)	<u>0.3</u>

TABLES

- 1- Groundwater and Surface Water Results For PFAS
- 2- 1,4-Dioxane Results In Groundwater
- 3- Soil Results for PFAS
- 4- Ratio of Stable Isotopes Oxygen –18 and Hydrogen-2
- 5- Fire Truck Spray Water Results for PFAS Compounds

Table 1. Groundwater and Surface Water Results for PFAS Compounds ug/L

	North Ramp														Lewis Pond Area		Airport Road Area								Surface Water			ARFF Building	Steamship Parking Lot													
Sample ID	HW-1	HW-1	HW-1	HW-4M	HW-5	HW-5	HW-5	HW-5	HW-23	HW-19D	HW-19D	HW-401S	HW-A(S)	HW-B(S)	HW-B(S)	HW-B(D)	HW-M	HW-N	HW-O	HW-C	Kmart	LP-1	UGP-1	HW-L	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	6/20/2017	10/26/2018	4/7/2017	7/1/2016	4/7/2017	10/26/2018	6/20/2017	11/7/2018	6/20/2017	11/7/2018	4/7/2017	4/7/2017	10/26/2018	10/26/2018	6/24/2019	11/7/2018	4/7/2017	4/7/2017	6/20/2017	6/20/2017	7/11/19	7/11/19	7/11/19	6/19/2019	7/1/2016	5/5/2020	7/1/2016	4/5/2017	10/26/2018	5/5/2020	7/1/2016	7/1/2016	12/3/2018	6/19/2019	5/21/2020						
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	24.62	22.26	21.59	21.66	20.32	15.48	3.62	38.50	NA	NA	NA	19.40	27.48	25.33	25.18	25.70	26.06	23.64	22.52	25.05	23.52	22.65	20.88	20.56						
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	32.00	30.23	30.23	57.13	26.92	22.33	14.10	42.15	NA	NA	NA	70.55	32.01	32.01	30.08	30.08	30.08	30.33	30.42	30.45	30.45	44.18	44.18							
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	0.0048 J	0.049	0.012 J	0.0074 U	0.007	0.0034	<0.002	0.0033 U	0.0033 U	<0.01	<0.02	0.0078	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)	0.018	0.065	0.018 J	0.018 J	0.02	0.011	0.018 J	0.0056 U	0.021	0.023	0.046	0.045	0.011 J	0.0079 J	0.044	0.0033	0.0034	0.0034 U	0.0034 U	<0.01	<0.02	0.033	0.0035	0.0066	0.0043	0.0020 J	0.012 J	0.012 J	0.0087	0.012	0.038	0.0063	0.016 J	<0.002	0.001							
Perfluorononanoic acid (PFNA)	<0.002	0.0057 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	0.0046 U	0.0087 U	<0.002	<0.002	<0.002	0.0046 U	0.0043 J	<0.01	<0.02	0.0033	<0.002	0.016	0.0063	0.027 J	0.023	0.021	<0.002	<0.002	0.054	0.0097 J	<0.002	0.0012								
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	0.0026 U	0.0094 J	0.020 J	0.027	0.0088	0.0039	0.0026 U	0.0026 U	<0.01	<0.02	0.025	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)	0.033	0.24	0.028	0.043	0.031	0.052	0.12	0.0079 J	0.015 J	0.069	0.012 J	0.0074	0.004	0.017	0.0046 U	0.0046 U	<0.01	<0.02	0.049	0.0091	0.15	<0.02	0.053	0.0063	0.053	0.0091	0.15	<0.02	0.053	0.0091	0.15	<0.02	0.053	0.0091	0.15	<0.02	0.053					
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	0.0040 U	0.0040 U	<0.002	<0.002	0.0021	0.0040 U	0.0040 U	<0.01	<0.02	<0.002	NA	<0.002	NA	<0.002	NA	0.0040 U	0.0061 U	0.0014	NA	NA	NA	0.0061 U	<0.002	<0.002						
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	0.0127	0.1284	0.098	0.022	0.0574	0.0492	0.0273	<0.0046	0.0043	<0.01	<0.02	0.1181	0.0289	0.1496	0.1197	0.362	0.245	0.285	0.0438	0.0547	0.1263	0.1017	0.0092	0.0085						
Sample ID	HW-D (m)	HW-D (m)	HW-D (d)	HW-D (d)	Solar Field														Deployment Area								Maher Wells															
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	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018	12/3/2018						
Depth to Groundwater	18.83	18.34	18.99	18.23	20.60	19.97	20.69	20.75	20.71	18.35	15.39	16.33	15.61	16.20	15.49	19.18	19.05	19.38	17.82	16.16	19.60	20.08	16.82	20.39	17.37	12.23	10.80	10.14	11.11	10.45	12.48	10.82	10.15	12.10	11.30							
Total Well Depth	30.32	30.32	44.94	44.94	65.05	65.05	48.28	38.25	25.10	24.80	41.67	26.22	26.22	26.22	26.89	26.89	26.89	27.09	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35	21.35						
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	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	0.0074 U	0.23	0.077	0.28	0.014	0.048	0.0064	0.11	0.0061	0.0028	0.033	0.044	0.034	0.015 J							
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	0.18	0.22	0.019	0.0091	0.057	0.018	0.0056 U	0.042	0.0056 U	0.0021	0.011	0.0191	0.0056 U	0.005	0.0056 U	0.0031	<0.003	0.023	0.011	0.0056 U	0.0033	0.012	0.12	0.18	0.12	0.042							
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	0.16	0.082	<0.002	0.00078	<0.002	<0.002	0.0087 J	0.0087 U	<0.002	0.0052	0.0046 U	0.0087 U	0.00081	0.0087 U	<0.002	0.0077	0.0087 U	0.0033	0.044	0.0037	0.0036	0.1	0.15	0.059	0.038								
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	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	0.0033 U	0.02	0.0050 J	0.002	0.0074	0.032	0.0043	0.052	0.0035	0.041	0.057	0.088	0.055	0.020 J							
Perfluorooctane sulfonate (PFOS)	0.022	0.0011	0.095	0.12	0.013	0.013	0.036	0.0060 U	0.066	0.04	0.014	0.014	0.014	0.012	0.02	0.13	0.047	0.0060 U	<0.002	0.0037	0.0026 U	0.0060 U	0.00086	0.0060 U	<0.002	0.007	0.024	0.0058	0.0081 J	0.01	0.0052	0.52	0.72	0.5	0.14							
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	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	0.0061 U	<0.002	0.0061 U	<0.002	NA	0.0061 U	<0.002	0.0061 U	<0.002	NA	0.0061 U	<0.002	0.0040 U	0.0061 U							
Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA)	0.0309	0.0011	0.2018	0.2026	0.0263	0.0239	0.0087 U	0.059	0.0087 U	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	0.0087 U	0.25667	0.082	0.2851	0.0361	0.127	0.0308	0.2141	0.0266	0.0646	0.83	1.182	0.768	0.255							
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-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	12/7/2018	5/8/2020	4/11/2017	12/7/2018	5/13/2020	4/11/2017	5/13/2020																												
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	26.73	25.64																													
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	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	0.0151	0.014 J	0.012	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	0.029	0.12																													
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	0.006 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	0.0046 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	0.029	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	0.0040 U	<0.002																													
6:2 Fluorotelomer sulfonate (6:2 FTS)	NA	0.0066 U	<0.002	NA	0.0066 U	<0.002	NA	NA	0.0032 U	0.0066 U	<0.002	0.0032 U	<0.002																													
Sum of Six	0.0402	0.04	0.0416	0.0763	0.319	0.2697	0.0475	0.048	0.39	0.483	0.0953	0.0691	0.4657																													
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	0.0691	0.4657																													

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 MassDEP 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 detected PFAS analytes including estimated values and does not include non-detects (U or <).

NR = Not Recorded

Table 2. 1,4 Dioxane Groundwater Results ug/L

	North Ramp															Airport Road					ARFF Building	
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	HW-A(D)	HW-A(D)	HW-B(D)	HW-N	HW-O	HW-L	HW-L
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	4/5/2017	8/5/2019	4/5/2017	8/5/2019	8/5/2019	7/2/2019	5/13/2020
Depth to Groundwater	NR	19.48	NR	NR	NR	23.38	26.2	26.35	23.67	22.71	23	23.76	22.9	21.3	21.05	22.4	18.76	22.75	15.8	8.83	19.08	18.62
Total Well Depth	30.84	30.84	27.8	26.00	31.8	31.8	32	48	32	29.87	25.64	34.18	34.18	41.3	41.3	57.05	57.05	57.15	22.33	14.1	70.55	70.55
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	<0.25	<0.25	<0.25	<0.25	<0.25	0.727	0.75
	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							
Depth to Groundwater	NR	NR	10.82	10.15	NR	12.5	11.3	25.4	25.55	24.28	23.54	26.5	26.73	26.28	25.78							
Total Well Depth	56.2	68.63	68.63	68.63	86.75	86.75	86.75	74.44	123.36	123.36	123.36	76.5	110.42	110.42	110.42							
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 MassDEP GW-1 standard (0.3 ug/L)

NR = Not Recorded

Table 3. Soil Results for PFAS ug/kg

		ARFF Building																														
Sample ID	MCP Standard		ARFF1 (0-1')	ARFF1 (2')	ARFF1 (4')	ARFF2 (0-1')	ARFF3 (0-1')	ARFF4 (0-1')	ARFFCB (0-1)	A1 (0-1')	A2 (0-1')	A3 (0-1')	A4 (0-1')	A5 (0-1')	A6 (0-1')	A7 (0-1')	A8 (0-1')	A9 (0-1')	A10 (0-1')	A11 (0-1')	A12 (0-1')	ARFF3 (10-12')	A13 (0-1')	A14 (0-1')	A14 (0-1')	A15 (0-1')	A15 (0-1')	A16 (0-1')	A17 (0-1')	HW-P(M) [8-10]	HW-P(M) [18-20]	
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	9/26/2017	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	10/9/2018	2/27/2019	2/27/2019	5/13/2020	2/27/2019	5/13/2020	9/17/2020	9/17/2020	9/18/2020	9/18/2020	
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.82 J	1.8	0.66 J	0.17 U	0.60 J	0.75 J	0.60 J	0.19 U	0.19 U	0.38 J	0.19 U	1.1	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.19 U	0.32 J	<2.0	<1.9	0.51 J	<2.0	0.21 U	0.067 J	1.07	0.044 U	0.043 U	
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	0.23 U	0.23 U	0.23 U	0.64 J	0.23 U	0.23 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	0.24 U	<2.0	<1.9	0.24 U	<2.0	0.21 U	0.085 J	0.058 U	0.058 U	
Perfluorooctanoic acid (PFOA)	0.72	300	0.75 J	2.6	0.75 J	0.26 U	0.78 J	0.97 J	0.90 J	0.25 U	0.25 U	0.37 J	0.30 J	1.9	0.25 U	0.25 U	0.25 U	0.34 J	0.25 U	0.25 U	0.25 U	1.9	<2.0	<1.9	0.68 J	<2.0	0.14 U	0.088 J	0.989	0.089 J	0.046 J	
Perfluorononanoic acid (PFNA)	0.32	300	2.5	5.7	1.4	0.20 J	0.91 J	2.9	0.17 U	0.22 U	0.22 U	0.51 J	0.22 U	0.87 J	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	0.22 U	3.1	<2.0	<1.9	0.54 J	<2.0	0.15 U	0.119 J	0.774 J	0.073 U	0.072 U	
Perfluorooctane sulfonate (PFOS)	2	300	4.5	2.7	1.1	0.29 J	4.4	1.0	1.1	0.26 U	0.26 U	0.29 J	0.26 U	0.26 U	0.26 U	0.38 J	0.26 U	0.85 J	0.26 U	0.26 U	0.26 U	1.1	<2.0	<1.9	0.32 J	<2.0	0.29	2.02	0.573 J	0.0127 U	0.0124 U	
Perfluorodecanoic acid (PFDA)	0.3	300	4.4	1.2	0.62 J	0.13 U	1.6	0.85 J	0.13 U	0.28 U	0.28 U	0.42 J	0.28 U	1.4	0.28 U	0.28 U	0.28 U	0.28 U	0.33 J	0.28 U	0.28 U	0.28 U	<2.0	<1.9	0.95 J	<2.0	0.15 U	0.074 J	0.147 J	0.065 U	0.064 U	
Deployment Area																																
Sample ID	MCP Standard		DL1(0-1')	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')	DL 11 (0-1')	DL 11 (0-1')	DL12 (0-1')	DL13 (0-1')							
Sample Date	S-1/GW-1	S-1/GW-3	6/20/2017	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	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	9/26/2017	9/26/2017							
Perfluoroheptanoic acid (PFHpA)	0.5	300	0.30 J	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	1.2	1.6							
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.23 U	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	0.23 U	0.23 U							
Perfluorooctanoic acid (PFOA)	0.72	300	0.26 U	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	4.6	2.4							
Perfluorononanoic acid (PFNA)	0.32	300	0.17 U	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	7.3	1.5							
Perfluorooctane sulfonate (PFOS)	2	300	0.40 J	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	23	0.66 J							
Perfluorodecanoic Acid (PFDA)	0.3	300	0.63 J	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	0.66 J	7.4							
Deployment Area																																
Sample ID	MCP Standard		DL14 (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')	DL11 (4-6')	DL11 (10-12')	DL11 (14-16')	DL14 (0-1')	DL14 (4-6')	DL14 (10-12')	DL14 (14-16')	HW-F (10-12')	HW-F (14-16')	HW-3 (0-1')							
Sample Date	S-1/GW-1	S-1/GW-3	9/26/2017	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	10/4/2018	9/26/2017	10/4/2018	10/4/2018	10/4/2018	10/4/2018	10/4/2018	10/9/2018							
Perfluoroheptanoic acid (PFHpA)	0.5	300	4.9	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	1.3	0.31 J	0.23 J	4.9	0.36 J	0.19 U	1.4	0.32 J	1.3	0.19 U							
Perfluorohexanesulfonic acid (PFHxS)	0.3	300	0.71 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	0.71 J	0.24 U	0.24 U	0.74 J	0.24 U	0.24 U	0.24 U							
Perfluorooctanoic acid (PFOA)	0.72	300	23	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	2.9	1.9	0.50 J	23	0.58 J	0.32 J	2.9	0.25 U	1.4	0.25 U							
Perfluorononanoic acid (PFNA)	0.32	300	10	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	2.5	0.22 U	0.22 U	10	0.22 U	0.22 U	10	0.22 U	0.22 U	0.22 U							
Perfluorooctane sulfonate (PFOS)	2	300	7.6	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	7.6	0.26 U	0.26 U	2.3	0.26 U	0.26 U	0.26 U							
Perfluorodecanoic Acid (PFDA)	0.3	300	9.6	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	9.6	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U							
1991 Drill Location																																
Sample ID	MCP 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																								

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 MassDEP S-1/GW-1 standard

Table 4: 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
	-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	-
-7.58						0.20	-	-49.29
12/7/2018	1812232-1	OW-18S	-7.54	0.20	-	-49.66	0.0148	-
			-6.95	0.20	-	-42.64	0.01491	-
	1812232-2	OW-18M	-6.89	0.20	-	-42.57	0.01491	-
			-7.28	0.20	-	-44.76	0.01488	*
	1812232-3	OW-18D	-7.36	0.20	-	-41.61	0.01493	*
			IAEA OH-14	-	-5.64	0.20	-5.6	-37.45
QA/QC	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 5. Fire Truck Spray Water Results for PFAS 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
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 MassDEP GW-1 standard (0.02 ug/L)

APPENDIX A

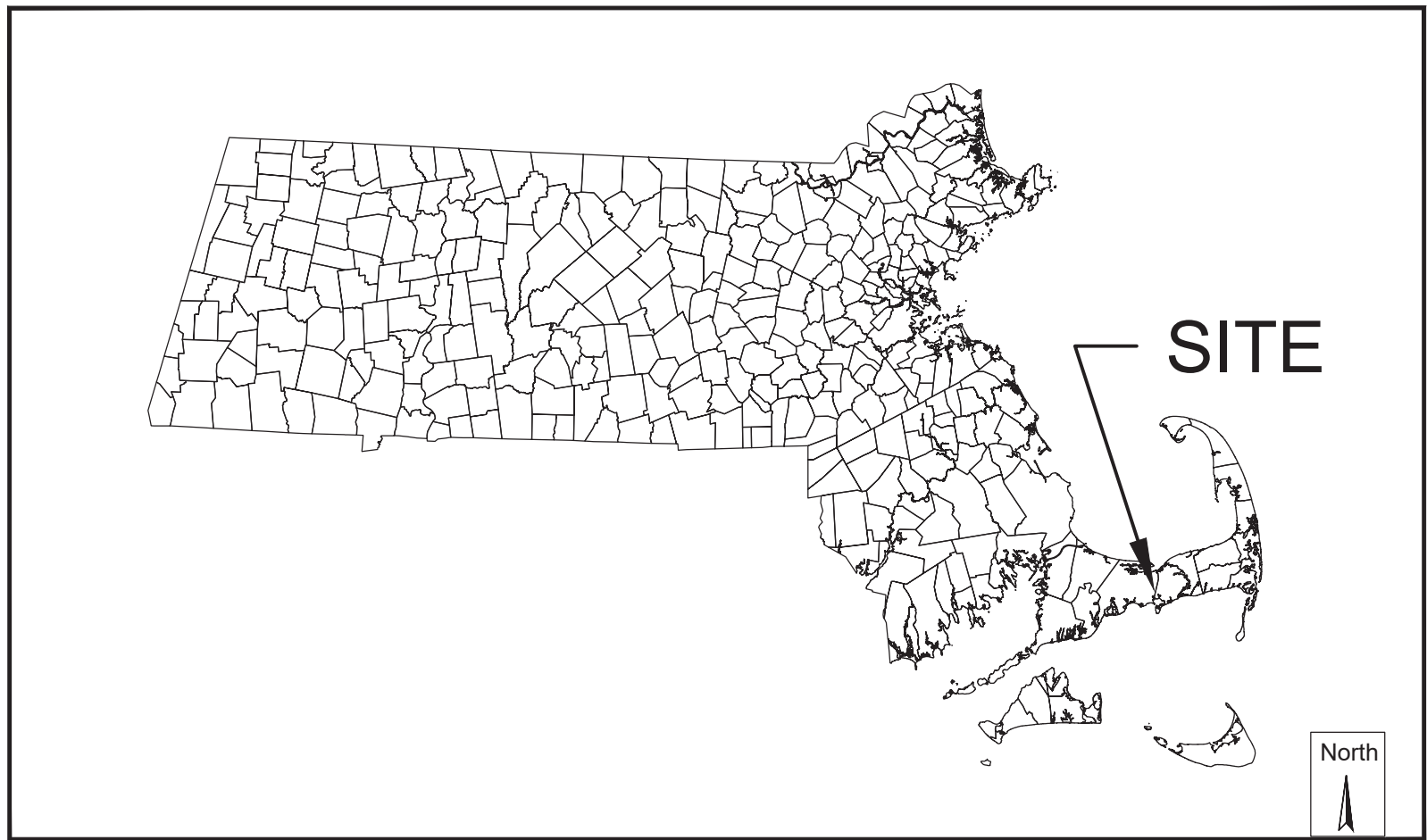
Final HYA Soil Capping & Drainage for Per- and Poly-Fluoroalkyl Substances Mitigation
Plan Set

HYA SOIL CAPPING & DRAINAGE FOR PER- AND POLY-FLUOROALKYL SUBSTANCES (PFAS) MITIGATION

FINAL CONSTRUCTION PLANS

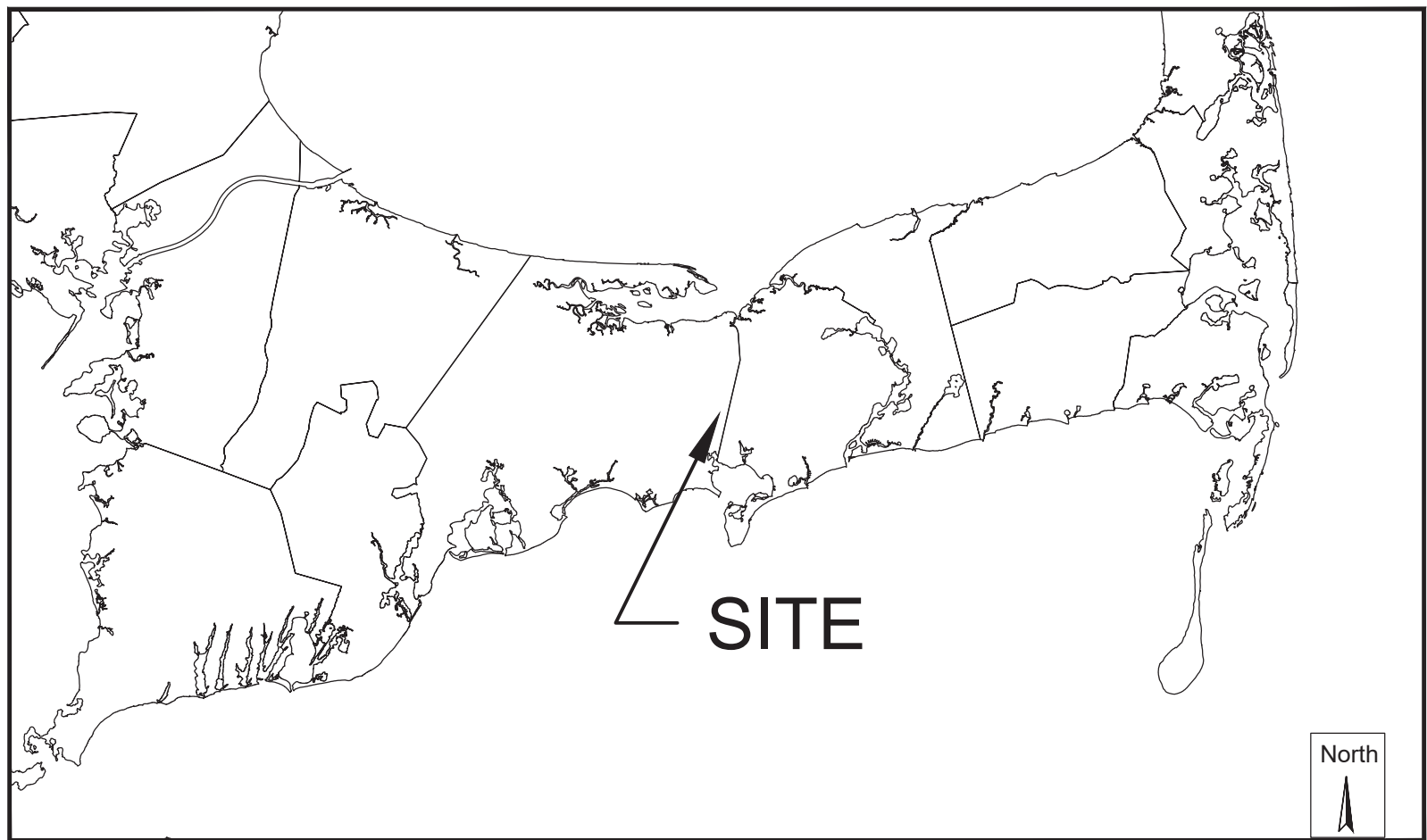
BARNSTABLE, MASSACHUSETTS

MAY 2020



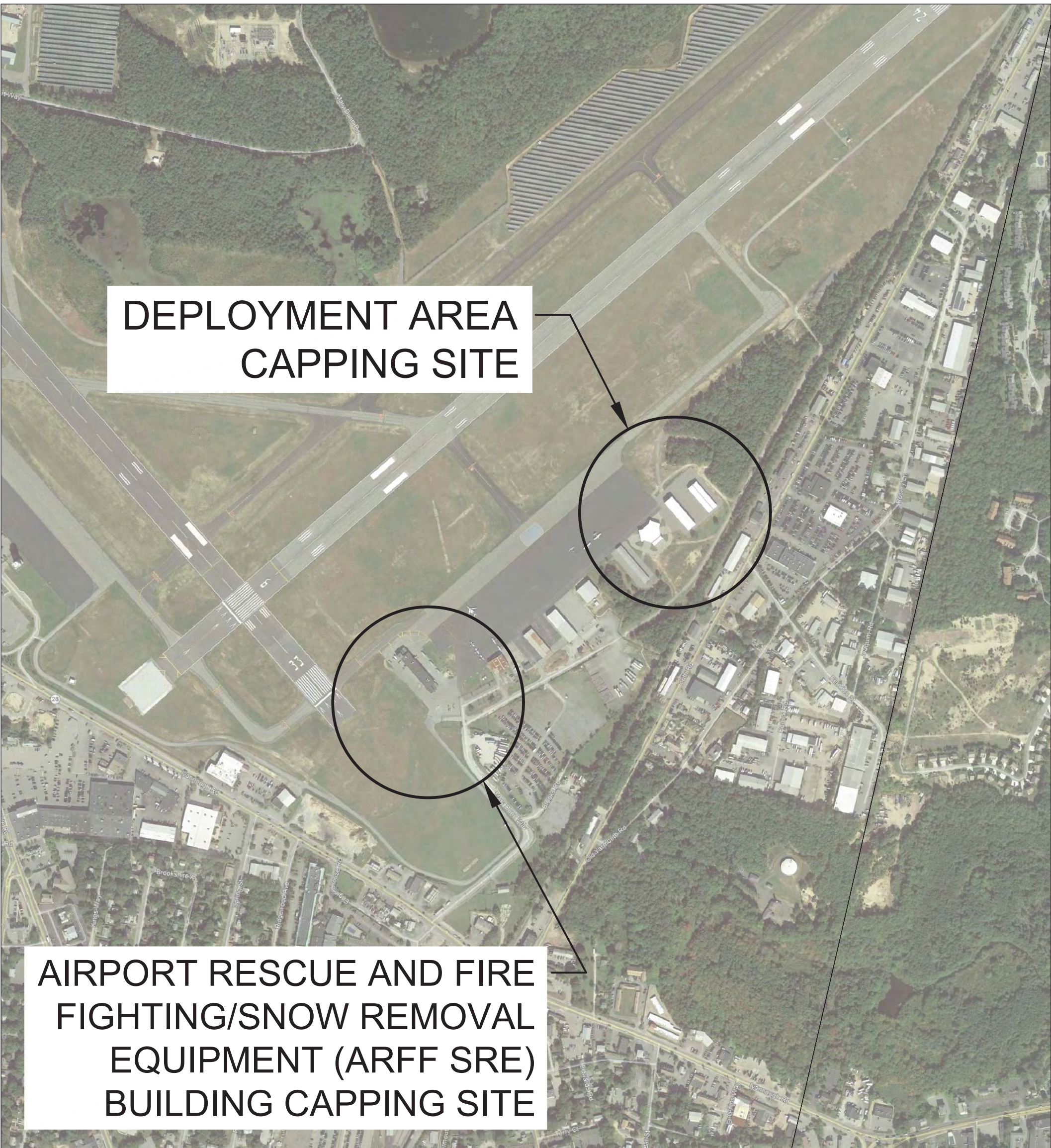
MASSACHUSETTS

Graphic Scale
0 150000
SCALE IN FEET
1:150000



BARNSTABLE

Graphic Scale
0 12000
SCALE IN FEET
1:12000



CAPPING SITES

1 INCH = 500 FEET
0 500
SCALE IN FEET
1:500

Sheet List Table	
Sheet Number	Sheet Title
1	COVER & SHEET INDEX
2	CONSTRUCTION NOTES & DETAILS
3	EROSION & SEDIMENTATION CONTROL PLAN
4	SITE PLAN (ARFF SRE BUILDING)
5	SITE PLAN (DEPLOYMENT AREA)
6	CONSTRUCTION SAFETY AND PHASING PLAN - GENERAL NOTES
7	CONSTRUCTION SAFETY AND PHASING PLAN - DETAILS
8	CONSTRUCTION SAFETY AND PHASING PLAN - SITE PLAN
9	CONSTRUCTION SAFETY AND PHASING PLAN - WORK AREA I
10	CONSTRUCTION SAFETY AND PHASING PLAN - WORK AREA II

GENERAL NOTES:
1. THIS PLAN SET IS FOR BIDDING/PRICING AND NOT FOR CONSTRUCTION.

Plan Set:
HYA SOIL CAPPING & DRAINAGE FOR PER- AND POLY-FLUOROALKYL SUBSTANCES (PFAS) MITIGATION
FINAL CONSTRUCTION PLANS
BARNSTABLE, MASSACHUSETTS

Prepared For:
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480 Barnstable Road
Hyannis, MA 02601
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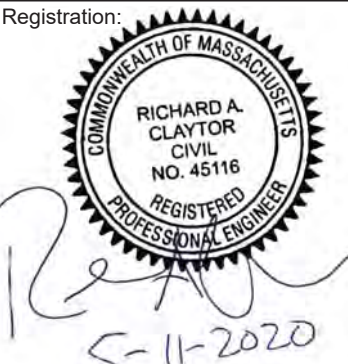
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Date Issued: MAY 2020	Registration:  5-11-2020	Revisions <table><tr><td>Δ</td><td></td><td></td><td></td><td></td></tr><tr><td>Δ</td><td></td><td></td><td></td><td></td></tr><tr><td>Δ</td><td></td><td></td><td></td><td></td></tr><tr><td>Δ</td><td></td><td></td><td></td><td></td></tr><tr><td>Δ</td><td></td><td></td><td></td><td></td></tr></table>	Δ					Δ					Δ					Δ					Δ					Project Number: 17027A
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last modified: 03/23/2020 printed: 05/11/2020 by ml H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\Drawings\17027A DE.dwg

SURVEY NOTES:

- THE EXISTING CONDITIONS DEPICTED IN THIS PLAN SET WERE TAKEN FROM THE SURVEY PLANS ENTITLED "EAST RAMP EXISTING CONDITIONS PLAN," PRODUCED BY DANIEL W. MACKENZIE, PLS OF THE HORSLEY WITTEN GROUP, INC. ON 2/7/20. THESE SURVEY PLANS WERE BASED ON A FIELD SURVEY CONDUCTED BY THE HORSLEY WITTEN GROUP ON NOVEMBER 19, AND NOVEMBER 22, 2019.
- THIS PLAN DOES NOT SHOW ANY RECORDED OR UNWRITTEN EASEMENTS WHICH MAY EXIST. HOWEVER, THIS DOES NOT CONSTITUTE A GUARANTEE THAT NO SUCH EASEMENTS EXIST.
- THE ELEVATIONS DEPICTED HEREON WERE BASED ON THE NORTH AMERICAN VERTICAL DATUM OF 1988.
- ALL PROPERTY AND BOUNDARY LINES DEPICTED ARE APPROXIMATE ONLY.
- EXISTING CONTOUR INTERVALS ARE EQUAL TO ONE FOOT.
- THE ACCURACY OF MEASURED PIPE INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER CONDITIONS.

GENERAL CONSTRUCTION NOTES:

- ALL SITE WORK TO COMPLETE THIS PROJECT AS INDICATED ON THE DRAWINGS AND IN THE SPECIFICATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR.
- IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED.
- UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC, ALL PERSONNEL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING THE INSTALLATION OF TEMPORARY FENCING BARRICADES, SAFETY LIGHTING, CONES, POLICE DETAIL AND/OR FLAGMEN AS DETERMINED NECESSARY BY THE TOWN/OTYLOCAL MUNICIPALITY. THE CONTRACTOR IS RESPONSIBLE FOR THE COST OF POLICE DETAIL AND FOR COORDINATING WITH THE LOCAL OR STATE POLICE DEPARTMENT FOR ALL REQUIRED POLICE DETAIL.
- MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, PAY ALL FEES INCLUDING POLICE DETAILS AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE OWNER AND THE ENGINEER.
- ALL EXISTING CONDITIONS SHOWN ARE APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. PRIOR TO THE START OF CONSTRUCTION VERIFY THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.
- THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS INDICATED ON THE DRAWINGS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES IN THE FIELD PRIOR TO THE START OF CONSTRUCTION. CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE TOWN, AND "DIGSAFE" (1-888-344-7233) AT LEAST THREE BUSINESS DAYS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. THE CONTRACTOR MUST RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCORRECTLY LOCATED, OR INADEQUATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.
- COORDINATE AND MAKE ALL CONNECTION ARRANGEMENTS WITH UTILITY COMPANIES, AS REQUIRED.
- THE CONTRACTOR MUST MAINTAIN ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. REPAIR ANY STRUCTURES INCURRED DURING CONSTRUCTION. THE CONTRACTOR IS RESPONSIBLE FOR ALL COST RELATED TO THE REPAIR OF UTILITIES. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES MUST BE DONE BY HAND.
- COORDINATE ALL TRENCHING WORK WITHIN ROADWAYS WITH THE PROPER LOCAL & STATE AGENCY. THE CONTRACTOR IS RESPONSIBLE FOR ALL TRENCH SAFETY INCLUDING ANY LOCAL AND/OR STATE PERMITS REQUIRED FOR THE TRENCH WORK. IF THIS WORK IS REQUIRED TO OCCUR OUTSIDE THE AGREED UPON HOURS OF OPERATION FOR THE FACILITY, THE CONTRACTOR MUST PLAN ACCORDINGLY.
- SAWCUT ALL TRENCH WORK WITHIN EXISTING PAVEMENT AS INDICATED ON THE DRAWINGS. BACKFILL AND COMPACT TRENCH WORK AS INDICATED ON THE DRAWING AND IN THE SPECIFICATIONS. IF SETTLEMENT OCCURS DUE TO INADEQUATE COMPACTION, AS DETERMINED BY THE ENGINEER, WITHIN THE WARRANTY PERIOD, CONTRACTOR IS REQUIRED TO REMOVE, PATCH AND REPAVE AFTER ONE COMPLETE 12-MONTH CYCLE.
- IMPORT ONLY CLEAN MATERIAL. MATERIAL FROM AN EXISTING OR FORMER 21E SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000 WILL NOT BE ACCEPTED. ANALYTICAL TESTING OF BACKFILL MATERIAL FOR PFAS IS REQUIRED TO BE SUBMITTED TO THE OWNER AND ENGINEER FOR APPROVAL PRIOR TO PLACEMENT.
- IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH AND MAINTAIN ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. COORDINATE WITH THE ENGINEER THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS.
- SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION MUST BE PROVIDED BY THE CONTRACTOR AND PERFORMED BY A MASSACHUSETTS' REGISTERED PROFESSIONAL LAND SURVEYOR. THE CONTRACTOR IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR FOR ALL SITE SURVEY WORK.
- MAINTAIN ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES ARE TO REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES IS THE RESPONSIBILITY (INCLUDING COST) OF THE CONTRACTOR.
- UNLESS OTHERWISE INDICATED ON THE DRAWINGS AND/OR IN THE SPECIFICATIONS, ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE MOST RECENT VERSION OF THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (THE COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY AND BRIDGES 2020 EDITION).
- PROVIDE ALL CONSTRUCTION SERVICE IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
- COLLECT SOLID WASTES AND STORE IN A SECURED DUMPSTER. THE DUMPSTER MUST MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
- RESTORE ALL SURFACES EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE PER SPECIFICATIONS. LEAVE ALL AREAS NOT DISTURBED BY CONSTRUCTION IN THEIR NATURAL STATE. TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. WHEREAS THE PLANS DO NOT SHOW ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE CONTRACTOR IN ADVANCE OF THE WORK.
- REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. PROMPTLY REMOVE ALL DEMOLITION DEBRIS FROM THE SITE TO AN APPROVED DUMP SITE.
- ALL TRUCKS LEAVING THE SITE MUST BE COVERED.
- DO NOT WASH ANY CONCRETE OR MORTAR ONSITE. REMOVE BY HAND ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA.
- BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED.
- AT THE END OF CONSTRUCTION, REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE. PERFORM A THOROUGH INSPECTION OF THE WORK PERIMETER. COLLECT AND REMOVE ALL MATERIALS AND BLOWN OR WATER CARRIED DEBRIS FROM THE SITE.
- THE WORK AREA IS A DISPOSAL SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DEVELOP A SITE SPECIFIC HEALTH AND SAFETY PLAN FOR INTRUSIVE SOIL ACTIVITIES IN AN AREA WITH KNOWN PFAS CONTAMINATION. THE OWNER WILL PROVIDE OVERSIGHT AND DUST MONITORING UNDER THE DIRECTION OF A LICENSED SITE PROFESSIONAL.
- DETAILS REGARDING PFAS CONCENTRATIONS IN SOIL ARE SET FORTH IN THE REPORT TITLED, "FINAL IMMEDIATE RESPONSE ACTION PLAN MODIFICATION," PREPARED BY HORSLEY WITTEN GROUP DATED DECEMBER 2019. THE MAXIMUM CONCENTRATION OF THE MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION SUM OF SIX PFAS IN SOIL IS 87.9 µg / kg. REFER TO THE ATTACHED REPORT FOR ADDITIONAL DETAILS.
- THE CONTRACTOR IS RESPONSIBLE FOR DUST CONTROL. AT NO TIME IS VISIBLE DUST GENERATION ACCEPTABLE. DUST SUPPRESSION INCLUDING THE USE OF WATER IS CONSIDERED INCIDENTAL TO THIS PROCESS.
- SOIL REMOVED FROM ARFF SRE AREA IS TO BE USED IN GRADING AND SHAPING WITHIN THE DEPLOYMENT AREA. AT NO TIME IS ADDITIONAL SOIL FROM THE ARFF SRE OR DEPLOYMENT AREA TO BE DISTURBED OR REMOVED WITHOUT APPROVAL FROM OWNER OR ENGINEER.

GENERAL DEMOLITION NOTES:

- THIS PLAN SET DOES NOT INCLUDE DETAILS & SPECIFICATIONS FOR ALL DEMOLITION WORK REQUIRED WITHIN THE PROPOSED CONSTRUCTION LIMITS. UNLESS OTHERWISE NOTED, THE CONTRACTOR IS RESPONSIBLE FOR THE RELOCATION, DEMOLITION, REMOVAL AND DISPOSAL, IN A LOCATION APPROVED BY ALL GOVERNING AUTHORITIES, OF ALL EXISTING SITE ELEMENTS AND STRUCTURES INCLUDING: TO ROADSWAYS, PAVEMENT, CONCRETE, BITUMINOUS CONCRETE, CEMENT CEMENT CONCRETE, GRAVEL, BERMS, AND ALL OTHER STRUCTURES SHOWN AND NOT SHOWN WITHIN CONSTRUCTION LIMITS, AND WHERE NEEDED, TO ALLOW FOR NEW CONSTRUCTION. ALL FACILITIES TO BE REMOVED ARE TO BE UNDERCUT TO SUITABLE MATERIAL AND BROUGHT TO GRADE WITH SUITABLE FILL MATERIAL, COMPACTED IF NECESSARY, PER SPECIFICATIONS.
- OBTAIN ANY PERMITS REQUIRED FOR DEMOLITION AND DISPOSAL.
- REMOVE ALL DEBRIS FROM THE SITE AND DISPOSE OF THE DEBRIS IN A PROPER AND LEGAL MANNER.
- PRIOR TO DEMOLITION OCCURRING, ALL EROSION CONTROL DEVICES ARE TO BE INSTALLED.

BASIC CONSTRUCTION SEQUENCE:

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. COORDINATE WITH THE OWNER AND ENGINEER AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW AND APPROVAL PRIOR TO CONSTRUCTION.

- SURVEY AND STAKE THE PROPOSED LIMIT OF DISTURBANCE, THE PROPOSED MATERIAL/EQUIPMENT STORAGE AREA, AND SEDIMENTATION BARRIER EXTENTS.
- PLACE SEDIMENTATION BARRIERS AS INDICATED ON DRAWINGS AND STAKED OUT IN THE FIELD. UNDER NO CIRCUMSTANCES IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS/LIMIT OF DISTURBANCE AS INDICATED ON DRAWINGS.
- INSTALL DRAINAGE MANHOLES, CATCH BASINS, DRAINAGE PIPES, AND UNDERGROUND DRAINAGE STRUCTURES. BEGIN WORK AT THE STORMWATER MANAGEMENT AREAS AND PROGRESS UP-GRADE. THE STORMWATER MANAGEMENT AREA(S) AND DRAINAGE NETWORK ARE TO BE PROTECTED FROM SEDIMENTATION UNTIL ALL UN-STABILIZED AREAS ARE STABILIZED. INSTALL SEDIMENT BARRIERS AT ALL POINTS OF ENTRY INTO THE DRAINAGE NETWORK. TAKE PARTICULAR CARE TO PROTECT THE UNDERGROUND STRUCTURES FROM SEDIMENT.
- STRIP TOPSOIL FROM THE AREA OF THE PROPOSED CAPPING AND STOCKPILE IT IN APPROVED LOCATIONS. TOPSOIL STOCKPILES MUST BE PROTECTED BY A SEDIMENT BARRIER.
- BEGIN ROUGH GRADING AREAS FOR CAPPING. BRING ROUGH GRADING TO PROPER ELEVATIONS AS SOON AS PRACTICABLE. COORDINATE WORK TO MINIMIZE TIME SOILS ARE UN-STABILIZED.
- PERFORM CAPPING INSTALLATION AND TRENCHING.
- FINISH PERMANENT VEGETATIVE STABILIZATION.
- SWEEP THE ADJACENT PAVED WORK AREAS TO REMOVE ALL SEDIMENTS. REPAIR DRAINAGE OUTLETS AND BASINS AS REQUIRED. CLEAN AND FLUSH THE DRAINAGE STRUCTURES AND PIPES AT THE END OF CONSTRUCTION AND REMOVE ALL ACCUMULATED SEDIMENTS IN THE STORMWATER MANAGEMENT AREAS. CONTRACTOR MUST INSPECT THE DRAINAGE NETWORK AND REPAIR ANY DAMAGE IMMEDIATELY.
- ENGINEER TO APPROVE THE REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS AND DETERMINE WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.

GENERAL GRADING AND DRAINAGE NOTES:

































- ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
- ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
- PROPOSED ELEVATIONS ARE SHOWN TO FINISH PAVEMENT OR GRADE UNLESS NOTED OTHERWISE.
- ALL EARTHWORK AND SITE PREPARATION MUST BE DONE IN STRICT ACCORDANCE WITH THE RECOMMENDATIONS OF ANY SUBSURFACE INVESTIGATION OR GEOTECHNICAL REPORTS PREPARED FOR THIS SITE.

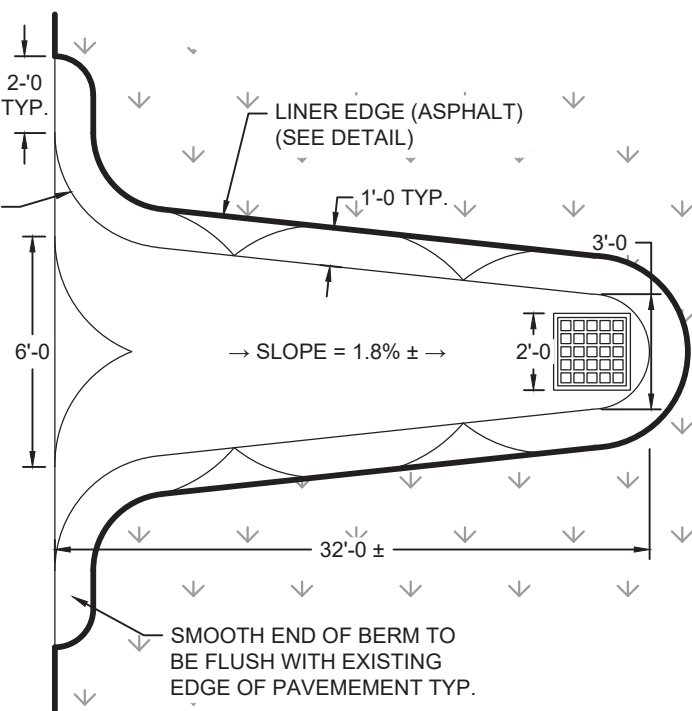
STORMWATER FACILITY OPERATION & MAINTENANCE:

THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL DRAINAGE/STORMWATER MANAGEMENT FACILITIES AS OUTLINED BELOW DURING CONSTRUCTION AND UNTIL SUCH TIME THAT THE PROJECT IS ACCEPTED BY THE OWNER AND THE ENGINEER.

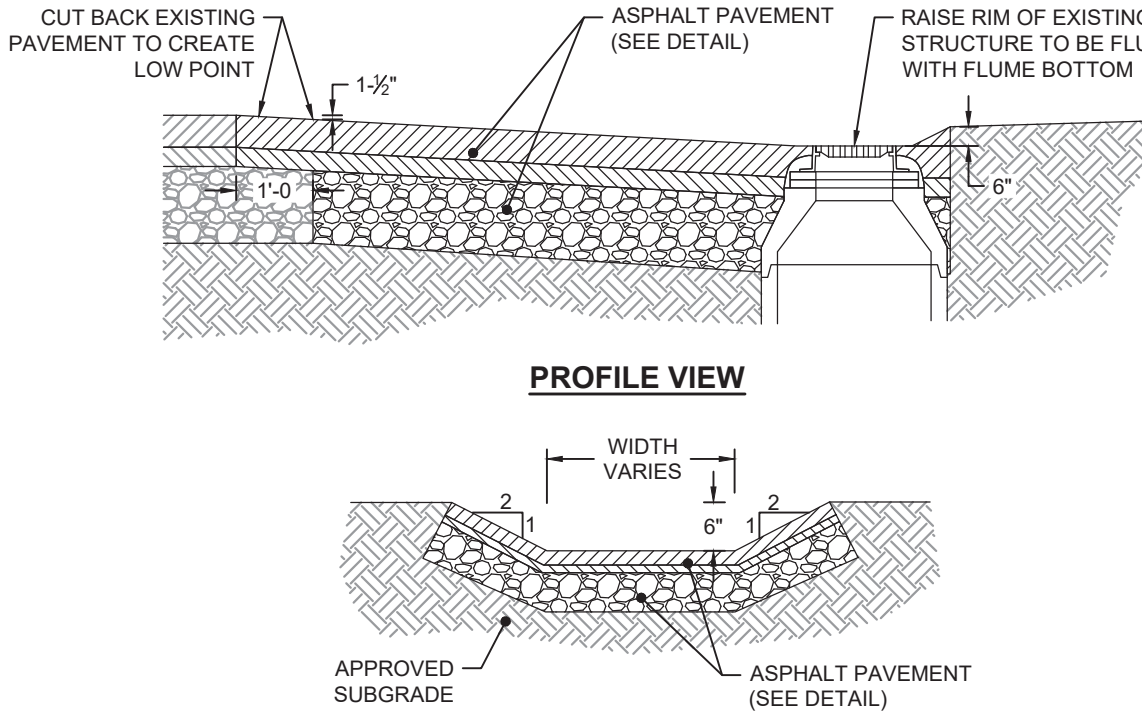
- INSPECT AND RESTORE/CLEAN ALL NEWLY CONSTRUCTED OR ALTERED EXISTING FACILITIES (INLETS, MANHOLES, PIPES, AND UNDERGROUND INFILTRATION STRUCTURES) OF ACCUMULATED SEDIMENT AND DEBRIS PRIOR TO THE OWNER'S ACCEPTANCE.
- REMOVE AND DISPOSE ALL SEDIMENT AND DEBRIS TO A PRE-APPROVED LOCATION.
- REFER TO THE STORMWATER POLLUTION PREVENTION PLAN (SWPPP) FOR ADDITIONAL INFORMATION PERTAINING TO STORMWATER FACILITY OPERATION AND MAINTENANCE REQUIREMENTS. MAINTAIN A WORKING COPY OF THE SWPPP ON SITE AT ALL TIMES.
- AT A MINIMUM INSPECT MONTHLY AND AFTER STORM EVENTS GREATER THAN OR EQUAL TO 1" OF RAINFALL. AS NECESSARY FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3 MONTHS AFTER CONSTRUCTION TO ENSURE PROPER OPERATION AND EFFECTIVE SITE STABILIZATION.
- SPECIFIC MAINTENANCE REQUIRED DURING CONSTRUCTION:
 - DRAINAGE STRUCTURES (INLETS, MANHOLES, CATCHBASINS, UNDERGROUND INFILTRATION STRUCTURES): MONITOR AND REGULARLY INSPECT ALL EXISTING AND PROPOSED DRAINAGE STRUCTURES FOR PROPER OPERATION, COLLECTION OF LITTER OR TRASH, AND STRUCTURAL DETERIORATION. CLEAN AND REMOVE SEDIMENT FROM THE STRUCTURES (INCLUDING SUMPS) AS NECESSARY, AND REPAIR WHEN REQUIRED.
 - ROUTINE MAINTENANCE: OTHER ROUTINE MAINTENANCE INCLUDES THE REMOVAL OF TRASH AND LITTER FROM PAVED AND PERIMETER AREAS, AND STREET AND PARKING LOT SWEEPING UPON COMPLETION OF CONSTRUCTION TO AVOID EXCESSIVE ACCUMULATION OF SEDIMENT IN THE DRAINAGE SYSTEM. INSPECT THE PIPES AND STRUCTURES FOR SEDIMENT ACCUMULATION AND PROPER FLOW.

LEGEND:

GENERAL		SYMBOLS	
			EXISTING SPOT GRADE
	39		SPOT GRADE
	40		SEWER MANHOLE
			ELECTRIC MANHOLE
			TELEPHONE MANHOLE
			MANHOLE
			DRAIN MANHOLE
			CATCHBASIN
			INLET PROTECTION
			WATER VALVE
			GAS VALVE
			CLEAN OUT
			PIPE STUB
	SF		HYDRANT
	SS		MONITORING WELL
			
			

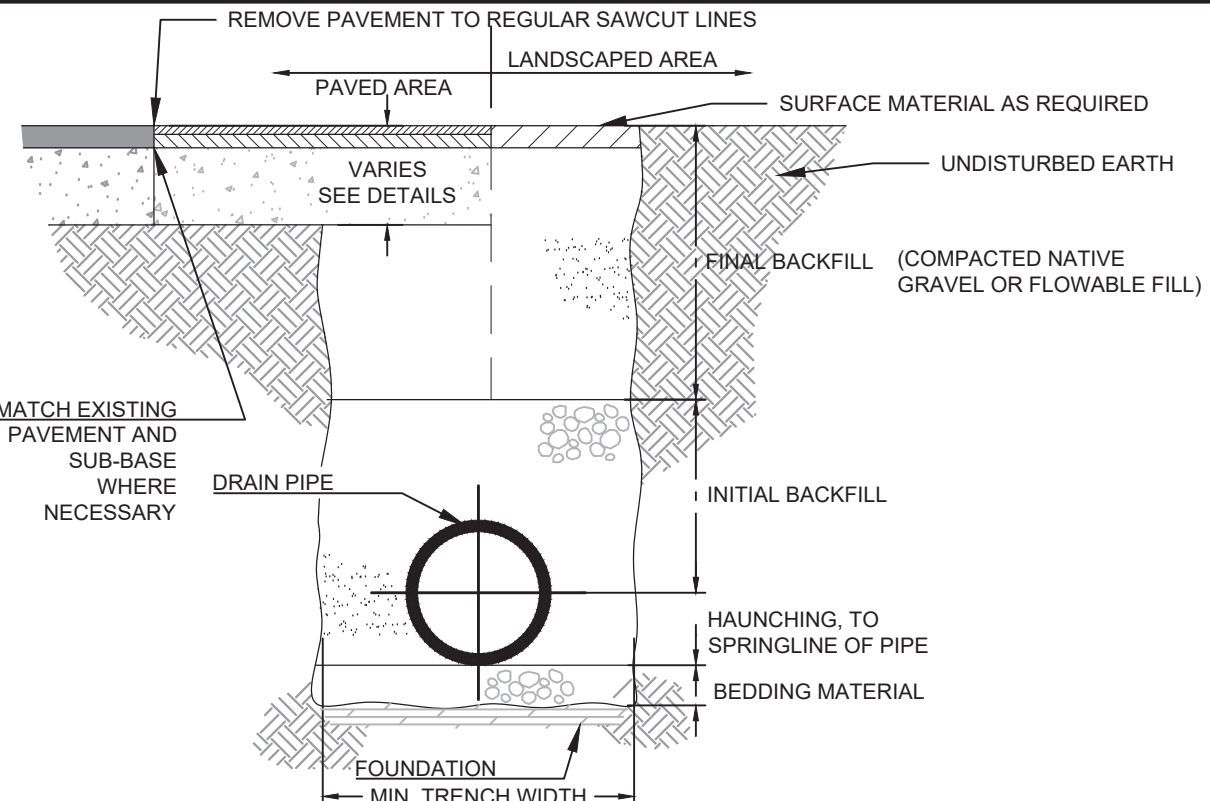


PLAN VIEW



PAVED FLUME
NOT TO SCALE

CHANNEL SECTION VIEW

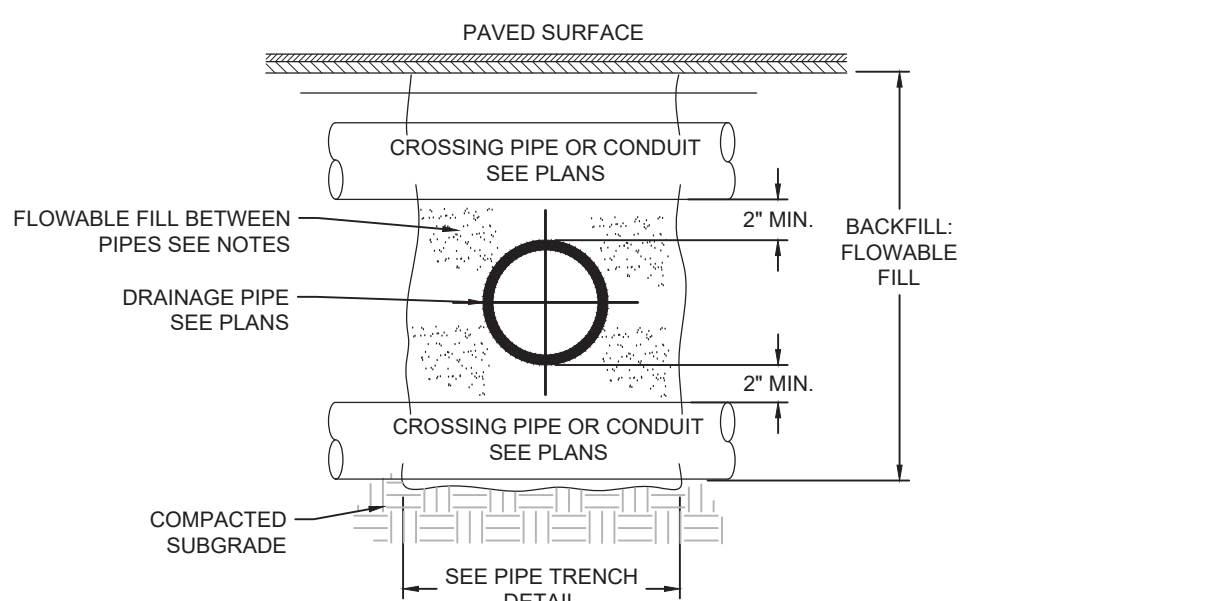


- NOTES:
- FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR TO EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A SUITABLE COMPACTED GRAVEL MATERIAL OR AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.
 - BEDDING, HAUNCHING AND INITIAL BACKFILL: SUITABLE MATERIAL TO CONSIST OF CLEAN, HARD, PARTICLES OF GRAVEL MEETING THE FOLLOWING:
- | SIEVE SIZE | PERCENT PASSING |
|------------|-----------------|
| 3/8" | 85-95 |
| NO. 4 | 5-15 |
| NO. 8 | 0-2 |
3. MINIMUM TRENCH WIDTHS TO BE AS FOLLOWS:
- | NOMINAL Ø inches | MIN. RECOMMENDED TRENCH WIDTH inches |
|------------------|--------------------------------------|
| 6 | 36 |
| 12 | 36 |

MATERIAL TO BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

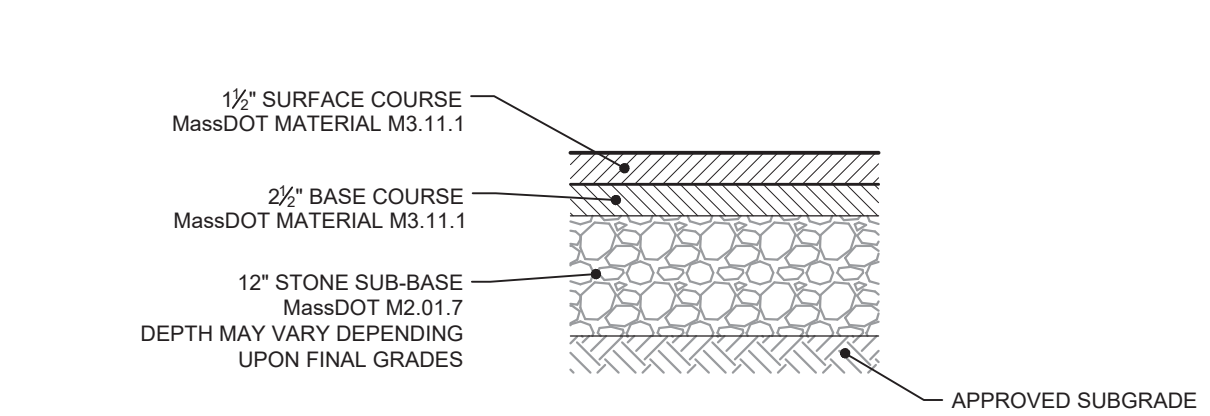
MINIMUM BEDDING THICKNESS TO BE 4" (100mm) FOR 4"-24" PIPE (100-600mm).

STORM DRAIN PIPE TRENCH
NOT TO SCALE



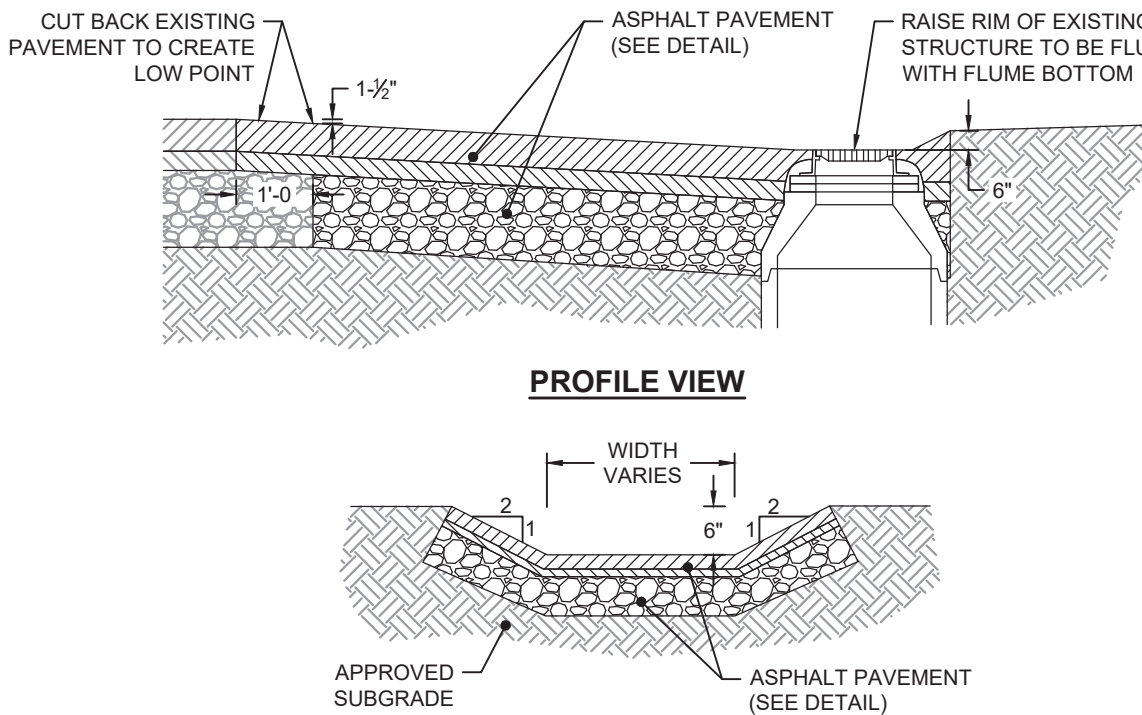
- GENERAL BACKFILL:
- WHERE TWO UTILITIES CROSS, USE FLOWABLE FILL FOR BACKFILL (INCLUDING DISTURBED AREAS SURROUNDING TRENCHES) AT THE AREA OF THE PIPE CROSSINGS.
 - THE FLOWABLE FILL MIX MUST BE FINE ENOUGH TO FILL THE VOID SPACE BETWEEN THE CROWN OF THE PIPE BELOW AND THE BOTTOM OF PIPE ABOVE.
 - THE FLOWABLE FILL MUST ENCOMPASS THE ENTIRE SPACE BETWEEN THE PIPES AS WELL AS AROUND THE PIPES.

STORM DRAIN PIPE/UTILITY CROSSING
NOT TO SCALE

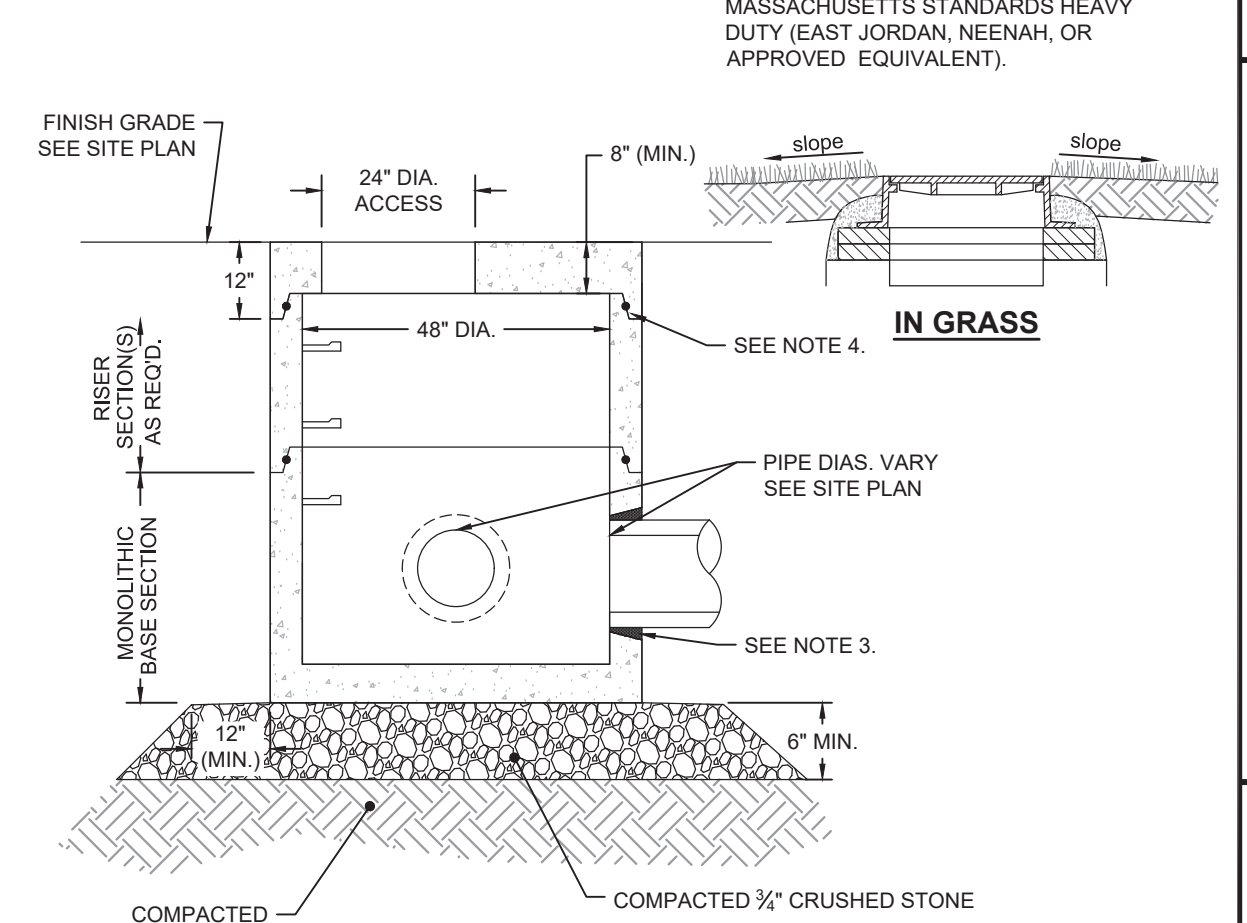
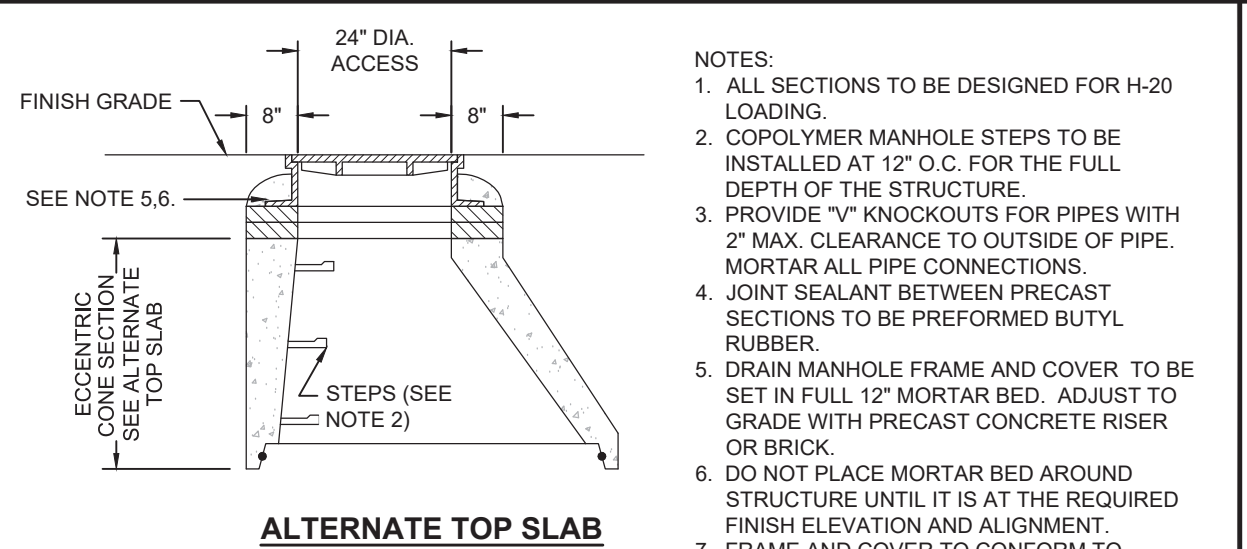


- GENERAL NOTES:
- SUB-GRADE (EXISTING MATERIAL) SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND/OR COARSE SAND, FREE FROM LOAM AND CLAY TO A DEPTH NOT LESS THAN 4 FEET BELOW THE FINISH PAVEMENT SURFACE. EXCAVATE SANDY LOAM AND/OR LOAMY-SAND TOPSOIL MATERIAL FROM ALL PAVED AREAS PRIOR TO SUB-BASE INSTALLATION.
 - PLACE SUB-BASE IN MAXIMUM 6" LIFTS (COMPACTED TO 95%).
 - COMPACT SUB-GRADE FILL TO 95% COMPACTION.
 - SEE SITE LAYOUT PLAN FOR PAVEMENT WIDTH AND LOCATION.
 - SEE GRADING PLANS FOR PAVEMENT SLOPE AND CROSS SLOPE.

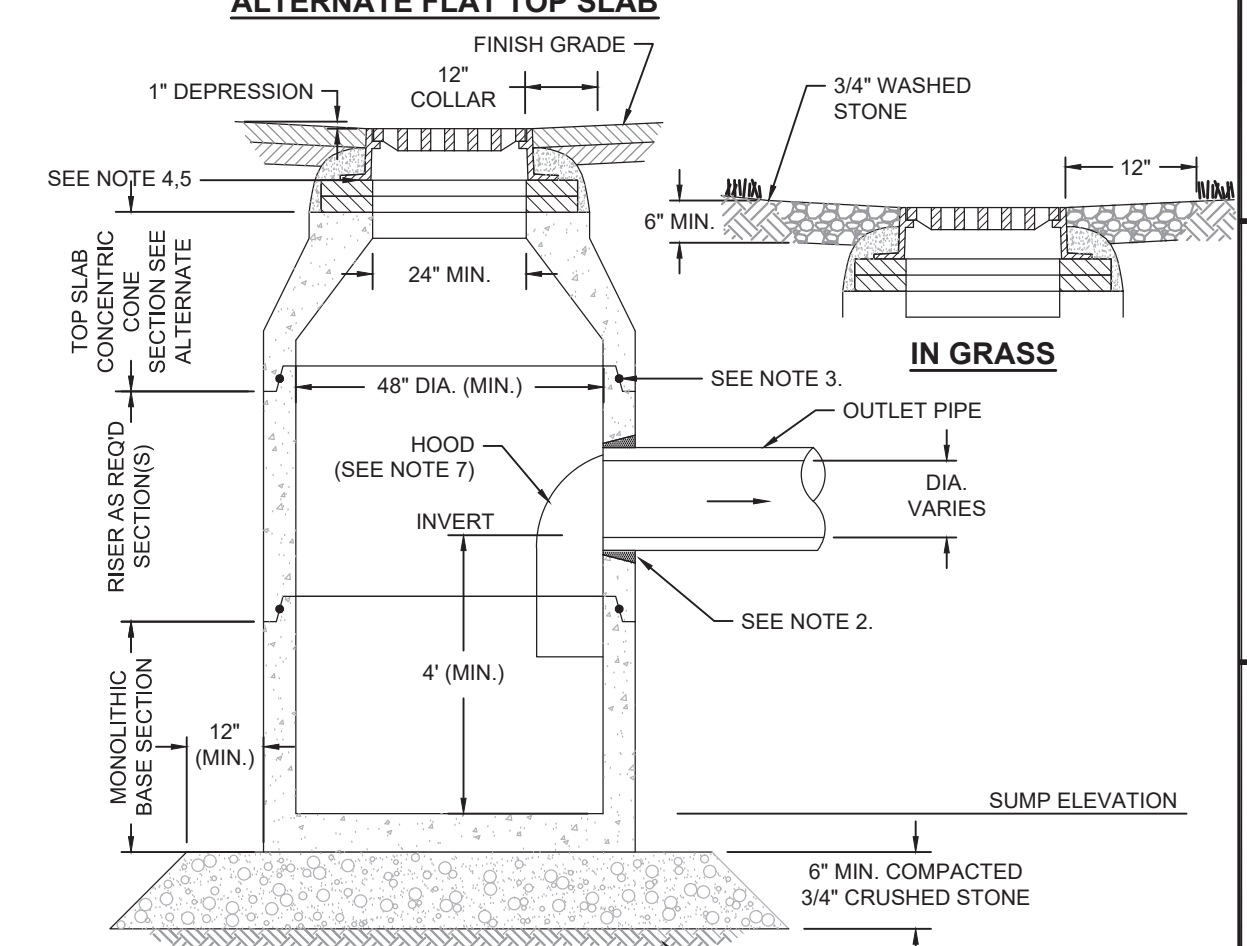
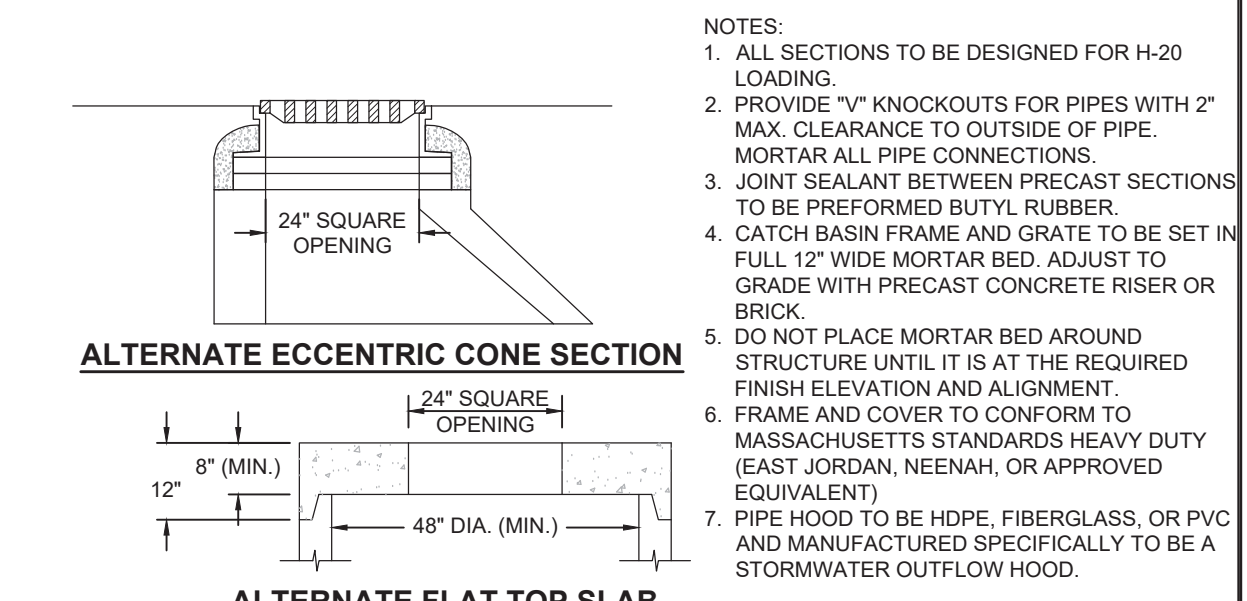
TYPICAL BITUMINOUS PAVEMENT
NOT TO SCALE



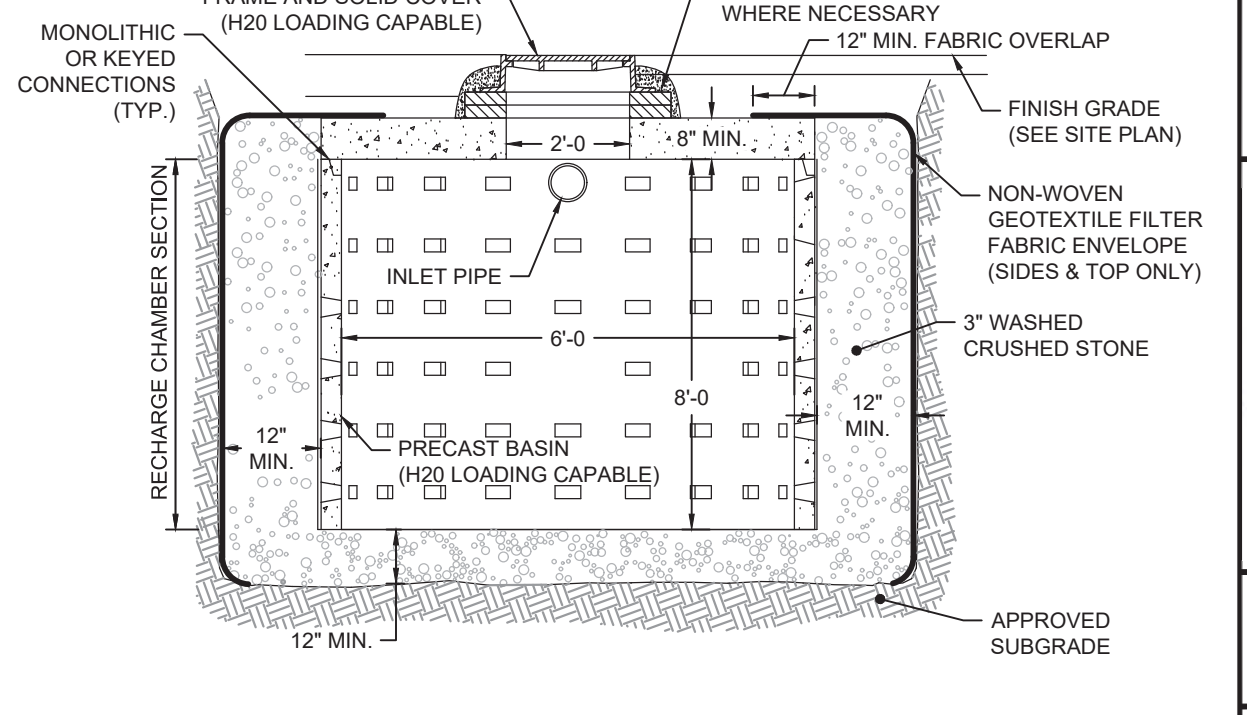
PROFILE VIEW



PRECAST DRAIN MANHOLE (DMH)
NOT TO SCALE



PRECAST CONCRETE CATCH BASIN (CB) WITH HOOD
NOT TO SCALE



RECHARGE BASIN (RCB)
NOT TO SCALE

Revisions

Rev	Date	By	Description
1			
2			
3			
4			
5			

Horsley Witten Group, Inc.

Sustainable Environmental Solutions

90 Route 6A

Sandwich, MA 02563

Phone: (508) 833-6600

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Checkered By: MCL

Drawn By: MCL

Checked By: BM

Date: MAY 2020

HYA SOIL CAPPING & DRAINAGE FOR PER- AND POLY-FLUOROALKYL SUBSTANCES (PFAS) MITIGATION

FINAL CONSTRUCTION PLANS

BARNSTABLE, MASSACHUSETTS

Plan Set

Prepared For: Barnstable Municipal Airport

480 Barnstable Road

Hyannis, MA 02601

Phone: (508) 775-2020

Fax: ---

Survey Provided By: Horsley Witten Group, Inc.

90 Route 6A

Sandwich, MA 02563

Phone: (508) 833-6600

Fax: ---

Date: January 2019

Registration:



5-11-2020

Project Number: 17027A

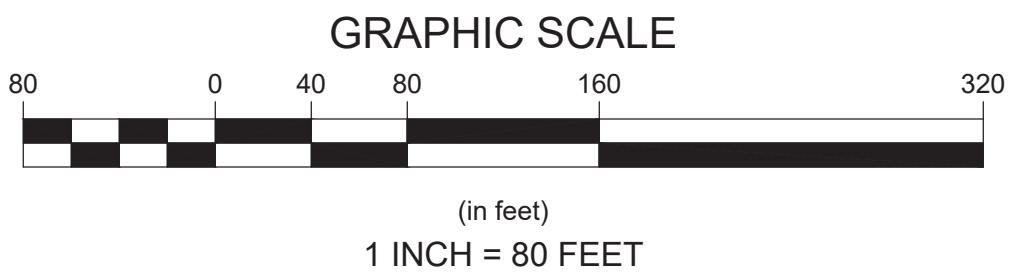
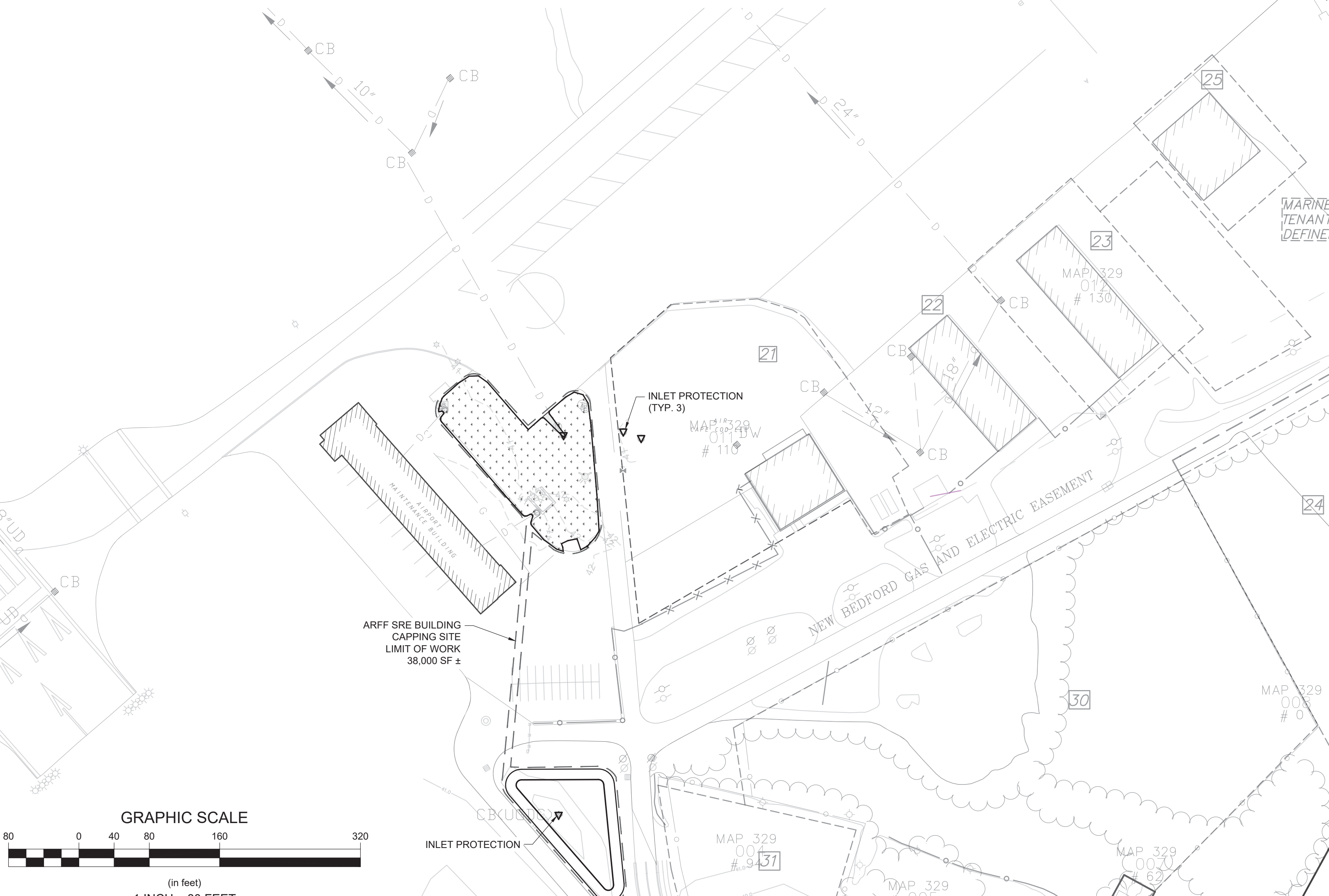
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last modified: 03/25/20 printed: 05/11/2020 by ml H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\Drawings\17027A ST.dwg

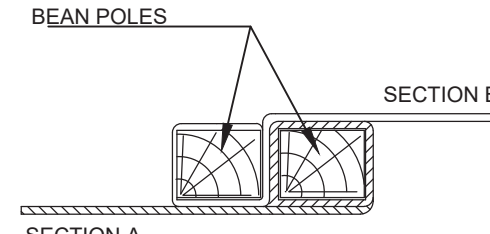
EROSION & SEDIMENT CONTROL NOTES:

- PRIOR TO THE START OF CONSTRUCTION A NOTICE OF INTENT (NOI) MUST BE FILED WITH NPDES. REFER TO THE HYA SITE-WIDE STORMWATER AND POLLUTION PREVENTION PLAN (SWPPP) REGARDING ALL EROSION CONTROL MATTERS. MAINTAIN A WORKING COPY OF THE SWPPP ONSITE AT ALL TIMES. FOLLOW THE SWPPP PROTOCOL FOR SITE MAINTENANCE, INSPECTIONS AND PROPER DOCUMENTATION UNTIL THE SITE HAS BEEN ACCEPTED BY THE OWNER. AT THE COMPLETION OF THE PROJECT THE CONTRACTOR OR OWNER MUST FILE A NOTICE OF TERMINATION WITH NPDES. IN ACCORDANCE WITH NPDES REGULATIONS, THE COMPLETED SWPPP MUST INCLUDE ALL OF THE SITE EROSION CONTROL DOCUMENTATION, WEEKLY EROSION INSPECTION REPORTS COMPLETED BY THE DESIGNATED SITE PERSONNEL, AND ANY OTHER PERTINENT SITE DOCUMENTATION MUST BE RETAINED FOR A MINIMUM OF 3 YEARS FROM THE DATE OF TERMINATION.
- DESIGNATE THE SITE CONSTRUCTION FOREMAN AS THE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND IMPLEMENTATION OF ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
- INSTALL ALL EROSION AND SEDIMENT CONTROL (ESC) MEASURES AS INDICATED ON DRAWINGS IN CONSULTATION WITH THE ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES BEGIN. INSPECT, MAINTAIN REPAIR AND REPLACE EROSION CONTROL MEASURES, AS NECESSARY, DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. THE SITE PERIMETER EROSION CONTROLS ARE THE DESIGNATED LIMIT OF WORK. INFORM ALL PERSONNEL WORKING ON THE PROJECT SITE THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGHOUT THE CONSTRUCTION PERIOD.
- MAINTAIN A MINIMUM SURPLUS OF 100 FEET OF EROSION CONTROL BARRIER (SILT FENCE AND/OR SILT SOCK) ONSITE AT ALL TIMES.
- KEEP THE LIMIT OF CLEARING, GRADING AND DISTURBANCES TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL. PROPERLY INSTALL THE SEDIMENTATION CONTROLS PRIOR TO BEGINNING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
- MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, USE BEST PROFESSIONAL JUDGEMENT AND GOOD CONSTRUCTION PRACTICES WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND ENSURE THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
- INSPECT EROSION AND SEDIMENT CONTROL DEVICES ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF .25 INCH OR GREATER. REPAIR IDENTIFIED PROBLEMS WITHIN 24 HOURS TO ENSURE EROSION AND SEDIMENT CONTROLS ARE IN GOOD WORKING ORDER. RESET OR REPLACE MATERIALS AS REQUIRED.
- SURROUND THE PERIMETER OF SOIL STOCKPILES WITH SILT SOCK AND/OR SILT FENCE AS DETERMINED NECESSARY.
- INSTALL A SILT SACK OR APPROVED EQUIVALENT IN EACH EXISTING CATCHBASIN AS IDENTIFIED ON THIS PLAN. UPON THE INSTALLATION OF EACH CATCH BASIN, INSTALL A SILT SACK OR APPROVED EQUIVALENT. INSPECT SILT SACKS, AFTER EACH SIGNIFICANT STORM EVENT AND REMOVE AND EMPTY AS NEEDED FOR THE DURATION OF THE CONSTRUCTION PERIOD.
- SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE SITE CONTRACTOR, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CREATE THESE BASINS IN APPROPRIATE LOCATIONS.
- CONTAIN ALL SEDIMENT ONSITE. SWEEP ALL EXITS FROM THE SITE AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. SWEEP PAVED AREAS AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS ACCUMULATED DURING SITE CONSTRUCTION.
- REMOVE ACCUMULATED SEDIMENT FROM ALL TEMPORARY PRACTICES AND DISPOSE OF IN A PRE-APPROVED LOCATION.
- PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER.
- PRIOR TO THE INSTALLATION OF FILTER FABRIC AND MEDIA WITHIN THE BIORETENTION AREAS, REMOVE AND PROPERLY DISPOSE OF SEDIMENT ACCUMULATED IN ANY PARTIALLY CONSTRUCTED OR TEMPORARY BIORETENTION/DRAINAGE AREA USED FOR SEDIMENT CONTROL DURING CONSTRUCTION. PROVIDE A SURFACE ELEVATION AT A MINIMUM 1 FOOT ABOVE THE BOTTOM OF MEDIA ELEVATION AS SHOWN IN THE BIORETENTION SCHEDULE FOR PARTIALLY CONSTRUCTED BIORETENTION AREAS. THIS ALLOWS FOR AN OVER-DIG OF THE COLLECTED SEDIMENT FROM WITHIN THE BIORETENTION AREA PRIOR TO MEDIA/FABRIC INSTALLATION.
- CONTROL DUST BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER.
- THE CONTRACTOR IS RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR AFFECTED BY THE PROJECT. REMOVE SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT WORK PRIOR TO THE OWNER'S ACCEPTANCE.

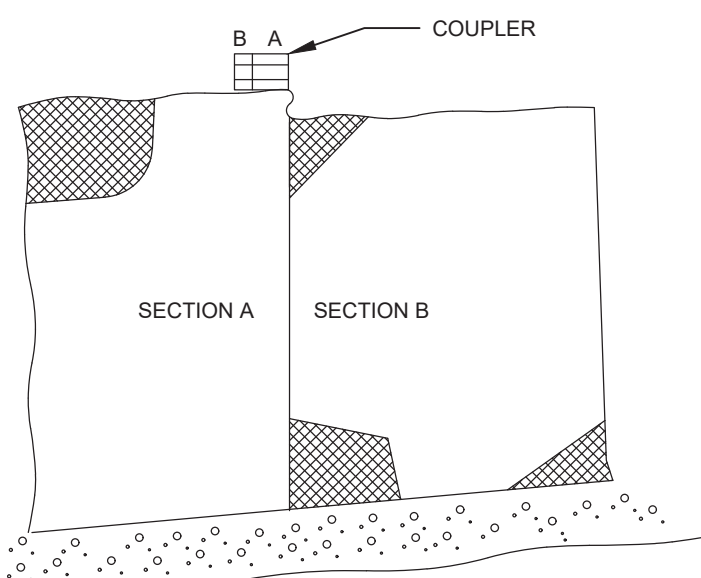


NOTES:

- FENCE FABRIC TO BE 36-INCHES WIDE MINIMUM AND TO BE SECURELY FASTENED TO BEANPOLES. 6" MIN OF FABRIC TO BE BELOW GROUND SURFACE (BACKFILLED OR TOE-ED INTO GROUND).



TOP VIEW

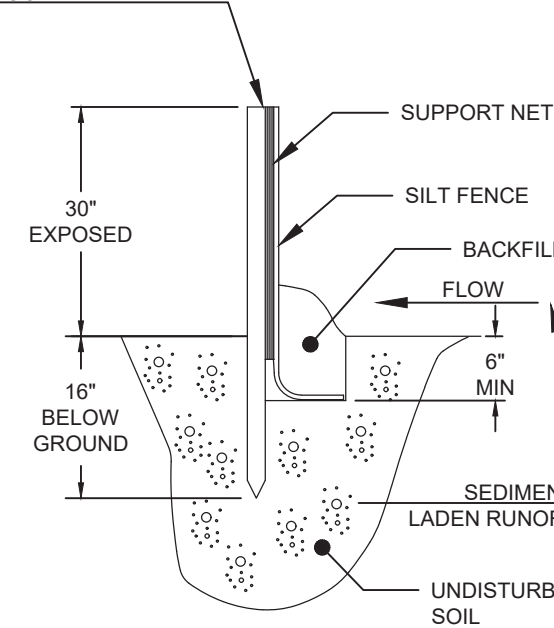


JOINING SECTIONS OF FENCE

FABRIC SEDIMENTATION FENCE (SILT FENCE)

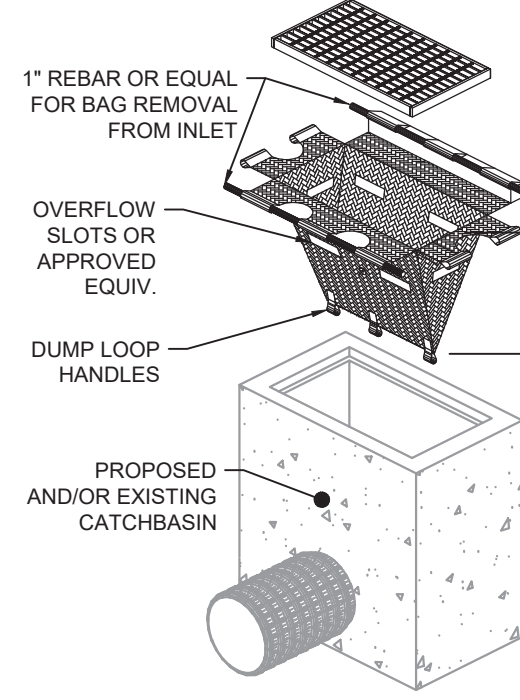
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2" X 2" X 4' WOODEN STAKE



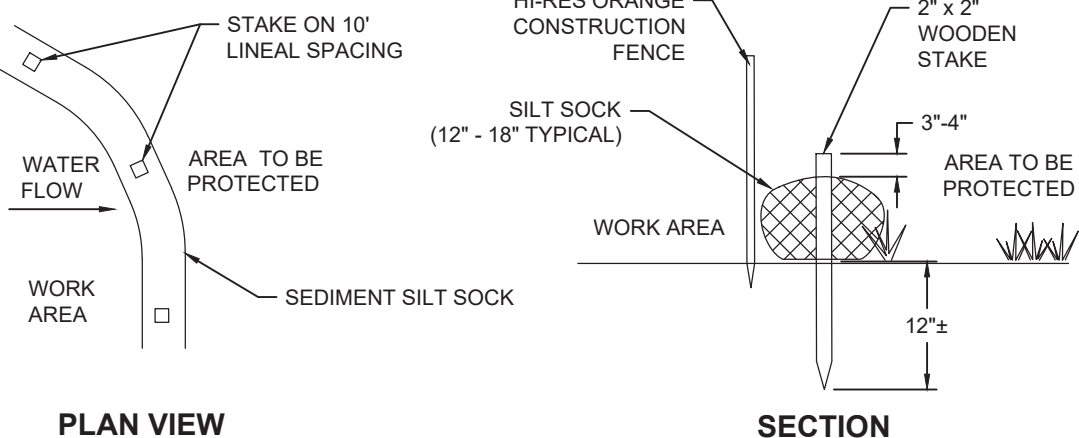
TEMPORARY INLET PROTECTION (SILT SACK)

NOT TO SCALE



NOTES:

- SEDIMENT CONTROL INSERTS TO BE INSTALLED OVER ALL CATCHBASIN INLETS THAT WILL RECEIVE RUNOFF FROM THE PROJECT SITE.
- TEMPORARY INLET PROTECTION TO BE REMOVED AFTER CONTRIBUTING DRAINAGE AREA HAS BEEN PERMANENTLY STABILIZED.
- DEPTH (D) TO BE A MINIMUM OF 16-INCHES.
- MANUFACTURER TO BE SILT SACK OR APPROVED EQUIVALENT.



PLAN VIEW

SECTION

NOTES:

- SILT SACK MANUFACTURER TO BE SILT SOCKX OR ENGINEER APPROVED EQUAL.
- ALL MATERIAL TO MEET MANUFACTURER'S SPECIFICATIONS.
- SEDIMENT SILT SOCK TO BE FILLED WITH LEAF COMPOST AND/OR WOODY MULCH PER MANUFACTURER'S REQUIREMENTS.
- FOLLOWING CONSTRUCTION AND SITE STABILIZATION, COMPOST MATERIAL TO BE REMOVED AND DISPERSED ON SITE, IN A LOCATION APPROVED BY THE ENGINEER AND OWNER.

SEDIMENTATION BARRIER (SILT SOCK)

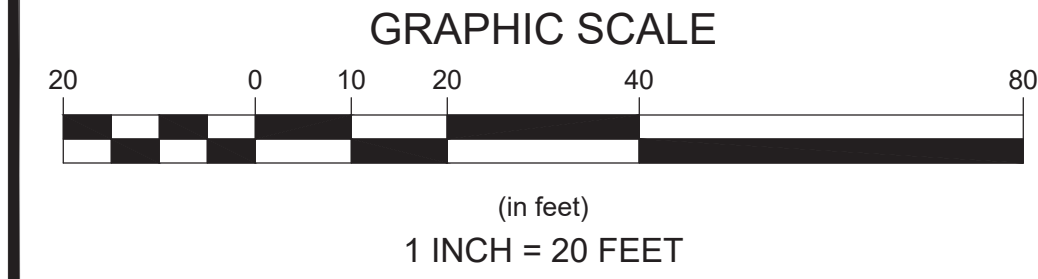
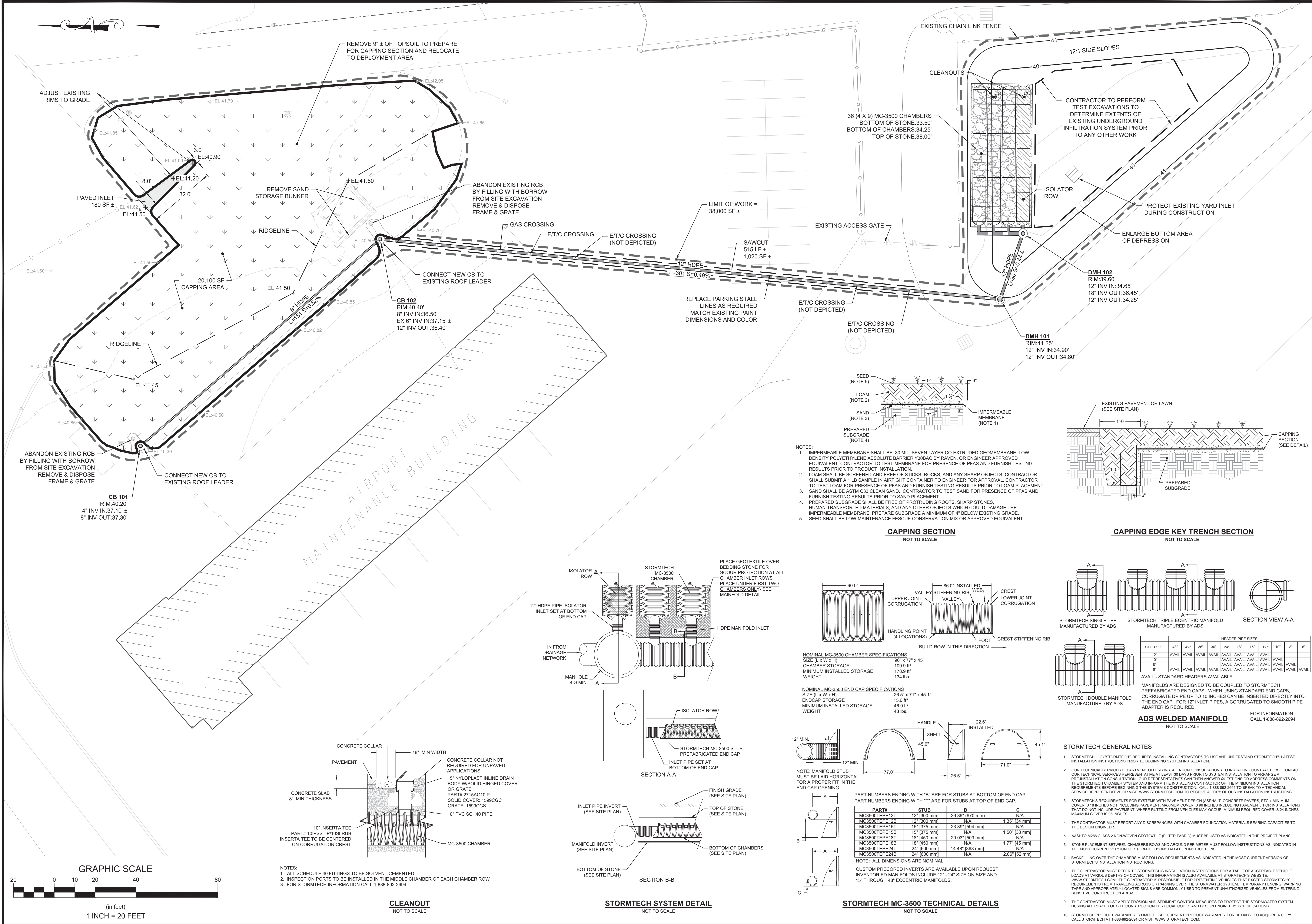
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Revisions	Date		By		Appr		Description	
	Rev							
Horsley Witten Group, Inc. Sustainable Environmental Solutions info@hwsolutions.com 40 Route 6A Sandwich, MA 02563 508-833-6600 voice 508-833-3150 fax								
Prepared For:		Barnstable Municipal Airport		Survey Provided By:		Horsley Witten Group, Inc.		Project Number: 17027A
480 Barnstable Road Hyannis, MA 02601 Phone: (508) 775-2020 Fax: ---		40 Route 6A Sandwich, MA 02563 Phone: (508) 833-6600 Fax: ---		Dated: January 2019		Sheet: 3 of 10		
Registration: 								
Sheet Number: C - 3								

Plan Set: HYA SOIL CAPPING & DRAINAGE FOR PER- AND POLY-FLUOROALKYL SUBSTANCES (PFAS) MITIGATION
FINAL CONSTRUCTION PLANS
BARNSTABLE, MASSACHUSETTS

Plan Title: EROSION & SEDIMENTATION CONTROL PLAN

last modified: 03/25/20 printed: 05/11/20 by ml H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\Drawings\17027A ST.dwg



- NOTES:
1. ALL SCHEDULE 40 FITTINGS TO BE SOLVENT CEMENTED.
 2. INSPECTION PORTS TO BE INSTALLED IN THE MIDDLE CHAMBER OF EACH CHAMBER ROW
 3. FOR STORMTECH INFORMATION CALL 1-888-892-2694

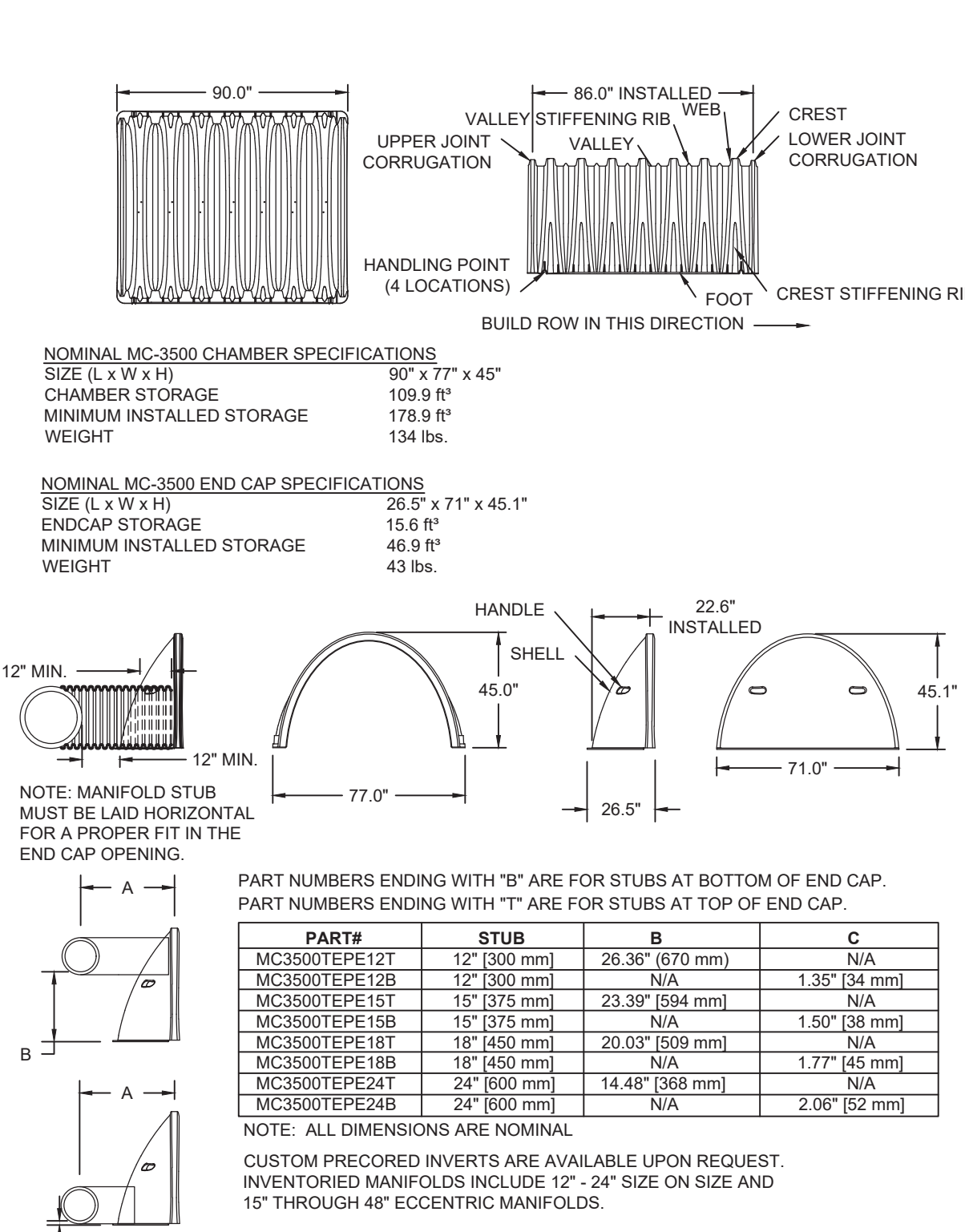
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STORMTECH SYSTEM DETAIL
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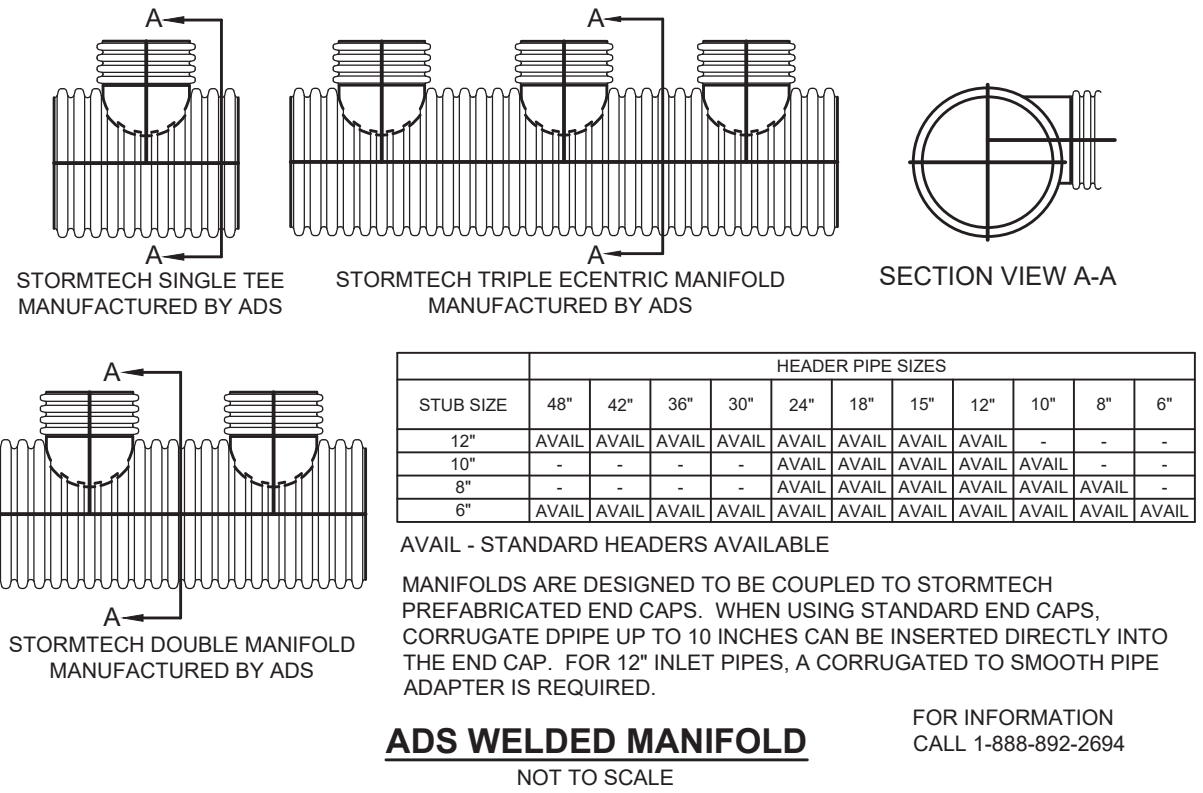
- NOTES:
1. IMPERMEABLE MEMBRANE SHALL BE 30 MIL, SEVEN-LAYER CO-EXTRUDED GEOMEMBRANE, LOW DENSITY POLYETHYLENE ABSOLUTE BARRIER Y30BAC BY RAVEN, OR ENGINEER APPROVED EQUIVALENT. CONTRACTOR TO TEST MEMBRANE FOR PRESENCE OF PFAS AND FURNISH TESTING RESULTS PRIOR TO PRODUCT INSTALLATION.
 2. LOAM SHALL BE SCREENED AND FREE OF STICKS, ROCKS, AND ANY SHARP OBJECTS. CONTRACTOR SHALL SUBMIT A 1 LB SAMPLE IN AIRTIGHT CONTAINER TO ENGINEER FOR APPROVAL. CONTRACTOR TO TEST LOAM FOR PRESENCE OF PFAS AND FURNISH TESTING RESULTS PRIOR TO LOAM PLACEMENT.
 3. SAND SHALL BE ASTM C33 CLEAN SAND. CONTRACTOR TO TEST SAND FOR PRESENCE OF PFAS AND FURNISH TESTING RESULTS PRIOR TO SAND PLACEMENT.
 4. PREPARED SUBGRADE SHALL BE FREE OF PROTRUDING ROOTS, SHARP STONES, HUMAN-TRANSPORTED MATERIALS, AND ANY OTHER OBJECTS WHICH COULD DAMAGE THE IMPERMEABLE MEMBRANE. PREPARE SUBGRADE A MINIMUM OF 4" BELOW EXISTING GRADE.
 5. SEED SHALL BE LOW-MAINTENANCE FESCUE CONSERVATION MIX OR APPROVED EQUIVALENT.

CAPPING SECTION
NOT TO SCALE

CAPPING EDGE KEY TRENCH SECTION
NOT TO SCALE



STORMTECH MC-3500 TECHNICAL DETAILS
NOT TO SCALE



STORMTECH GENERAL NOTES

1. STORMTECH LLC ("STORMTECH") REQUIRES INSTALLING CONTRACTORS TO USE AND UNDERSTAND STORMTECH'S LATEST INSTALLATION INSTRUCTIONS PRIOR TO BEGINNING SYSTEM INSTALLATION.
2. OUR TECHNICAL SERVICES DEPARTMENT OFFERS INSTALLATION CONSULTATIONS TO INSTALLING CONTRACTORS. CONTACT OUR TECHNICAL SERVICES REPRESENTATIVE AT LEAST 30 DAYS PRIOR TO SYSTEM INSTALLATION TO ARRANGE A PRE-INSTALLATION CONSULTATION. OUR REPRESENTATIVES CAN THEN ANSWER QUESTIONS OR ADDRESS COMMENTS ON THE STORMTECH CHAMBER SYSTEM AND INFORM THE INSTALLING CONTRACTOR OF THE MINIMUM INSTALLATION REQUIREMENTS BEFORE BEGINNING THE SYSTEMS CONSTRUCTION. CALL 1-888-892-2694 TO SPEAK TO A TECHNICAL SERVICE REPRESENTATIVE OR VISIT WWW.STORMTECH.COM TO RECEIVE A COPY OF OUR INSTALLATION INSTRUCTIONS.
3. STORMTECH'S REQUIREMENTS FOR SYSTEMS WITH PAVEMENT DESIGN (ASPHALT, CONCRETE PAVERS, ETC.): MINIMUM COVER IS 18 INCHES NOT INCLUDING PAVEMENT; MAXIMUM COVER IS 96 INCHES INCLUDING PAVEMENT. FOR INSTALLATIONS THAT DO NOT INCLUDE PAVEMENT, WHERE RUTTING FROM VEHICLES MAY OCCUR, MINIMUM REQUIRED COVER IS 24 INCHES, MAXIMUM COVER IS 96 INCHES.
4. THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE DESIGN ENGINEER.
5. AASHTO M288 CLASS 2 NON-WOVEN GEOTEXTILE (FILTER FABRIC) MUST BE USED AS INDICATED IN THE PROJECT PLANS.
6. STONE PLACEMENT BETWEEN CHAMBERS ROWS AND AROUND PERIMETER MUST FOLLOW INSTRUCTIONS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
7. BACKFILLING OVER THE CHAMBERS MUST FOLLOW REQUIREMENTS AS INDICATED IN THE MOST CURRENT VERSION OF STORMTECH'S INSTALLATION INSTRUCTIONS.
8. THE CONTRACTOR MUST REFER TO STORMTECH'S INSTALLATION INSTRUCTIONS FOR A TABLE OF ACCEPTABLE VEHICLE LOADS AT VARIOUS DEPTHS OF COVER. THIS INFORMATION IS ALSO AVAILABLE AT STORMTECH'S WEBSITE: WWW.STORMTECH.COM. THE CONTRACTOR IS RESPONSIBLE FOR PREVENTING VEHICLES THAT EXCEED STORMTECH'S REQUIREMENTS FROM TRAVELING ACROSS OR PARKING OVER THE STORMWATER SYSTEM. TEMPORARY FENCING, WARNING TAPE AND APPROPRIATELY LOCATED SIGNS ARE COMMONLY USED TO PREVENT UNAUTHORIZED VEHICLES FROM ENTERING SENSITIVE CONSTRUCTION AREAS.
9. THE CONTRACTOR MUST APPLY EROSION AND SEDIMENT CONTROL MEASURES TO PROTECT THE STORMWATER SYSTEM DURING ALL PHASES OF SITE CONSTRUCTION PER LOCAL CODES AND DESIGN ENGINEER'S SPECIFICATIONS.
10. STORMTECH PRODUCT WARRANTY IS LIMITED. SEE CURRENT PRODUCT WARRANTY FOR DETAILS. TO ACQUIRE A COPY CALL STORMTECH AT 1-888-892-2694 OR VISIT WWW.STORMTECH.COM.

Revisions

Rev	Date	By	Appr	Description
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Survey Provided By:

Prepared For:

Registration:

Horsley Witten Group, Inc.

Sustainable Environmental Solutions

90 Route 6A

Sandwich, MA 02563

Phone: (508) 833-6600

Fax: (508) 833-3150

Date: MAY 2020

Project Number:

Sheet :

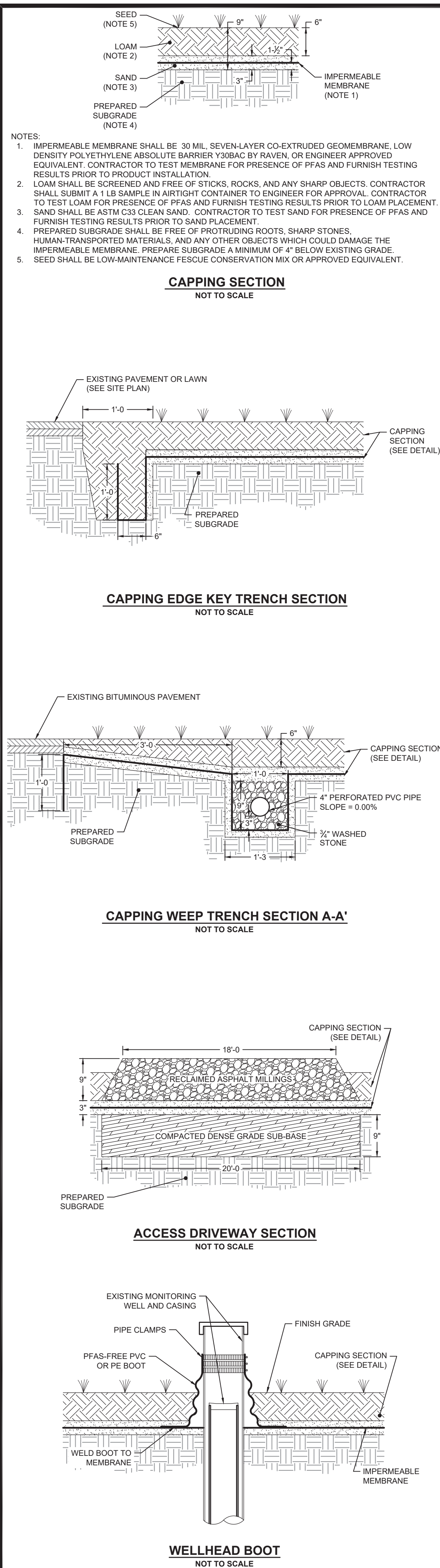
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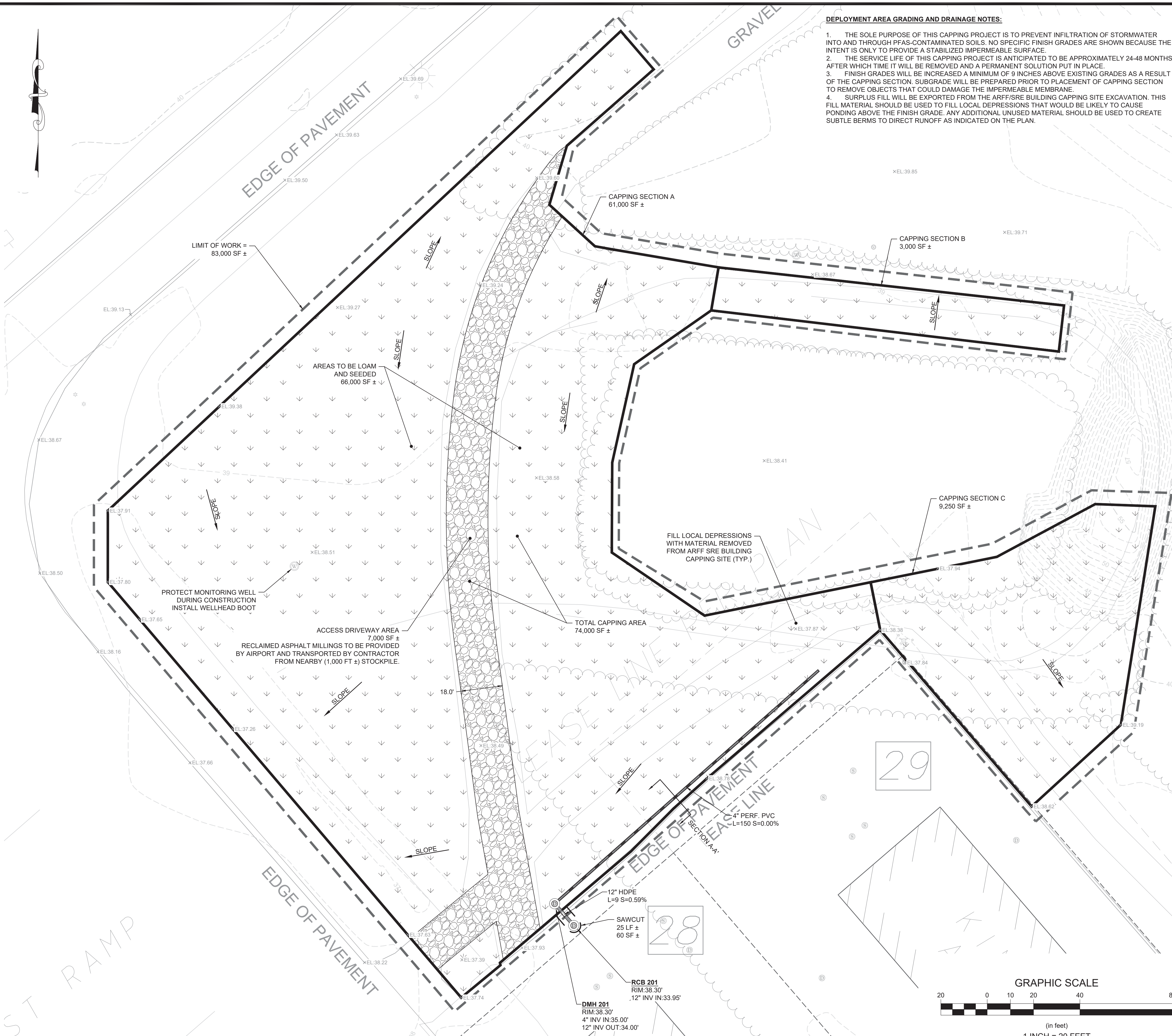
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DEPLOYMENT AREA GRADING AND DRAINAGE NOTES:

1. THE SOLE PURPOSE OF THIS CAPPING PROJECT IS TO PREVENT INFILTRATION OF STORMWATER INTO AND THROUGH PPAS-CONTAMINATED SOILS. NO SPECIFIC FINISH GRADES ARE SHOWN BECAUSE THE INTENT IS ONLY TO PROVIDE A STABILIZED IMPERMEABLE SURFACE.
2. THE SERVICE LIFE OF THIS CAPPING PROJECT IS ANTICIPATED TO BE APPROXIMATELY 24-48 MONTHS AFTER WHICH TIME IT WILL BE REMOVED AND A PERMANENT SOLUTION PUT IN PLACE.
3. FINISH GRADES WILL BE INCREASED A MINIMUM OF 9 INCHES ABOVE EXISTING GRADES AS A RESULT OF THE CAPPING SECTION. SUBGRADE WILL BE PREPARED PRIOR TO PLACEMENT OF CAPPING SECTION TO REMOVE OBJECTS THAT COULD DAMAGE THE IMPERMEABLE MEMBRANE.

THE CAPPING SECTION WILL BE REMOVED AFTER THE CAPPING SECTION EXCAVATION. THIS FILL MATERIAL SHOULD BE USED TO FILL LOCAL DEPRESSIONS THAT WOULD BE LIKELY TO CAUSE PONDING ABOVE THE FINISH GRADE. ANY ADDITIONAL UNUSED MATERIAL SHOULD BE USED TO CREATE SUBTLE BERMS TO DIRECT RUNOFF AS INDICATED ON THE PLAN.

[illegible]

GENERAL NOTES

AIRPORT MANAGER

1.THE AIRPORT MANAGER AND/OR HIS/HER DESIGNEE HAVE THE AUTHORITY TO OPEN AND CLOSE AIRPORT FACILITIES, ISSUE AND CANCEL NOTAM'S AND TO COORDINATE WITH AIRPORT USERS. THE AIRPORT MANAGER IS THE SOLE AUTHORITY WITH RESPECT TO AIRPORT OPERATIONS, SAFETY AND SECURITY.

AIRPORT SAFETY AND SECURITY

2.THE CONTRACTOR SHALL INSTALL AND MAINTAIN SAFETY AND SECURITY MEASURES THROUGHOUT THE PROJECT, INCLUDING BUT NOT LIMITED TO: WORKER SAFETY, PEDESTRIAN SITE ACCESS AND SAFETY, AIRFIELD AND OFF-AIRPORT TRAFFIC SAFETY DIRECTLY IMPACTED BY THE PROJECT, PEDESTRIAN ACCESS AND SAFETY MEASURES FOR ACCESSING AIRPORT FACILITIES THAT ARE IMPACTED BY THE PROJECT.

3.THE CONTRACTOR SHALL COMPLY WITH ALL AIRPORT SECURITY REQUIREMENTS AS DIRECTED BY THE AIRPORT MANAGER OR HIS/HER DESIGNEE. THE CONTRACTOR SHALL COMPLY WITH BADGING PER AIRPORT REQUIREMENTS.

4.THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTROLLING ACCESS TO THE WORK AREA AND ENSURING THAT SECURITY WITHIN THE CONTRACTOR'S LIMIT OF WORK IS MAINTAINED AT ALL TIMES. THE FAA CAN IMPOSE SIGNIFICANT FINES FOR SECURITY VIOLATIONS AND INCURSIONS INTO ACTIVE AIRCRAFT OPERATION AREAS (AOA). THE CONTRACTOR SHALL PAY ALL FINES ASSESSED AGAINST THE AIRPORT DUE TO VIOLATIONS CAUSED BY THE CONTRACTOR AND HIS/HER PERSONNEL, SUBCONTRACTORS AND VENDORS.

5.PARKING PERSONAL VEHICLES SHALL BE IN DESIGNATED LOCATIONS ONLY, BUT NOT WITHIN AN ACTIVE CONSTRUCTION AREA. THE CONTRACTOR, AS A SUBSIDIARY OBLIGATION, SHALL PROVIDE ADEQUATE AND SAFE TRANSPORTATION FOR HIS/HER EMPLOYEES, AND FOR ITS SUBCONTRACTORS AND VENDORS, BETWEEN THE WORK AREAS AND THE LOCATION OF THE PERSONAL VEHICLES. EMPLOYEES AND DRIVERS OF WORK VEHICLES SHALL BE INSTRUCTED AS TO PROPER ACCESS ROADS AND SHALL BE CAUTIONED THAT UNAUTHORIZED ACCESS AND USE OF AIRPORT PAVEMENTS OR OTHER AREAS OUTSIDE THE DESIGNATED WORK AREAS MAY LEAD TO THEIR ARREST AND SUBSEQUENT PAYMENT OF FINES. NO PERSONAL VEHICLES FOR EMPLOYEES OR REPRESENTATIVES OF THE CONTRACTOR OR ITS SUBCONTRACTORS OR VENDORS ARE ALLOWED WITHIN THE AIRCRAFT OPERATIONS AREA.

6.THE CONTRACTOR SHALL PROVIDE INSTRUCTION TO ALL OF ITS EMPLOYEES ENGAGED IN THE PROJECT AS WELL AS ALL SUBCONTRACTORS AND VENDORS INCLUDING MATERIAL SUPPLIERS REGARDING THE AIRPORT ACCESS PROCEDURES TO BE FOLLOWED BY THEIR DELIVERY DRIVERS. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ESCORTS OF NON-BADGED EMPLOYEES INCLUDING BUT NOT LIMITED TO MANAGEMENT STAFF, AS WELL AS VENDORS, SUBCONTRACTORS, VISITORS, DELIVERY DRIVERS, AND OTHERS UNDER THE AUTHORITY OF THE CONTRACTOR WHILE ON THE AIRPORT.

7.THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER AND THE OWNER PRIOR TO THE START OF WORK, A WRITTEN CONSTRUCTION MANAGEMENT PLAN WHICH DETAILS AMONG OTHER THINGS, THE PRECAUTIONS HE/SHE PROPOSES FOR THE CONTROL OF ITS WORK INCLUDING VEHICLE TRAFFIC INCLUDING POLICE DETAILS, FLAG PERSONS, SIGNS, BARRICADES AND ANY OTHER MEASURES HE/SHE PROPOSES. THE OWNER AND ENGINEER WILL REVIEW AND APPROVE THE PROPOSED PLAN; THE CONTRACTOR SHALL COMPLY WITH THE APPROVED DOCUMENT. STOPPAGE OF WORK BY THE OWNER FOR NON-CONFORMANCE SHALL NOT CONSTITUTE A VALID REASON FOR EXTENDING CONTRACT TIME OR FOR ANY CLAIM OF ADDITIONAL COMPENSATION BY THE CONTRACTOR.

8.THE CONTRACTOR'S PERSONNEL AND CONTRACTOR'S VEHICLES SHALL BE RESTRICTED TO AND SHALL REMAIN WITHIN THE WORK AREAS, HAUL AND ACCESS ROUTES, AND THE STAGING AREAS AS SHOWN ON THE CONTRACT PLANS.

9.THE CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SECURITY WHEN USING AIRPORT GATES TO ACCESS THE CONSTRUCTION SITE. GATES SHALL BE CLOSED AND LOCKED WHEN NOT IN USE. WHEN GATE(S) ARE IN USE IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE A DEDICATED GATE GUARD TO MONITOR THE CONSTRUCTION TRAFFIC, AS WELL AS VEHICULAR AND PEDESTRIAN ACCESS WHICH MAY CONFLICT WITH THE CONTRACTOR'S OPERATION. LIQUIDATED DAMAGES MAY BE APPLICABLE FOR A VIOLATION OF THIS REQUIREMENT – SEE SPECIFICATIONS.

AIRCRAFT OPERATIONS AREA (AOA)

10.IN GENERAL, THE WORK ASSOCIATED WITH THIS PROJECT WILL REQUIRE THE CONTRACTOR TO BE NEAR OR WITHIN THE AIRCRAFT OPERATIONS AREA (AOA). THE AOA IS ANY AREA OF AN AIRPORT USED OR INTENDED TO BE USED FOR LANDING, TAKEOFF, OR SURFACE MANEUVERING OF AIRCRAFT. AN AOA INCLUDES SUCH PAVED OR TURF AREAS THAT ARE USED OR INTENDED TO BE USED FOR THE UNOBSTRUCTED MOVEMENT OF AIRCRAFT IN ADDITION TO ITS ASSOCIATED RUNWAY, TAXIWAY, OR APRON.

11.FOR THIS PROJECT, THE CONTRACTOR SHALL KEEP HIS/HER PERSONNEL AND EQUIPMENT OUTSIDE OF THE TAXIWAY / RUNWAY SAFETY AREAS PER THE CONSTRUCTION SAFETY AND PHASING PLAN (CSPP).

12.THE CONTRACTOR SHALL FURNISH, INSTALL, MAINTAIN, AND RELOCATE SAFETY BARRICADES. THE CONTRACTOR SHALL MAINTAIN THE BARRICADES ON A REGULAR BASIS AND IN ACCORDANCE WITH THE CONTRACTOR'S APPROVED CONSTRUCTION MANAGEMENT PLAN.

13.PRIOR TO THE RE-OPENING OF THE WORK AREA(S), THE CONTRACTOR SHALL RELOCATE ALL MATERIALS AND EQUIPMENT OUT OF THE AOA TO THE STAGING AREA, REMOVE STOCKPILES, BACKFILL AND COMPACT TRENCHES AND EXCAVATIONS, AND RESTORE GRADES PER THE CONTRACT DOCUMENTS, AND MECHANICALLY SWEEP ALL PAVED AREAS TO REMOVE ALL DEBRIS, MAKING SURE THAT CLEANUP AND SWEEPING OPERATIONS ARE COMPLETED WITH NO ADVERSE IMPACT TO AIRPORT OPERATIONS. STREET SWEEPING AND OTHER SOIL INTRUSIVE ACTIVITES SHALL BE CONDUCTED IN A MANNER THAT DOES NOT GENERATE FUGITIVE DUST EMISSIONS. SITE SOILS CONTAIN PFAS. APPROPRIATE DUST SUPPRESSION TECHNIQUES ARE CONSIDERED INCIDENTAL TO THE PROJECT. THE OWNER WILL PROVIDE DUST MONITORING AT THE SITE UNDER THE DIRECTION OF A LICENSED SITE PROFESSIONAL.

14.THE CONTRACTOR SHALL KEEP ACTIVE PAVED SURFACES CLEAN AND CLEAR OF CONSTRUCTION MATERIAL, FOREIGN OBJECTS, DIRT, GRAVEL, AND DEBRIS, AND SHALL REMOVE SUCH MATERIALS FROM ACTIVE PAVED SURFACES WITHIN 15 MINUTES OF VERBAL NOTICE FROM THE AIRPORT MANAGER OR HIS/HER DESIGNEE OR THE ENGINEER. THE CONTRACTOR SHALL PROVIDE A MANNED VAC SWEEPER DURING ALL TIMES WHEN ACTIVE AOA PAVEMENTS ARE CROSSED AT NO ADDITIONAL COST TO THE OWNER.

15.THE CONTRACTOR MUST STAY WITHIN THE LIMITS OF THE WORK AREA, DESIGNATED HAUL ROADS, AND STAGING AREAS AT ALL TIMES WHILE OPERATING AT THE AIRPORT. THE CONTRACTOR SHALL PAY CAREFUL ATTENTION TO WORK AREA REQUIREMENTS AND ENSURE THAT ITS OWN PERSONNEL AS WELL AS SUBCONTRACTORS AND VENDORS UNDERSTAND WHICH AREAS ARE ACTIVE (TO AIRCRAFT MOVEMENT) AND WHICH AREAS ARE CLOSED DURING CONSTRUCTION ACTIVITIES.

16.ALL OF THE CONTRACTOR'S EQUIPMENT AND VEHICLES, INCLUDING ESCORT VEHICLES, SHALL BE EQUIPPED WITH A 3' X 3' CHECKERED ORANGE AND WHITE FLAG WITH COMPANY IDENTIFICATION PLAINLY VISIBLE ON BOTH SIDES OF THE VEHICLE, AS WELL AS AMBER FLASHING ROTATING BEACONS.

OPEN TRENCHES OR EXCAVATIONS

17.THE CONTRACTOR WILL NOT BE PERMITTED TO LEAVE TRENCHES OR OTHER EXCAVATIONS OPEN AT NIGHT, ON WEEKENDS, OR AT OTHER TIMES WHEN THE CONTRACTOR IS NOT ON THE WORK SITE, UNLESS APPROVAL IS RECEIVED BY THE AIRPORT MANAGER AND THE CONTRACTOR PROTECTS THE EXCAVATION AS MAY BE APPROPRIATE TO MAINTAIN SAFETY AND SECURITY, INCLUDING BUT NOT LIMITED TO THE USE OF STEEL PLATES, BARRICADES, AND LIGHTING, AS APPROVED BY THE ENGINEER.

IN ADDITION, NO EXCAVATION EXCEEDING 3 INCHES IN DEPTH SHALL BE LEFT OPEN WITHIN THE AOA, AS DESCRIBED ABOVE, WHILE THE WORK AREA(S) ARE IN USE UNLESS THE EXCAVATIONS ARE COVERED WITH APPROVED STEEL PLATES AND/OR OTHER MEASURES AS MAY BE REQUIRED TO MAINTAIN SAFETY AND SECURITY. STEEL PLATES SHALL BE CAPABLE OF BEARING THE HEAVIEST AIRCRAFT/VEHICLE USING THE AIRPORT OVER THE SPAN OF TIME IN WHICH THEY ARE TO BE USED.

18.ALL EXCAVATIONS SHALL BE BACK FILLED, COMPACTED AND THE PAVEMENT REPAIRED AND PROPERLY CURED PRIOR TO THE AREA BEING REOPENED TO TRAFFIC. ALL EXCAVATION REQUIRED SHALL BE CONSTRUCTED PER THE CONTRACT DOCUMENTS, INCLUDING DEPTH OF EXCAVATION, SIDEWALL STABILIZATION, BACKFILL, COMPACTION, ETC.

DEBRIS AND DUST CONTROL

19.THE CONTRACTOR SHALL STRICTLY CONTROL DEBRIS AND LITTER AT ITS WORK SITE(S) FOR THE PROJECT. MUD, STONES OR OTHER DEBRIS RESULTING FROM CONSTRUCTION OPERATIONS SHALL BE PROMPTLY AND COMPLETELY REMOVED FROM ALL PAVEMENTS TO FACILITATE DAILY AIRCRAFT OPERATIONS AND A CLEAN ENVIRONMENT. DUST CONTROL MEASURES SHALL BE TAKEN AS NECESSARY BY THE CONTRACTOR TO ENSURE THAT NO DUST PRODUCED BY CONSTRUCTION ACTIVITY IS ALLOWED TO DRIFT INTO THE AOA, INTO LOCATIONS WHERE AIRCRAFT ARE PARKED AT ANY TIME, OR SURROUNDING RESIDENCES OR BUSINESSES. THE CONTRACTOR SHALL ENSURE THAT ALL PUBLIC ROADS ARE CONTINUOUSLY MAINTAINED FREE OF MUD AND DEBRIS THAT MAY RESULT FROM ITS OPERATIONS INCLUDING OPERATIONS ASSOCIATED WITH ITS SUBCONTRACTOR AND VENDORS. DEBRIS AND DUST CONTROL MEASURES SHALL BE CONSIDERED INCIDENTAL TO THE CONTRACT. THE CONTRACTOR SHALL PROVIDE A MANNED VAC SWEEPER DURING ALL TIMES WHEN ACTIVE AOA PAVEMENTS ARE CROSSED AT NO ADDITIONAL COST TO THE OWNER.

CONTRACTOR'S STAGING AREAS

20.THE CONTRACTOR SHALL USE THE AREAS SHOWN ON THE PLANS FOR HIS/HER STAGING AREA(S). NO OTHER AREAS ARE APPROVED WITHOUT THE EXPLICIT CONSENT OF THE AIRPORT MANAGER AND THE ENGINEER. THE CONTRACTOR IS RESPONSIBLE FOR ANY AND ALL IMPROVEMENT AND RESTORATION OF THE DESIGNATED STAGING AREAS SUCH AS GRUBBING, GRADING, AND CONSTRUCTION OF STABILIZED ACCESS ROADS, THAT IS NECESSARY FOR THE UTILIZATION OF THE AREA. THE CONTRACTOR SHALL ALSO BE RESPONSIBLE FOR ANY TEMPORARY ACCESS PERMITS AND ASSOCIATED FEES FOR ACCESS TO THE ADJACENT ROAD NETWORK. THERE WILL BE NO SEPARATE PAYMENT FOR THIS WORK. THE COST FOR ALL WORK NECESSARY TO ESTABLISH, USE AND RESTORE THE STAGING AREA(S) SHALL BE DEEMED INCIDENTAL TO THE OVERALL PROJECT.

21.THE CONTRACTOR SHALL MAINTAIN THE STAGING AREA(S), AND THE PROJECT SITE, IN A NEAT MANNER AND PREVENT TRASH, DUST, AND DEBRIS FROM BLOWING INTO ABUTTING AREAS.

GENERAL NOTES

22.IF THE OWNER REQUIRES WEEKLY JOB MEETINGS, THE TIME AND DATE WILL BE DETERMINED BY MUTUAL AGREEMENT OF THE OWNER, CONTRACTOR AND ENGINEER. ENGINEER WILL CONDUCT THE MEETING. AT A MINIMUM THE CONTRACTOR SHALL PROVIDE IT'S PROJECT MANAGER, SITE SUPERINTENDENT(S) AND OTHER KEY PERSONNEL THAT THE CONTRACTOR FEELS IS NECESSARY TO ATTEND THE MEETING. THE MEETING SHALL ALSO BE ATTENDED BY A REPRESENTATIVE OF EACH SUBCONTRACTOR THAT IS PERFORMING WORK AT THE TIME OF THE MEETING, OR BY A SUBCONTRACTOR THAT MAY PLAY A CRITICAL ROLE IN ANY PARTICULAR MEETING. THE MEETING MAY ALSO BE ATTENDED BY THE AIRPORT MANAGER OR HIS/HER DESIGNEE, AND OTHER INVITED PARTIES.

23.THE CONTRACTOR SHALL PROVIDE A WRITTEN UPDATE TO THE PROJECT SCHEDULE AT EACH WEEKLY JOB MEETING; AN ELECTRONIC COPY OF THE SCHEDULE SHALL ALSO BE PROVIDED TO THE OWNER AND ENGINEER VIA EMAIL ON THE DATE OF EACH WEEKLY JOB MEETING. AT A MINIMUM, THE PROJECT SCHEDULE SHALL INCLUDE THE STATUS OF EACH PAY ITEM BY NOTING THE PERCENT COMPLETE TO DATE AND THE CORRESPONDING ANTICIPATED COMPLETION DATE. THE CONTRACTOR SHALL ALSO INDICATE THE STATUS OF THE OVERALL PROJECT INDICATING WHETHER THE PROJECT IS ON SCHEDULE, AHEAD OF SCHEDULE, OR BEHIND SCHEDULE.

24.THE CONTRACTOR SHALL SUBMIT A CONSTRUCTION MANAGEMENT PLAN FOR REVIEW AND APPROVAL BY ENGINEER. AT A MINIMUM, THIS PLAN SHALL INCLUDE, BUT NOT LIMITED TO, THE FOLLOWING ELEMENTS:
a.PROJECT SCHEDULE – UPDATED WEEKLY
b.24-HOUR CONTACT INFORMATION FOR KEY PERSONNEL, INCLUDING: PROJECT MANAGER, SITE SUPERINTENDENT(S), AND 24-HOUR CONTACT INFORMATION FOR ALL SUBCONTRACTORS.
c.SITE SECURITY PLAN
d.DUST CONTROL
e.CONSTRUCTION SAFETY MEASURES PURSUANT TO THE CONSTRUCTION SAFETY AND PHASING PLAN

CLOSEOUT DELIVERABLES AND FINAL PAYMENT

25.THE CONTRACTOR SHALL COMPLETE AND PROVIDE THE FOLLOWING DOCUMENTS AND DELIVERABLES BEFORE FINAL PAYMENT:

- a.AS-BUILT PLANS, STAMPED BY PLS SUBCONTRACTOR
- b.AUTOCAD DRAWING OF AS-BUILT PLANS
- c.PROJECT PHOTOGRAPHS
- d.CONTRACTOR WARRANTY
- e.LIEN WAIVERS
- f.FINAL CERTIFIED PAYROLL
- g.EQUIPMENT / O&M MANUALS, AS REQUIRED

26.THE CONTRACTOR IS RESPONSIBLE FOR THE PREPARATION OF ITS OWN HEALTH AND SAFETY PLAN CONSISTENT WITH OSHA. PFAS IS LOCATED WITHIN SITE SOILS. REFER TO DOCUMENT TITLED " FINAL IMMEDIATE RESPONSE ACTION PLAN MODIFICATION", PREPARED BY THE HORSELY WITTEN GROUP, INC. AND DATED DECEMBER 2019



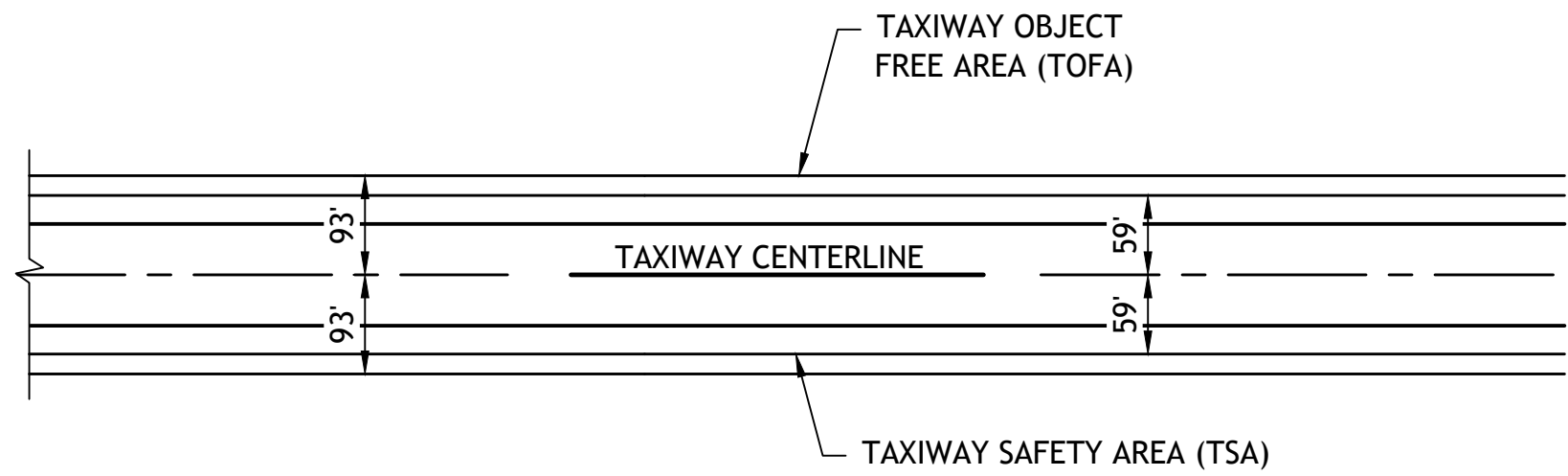
NO.	DATE	DESCRIPTION	BY

PROJECT	OWNER
PFAS MITIGATION	BARNSTABLE MUNICIPAL AIRPORT 480 Barnstable Road • Hyannis, MA 02601 (508) 775-2020

PROJECT NO.	17027A
DESIGNED BY	PEJ
DRAWN BY	PEJ
CHECKED BY	CAS
DATE	MARCH 2020
DRAWING SCALE	N.T.S

SHEET TITLE	GRAPHIC SCALE
CONSTRUCTION SAFETY AND PHASING PLAN - GENERAL NOTES	N.T.S.

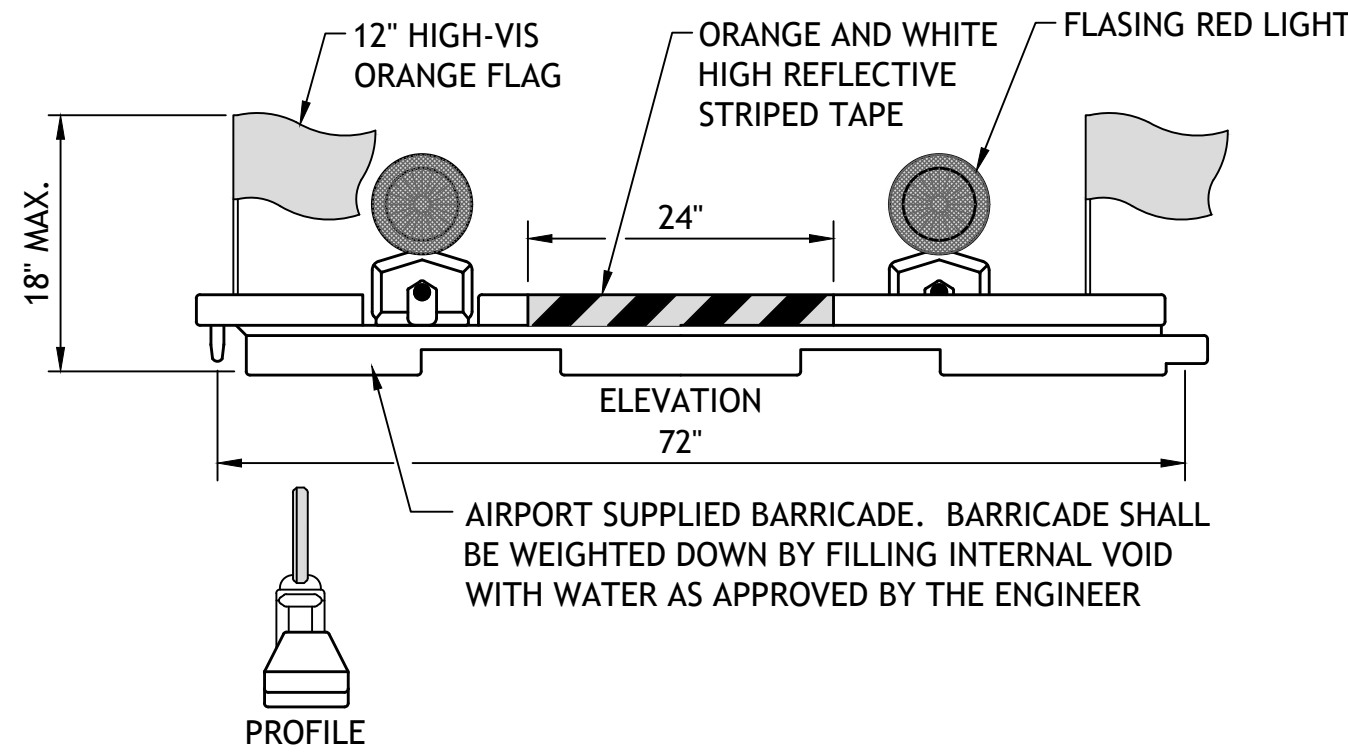
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6 OF 10



NOTE: NO WORK MAY OCCUR WITHIN THE TSA WITHOUT CLOSING DOWN THE TAXIWAY.

TAXIWAYS B RESTRICTED CONSTRUCTION AREAS

SCALE: N.T.S.

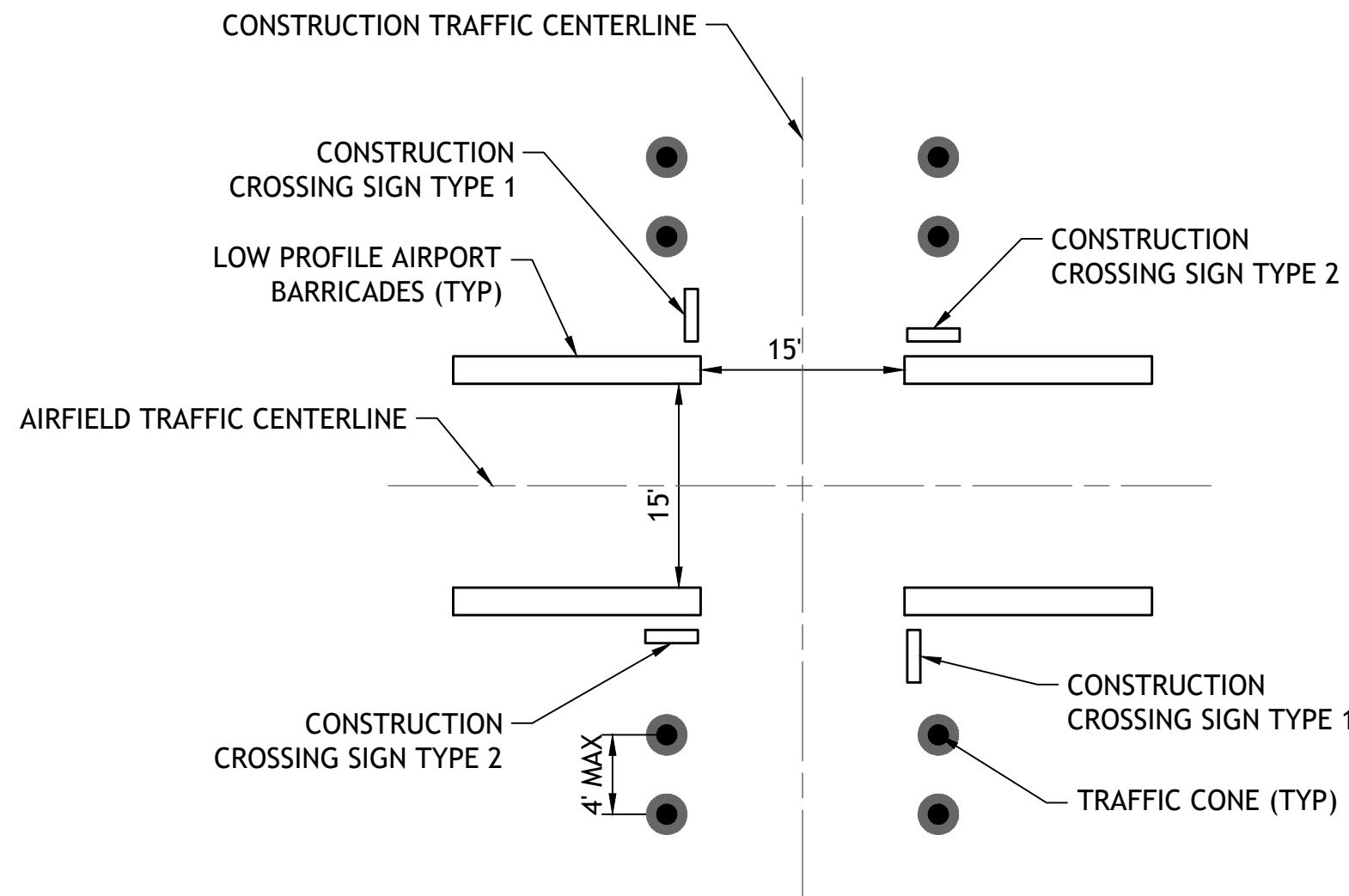


NOTES

1. THE AIRPORT WILL SUPPLY 210 BARRICADES. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT THE BARRICADES MEET FAA REQUIREMENTS FOR VISIBILITY, PER ADVISORY CIRCULAR 150/5370-2G, OR LATEST EDITION, SUCH AS PROVIDING NEW LIGHTS, REPLACEMENT OF BATTERIES, PROVIDING NEW FLAGS, ETC.
2. IT IS THE CONTRACTORS RESPONSIBILITY TO TRANSPORT AND PLACE THE BARRICADES FROM THEIR CURRENT LOCATION ON THE AIRPORT TO THE WORK AREA. IT IS ALSO THE RESPONSIBILITY OF THE CONTRACTOR TO RETURN THE BARRICADES BACK TO THEIR ORIGINAL AIRPORT STORAGE AREA UPON COMPLETION OF THE PROJECT.
3. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE THAT THE BARRICADES ARE RETURNED IN A LIKE OR BETTER CONDITION. ANY BARRICADES DAMAGED BY THE CONTRACTOR SHALL BE REPLACED IN KIND BY THE CONTRACTOR AT THEIR COST.
4. BARRICADE LIGHTS SHALL HAVE RED LENSES AND LED LAMPS AND ORANGE FLAGS.
5. DURING CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE NECESSARY SAFETY BARRICADES TO ENSURE THE SAFETY OF AIRCRAFT, AIRCRAFT PASSENGERS, AIRFIELD EMPLOYEES, THE PUBLIC, AND THE CONTRACTOR'S EMPLOYEES.
6. BARRICADES SHALL BE IN PLACE EACH DAY TO DELINEATE THE WORK AREA AND TO RESTRICT ANY AIRCRAFT FROM TAXIING INTO THE ACTIVE WORK AREA. PLACEMENT AND LOCATION OF BARRICADES SHALL BE APPROVED BY THE ENGINEER ON A DAILY BASIS AND COORDINATED WITH THE AIRPORT MANAGER.
7. BARRICADES SHALL BE WEIGHTED WITH WATER TO RESIST WIND, PROP WASH, AND JET BLAST.
8. MAXIMUM ALLOWABLE HEIGHT IS 18 INCHES. STANDARD TYPE HIGHWAY BARRICADES, BARRELS, AND CONES ARE NOT ACCEPTABLE FOR AIRPORT BARRICADES.
9. THE BARRICADES SHOWN ON THE PLAN DO NOT REPRESENT THE QUANTITY OF BARRICADES BUT REPRESENTS THE LOCATION.

LOW PROFILE AIRPORT BARRICADE

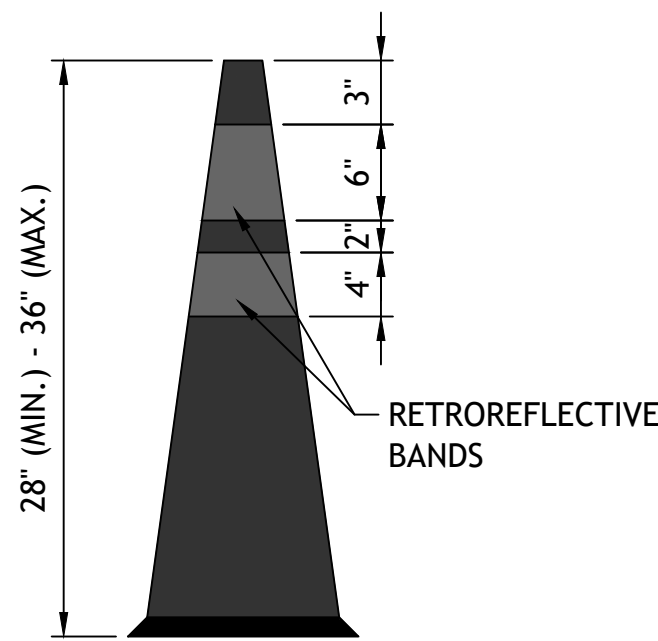
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NOTE: CONSTRUCTION SITE CROSSING TO BE IMPLEMENTED DURING WORK AREA 1B.

CONSTRUCTION SITE CROSSING

SCALE: N.T.S.



NOTES:

1. TRAFFIC CONES MUST MEET THE REQUIREMENTS OF THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, LATEST EDITION.
2. DURING CONSTRUCTION, THE CONTRACTOR SHALL PROVIDE THE NECESSARY TRAFFIC CONES TO ENSURE THE SAFETY OF AIRCRAFT, AIRCRAFT PASSENGERS, AIRFIELD EMPLOYEES, THE PUBLIC, AND THE CONTRACTOR'S EMPLOYEES.
3. CONES SHALL BE IN PLACE EACH DAY TO DELINEATE THE WORK AREA AND TO RESTRICT ANY AIRCRAFT FROM TAXIING INTO THE ACTIVE WORK AREA. PLACEMENT AND LOCATION OF CONES SHALL BE APPROVED BY THE ENGINEER ON A DAILY BASIS AND COORDINATED WITH THE AIRPORT MANAGER.
4. CONES SHALL BE WEIGHTED TO RESIST WIND, PROP WASH, AND JET BLAST.
5. MAXIMUM ALLOWABLE SPACING OF CONES IS TEN (10) FEET. SEE DRAWINGS.

TRAFFIC CONE

SCALE: N.T.S.



CONSTRUCTION CROSSING SIGN

TYPE 1

SCALE: N.T.S.



CONSTRUCTION CROSSING SIGN

TYPE 2

SCALE: N.T.S.

NOTES:

1. "WATCH FOR CROSSING TRAFFIC" SIGNS SHALL BE DESIGNED PER W20-1 SIGN IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION.
2. "DO NOT TURN" SIGNS SHALL BE DESIGNED PER R3-3 SIGN IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION.
3. SIGNS SHALL CONFORM TO THE DIMENSIONS AND MATERIAL REQUIRED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION.
4. SIGN MOUNTING TO BE APPROVED BY ENGINEER.
5. SIGNS SHALL BE OF RETROREFLECTIVE MATERIAL AND MEET THE MINIMUM REQUIREMENTS LISTED IN THE MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD), 2009 EDITION.
6. SIGNS SHALL BE PLACED AS INDICATED ON THE PLANS OR AS DIRECTED BY THE ENGINEER OR AIRPORT.

TEMPORARY CONSTRUCTION SIGNS

SCALE: N.T.S.

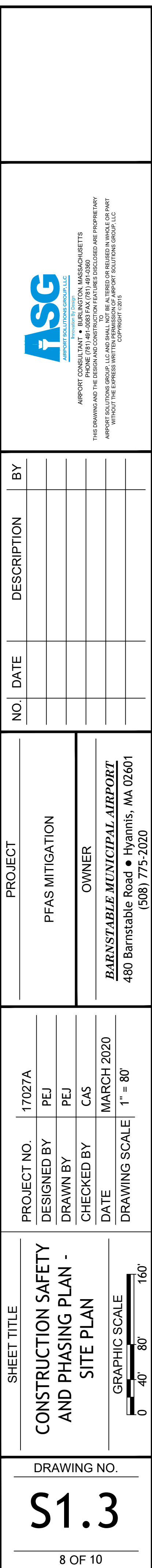
NO.	DATE	DESCRIPTION	BY

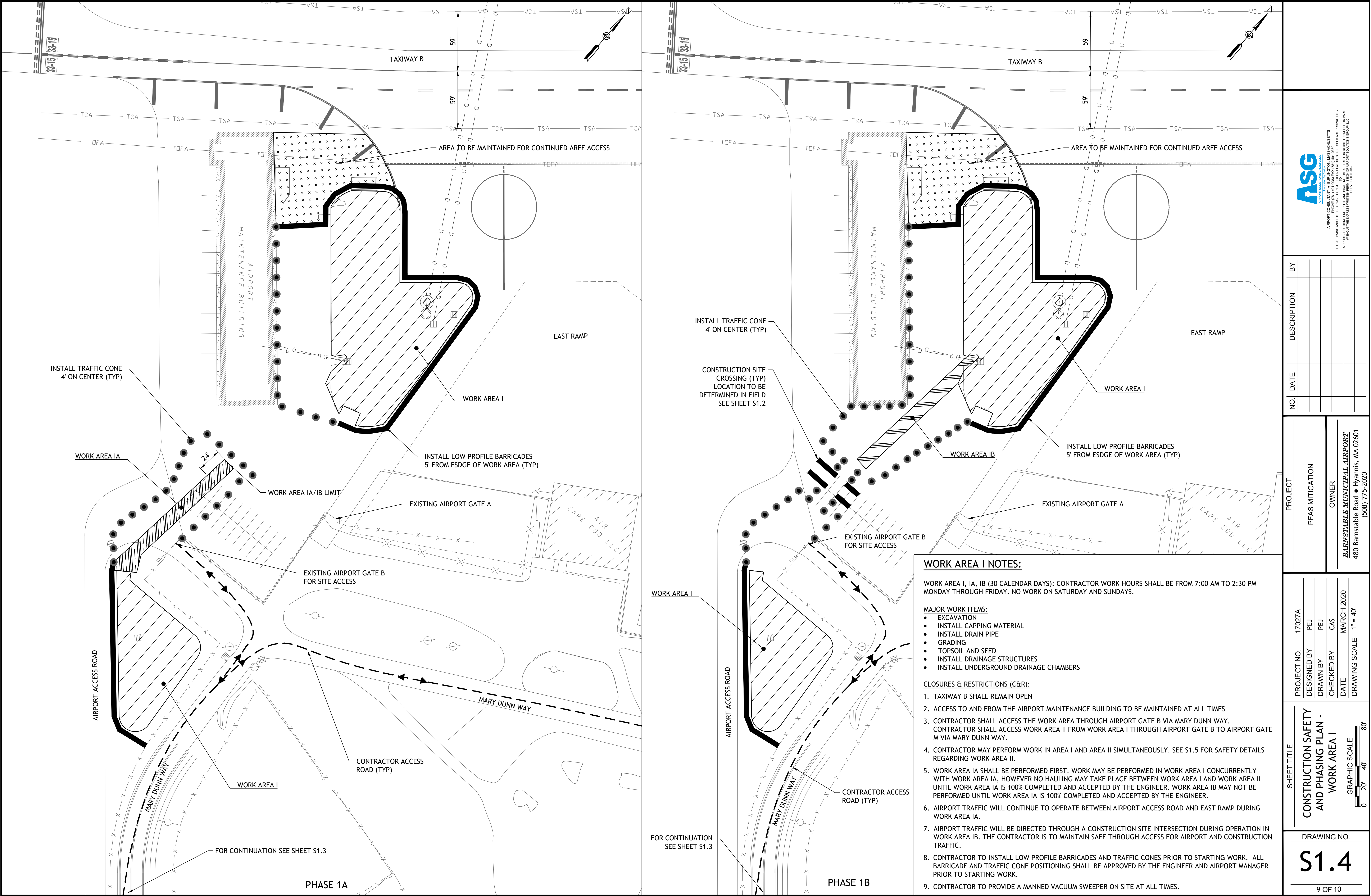
PROJECT	OWNER
PFAS MITIGATION	BARNSTABLE MUNICIPAL AIRPORT 480 Barnstable Road • Hyannis, MA 02601 (508) 775-2020

PROJECT NO.	17027A
DESIGNED BY	PEJ
DRAWN BY	PEJ
CHECKED BY	CAS
DATE	MARCH 2020
DRAWING SCALE	N.T.S.

SHEET TITLE	GRAPHIC SCALE
CONSTRUCTION SAFETY AND PHASING PLAN - DETAILS	 N.T.S.

DRAWING NO.
S1.2
7 OF 10





AIRPORT CONSULTANTS • BURLINGTON, MASSACHUSETTS
PHONE (978) 681-0083 FAX (978) 681-0300
WWW.ASG-CONSULTANTS.COM
THIS DRAWING AND THE INFORMATION CONTAINED HEREIN ARE THE PROPERTY OF ASG CONSULTANTS, LLC AND SHALL BE USED ONLY FOR THE PROJECT AND SITE SPECIFICALLY IDENTIFIED HEREON. NO PART OF THIS DRAWING OR INFORMATION SHALL BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, WITHOUT THE EXPRESS WRITTEN PERMISSION OF ASG CONSULTANTS GROUP, LLC.
DATE: 03/20/2020

NO.	DATE	DESCRIPTION	BY

PROJECT	OWNER
PFAS MITIGATION	BARNSTABLE MUNICIPAL AIRPORT 480 Barnstable Road • Hyannis, MA 02601 (508) 775-2020

PROJECT NO.	17027A
DESIGNED BY	PEJ
DRAWN BY	PEJ
CHECKED BY	CAS
DATE	MARCH 2020
DRAWING SCALE	1" = 40'

SHEET TITLE	GRAPHIC SCALE
CONSTRUCTION SAFETY AND PHASING PLAN - WORK AREA I	0 20' 40' 80'

DRAWING NO.
S1.4
9 OF 10

WORK AREA II NOTES:

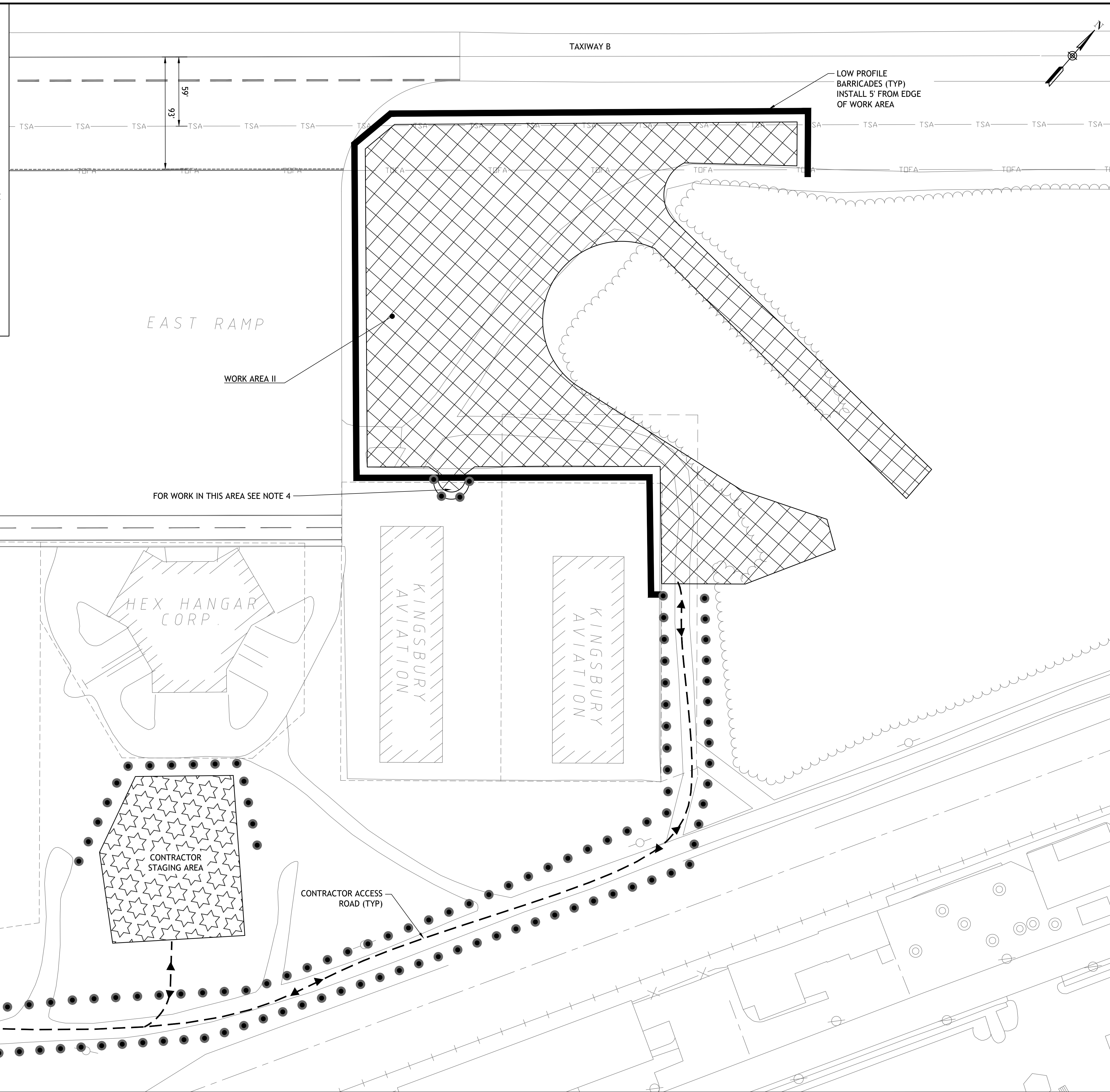
WORK AREA II (30 CALENDAR DAYS): CONTRACTOR WORK HOURS SHALL BE FROM 7:00 AM TO 5:00 PM MONDAY THROUGH FRIDAY. NO WORK ON SATURDAY AND SUNDAYS.

MAJOR WORK ITEMS:

- INSTALL CAPPING MATERIAL
- GRADING
- TOPSOIL AND SEED
- INSTALL KEY TRENCH
- INSTALL ACCESS ROAD
- INSTALL DRAINAGE STRUCTURES

CLOSURES & RESTRICTIONS (C&R):

1. TAXIWAY B SHALL REMAIN OPEN
2. CONTRACTOR SHALL ACCESS THE WORK AREA THROUGH AIRPORT GATE M VIA MARY DUNN WAY.
CONTRACTOR SHALL ACCESS WORK AREA I FROM WORK AREA II THROUGH AIRPORT GATE M TO AIRPORT GATE A VIA MARY DUNN WAY.
3. CONTRACTOR MAY PERFORM WORK IN AREA I AND AREA II SIMULTANEOUSLY. SEE S1.4 FOR SAFETY DETAILS REGARDING WORK AREA I.
4. CONTRACTOR MUST PROVIDE THE AIRPORT WITH 1 WEEK NOTICE BEFORE DRAINAGE WORK IS TO BEGIN IN THE AREA. ALL CONSTRUCTION EQUIPMENT, FOR THIS WORK, SHALL BE OPERATED FROM WORK AREA II TO MINIMIZE ACCESS IMPACTS TO THE HANGARS. NO EQUIPMENT WILL BE ALLOWED ON PAVEMENT FOR THIS WORK. CONTRACTOR SHALL BE PREPARED TO PULL BACK MEN AND EQUIPMENT TO ALLOW AIRCRAFT TO TAXI BY.
5. CONTRACTOR TO INSTALL LOW PROFILE BARRICADES PRIOR TO STARTING WORK. ALL BARRICADE POSITIONING SHALL BE APPROVED BY THE ENGINEER AND AIRPORT MANAGER PRIOR TO STARTING WORK.
6. CONTRACTOR TO PROVIDE A MANNED VACUUM SWEEPER ON SITE AT ALL TIMES.

[illegible]

APPENDIX B

Laboratory Analysis Reports

May 20, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20E0260

Enclosed are results of analyses for samples received by the laboratory on May 7, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 5/20/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20E0260

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
OW-9D	20E0260-01	Ground Water		SOP 434-PFAAS SW-846 8270D-E	
HW-E	20E0260-02	Ground Water		SOP 434-PFAAS	
HW-F	20E0260-03	Ground Water		SOP 434-PFAAS	
HW-2	20E0260-04	Ground Water		SOP 434-PFAAS	
HW-3	20E0260-05	Ground Water		SOP 434-PFAAS	

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS**Qualifications:****S-21**

Surrogate was diluted below its calibration range due to elevated levels of target analytes.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0260-01RE1[OW-9D], 20E0260-02RE1[HW-E], 20E0260-03RE1[HW-F]

13C-PFHxA

20E0260-01RE1[OW-9D], 20E0260-02RE1[HW-E], 20E0260-03RE1[HW-F]

d5-NEtFOSAA

20E0260-01RE1[OW-9D], 20E0260-02RE1[HW-E], 20E0260-03RE1[HW-F]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa A. Worthington", is written over a light gray rectangular background.

Lisa A. Worthington
Technical Representative

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: OW-9D

Sampled: 5/5/2020 11:27

Sample ID: 20E0260-01

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	ND	0.19	µg/L	1		SW-846 8270D-E	5/12/20	5/18/20 17:12	CLA
Surrogates	% Recovery	Recovery Limits			Flag/Qual				
1,4-Dioxane-d8	19.1	15-110						5/18/20 17:12	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: OW-9D

Sampled: 5/5/2020 11:27

Sample ID: 20E0260-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorobutanesulfonic acid (PFBS)	3.2	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluoropentanoic acid (PFPeA)	86	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorohexanoic acid (PFHxA)	71	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorohexanesulfonic acid (PFHxS)	180	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluoroheptanoic acid (PFHpA)	44	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluoroheptanesulfonic acid (PFHpS)	9.0	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorooctanoic acid (PFOA)	88	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorooctanesulfonic acid (PFOS)	720	20	6.8	ng/L	10		SOP 434-PFAAS	5/11/20	5/20/20 5:42	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
6:2 Fluorotelomersulfonic acid (6:2FTS A)	230	20	3.9	ng/L	10		SOP 434-PFAAS	5/11/20	5/20/20 5:42	JFC
Perfluorononanoic acid (PFNA)	150	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:17	BLM
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	92.8	70-130				5/19/20 2:17				
13C-PFHxA	*	70-130		S-21		5/20/20 5:42				
13C-PFDA	91.9	70-130				5/19/20 2:17				
13C-PFDA	*	70-130		S-21		5/20/20 5:42				
d5-NEtFOSAA	92.4	70-130				5/19/20 2:17				
d5-NEtFOSAA	*	70-130		S-21		5/20/20 5:42				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: HW-E

Sampled: 5/5/2020 14:08

Sample ID: 20E0260-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.6	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorobutanesulfonic acid (PFBS)	0.55	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluoropentanoic acid (PFPeA)	43	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorohexanoic acid (PFHxA)	47	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorohexanesulfonic acid (PFHxS)	11	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluoroheptanoic acid (PFHpA)	44	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluoroheptanesulfonic acid (PFHpS)	1.7	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorooctanoic acid (PFOA)	27	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorooctanesulfonic acid (PFOS)	3.7	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
6:2 Fluorotelomersulfonic acid (6:2FTS A)	860	20	3.9	ng/L	10		SOP 434-PFAAS	5/11/20	5/20/20 6:03	JFC
Perfluorononanoic acid (PFNA)	5.2	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 2:39	BLM
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	92.8	70-130				5/19/20 2:39				
13C-PFHxA	*	70-130		S-21		5/20/20 6:03				
13C-PFDA	93.0	70-130				5/19/20 2:39				
13C-PFDA	*	70-130		S-21		5/20/20 6:03				
d5-NEtFOSAA	90.0	70-130				5/19/20 2:39				
d5-NEtFOSAA	*	70-130		S-21		5/20/20 6:03				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: HW-F

Sampled: 5/5/2020 15:08

Sample ID: 20E0260-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	9.7	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorobutanesulfonic acid (PFBS)	16	40	9.9	ng/L	20		SOP 434-PFAAS	5/11/20	5/20/20 10:32	JFC
Perfluoropentanoic acid (PFPeA)	430	40	8.5	ng/L	20		SOP 434-PFAAS	5/11/20	5/20/20 10:32	JFC
Perfluorohexanoic acid (PFHxA)	460	40	10	ng/L	20		SOP 434-PFAAS	5/11/20	5/20/20 10:32	JFC
Perfluorohexanesulfonic acid (PFHxS)	5.0	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluoroheptanoic acid (PFHpA)	230	40	11	ng/L	20		SOP 434-PFAAS	5/11/20	5/20/20 10:32	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorooctanoic acid (PFOA)	20	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorooctanesulfonic acid (PFOS)	0.86	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1500	40	7.8	ng/L	20		SOP 434-PFAAS	5/11/20	5/20/20 10:32	JFC
Perfluorononanoic acid (PFNA)	0.81	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:22	BLM
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	87.7	70-130				5/19/20 3:22				
13C-PFHxA	*	70-130		S-21		5/20/20 10:32				
13C-PFDA	96.1	70-130				5/19/20 3:22				
13C-PFDA	*	70-130		S-21		5/20/20 10:32				
d5-NEtFOSAA	80.2	70-130				5/19/20 3:22				
d5-NEtFOSAA	*	70-130		S-21		5/20/20 10:32				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: HW-2

Sampled: 5/5/2020 15:58

Sample ID: 20E0260-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorobutanesulfonic acid (PFBS)	0.68	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluoropentanoic acid (PFPeA)	62	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorohexanoic acid (PFHxA)	54	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorohexanesulfonic acid (PFHxS)	6.6	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluoroheptanoic acid (PFHpA)	35	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorooctanoic acid (PFOA)	39	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorooctanesulfonic acid (PFOS)	53	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
6:2 Fluorotelomersulfonic acid (6:2FTS A)	150	4.0	0.78	ng/L	2		SOP 434-PFAAS	5/11/20	5/20/20 6:46	JFC
Perfluorononanoic acid (PFNA)	16	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
8:2 Fluorotelomersulfonic acid (8:2FTS A)	9.2	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 3:43	BLM
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	91.0		70-130				5/19/20 3:43			
13C-PFHxA	89.3		70-130				5/20/20 6:46			
13C-PFDA	94.0		70-130				5/19/20 3:43			
13C-PFDA	87.2		70-130				5/20/20 6:46			
d5-NEtFOSAA	89.6		70-130				5/19/20 3:43			
d5-NEtFOSAA	88.3		70-130				5/20/20 6:46			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0260

Date Received: 5/7/2020

Field Sample #: HW-3

Sampled: 5/5/2020 16:46

Sample ID: 20E0260-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	5.6	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorobutanoic acid (PFBA)	5.5	4.0	1.3	ng/L	2		SOP 434-PFAAS	5/11/20	5/20/20 7:08	JFC
Perfluorobutanesulfonic acid (PFBS)	0.88	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluoropentanoic acid (PFPeA)	330	4.0	0.85	ng/L	2		SOP 434-PFAAS	5/11/20	5/20/20 7:08	JFC
Perfluorohexanoic acid (PFHxA)	210	4.0	1.0	ng/L	2		SOP 434-PFAAS	5/11/20	5/20/20 7:08	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.7	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluoroheptanoic acid (PFHpA)	100	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluoroheptanesulfonic acid (PFHpS)	1.6	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorooctanoic acid (PFOA)	54	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorooctanesulfonic acid (PFOS)	100	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
6:2 Fluorotelomersulfonic acid (6:2FTS A)	130	4.0	0.78	ng/L	2		SOP 434-PFAAS	5/11/20	5/20/20 7:08	JFC
Perfluorononanoic acid (PFNA)	21	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorodecanoic acid (PFDA)	1.4	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
8:2 Fluorotelomersulfonic acid (8:2FTS A)	4.1	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluoroundecanoic acid (PFUnA)	1.7	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/11/20	5/19/20 4:05	BLM
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	91.5	70-130				5/19/20 4:05				
13C-PFHxA	81.7	70-130				5/20/20 7:08				
13C-PFDA	89.5	70-130				5/19/20 4:05				
13C-PFDA	80.3	70-130				5/20/20 7:08				
d5-NEtFOSAA	82.6	70-130				5/19/20 4:05				
d5-NEtFOSAA	75.4	70-130				5/20/20 7:08				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332**Sample Extraction Data****Prep Method: SOP 434-PFAAS Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0260-01 [OW-9D]	B257729	250	1.00	05/11/20
20E0260-01RE1 [OW-9D]	B257729	250	1.00	05/11/20
20E0260-02 [HW-E]	B257729	250	1.00	05/11/20
20E0260-02RE1 [HW-E]	B257729	250	1.00	05/11/20
20E0260-03 [HW-F]	B257729	250	1.00	05/11/20
20E0260-03RE1 [HW-F]	B257729	250	1.00	05/11/20
20E0260-04 [HW-2]	B257729	250	1.00	05/11/20
20E0260-04RE1 [HW-2]	B257729	250	1.00	05/11/20
20E0260-05 [HW-3]	B257729	250	1.00	05/11/20
20E0260-05RE1 [HW-3]	B257729	250	1.00	05/11/20

Prep Method: SW-846 3510C Analytical Method: SW-846 8270D-E

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0260-01 [OW-9D]	B257825	1060	1.00	05/12/20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL
1,4-Dioxane by isotope dilution GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC Limits	RPD	RPD Limit	Notes
Batch B257825 - SW-846 3510C									
Blank (B257825-BLK1)				Prepared: 05/12/20 Analyzed: 05/18/20					
1,4-Dioxane	ND	0.20	µg/L						
Surrogate: 1,4-Dioxane-d8	2.37		µg/L	10.0		23.7	15-110		
LCS (B257825-BS1)				Prepared: 05/12/20 Analyzed: 05/18/20					
1,4-Dioxane	10.3	0.20	µg/L	10.0		103	40-140		
Surrogate: 1,4-Dioxane-d8	2.70		µg/L	10.0		27.0	15-110		
LCS Dup (B257825-BSD1)				Prepared: 05/12/20 Analyzed: 05/18/20					
1,4-Dioxane	10.8	0.20	µg/L	10.0		108	40-140	5.35	30
Surrogate: 1,4-Dioxane-d8	2.34		µg/L	10.0		23.4	15-110		

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B257729 - SOP 434-PFAAS

Blank (B257729-BLK1)

Prepared: 05/11/20 Analyzed: 05/19/20

Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	38.0		ng/L	40.0		94.9	70-130			
Surrogate: 13C-PFDA	38.8		ng/L	40.0		97.0	70-130			
Surrogate: d5-NEtFOSAA	176		ng/L	160		110	70-130			

LCS (B257729-BS1)

Prepared: 05/11/20 Analyzed: 05/19/20

Perfluorobutanoic acid (PFBA)	1.53	2.0	ng/L	2.00		76.5	70-130			
Perfluorobutanesulfonic acid (PFBS)	1.80	2.0	ng/L	1.77		102	70-130			
Perfluoropentanoic acid (PFPeA)	1.81	2.0	ng/L	2.00		90.5	70-130			
Perfluorohexanoic acid (PFHxA)	1.93	2.0	ng/L	2.00		96.4	70-130			
Perfluorohexanesulfonic acid (PFHxS)	1.68	2.0	ng/L	1.82		92.6	70-130			
Perfluoroheptanoic acid (PFHpA)	1.74	2.0	ng/L	2.00		86.9	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	1.91	2.0	ng/L	1.90		101	70-130			
Perfluorooctanoic acid (PFOA)	1.94	2.0	ng/L	2.00		97.2	70-130			
Perfluorooctanesulfonic acid (PFOS)	1.94	2.0	ng/L	1.85		105	70-130			
Perfluorooctanesulfonamide (FOSA)	1.53	2.0	ng/L	2.00		76.3	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.21	2.0	ng/L	2.00		110	70-130			
Perfluorononanoic acid (PFNA)	2.10	2.0	ng/L	2.00		105	70-130			
Perfluorodecanoic acid (PFDA)	2.01	2.0	ng/L	2.00		100	70-130			
Perfluorodecanesulfonic acid (PFDS)	1.85	2.0	ng/L	1.93		95.6	70-130			
N-EtFOSAA	2.08	2.0	ng/L	2.00		104	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.38	2.0	ng/L	1.92		124	70-130			
Perfluoroundecanoic acid (PFUnA)	2.04	2.0	ng/L	2.00		102	70-130			
N-MeFOSAA	2.16	2.0	ng/L	2.00		108	70-130			
Perfluorododecanoic acid (PFDoA)	1.89	2.0	ng/L	2.00		94.6	70-130			
Perfluorotridecanoic acid (PFTrDA)	2.14	2.0	ng/L	2.00		107	70-130			
Perfluorotetradecanoic acid (PFTA)	2.13	2.0	ng/L	2.00		106	70-130			
Surrogate: 13C-PFHxA	35.5		ng/L	40.0		88.8	70-130			
Surrogate: 13C-PFDA	38.2		ng/L	40.0		95.6	70-130			
Surrogate: d5-NEtFOSAA	161		ng/L	160		100	70-130			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
S-21	Surrogate was diluted below its calibration range due to elevated levels of target analytes.

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
<i>SOP 434-PFAAS in Water</i>	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

SW-846 8270D-E in Water

1,4-Dioxane	NY
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The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020

I Have Not Confirmed Sample Container Numbers With Lab Staff Before Relinquishing Over Samples _____



con-test[®]
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False

Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten Group

Received By CA Date 5/7/20 Time 1820

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 2 Actual Temp - 5.1
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? N/A Were Samples Tampered with? N/A
Was COC Relinquished? T Does Chain Agree With Samples? F

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all Client T Analysis T Sampler Name T
pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F

Are there Rushes? F

Are there Short Holds? F

Is there enough Volume? T

Is there Headspace where applicable? N/A

Proper Media/Containers Used? T

Were trip blanks received? F

Do all samples have the proper pH? N/A Acid _____ Base _____

Who was notified? _____
Who was notified? _____
Who was notified? _____
MS/MSD? F
Is splitting samples required? F
On COC? F

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.	<u>2</u>	1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	<u>10</u>	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

May 27, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20E0400

Enclosed are results of analyses for samples received by the laboratory on May 11, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 5/27/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20E0400

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-I (S)	20E0400-01	Ground Water		SOP 434-PFAAS	
HW-I (M)	20E0400-02	Ground Water		SOP 434-PFAAS	
HW-I (D)	20E0400-03	Ground Water		SOP 434-PFAAS	
HW-H	20E0400-04	Ground Water		SOP 434-PFAAS	
OW-9 (S)	20E0400-05	Ground Water		SOP 434-PFAAS	
OW-9 (M)	20E0400-06	Ground Water		SOP 434-PFAAS	
OW-18 (S)	20E0400-07	Ground Water		SOP 434-PFAAS	
OW-18 (M)	20E0400-08	Ground Water		SOP 434-PFAAS	

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS**Qualifications:****L-01**

Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

Analyte & Samples(s) Qualified:**Perfluorotetradecanoic acid (PFTA)**

B258207-BS1

PF-01

Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.

Analyte & Samples(s) Qualified:**13C-PFHxA**

20E0400-04[HW-H], 20E0400-05[OW-9 (S)]

PF-05

Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance.

Analyte & Samples(s) Qualified:**Perfluoroheptanesulfonic acid (PF1)**

S048789-CCV2

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0400-01RE2[HW-I (S)]

13C-PFHxA

20E0400-01RE2[HW-I (S)]

d5-NEtFOSAA

20E0400-01RE2[HW-I (S)]

S-21

Surrogate was diluted below its calibration range due to elevated levels of target analytes.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

13C-PFHxA

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

d5-NEtFOSAA

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa Worthington", is written over a light pink rectangular background.

Lisa A. Worthington
Technical Representative

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (S)

Sampled: 5/8/2020 13:41

Sample ID: 20E0400-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	21	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorobutanesulfonic acid (PFBS)	14	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluoropentanoic acid (PFPeA)	810	40	8.5	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorohexanoic acid (PFHxA)	510	40	10	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorohexanesulfonic acid (PFHxS)	220	40	15	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluoroheptanoic acid (PFHpA)	540	40	11	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluoroheptanesulfonic acid (PFHpS)	8.6	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorooctanoic acid (PFOA)	290	40	14	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorooctanesulfonic acid (PFOS)	40	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	13000	400	78	ng/L	200		SOP 434-PFAAS	5/20/20	5/27/20 16:17	JFC
Perfluorononanoic acid (PFNA)	82	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.7	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotetradecanoic acid (PFTA)	ND	400	100	ng/L	200		SOP 434-PFAAS	5/20/20	5/27/20 16:17	JFC
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	86.2	70-130				5/22/20 14:48				
13C-PFHxA	*	70-130		S-21		5/26/20 13:04				
13C-PFHxA	*	70-130		S-01		5/27/20 16:17				
13C-PFDA	96.4	70-130				5/22/20 14:48				
13C-PFDA	*	70-130		S-21		5/26/20 13:04				
13C-PFDA	*	70-130		S-01		5/27/20 16:17				
d5-NEtFOSAA	84.2	70-130				5/22/20 14:48				
d5-NEtFOSAA	*	70-130		S-21		5/26/20 13:04				
d5-NEtFOSAA	*	70-130		S-01		5/27/20 16:17				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (M)

Sampled: 5/8/2020 14:25

Sample ID: 20E0400-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoropentanoic acid (PFPeA)	2.8	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorohexanoic acid (PFHxA)	3.4	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorohexanesulfonic acid (PFHxS)	9.1	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroheptanoic acid (PFHpA)	1.2	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanoic acid (PFOA)	1.8	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanesulfonic acid (PFOS)	14	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorononanoic acid (PFNA)	0.78	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	82.5		70-130				5/26/20 13:25			
13C-PFDA	71.8		70-130				5/26/20 13:25			
d5-NEtFOSAA	86.0		70-130				5/26/20 13:25			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (D)

Sampled: 5/8/2020 15:37

Sample ID: 20E0400-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.75	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorobutanesulfonic acid (PFBS)	1.1	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoropentanoic acid (PFPeA)	22	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorohexanoic acid (PFHxA)	19	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorohexanesulfonic acid (PFHxS)	18	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroheptanoic acid (PFHpA)	4.6	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanoic acid (PFOA)	2.8	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanesulfonic acid (PFOS)	20	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.6	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	76.5		70-130				5/22/20 15:31			
13C-PFDA	76.5		70-130				5/22/20 15:31			
d5-NEtFOSAA	78.3		70-130				5/22/20 15:31			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-H

Sampled: 5/8/2020 16:25

Sample ID: 20E0400-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	21	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorobutanesulfonic acid (PFBS)	0.56	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoropentanoic acid (PFPeA)	470	20	4.2	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorohexanoic acid (PFHxA)	360	20	5.1	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.1	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoroheptanoic acid (PFHpA)	280	20	5.3	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanoic acid (PFOA)	2.0	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	130	20	3.9	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	69.6	*	70-130	PF-01
13C-PFHxA		*	70-130	S-21
13C-PFDA	75.5		70-130	
13C-PFDA		*	70-130	S-21
d5-NEtFOSAA	80.8		70-130	
d5-NEtFOSAA		*	70-130	S-21

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-9 (S)

Sampled: 5/8/2020 10:20

Sample ID: 20E0400-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.78	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorobutanesulfonic acid (PFBS)	1.2	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoropentanoic acid (PFPeA)	19	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorohexanoic acid (PFHxA)	15	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorohexanesulfonic acid (PFHxS)	11	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroheptanoic acid (PFHpA)	6.4	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanoic acid (PFOA)	4.3	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanesulfonic acid (PFOS)	5.8	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorononanoic acid (PFNA)	3.3	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	150	*	70-130		PF-01			5/22/20	16:14	
13C-PFDA	101		70-130					5/22/20	16:14	
d5-NEtFOSAA	121		70-130					5/22/20	16:14	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-9 (M)

Sampled: 5/8/2020 12:02

Sample ID: 20E0400-06

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.1	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoropentanoic acid (PFPeA)	31	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorohexanoic acid (PFHxA)	18	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.3	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroheptanoic acid (PFHpA)	6.1	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanoic acid (PFOA)	3.5	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanesulfonic acid (PFOS)	10	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	4.9	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorononanoic acid (PFNA)	3.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	81.6		70-130				5/22/20 16:36			
13C-PFDA	78.4		70-130				5/22/20 16:36			
d5-NEtFOSAA	86.1		70-130				5/22/20 16:36			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-18 (S)

Sampled: 5/8/2020 14:25

Sample ID: 20E0400-07

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorobutanesulfonic acid (PFBS)	0.63	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoropentanoic acid (PFPeA)	9.2	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorohexanoic acid (PFHxA)	8.1	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.5	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroheptanoic acid (PFHpA)	3.9	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanoic acid (PFOA)	10	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanesulfonic acid (PFOS)	16	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorononanoic acid (PFNA)	3.2	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	78.4		70-130				5/22/20 16:57			
13C-PFDA	70.0		70-130				5/22/20 16:57			
d5-NEtFOSAA	75.8		70-130				5/22/20 16:57			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-18 (M)

Sampled: 5/8/2020 16:16

Sample ID: 20E0400-08

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	2.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorobutanesulfonic acid (PFBS)	3.4	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoropentanoic acid (PFPeA)	110	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorohexanoic acid (PFHxA)	47	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorohexanesulfonic acid (PFHxS)	70	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroheptanoic acid (PFHpA)	7.4	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroheptanesulfonic acid (PFHpS)	3.3	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanoic acid (PFOA)	9.6	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanesulfonic acid (PFOS)	180	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorononanoic acid (PFNA)	2.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	82.2		70-130				5/22/20 17:19			
13C-PFDA	82.0		70-130				5/22/20 17:19			
d5-NEtFOSAA	90.7		70-130				5/22/20 17:19			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332**Sample Extraction Data****Prep Method: SOP 434-PFAAS Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0400-01 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-01RE1 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-01RE2 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-02 [HW-I (M)]	B258207	250	1.00	05/20/20
20E0400-03 [HW-I (D)]	B258207	250	1.00	05/20/20
20E0400-04 [HW-H]	B258207	250	1.00	05/20/20
20E0400-04RE1 [HW-H]	B258207	250	1.00	05/20/20
20E0400-05 [OW-9 (S)]	B258207	250	1.00	05/20/20
20E0400-06 [OW-9 (M)]	B258207	250	1.00	05/20/20
20E0400-07 [OW-18 (S)]	B258207	250	1.00	05/20/20
20E0400-08 [OW-18 (M)]	B258207	250	1.00	05/20/20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B258207 - SOP 434-PFAAS										
Blank (B258207-BLK1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	32.3		ng/L	40.0		80.6	70-130			
Surrogate: 13C-PFDA	31.2		ng/L	40.0		78.0	70-130			
Surrogate: d5-NEtFOSAA	139		ng/L	160		87.0	70-130			
LCS (B258207-BS1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	1.76	2.0	ng/L	2.00		88.2	70-130			
Perfluorobutanesulfonic acid (PFBS)	1.65	2.0	ng/L	1.77		93.3	70-130			
Perfluoropentanoic acid (PFPeA)	1.88	2.0	ng/L	2.00		93.8	70-130			
Perfluorohexanoic acid (PFHxA)	2.02	2.0	ng/L	2.00		101	70-130			
Perfluorohexanesulfonic acid (PFHxS)	1.59	2.0	ng/L	1.82		87.6	70-130			
Perfluoroheptanoic acid (PFHpA)	1.86	2.0	ng/L	2.00		92.9	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	1.52	2.0	ng/L	1.90		80.2	70-130			
Perfluorooctanoic acid (PFOA)	1.97	2.0	ng/L	2.00		98.7	70-130			
Perfluorooctanesulfonic acid (PFOS)	1.98	2.0	ng/L	1.85		107	70-130			
Perfluorooctanesulfonamide (FOSA)	1.73	2.0	ng/L	2.00		86.5	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.35	2.0	ng/L	2.00		117	70-130			
Perfluorononanoic acid (PFNA)	2.04	2.0	ng/L	2.00		102	70-130			
Perfluorodecanoic acid (PFDA)	2.09	2.0	ng/L	2.00		104	70-130			
Perfluorodecanesulfonic acid (PFDS)	1.90	2.0	ng/L	1.93		98.4	70-130			
N-EtFOSAA	2.10	2.0	ng/L	2.00		105	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.12	2.0	ng/L	1.92		110	70-130			
Perfluoroundecanoic acid (PFUnA)	2.20	2.0	ng/L	2.00		110	70-130			
N-MeFOSAA	1.91	2.0	ng/L	2.00		95.5	70-130			
Perfluorododecanoic acid (PFDoA)	2.30	2.0	ng/L	2.00		115	70-130			
Perfluorotridecanoic acid (PFTrDA)	2.59	2.0	ng/L	2.00		129	70-130			
Perfluorotetradecanoic acid (PFTA)	3.20	2.0	ng/L	2.00		160 *	70-130			L-01
Surrogate: 13C-PFHxA	35.9		ng/L	40.0		89.7	70-130			
Surrogate: 13C-PFDA	38.4		ng/L	40.0		96.0	70-130			
Surrogate: d5-NEtFOSAA	173		ng/L	160		108	70-130			

FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-01	Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
PF-01	Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.
PF-05	Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-21	Surrogate was diluted below its calibration range due to elevated levels of target analytes.

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020

I Have Not Confirmed Sample Container
Numbers With Lab Staff Before Relinquishing
Over Samples _____



con-test®
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

**Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False
Statement will be brought to the attention of the Client - State True or False**

Client Horsley
Received By [Signature] Date 5/11/20 Time 1940

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 5 Actual Temp - 3.9
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? na Were Samples Tampered with? na
Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T
Did COC include all Client T Analysis T Sampler Name T
pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T
Are there Lab to Filters? F Who was notified? _____
Are there Rushes? F Who was notified? _____
Are there Short Holds? F Who was notified? _____

Is there enough Volume? T
Is there Headspace where applicable? na MS/MSD? F
Proper Media/Containers Used? T Is splitting samples required? F
Were trip blanks received? F On COC? F
Do all samples have the proper pH? _____ Acid na Base na

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	<u>10</u>	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

May 27, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20E0400

Enclosed are results of analyses for samples received by the laboratory on May 11, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 5/27/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20E0400

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-I (S)	20E0400-01	Ground Water		SOP 434-PFAAS	
HW-I (M)	20E0400-02	Ground Water		SOP 434-PFAAS	
HW-I (D)	20E0400-03	Ground Water		SOP 434-PFAAS	
HW-H	20E0400-04	Ground Water		SOP 434-PFAAS	
OW-9 (S)	20E0400-05	Ground Water		SOP 434-PFAAS	
OW-9 (M)	20E0400-06	Ground Water		SOP 434-PFAAS	
OW-18 (S)	20E0400-07	Ground Water		SOP 434-PFAAS	
OW-18 (M)	20E0400-08	Ground Water		SOP 434-PFAAS	

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS**Qualifications:****L-01**

Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

Analyte & Samples(s) Qualified:**Perfluorotetradecanoic acid (PFTA)**

B258207-BS1

PF-01

Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.

Analyte & Samples(s) Qualified:**13C-PFHxA**

20E0400-04[HW-H], 20E0400-05[OW-9 (S)]

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0400-01RE2[HW-I (S)]

13C-PFHxA

20E0400-01RE2[HW-I (S)]

d5-NEtFOSAA

20E0400-01RE2[HW-I (S)]

S-21

Surrogate was diluted below its calibration range due to elevated levels of target analytes.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

13C-PFHxA

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

d5-NEtFOSAA

20E0400-01RE1[HW-I (S)], 20E0400-04RE1[HW-H]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.



Lisa A. Worthington

Technical Representative

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (S)

Sampled: 5/8/2020 13:41

Sample ID: 20E0400-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	21	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorobutanesulfonic acid (PFBS)	14	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluoropentanoic acid (PFPeA)	810	40	8.5	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorohexanoic acid (PFHxA)	510	40	10	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorohexanesulfonic acid (PFHxS)	220	40	15	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluoroheptanoic acid (PFHpA)	540	40	11	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluoroheptanesulfonic acid (PFHpS)	8.6	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorooctanoic acid (PFOA)	290	40	14	ng/L	20		SOP 434-PFAAS	5/20/20	5/26/20 13:04	JFC
Perfluorooctanesulfonic acid (PFOS)	40	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	13000	400	78	ng/L	200		SOP 434-PFAAS	5/20/20	5/27/20 16:17	JFC
Perfluorononanoic acid (PFNA)	82	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.7	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 14:48	JFC
Perfluorotetradecanoic acid (PFTA)	ND	400	100	ng/L	200		SOP 434-PFAAS	5/20/20	5/27/20 16:17	JFC
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	86.2	70-130				5/22/20 14:48				
13C-PFHxA	*	70-130		S-21		5/26/20 13:04				
13C-PFHxA	*	70-130		S-01		5/27/20 16:17				
13C-PFDA	96.4	70-130				5/22/20 14:48				
13C-PFDA	*	70-130		S-21		5/26/20 13:04				
13C-PFDA	*	70-130		S-01		5/27/20 16:17				
d5-NEtFOSAA	84.2	70-130				5/22/20 14:48				
d5-NEtFOSAA	*	70-130		S-21		5/26/20 13:04				
d5-NEtFOSAA	*	70-130		S-01		5/27/20 16:17				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (M)

Sampled: 5/8/2020 14:25

Sample ID: 20E0400-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoropentanoic acid (PFPeA)	2.8	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorohexanoic acid (PFHxA)	3.4	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorohexanesulfonic acid (PFHxS)	9.1	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroheptanoic acid (PFHpA)	1.2	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanoic acid (PFOA)	1.8	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanesulfonic acid (PFOS)	14	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorononanoic acid (PFNA)	0.78	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/26/20 13:25	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	82.5		70-130				5/26/20 13:25			
13C-PFDA	71.8		70-130				5/26/20 13:25			
d5-NEtFOSAA	86.0		70-130				5/26/20 13:25			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-1 (D)

Sampled: 5/8/2020 15:37

Sample ID: 20E0400-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.75	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorobutanesulfonic acid (PFBS)	1.1	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoropentanoic acid (PFPeA)	22	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorohexanoic acid (PFHxA)	19	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorohexanesulfonic acid (PFHxS)	18	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroheptanoic acid (PFHpA)	4.6	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanoic acid (PFOA)	2.8	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanesulfonic acid (PFOS)	20	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.6	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:31	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	76.5		70-130				5/22/20 15:31			
13C-PFDA	76.5		70-130				5/22/20 15:31			
d5-NEtFOSAA	78.3		70-130				5/22/20 15:31			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: HW-H

Sampled: 5/8/2020 16:25

Sample ID: 20E0400-04

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	21	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorobutanesulfonic acid (PFBS)	0.56	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoropentanoic acid (PFPeA)	470	20	4.2	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorohexanoic acid (PFHxA)	360	20	5.1	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.1	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoroheptanoic acid (PFHpA)	280	20	5.3	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanoic acid (PFOA)	2.0	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	130	20	3.9	ng/L	10		SOP 434-PFAAS	5/20/20	5/26/20 14:08	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 15:53	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual	
13C-PFHxA	69.6	*	70-130	PF-01
13C-PFHxA		*	70-130	S-21
13C-PFDA	75.5		70-130	
13C-PFDA		*	70-130	S-21
d5-NEtFOSAA	80.8		70-130	
d5-NEtFOSAA		*	70-130	S-21

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-9 (S)

Sampled: 5/8/2020 10:20

Sample ID: 20E0400-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.78	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorobutanesulfonic acid (PFBS)	1.2	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoropentanoic acid (PFPeA)	19	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorohexanoic acid (PFHxA)	15	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorohexanesulfonic acid (PFHxS)	11	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroheptanoic acid (PFHpA)	6.4	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanoic acid (PFOA)	4.3	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanesulfonic acid (PFOS)	5.8	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorononanoic acid (PFNA)	3.3	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:14	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	150	*	70-130		PF-01			5/22/20	16:14	
13C-PFDA	101		70-130					5/22/20	16:14	
d5-NEtFOSAA	121		70-130					5/22/20	16:14	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-9 (M)

Sampled: 5/8/2020 12:02

Sample ID: 20E0400-06

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.1	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoropentanoic acid (PFPeA)	31	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorohexanoic acid (PFHxA)	18	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorohexanesulfonic acid (PFHxS)	3.3	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroheptanoic acid (PFHpA)	6.1	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanoic acid (PFOA)	3.5	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanesulfonic acid (PFOS)	10	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	4.9	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorononanoic acid (PFNA)	3.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:36	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	81.6		70-130				5/22/20 16:36			
13C-PFDA	78.4		70-130				5/22/20 16:36			
d5-NEtFOSAA	86.1		70-130				5/22/20 16:36			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-18 (S)

Sampled: 5/8/2020 14:25

Sample ID: 20E0400-07

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorobutanesulfonic acid (PFBS)	0.63	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoropentanoic acid (PFPeA)	9.2	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorohexanoic acid (PFHxA)	8.1	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.5	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroheptanoic acid (PFHpA)	3.9	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanoic acid (PFOA)	10	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanesulfonic acid (PFOS)	16	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorononanoic acid (PFNA)	3.2	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 16:57	JFC
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	78.4	70-130								
13C-PFDA	70.0	70-130								
d5-NEtFOSAA	75.8	70-130								

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0400

Date Received: 5/11/2020

Field Sample #: OW-18 (M)

Sampled: 5/8/2020 16:16

Sample ID: 20E0400-08

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	2.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorobutanesulfonic acid (PFBS)	3.4	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoropentanoic acid (PFPeA)	110	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorohexanoic acid (PFHxA)	47	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorohexanesulfonic acid (PFHxS)	70	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroheptanoic acid (PFHpA)	7.4	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroheptanesulfonic acid (PFHpS)	3.3	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanoic acid (PFOA)	9.6	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanesulfonic acid (PFOS)	180	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorononanoic acid (PFNA)	2.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:19	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	82.2		70-130				5/22/20 17:19			
13C-PFDA	82.0		70-130				5/22/20 17:19			
d5-NEtFOSAA	90.7		70-130				5/22/20 17:19			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332**Sample Extraction Data****Prep Method: SOP 434-PFAAS Analytical Method: SOP 434-PFAAS**

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0400-01 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-01RE1 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-01RE2 [HW-I (S)]	B258207	250	1.00	05/20/20
20E0400-02 [HW-I (M)]	B258207	250	1.00	05/20/20
20E0400-03 [HW-I (D)]	B258207	250	1.00	05/20/20
20E0400-04 [HW-H]	B258207	250	1.00	05/20/20
20E0400-04RE1 [HW-H]	B258207	250	1.00	05/20/20
20E0400-05 [OW-9 (S)]	B258207	250	1.00	05/20/20
20E0400-06 [OW-9 (M)]	B258207	250	1.00	05/20/20
20E0400-07 [OW-18 (S)]	B258207	250	1.00	05/20/20
20E0400-08 [OW-18 (M)]	B258207	250	1.00	05/20/20

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B258207 - SOP 434-PFAAS										
Blank (B258207-BLK1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	32.3		ng/L	40.0		80.6	70-130			
Surrogate: 13C-PFDA	31.2		ng/L	40.0		78.0	70-130			
Surrogate: d5-NEtFOSAA	139		ng/L	160		87.0	70-130			
LCS (B258207-BS1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	1.76	2.0	ng/L	2.00		88.2	70-130			
Perfluorobutanesulfonic acid (PFBS)	1.65	2.0	ng/L	1.77		93.3	70-130			
Perfluoropentanoic acid (PFPeA)	1.88	2.0	ng/L	2.00		93.8	70-130			
Perfluorohexanoic acid (PFHxA)	2.02	2.0	ng/L	2.00		101	70-130			
Perfluorohexanesulfonic acid (PFHxS)	1.59	2.0	ng/L	1.82		87.6	70-130			
Perfluoroheptanoic acid (PFHpA)	1.86	2.0	ng/L	2.00		92.9	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	1.52	2.0	ng/L	1.90		80.2	70-130			
Perfluorooctanoic acid (PFOA)	1.97	2.0	ng/L	2.00		98.7	70-130			
Perfluorooctanesulfonic acid (PFOS)	1.98	2.0	ng/L	1.85		107	70-130			
Perfluorooctanesulfonamide (FOSA)	1.73	2.0	ng/L	2.00		86.5	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.35	2.0	ng/L	2.00		117	70-130			
Perfluorononanoic acid (PFNA)	2.04	2.0	ng/L	2.00		102	70-130			
Perfluorodecanoic acid (PFDA)	2.09	2.0	ng/L	2.00		104	70-130			
Perfluorodecanesulfonic acid (PFDS)	1.90	2.0	ng/L	1.93		98.4	70-130			
N-EtFOSAA	2.10	2.0	ng/L	2.00		105	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.12	2.0	ng/L	1.92		110	70-130			
Perfluoroundecanoic acid (PFUnA)	2.20	2.0	ng/L	2.00		110	70-130			
N-MeFOSAA	1.91	2.0	ng/L	2.00		95.5	70-130			
Perfluorododecanoic acid (PFDoA)	2.30	2.0	ng/L	2.00		115	70-130			
Perfluorotridecanoic acid (PFTrDA)	2.59	2.0	ng/L	2.00		129	70-130			
Perfluorotetradecanoic acid (PFTA)	3.20	2.0	ng/L	2.00		160 *	70-130			L-01
Surrogate: 13C-PFHxA	35.9		ng/L	40.0		89.7	70-130			
Surrogate: 13C-PFDA	38.4		ng/L	40.0		96.0	70-130			
Surrogate: d5-NEtFOSAA	173		ng/L	160		108	70-130			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332**FLAG/QUALIFIER SUMMARY**

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
L-01	Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
PF-01	Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-21	Surrogate was diluted below its calibration range due to elevated levels of target analytes.

CERTIFICATIONS
Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020



Phone: 413-525-2332
Fax: 413-525-6405

Email: info@contestlabs.com

Address: 40 ROUTE 6A
HORSLEY WITTEN GROUP

Phone: 508-833-6600
BARNSTABLE AIRPORT

Project Location: BARNSTABLE AIRPORT

Project Number: 19128

Project Manager: RJ MCCARTHY

Con-Test Quote Name/Number: BRYAN MASSA

Invoice Recipient: HW

Sampled By: HW

Client Sample ID / Description

Beginning Date/Time

Ending Date/Time

COMP GRAB

Matrix Code

Conc Code

VIALS

GLASS

PLASTIC

BACTERIA

ENCORE

Format: PDF

Other: EXCEL

CLP Like Data Pkg Required:

Email To: jordan@horskewittengroup.com

Fax To #:

7-Day

PFAS 10-Day (std)

10-Day

Due Date:

Field Filtered

Lab to Filter

1-Day

3-Day

4-Day

Field Filtered

Lab to Filter

Format: PDF

Other: EXCEL

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Other: EXCEL

CLP Like Data Pkg Required:

Email To: jordan@horskewittengroup.com

Fax To #:

7-Day

PFAS 10-Day (std)

10-Day

I Have Not Confirmed Sample Container
Numbers With Lab Staff Before Relinquishing
Over Samples _____



con-test®
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

**Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False
Statement will be brought to the attention of the Client - State True or False**

Client Horsley
Received By [Signature] Date 5/11/20 Time 1940

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 5 Actual Temp - 3.9
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tampered with? n/a
Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T
Did COC include all Client T Analysis T Sampler Name T
pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T
Are there Lab to Filters? F Who was notified? _____
Are there Rushes? F Who was notified? _____
Are there Short Holds? F Who was notified? _____

Is there enough Volume? T
Is there Headspace where applicable? n/a MS/MSD? F
Proper Media/Containers Used? T Is splitting samples required? F
Were trip blanks received? F On COC? F
Do all samples have the proper pH? _____ Acid n/a Base n/a

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic	<u>10</u>	4oz Amb/Clear	
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear	
DI-		Other Glass		Other Plastic		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Unused Media

Vials	#	Containers:	#		#		#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.	
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear	
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear	
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear	
DI-		Other Plastic		Other Glass		Encore	
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:	
Sulfuric-		Perchlorate		Ziplock			

Comments:

June 2, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20E0596

Enclosed are results of analyses for samples received by the laboratory on May 14, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed on a light gray rectangular background.

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 6/2/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20E0596

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-D (M)	20E0596-01	Ground Water		SOP 434-PFAAS	
HW-D (d)	20E0596-02	Ground Water		SOP 434-PFAAS	
HW-D (dd)	20E0596-03	Ground Water		SOP 434-PFAAS	
HW-L	20E0596-04	Ground Water		SW-846 8270D-E	
OW-18D	20E0596-05	Ground Water		SOP 434-PFAAS	
				SW-846 8270D-E	
OW-19D	20E0596-06	Ground Water		SOP 434-PFAAS	
				SW-846 8270D-E	
A14	20E0596-07	Soil		SM 2540G	
				SOP-466 PFAS	
A15	20E0596-08	Soil		SM 2540G	
				SOP-466 PFAS	

CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

SOP 434-PFAAS**Qualifications:****L-01**

Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.

Analyte & Samples(s) Qualified:**Perfluorotetradecanoic acid (PFTA)**

B258207-BS1

S-01

The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.

Analyte & Samples(s) Qualified:**13C-PFDA**

20E0596-06RE1[OW-19D]

13C-PFHxA

20E0596-06RE1[OW-19D]

d5-NEtFOSAA

20E0596-06RE1[OW-19D]

SOP-466 PFAS**Qualifications:****L-05**

Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.

Analyte & Samples(s) Qualified:**8:2 Fluorotelomersulfonic acid (8:2)**

B258609-BS1

PF-05

Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance.

Analyte & Samples(s) Qualified:**4:2 Fluorotelomersulfonic acid (4:2)**

S048924-CCV3

6:2 Fluorotelomersulfonic acid (6:2)

S048924-CCV3

8:2 Fluorotelomersulfonic acid (8:2)

S048924-CCV3

PF-06

Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the high side. Re-analysis yielded similar non-conformance.

Analyte & Samples(s) Qualified:**M2-4:2FTS**

S048924-CCV3

S-19

Surrogate recovery is outside of control limits, matrix interference suspected. Reanalysis yielded similar surrogate non-conformance.

Analyte & Samples(s) Qualified:**M2PFTA**

20E0596-07RE1[A14]

M4PFHpA

20E0596-07RE1[A14]

M5PFPeA

20E0596-07RE1[A14]

V-06

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.

Analyte & Samples(s) Qualified:**8:2 Fluorotelomersulfonic acid (8:2)**

S048924-CCV1

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa Worthington", is written over a light pink rectangular background.

Lisa A. Worthington
Technical Representative

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: HW-D (M)

Sampled: 5/13/2020 10:59

Sample ID: 20E0596-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorohexanoic acid (PFHxA)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluoroheptanoic acid (PFHpA)	ND	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorooctanoic acid (PFOA)	ND	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorooctanesulfonic acid (PFOS)	1.1	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorononanoic acid (PFNA)	ND	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 17:40	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	76.0		70-130				5/22/20 17:40			
13C-PFDA	74.0		70-130				5/22/20 17:40			
d5-NEtFOSAA	82.3		70-130				5/22/20 17:40			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: HW-D (d)

Sampled: 5/13/2020 11:56

Sample ID: 20E0596-02

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.93	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorobutanesulfonic acid (PFBS)	5.5	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluoropentanoic acid (PFPeA)	17	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorohexanoic acid (PFHxA)	22	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorohexanesulfonic acid (PFHxS)	39	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluoroheptanoic acid (PFHpA)	17	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluoroheptanesulfonic acid (PFHpS)	1.9	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorooctanoic acid (PFOA)	7.6	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorooctanesulfonic acid (PFOS)	120	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorononanoic acid (PFNA)	19	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/27/20	5/31/20 2:13	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	98.4		70-130				5/31/20 2:13			
13C-PFDA	94.3		70-130				5/31/20 2:13			
d5-NEtFOSAA	107		70-130				5/31/20 2:13			

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Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: HW-D (dd)

Sampled: 5/13/2020 14:18

Sample ID: 20E0596-03

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorobutanesulfonic acid (PFBS)	0.54	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluoropentanoic acid (PFPeA)	ND	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorohexanoic acid (PFHxA)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorohexanesulfonic acid (PFHxS)	8.0	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluoroheptanoic acid (PFHpA)	ND	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorooctanoic acid (PFOA)	ND	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorooctanesulfonic acid (PFOS)	13	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorononanoic acid (PFNA)	2.9	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 18:45	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	80.6		70-130				5/22/20 18:45			
13C-PFDA	79.1		70-130				5/22/20 18:45			
d5-NEtFOSAA	89.8		70-130				5/22/20 18:45			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: HW-L

Sampled: 5/13/2020 15:51

Sample ID: 20E0596-04

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	0.75	0.19	µg/L	1		SW-846 8270D-E	5/15/20	5/18/20 14:16	CLA
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
1,4-Dioxane-d8	21.0		15-110				5/18/20 14:16		

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: OW-18D

Sampled: 5/13/2020 14:08

Sample ID: 20E0596-05

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	0.35	0.20	µg/L	1		SW-846 8270D-E	5/15/20	5/18/20 14:35	CLA
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
1,4-Dioxane-d8	23.0		15-110				5/18/20 14:35		

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: OW-18D

Sampled: 5/13/2020 14:08

Sample ID: 20E0596-05

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.3	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorobutanesulfonic acid (PFBS)	1.6	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluoropentanoic acid (PFPeA)	45	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorohexanoic acid (PFHxA)	40	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorohexanesulfonic acid (PFHxS)	30	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluoroheptanoic acid (PFHpA)	12	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorooctanoic acid (PFOA)	9.5	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorooctanesulfonic acid (PFOS)	41	2.0	0.68	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorononanoic acid (PFNA)	2.8	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:06	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	80.2		70-130				5/22/20 19:06			
13C-PFDA	79.4		70-130				5/22/20 19:06			
d5-NEtFOSAA	86.6		70-130				5/22/20 19:06			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: OW-19D

Sampled: 5/13/2020 16:51

Sample ID: 20E0596-06

Sample Matrix: Ground Water

1,4-Dioxane by isotope dilution GC/MS

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
1,4-Dioxane	0.30	0.19	µg/L	1		SW-846 8270D-E	5/15/20	5/18/20 14:55	CLA
Surrogates	% Recovery		Recovery Limits		Flag/Qual				
1,4-Dioxane-d8	22.8		15-110				5/18/20 14:55		

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: OW-19D

Sampled: 5/13/2020 16:51

Sample ID: 20E0596-06

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	0.90	2.0	0.64	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorobutanesulfonic acid (PFBS)	8.5	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluoropentanoic acid (PFPeA)	28	2.0	0.42	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorohexanoic acid (PFHxA)	35	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorohexanesulfonic acid (PFHxS)	120	2.0	0.77	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluoroheptanoic acid (PFHpA)	11	2.0	0.53	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluoroheptanesulfonic acid (PFHpS)	8.2	2.0	1.0	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorooctanoic acid (PFOA)	23	2.0	0.71	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorooctanesulfonic acid (PFOS)	310	20	6.8	ng/L	10		SOP 434-PFAAS	5/20/20	5/27/20 15:54	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorononanoic acid (PFNA)	1.7	2.0	0.63	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorotridecanoic acid (PFTTrDA)	ND	2.0	0.67	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1		SOP 434-PFAAS	5/20/20	5/22/20 19:28	JFC
Surrogates	% Recovery	Recovery Limits		Flag/Qual						
13C-PFHxA	*	70-130		S-01		5/27/20 15:54				
13C-PFHxA	84.2	70-130				5/22/20 19:28				
13C-PFDA	*	70-130		S-01		5/27/20 15:54				
13C-PFDA	75.5	70-130				5/22/20 19:28				
d5-NEtFOSAA	*	70-130		S-01		5/27/20 15:54				
d5-NEtFOSAA	76.6	70-130				5/22/20 19:28				

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: A14

Sampled: 5/13/2020 16:33

Sample ID: 20E0596-07

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	1.4	1.1	0.36	µg/kg dry	1		SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	1.1	0.16	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoropentanoic acid (PFPeA)	5.3	1.1	0.085	µg/kg dry	1		SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorohexanoic acid (PFHxA)	1.2	1.1	0.20	µg/kg dry	1		SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
11Cl-PF3OUdS (F53B Major)	ND	1.1	0.21	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
9Cl-PF3ONS (F53B Minor)	ND	1.1	0.16	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	1.1	0.14	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	2.1	1.0	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	1.1	0.52	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorodecanoic acid (PFDA)	0.95	1.1	0.17	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorododecanoic acid (PFDoA)	0.35	1.1	0.10	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	ND	1.1	0.077	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	1.1	0.58	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
N-EtFOSAA	ND	1.1	0.36	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
N-MeFOSAA	ND	1.1	0.26	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorotetradecanoic acid (PFTA)	ND	1.1	0.29	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorotridecanoic acid (PFTrDA)	0.60	1.1	0.24	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	1.1	0.23	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	1.1	0.43	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorooctanesulfonamide (FOSA)	ND	1.1	0.24	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorononanesulfonic acid (PFNS)	ND	1.1	0.42	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	1.1	0.17	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoro-1-butanedisulfonamide (FBSA)	ND	1.1	0.13	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	1.1	0.24	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	1.1	0.25	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	1.1	0.091	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	1.1	0.25	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoropentanesulfonic acid (PFPeS)	ND	1.1	0.27	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoroundecanoic acid (PFUnA)	1.3	1.1	0.23	µg/kg dry	1		SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	1.1	0.28	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluoroheptanoic acid (PFHpA)	0.51	1.1	0.24	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorooctanoic acid (PFOA)	0.68	1.1	0.16	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorooctanesulfonic acid (PFOS)	0.32	1.1	0.19	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Perfluorononanoic acid (PFNA)	0.54	1.1	0.18	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:16	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
M8FOSA	52.5		50-150							
M2-4:2FTS	65.3		50-150							
M2PFTA	23.4		*							
M2-8:2FTS	103		50-150							
MPFBA	62.0		50-150							
M3HFPO-DA	54.3		50-150							
M6PFDA	55.9		50-150							
M3PFBS	52.6		50-150							

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: A14

Sampled: 5/13/2020 16:33

Sample ID: 20E0596-07

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
M7PFUnA	60.8			50-150				5/30/20	2:16	
M2-6:2FTS	81.5			50-150				5/30/20	2:16	
M5PFPeA	34.6	*		50-150		S-19		5/30/20	2:16	
M5PFHxA	52.4			50-150				5/30/20	2:16	
M3PFHxS	53.6			50-150				5/30/20	2:16	
M4PFHpA	48.5	*		50-150		S-19		5/30/20	2:16	
M8PFOA	59.6			50-150				5/30/20	2:16	
M8PFOS	54.4			50-150				5/30/20	2:16	
M9PFNA	56.2			50-150				5/30/20	2:16	
MPFDoA	51.6			50-150				5/30/20	2:16	
d5-NEtFOSAA	72.3			50-150				5/30/20	2:16	
d3-NMeFOSAA	61.0			50-150				5/30/20	2:16	

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Sampled: 5/13/2020 16:33

Field Sample #: A14

Sample ID: 20E0596-07

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	80.4		% Wt	1		SM 2540G	5/15/20	5/15/20 16:07	CBM

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: A15

Sampled: 5/13/2020 16:24

Sample ID: 20E0596-08

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	ND	0.92	0.32	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	0.92	0.14	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoropentanoic acid (PFPeA)	0.16	0.92	0.074	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorohexanoic acid (PFHxA)	ND	0.92	0.18	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
11Cl-PF3OUdS (F53B Major)	ND	0.92	0.18	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
9Cl-PF3ONS (F53B Minor)	ND	0.92	0.14	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.92	0.12	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	0.87	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.92	0.45	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorodecanoic acid (PFDA)	ND	0.92	0.15	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorododecanoic acid (PFDoA)	ND	0.92	0.091	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEA)	ND	0.92	0.067	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.92	0.50	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
N-EtFOSAA	ND	0.92	0.31	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
N-MeFOSAA	ND	0.92	0.23	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorotetradecanoic acid (PFTA)	ND	0.92	0.25	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	0.92	0.21	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.92	0.20	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	0.92	0.37	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorooctanesulfonamide (FOSA)	ND	0.92	0.21	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorononanesulfonic acid (PFNS)	ND	0.92	0.37	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.92	0.15	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoro-1-butanedisulfonamide (FBSA)	ND	0.92	0.11	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorohexanesulfonic acid (PFHxS)	ND	0.92	0.21	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.92	0.22	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.92	0.079	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.92	0.22	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoropentanesulfonic acid (PFPeS)	ND	0.92	0.24	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoroundecanoic acid (PFUnA)	ND	0.92	0.20	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Nonafluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.92	0.24	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluoroheptanoic acid (PFHpA)	ND	0.92	0.21	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorooctanoic acid (PFOA)	ND	0.92	0.14	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorooctanesulfonic acid (PFOS)	0.29	0.92	0.16	µg/kg dry	1	J	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC
Perfluorononanoic acid (PFNA)	ND	0.92	0.15	µg/kg dry	1	U	SOP-466 PFAS	5/28/20	5/30/20 2:45	JFC

Surrogates	% Recovery	Recovery Limits	Flag/Qual
M8FOSA	59.7	50-150	5/30/20 2:45
M2-4:2FTS	61.1	50-150	5/30/20 2:45
M2PFTA	56.7	50-150	5/30/20 2:45
M2-8:2FTS	77.7	50-150	5/30/20 2:45
MPFBA	71.2	50-150	5/30/20 2:45
M3HFPO-DA	64.9	50-150	5/30/20 2:45
M6PFDA	66.5	50-150	5/30/20 2:45
M3PFBS	69.7	50-150	5/30/20 2:45

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Field Sample #: A15

Sampled: 5/13/2020 16:24

Sample ID: 20E0596-08

Sample Matrix: Soil

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
M7PFUnA	69.3			50-150				5/30/20	2:45	
M2-6:2FTS	64.6			50-150				5/30/20	2:45	
M5PFPeA	63.4			50-150				5/30/20	2:45	
M5PFHxA	68.2			50-150				5/30/20	2:45	
M3PFHxS	61.8			50-150				5/30/20	2:45	
M4PFHpA	65.0			50-150				5/30/20	2:45	
M8PFOA	69.8			50-150				5/30/20	2:45	
M8PFOS	71.1			50-150				5/30/20	2:45	
M9PFNA	71.4			50-150				5/30/20	2:45	
MPFDoA	64.6			50-150				5/30/20	2:45	
d5-NEtFOSAA	90.5			50-150				5/30/20	2:45	
d3-NMeFOSAA	78.5			50-150				5/30/20	2:45	

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Project Location: Barnstable Airport

Sample Description:

Work Order: 20E0596

Date Received: 5/14/2020

Sampled: 5/13/2020 16:24

Field Sample #: A15

Sample ID: 20E0596-08

Sample Matrix: Soil

Conventional Chemistry Parameters by EPA/APHA/SW-846 Methods (Total)

Analyte	Results	RL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
% Solids	90.8		% Wt	1		SM 2540G	5/16/20	5/18/20 7:04	AVF

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Sample Extraction Data**Prep Method: % Solids Analytical Method: SM 2540G**

Lab Number [Field ID]	Batch	Date
20E0596-07 [A14]	B258101	05/15/20

Prep Method: % Solids Analytical Method: SM 2540G

Lab Number [Field ID]	Batch	Date
20E0596-08 [A15]	B258157	05/16/20

Prep Method: SOP 434-PFAAS Analytical Method: SOP 434-PFAAS

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0596-01 [HW-D (M)]	B258207	250	1.00	05/20/20
20E0596-03 [HW-D (dd)]	B258207	250	1.00	05/20/20
20E0596-05 [OW-18D]	B258207	250	1.00	05/20/20
20E0596-06 [OW-19D]	B258207	250	1.00	05/20/20
20E0596-06RE1 [OW-19D]	B258207	250	1.00	05/20/20

Prep Method: SOP 434-PFAAS Analytical Method: SOP 434-PFAAS

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0596-02RE1 [HW-D (d)]	B258727	250	1.00	05/27/20

Prep Method: SOP 465-PFAAS Analytical Method: SOP-466 PFAS

Lab Number [Field ID]	Batch	Initial [g]	Final [mL]	Date
20E0596-07RE1 [A14]	B258609	5.87	10.0	05/28/20
20E0596-08RE1 [A15]	B258609	5.99	10.0	05/28/20

Prep Method: SW-846 3510C Analytical Method: SW-846 8270D-E

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E0596-04 [HW-L]	B258084	1040	1.00	05/15/20
20E0596-05 [OW-18D]	B258084	1020	1.00	05/15/20
20E0596-06 [OW-19D]	B258084	1040	1.00	05/15/20

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QUALITY CONTROL
1,4-Dioxane by isotope dilution GC/MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B258084 - SW-846 3510C
Blank (B258084-BLK1)

Prepared: 05/15/20 Analyzed: 05/18/20

1,4-Dioxane	ND	0.20	µg/L							
Surrogate: 1,4-Dioxane-d8	2.76		µg/L	10.0		27.6	15-110			

LCS (B258084-BS1)

Prepared: 05/15/20 Analyzed: 05/18/20

1,4-Dioxane	10.2	0.20	µg/L	10.0		102	40-140			
Surrogate: 1,4-Dioxane-d8	3.14		µg/L	10.0		31.4	15-110			

LCS Dup (B258084-BSD1)

Prepared: 05/15/20 Analyzed: 05/18/20

1,4-Dioxane	10.7	0.20	µg/L	10.0		107	40-140	4.86	30	
Surrogate: 1,4-Dioxane-d8	2.74		µg/L	10.0		27.4	15-110			

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B258207 - SOP 434-PFAAS										
Blank (B258207-BLK1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	32.3		ng/L	40.0		80.6	70-130			
Surrogate: 13C-PFDA	31.2		ng/L	40.0		78.0	70-130			
Surrogate: d5-NEtFOSAA	139		ng/L	160		87.0	70-130			
LCS (B258207-BS1)										
Prepared: 05/20/20 Analyzed: 05/22/20										
Perfluorobutanoic acid (PFBA)	1.76	2.0	ng/L	2.00		88.2	70-130			
Perfluorobutanesulfonic acid (PFBS)	1.65	2.0	ng/L	1.77		93.3	70-130			
Perfluoropentanoic acid (PFPeA)	1.88	2.0	ng/L	2.00		93.8	70-130			
Perfluorohexanoic acid (PFHxA)	2.02	2.0	ng/L	2.00		101	70-130			
Perfluorohexanesulfonic acid (PFHxS)	1.59	2.0	ng/L	1.82		87.6	70-130			
Perfluoroheptanoic acid (PFHpA)	1.86	2.0	ng/L	2.00		92.9	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	1.52	2.0	ng/L	1.90		80.2	70-130			
Perfluorooctanoic acid (PFOA)	1.97	2.0	ng/L	2.00		98.7	70-130			
Perfluorooctanesulfonic acid (PFOS)	1.98	2.0	ng/L	1.85		107	70-130			
Perfluorooctanesulfonamide (FOSA)	1.73	2.0	ng/L	2.00		86.5	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.35	2.0	ng/L	2.00		117	70-130			
Perfluorononanoic acid (PFNA)	2.04	2.0	ng/L	2.00		102	70-130			
Perfluorodecanoic acid (PFDA)	2.09	2.0	ng/L	2.00		104	70-130			
Perfluorodecanesulfonic acid (PFDS)	1.90	2.0	ng/L	1.93		98.4	70-130			
N-EtFOSAA	2.10	2.0	ng/L	2.00		105	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	2.12	2.0	ng/L	1.92		110	70-130			
Perfluoroundecanoic acid (PFUnA)	2.20	2.0	ng/L	2.00		110	70-130			
N-MeFOSAA	1.91	2.0	ng/L	2.00		95.5	70-130			
Perfluorododecanoic acid (PFDoA)	2.30	2.0	ng/L	2.00		115	70-130			
Perfluorotridecanoic acid (PFTrDA)	2.59	2.0	ng/L	2.00		129	70-130			
Perfluorotetradecanoic acid (PFTA)	3.20	2.0	ng/L	2.00		160 *	70-130			L-01
Surrogate: 13C-PFHxA	35.9		ng/L	40.0		89.7	70-130			
Surrogate: 13C-PFDA	38.4		ng/L	40.0		96.0	70-130			
Surrogate: d5-NEtFOSAA	173		ng/L	160		108	70-130			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL
Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B258609 - SOP 465-PFAAS
Blank (B258609-BLK1)

Prepared: 05/28/20 Analyzed: 05/29/20

Perfluorobutanoic acid (PFBA)	ND	0.89	µg/kg wet							U
Perfluorobutanesulfonic acid (PFBS)	ND	0.89	µg/kg wet							U
Perfluoropentanoic acid (PFPeA)	ND	0.89	µg/kg wet							U
Perfluorohexanoic acid (PFHxA)	ND	0.89	µg/kg wet							U
11Cl-PF3OUdS (F53B Major)	ND	0.89	µg/kg wet							U
9Cl-PF3ONS (F53B Minor)	ND	0.89	µg/kg wet							U
4,8-dioxa-3H-perfluorononanoic acid (ADONA)	ND	0.89	µg/kg wet							U
Hexafluoropropylene oxide dimer acid (HFPO-DA)	ND	1.8	µg/kg wet							U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	0.89	µg/kg wet							U
Perfluorodecanoic acid (PFDA)	ND	0.89	µg/kg wet							U
Perfluorododecanoic acid (PFDoA)	ND	0.89	µg/kg wet							U
Perfluoro(2-ethoxyethane)sulfonic acid (PFEEESA)	ND	0.89	µg/kg wet							U
Perfluoroheptanesulfonic acid (PFHpS)	ND	0.89	µg/kg wet							U
N-EtFOSAA	ND	0.89	µg/kg wet							U
N-MeFOSAA	ND	0.89	µg/kg wet							U
Perfluorotetradecanoic acid (PFTA)	ND	0.89	µg/kg wet							U
Perfluorotridecanoic acid (PFTrDA)	ND	0.89	µg/kg wet							U
4:2 Fluorotelomersulfonic acid (4:2FTS A)	ND	0.89	µg/kg wet							U
Perfluorodecanesulfonic acid (PFDS)	ND	0.89	µg/kg wet							U
Perfluorooctanesulfonamide (FOSA)	ND	0.89	µg/kg wet							U
Perfluorononanesulfonic acid (PFNS)	ND	0.89	µg/kg wet							U
Perfluoro-1-hexanesulfonamide (FHxSA)	ND	0.89	µg/kg wet							U
Perfluoro-1-butanefulfonamide (FBSA)	ND	0.89	µg/kg wet							U
Perfluorohexanesulfonic acid (PFHxS)	ND	0.89	µg/kg wet							U
Perfluoro-4-oxapentanoic acid (PFMPA)	ND	0.89	µg/kg wet							U
Perfluoro-5-oxahexanoic acid (PFMBA)	ND	0.89	µg/kg wet							U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	0.89	µg/kg wet							U
Perfluoropentanesulfonic acid (PFPeS)	ND	0.89	µg/kg wet							U
Perfluoroundecanoic acid (PFUnA)	ND	0.89	µg/kg wet							U
Nonfluoro-3,6-dioxaheptanoic acid (NFDHA)	ND	0.89	µg/kg wet							U
Perfluoroheptanoic acid (PFHpA)	ND	0.89	µg/kg wet							U
Perfluorooctanoic acid (PFOA)	ND	0.89	µg/kg wet							U
Perfluorooctanesulfonic acid (PFOS)	ND	0.89	µg/kg wet							U
Perfluorononanoic acid (PFNA)	ND	0.89	µg/kg wet							U
Surrogate: M8FOSA	2.93		µg/kg wet	3.56		82.3	50-150			
Surrogate: M2-4:2FTS	2.79		µg/kg wet	3.33		83.7	50-150			
Surrogate: M2PFTA	1.96		µg/kg wet	3.56		54.9	50-150			
Surrogate: M2-8:2FTS	2.75		µg/kg wet	3.41		80.7	50-150			
Surrogate: MPFBA	3.11		µg/kg wet	3.56		87.2	50-150			
Surrogate: M3HFPO-DA	3.00		µg/kg wet	3.56		84.3	50-150			
Surrogate: M6PFDA	3.08		µg/kg wet	3.56		86.4	50-150			
Surrogate: M3PFBS	2.76		µg/kg wet	3.31		83.3	50-150			
Surrogate: M7PFUnA	2.99		µg/kg wet	3.56		84.1	50-150			
Surrogate: M2-6:2FTS	2.38		µg/kg wet	3.38		70.5	50-150			
Surrogate: M5PFPeA	2.84		µg/kg wet	3.56		79.7	50-150			
Surrogate: M5PFHxA	3.02		µg/kg wet	3.56		84.8	50-150			
Surrogate: M3PFHxS	2.83		µg/kg wet	3.37		84.1	50-150			
Surrogate: M4PFHpA	3.03		µg/kg wet	3.56		85.2	50-150			
Surrogate: M8PFOA	3.11		µg/kg wet	3.56		87.3	50-150			

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QUALITY CONTROL
Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B258609 - SOP 465-PFAAS										
Blank (B258609-BLK1)										
Prepared: 05/28/20 Analyzed: 05/29/20										
Surrogate: M8PFOS	2.85		µg/kg wet	3.41		83.5	50-150			
Surrogate: M9PFNA	3.04		µg/kg wet	3.56		85.4	50-150			
Surrogate: MPFDoA	2.56		µg/kg wet	3.56		71.8	50-150			
Surrogate: d5-NEtFOSAA	3.04		µg/kg wet	3.56		85.3	50-150			
Surrogate: d3-NMeFOSAA	2.82		µg/kg wet	3.56		79.2	50-150			
LCS (B258609-BS1)										
Prepared: 05/28/20 Analyzed: 05/29/20										
Perfluorobutanoic acid (PFBA)	2.52	0.91	µg/kg wet	2.27		111	71-135			
Perfluorobutanesulfonic acid (PFBS)	2.32	0.91	µg/kg wet	2.01		116	72-128			
Perfluoropentanoic acid (PFPeA)	2.90	0.91	µg/kg wet	2.27		128	69-132			
Perfluorohexanoic acid (PFHxA)	2.35	0.91	µg/kg wet	2.27		104	70-132			
11Cl-PF3OUdS (F53B Major)	2.10	0.91	µg/kg wet	2.14		98.5	50-150			
9Cl-PF3ONS (F53B Minor)	2.17	0.91	µg/kg wet	2.11		103	50-150			
4,8-dioxo-3H-perfluorononanoic acid (ADONA)	2.48	0.91	µg/kg wet	2.14		116	50-150			
Hexafluoropropylene oxide dimer acid (HFPO-DA)	2.23	1.8	µg/kg wet	2.27		98.5	50-150			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	3.00	0.91	µg/kg wet	2.17		138	* 65-137			L-05
Perfluorodecanoic acid (PFDA)	2.40	0.91	µg/kg wet	2.27		106	69-133			
Perfluorododecanoic acid (PFDoA)	2.47	0.91	µg/kg wet	2.27		109	69-135			
Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA)	1.88	0.91	µg/kg wet	2.02		93.1	50-150			
Perfluoroheptanesulfonic acid (PFHpS)	2.51	0.91	µg/kg wet	2.16		116	70-132			
N-EtFOSAA	2.06	0.91	µg/kg wet	2.27		90.8	61-139			
N-MeFOSAA	1.82	0.91	µg/kg wet	2.27		80.2	63-144			
Perfluorotetradecanoic acid (PFTA)	2.39	0.91	µg/kg wet	2.27		105	69-133			
Perfluorotridecanoic acid (PFTrDA)	2.98	0.91	µg/kg wet	2.27		131	66-139			
4:2 Fluorotelomersulfonic acid (4:2FTS A)	2.58	0.91	µg/kg wet	2.12		122	62-145			
Perfluorodecanesulfonic acid (PFDS)	2.17	0.91	µg/kg wet	2.19		99.0	59-134			
Perfluorooctanesulfonamide (FOSA)	2.44	0.91	µg/kg wet	2.27		107	67-137			
Perfluorononanesulfonic acid (PFNS)	2.66	0.91	µg/kg wet	2.18		122	69-125			
Perfluoro-1-hexanesulfonamide (FHxSA)	2.39	0.91	µg/kg wet	2.27		105	50-150			
Perfluoro-1-butanessulfonamide (FBSA)	2.77	0.91	µg/kg wet	2.27		122	50-150			
Perfluorohexanesulfonic acid (PFHxS)	1.90	0.91	µg/kg wet	2.07		91.8	67-130			
Perfluoro-4-oxapentanoic acid (PFMPA)	2.26	0.91	µg/kg wet	2.27		99.7	50-150			
Perfluoro-5-oxahexanoic acid (PFMBA)	2.65	0.91	µg/kg wet	2.27		117	50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	2.84	0.91	µg/kg wet	2.15		132	64-140			
Perfluoropentanesulfonic acid (PFPeS)	2.24	0.91	µg/kg wet	2.13		105	73-123			
Perfluoroundecanoic acid (PFUnA)	2.41	0.91	µg/kg wet	2.27		106	64-136			
Nonafluoro-3,6-dioxahexanoic acid (NFDHA)	1.87	0.91	µg/kg wet	2.27		82.4	50-150			
Perfluoroheptanoic acid (PFHpA)	2.57	0.91	µg/kg wet	2.27		113	71-131			
Perfluorooctanoic acid (PFOA)	2.52	0.91	µg/kg wet	2.27		111	69-133			
Perfluorooctanesulfonic acid (PFOS)	1.89	0.91	µg/kg wet	2.10		90.0	68-136			
Perfluorononanoic acid (PFNA)	2.39	0.91	µg/kg wet	2.27		105	72-129			
Surrogate: M8FOSA	2.80		µg/kg wet	3.63		77.1	50-150			
Surrogate: M2-4:2FTS	2.63		µg/kg wet	3.39		77.6	50-150			
Surrogate: M2PFTA	2.08		µg/kg wet	3.63		57.3	50-150			
Surrogate: M2-8:2FTS	2.66		µg/kg wet	3.48		76.6	50-150			
Surrogate: MPFBA	2.92		µg/kg wet	3.63		80.5	50-150			
Surrogate: M3HFPO-DA	2.86		µg/kg wet	3.63		78.7	50-150			
Surrogate: M6PFDA	2.87		µg/kg wet	3.63		79.1	50-150			
Surrogate: M3PFBS	2.76		µg/kg wet	3.37		81.9	50-150			

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

QUALITY CONTROL
Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
---------	--------	--------------------	-------	----------------	------------------	------	----------------	-----	--------------	-------

Batch B258609 - SOP 465-PFAAS
LCS (B258609-BS1)

Prepared: 05/28/20 Analyzed: 05/29/20

Surrogate: M7PFUnA	2.80		µg/kg wet	3.63		77.3	50-150			
Surrogate: M2-6:2FTS	2.40		µg/kg wet	3.44		69.8	50-150			
Surrogate: M5PFPeA	2.61		µg/kg wet	3.63		71.8	50-150			
Surrogate: M5PFHxA	2.86		µg/kg wet	3.63		78.7	50-150			
Surrogate: M3PFHxS	2.66		µg/kg wet	3.43		77.5	50-150			
Surrogate: M4PFHpA	2.73		µg/kg wet	3.63		75.3	50-150			
Surrogate: M8PFOA	2.85		µg/kg wet	3.63		78.4	50-150			
Surrogate: M8PFOS	2.77		µg/kg wet	3.47		79.7	50-150			
Surrogate: M9PFNA	2.87		µg/kg wet	3.63		79.0	50-150			
Surrogate: MPFDoA	2.67		µg/kg wet	3.63		73.7	50-150			
Surrogate: d5-NEtFOSAA	2.90		µg/kg wet	3.63		80.0	50-150			
Surrogate: d3-NMeFOSAA	2.84		µg/kg wet	3.63		78.1	50-150			

Batch B258727 - SOP 434-PFAAS
Blank (B258727-BLK1)

Prepared: 05/27/20 Analyzed: 05/31/20

Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							
N-EtFOSAA	ND	2.0	ng/L							
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							
N-MeFOSAA	ND	2.0	ng/L							
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							
Surrogate: 13C-PFHxA	39.8		ng/L	40.0		99.5	70-130			
Surrogate: 13C-PFDA	41.8		ng/L	40.0		104	70-130			
Surrogate: d5-NEtFOSAA	189		ng/L	160		118	70-130			

LCS (B258727-BS1)

Prepared: 05/27/20 Analyzed: 06/01/20

Perfluorobutanoic acid (PFBA)	8.57	2.0	ng/L	10.0		85.7	70-130			
Perfluorobutanesulfonic acid (PFBS)	7.63	2.0	ng/L	8.85		86.2	70-130			
Perfluoropentanoic acid (PFPeA)	9.30	2.0	ng/L	10.0		93.0	70-130			
Perfluorohexanoic acid (PFHxA)	8.97	2.0	ng/L	10.0		89.7	70-130			
Perfluorohexanesulfonic acid (PFHxS)	7.77	2.0	ng/L	9.10		85.3	70-130			
Perfluoroheptanoic acid (PFHpA)	8.81	2.0	ng/L	10.0		88.1	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	7.32	2.0	ng/L	9.50		77.0	70-130			
Perfluorooctanoic acid (PFOA)	9.44	2.0	ng/L	10.0		94.4	70-130			
Perfluorooctanesulfonic acid (PFOS)	7.71	2.0	ng/L	9.25		83.4	70-130			
Perfluorooctanesulfonamide (FOSA)	8.87	2.0	ng/L	10.0		88.7	70-130			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	8.38	2.0	ng/L	10.0		83.8	70-130			

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QUALITY CONTROL
Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
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Batch B258727 - SOP 434-PFAAS
LCS (B258727-BS1)

Prepared: 05/27/20 Analyzed: 06/01/20

Perfluorononanoic acid (PFNA)	8.91	2.0	ng/L	10.0		89.1	70-130			
Perfluorodecanoic acid (PFDA)	9.41	2.0	ng/L	10.0		94.1	70-130			
Perfluorodecanesulfonic acid (PFDS)	8.24	2.0	ng/L	9.65		85.4	70-130			
N-EtFOSAA	9.56	2.0	ng/L	10.0		95.6	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	8.45	2.0	ng/L	9.60		88.0	70-130			
Perfluoroundecanoic acid (PFUnA)	9.39	2.0	ng/L	10.0		93.9	70-130			
N-MeFOSAA	9.40	2.0	ng/L	10.0		94.0	70-130			
Perfluorododecanoic acid (PFDoA)	8.62	2.0	ng/L	10.0		86.2	70-130			
Perfluorotridecanoic acid (PFTrDA)	8.91	2.0	ng/L	10.0		89.1	70-130			
Perfluorotetradecanoic acid (PFTA)	8.15	2.0	ng/L	10.0		81.5	70-130			
Surrogate: 13C-PFHxA	39.4		ng/L	40.0		98.6	70-130			
Surrogate: 13C-PFDA	40.3		ng/L	40.0		101	70-130			
Surrogate: d5-NEtFOSAA	172		ng/L	160		107	70-130			

FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
L-01	Laboratory fortified blank /laboratory control sample recovery outside of control limits. Data validation is not affected since all results are "not detected" for all samples in this batch for this compound and bias is on the high side.
L-05	Laboratory fortified blank/laboratory control sample recovery is outside of control limits. Reported value for this compound is likely to be biased on the high side.
PF-05	Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the low side. Re-analysis yielded similar non-conformance.
PF-06	Opening calibration verification was within control criteria. Closing calibration verification was outside of criteria and biased on the high side. Re-analysis yielded similar non-conformance.
S-01	The surrogate recovery for this sample is not available due to sample dilution below the surrogate reporting limit required from high analyte concentration and/or matrix interferences.
S-19	Surrogate recovery is outside of control limits, matrix interference suspected. Reanalysis yielded similar surrogate non-conformance.
U	Analyte included in the analysis, but not detected
V-06	Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side for this compound.

CERTIFICATIONS

Certified Analyses included in this Report

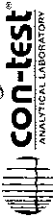
Analyte	Certifications
<i>SOP-434-PFAAS in Water</i>	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P
<i>SOP-466 PFAS in Soil</i>	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
<i>SW-846 8270D-E in Water</i>	
1,4-Dioxane	NY

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020

20E0596



Phone: 413-525-2332

Fax: 413-525-6403

Email: info@contestlabs.com

Address: 40 ROUTE 6A, SANDWICH, MA 02563

Phone: 508-833-6600

Project Location: BARNSTABLE AIRPORT

Project Number: 19128

Project Manager: R. MCCARTHY

Con-Test Quote Name/Number:

Invoice Recipient: BRYAN MASSA

Sampled By: HW

http://www.contestlabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 2_06262019

Page 1 of 1

ANALYSIS REQUESTED

7-Day ☐ 10-Day ☐ Due Date: ☐
PFAS 10-Day (std) ☒
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐
Field Filtered ☐ Lab to Filter ☐
Field Filtered ☐ Lab to Filter ☐
Format: PDF ☒ EXCEL ☒
Other: ☐
CLP Like Data Pkg Required: ☐
Email To: jvaneze@herscheywitten.com
Fax To #:

Con-Test Work Order#	Client Sample ID / Description	Beginning Date/Time	Ending Date/Time	COMP/GRAB	Matrix Code	Conc Code	VIALS	GLASS	PLASTIC	BACTERIA	ENCORE
1	HW-D (M)	5/13/20 10:54	5/13/20 5/13/20	GRAB	GW	U			X		
2	HW-D (A)	5/13/20 11:54	5/13/20 5/13/20	GRAB	GW	I			X		
3	HW-D (cold)	5/13/20 14:18	5/13/20 5/13/20	GRAB	GW	I			X		
4	HW-L	5/13/20 15:51	5/13/20 5/13/20	GRAB	GW	I		X			
5	OW-18D	5/13/20 14:08	5/13/20 5/13/20	GRAB	GW	I		X			
6	OW-19D	5/13/20 16:51	5/13/20 5/13/20	GRAB	GW	I		X			
7	A14	5/13/20 16:33	5/13/20 5/13/20	GRAB	S	I			X		
8	A15	5/13/20 16:24	5/13/20 5/13/20	GRAB	S	I			X		

Client Comments:

include MDL in report for all PFAS analyses
need to meet S-1/GW-1 standards

Relinquished by: (signature) *[Signature]* Date/Time: 5/14/2020 12:35
Received by: (signature) *[Signature]* Date/Time: 5/14/2020 12:35
Relinquished by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00
Received by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00
Relinquished by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00
Received by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00
Relinquished by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00
Received by: (signature) *[Signature]* Date/Time: 5/14/2020 17:00

Project Entity: Government ☐ Federal ☐ City ☐
Municipality: 21 J ☐ Brownfield ☐
MWRA ☐ School ☐ MBTA ☐
WFTA ☐
Other ☐
Chromatogram ☐
AIHA-LAP LLC ☐
NEIAC and AIHA-LAP LLC Accredited

Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

1 Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
A = Air
S = Soil
SL = Sludge
SOL = Solid
O = Other (please define)

2 Preservation Codes:
I = Iced
H = HCL
M = Methanol
N = Nitric Acid
S = Sulfuric Acid
B = Sodium Bisulfate
X = Sodium Hydroxide
T = Sodium Thiosulfate
O = Other (please define)

PCB ONLY
Soxhlet ☐
Non Soxhlet ☐

Comments:

Disclaimer: Con-Test Labs is not responsible for any omitted information on the Chain of Custody. The Chain of Custody is a legal document that must be complete and accurate and is used to determine whether analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Con-Test values your partnership on each project and will try to assist with missing information, but will not held accountable.

I Have Not Confirmed Sample Container
Numbers With Lab Staff Before Relinquishing
Over Samples _____



con-test[®]
ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False
Statement will be brought to the attention of the Client - State True or False

Client Horsley Witten

Received By [Signature]

Date 5/14/20

Time 1700

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 2 Actual Temp - 3.8
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tamed with? n/a

Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T

Did COC include all Client T Analysis T Sampler Name T
pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T

Are there Lab to Filters? F

Are there Rushes? F

Are there Short Holds? F

Is there enough Volume? T

Is there Headspace where applicable? n/a

Proper Media/Containers Used? T

Were trip blanks received? F

Do all samples have the proper pH? _____

Who was notified? _____

Who was notified? _____

Who was notified? _____

MS/MSD? F

Is splitting samples required? F

On COC? F

Acid n/a Base n/a

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.	<u>0</u>	1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic	<u>12</u>	4oz Amb/Clear
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear
DI-		Other Glass		Other Plastic		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Unused Media

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear
DI-		Other Plastic		Other Glass		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Comments:

June 10, 2020

Bryan Massa
Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563

Project Location: Barnstable Airport
Client Job Number:
Project Number: 19128
Laboratory Work Order Number: 20E1111

Enclosed are results of analyses for samples received by the laboratory on May 27, 2020. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

A handwritten signature in black ink, appearing to read "R J McCarthy", is displayed within a light gray rectangular box.

Raymond J. McCarthy
Project Manager

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39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Horsley Witten Group
90 Route 6A Unit #1
Sandwich, MA 02563
ATTN: Bryan Massa

REPORT DATE: 6/10/2020

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 19128

ANALYTICAL SUMMARY

WORK ORDER NUMBER: 20E1111

The results of analyses performed on the following samples submitted to the CON-TEST Analytical Laboratory are found in this report.

PROJECT LOCATION: Barnstable Airport

FIELD SAMPLE #	LAB ID:	MATRIX	SAMPLE DESCRIPTION	TEST	SUB LAB
HW-K	20E1111-01	Ground Water		SOP 434-PFAAS	

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CASE NARRATIVE SUMMARY

All reported results are within defined laboratory quality control objectives unless listed below or otherwise qualified in this report.

SOP 434-PFAAS

Qualifications:

PF-01

Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.

Analyte & Samples(s) Qualified:

13C-PFDA

20E1111-01[HW-K]

d5-NEtFOSAA

20E1111-01[HW-K]

The results of analyses reported only relate to samples submitted to the Con-Test Analytical Laboratory for testing.

I certify that the analyses listed above, unless specifically listed as subcontracted, if any, were performed under my direction according to the approved methodologies listed in this document, and that based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

A handwritten signature in black ink, appearing to read "Lisa Worthington", is written over a light gray rectangular background.

Lisa A. Worthington
Technical Representative

39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

Project Location: Barnstable Airport

Sample Description:

Work Order: 20E1111

Date Received: 5/27/2020

Field Sample #: HW-K

Sampled: 5/21/2020 10:07

Sample ID: 20E1111-01

Sample Matrix: Ground Water

Semivolatile Organic Compounds by - LC/MS-MS

Analyte	Results	RL	DL	Units	Dilution	Flag/Qual	Method	Date Prepared	Date/Time Analyzed	Analyst
Perfluorobutanoic acid (PFBA)	3.2	2.0	0.64	ng/L	1		SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluoropentanoic acid (PFPeA)	10	2.0	0.42	ng/L	1		SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorohexanoic acid (PFHxA)	5.8	2.0	0.51	ng/L	1		SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorohexanesulfonic acid (PFHxS)	1.0	2.0	0.77	ng/L	1	J	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluoroheptanoic acid (PFHpA)	2.8	2.0	0.53	ng/L	1		SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	1.0	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorooctanoic acid (PFOA)	1.9	2.0	0.71	ng/L	1	J	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorooctanesulfonic acid (PFOS)	1.6	2.0	0.68	ng/L	1	J	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorooctanesulfonamide (FOSA)	ND	2.0	0.83	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	0.39	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorononanoic acid (PFNA)	1.2	2.0	0.63	ng/L	1	J	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorodecanoic acid (PFDA)	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	0.51	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
N-EtFOSAA	ND	2.0	0.70	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	1.1	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluoroundecanoic acid (PFUnA)	ND	2.0	0.49	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
N-MeFOSAA	ND	2.0	0.62	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorododecanoic acid (PFDoA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	0.67	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Perfluorotetradecanoic acid (PFTA)	ND	2.0	0.50	ng/L	1	U	SOP 434-PFAAS	6/3/20	6/10/20 0:54	JFC
Surrogates	% Recovery		Recovery Limits		Flag/Qual					
13C-PFHxA	98.2		70-130				6/10/20 0:54			
13C-PFDA	48.5 *		70-130		PF-01		6/10/20 0:54			
d5-NEtFOSAA	35.0 *		70-130		PF-01		6/10/20 0:54			

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Sample Extraction Data

Prep Method: SOP 434-PFAAS **Analytical Method:** SOP 434-PFAAS

Lab Number [Field ID]	Batch	Initial [mL]	Final [mL]	Date
20E1111-01 [HW-K]	B259212	250	1.00	06/03/20

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QUALITY CONTROL

Semivolatile Organic Compounds by - LC/MS-MS - Quality Control

Analyte	Result	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Batch B259212 - SOP 434-PFAAS										
Blank (B259212-BLK1)										
Prepared: 06/03/20 Analyzed: 06/10/20										
Perfluorobutanoic acid (PFBA)	ND	2.0	ng/L							U
Perfluorobutanesulfonic acid (PFBS)	ND	2.0	ng/L							U
Perfluoropentanoic acid (PFPeA)	ND	2.0	ng/L							U
Perfluorohexanoic acid (PFHxA)	ND	2.0	ng/L							U
Perfluorohexanesulfonic acid (PFHxS)	ND	2.0	ng/L							U
Perfluoroheptanoic acid (PFHpA)	ND	2.0	ng/L							U
Perfluoroheptanesulfonic acid (PFHpS)	ND	2.0	ng/L							U
Perfluorooctanoic acid (PFOA)	ND	2.0	ng/L							U
Perfluorooctanesulfonic acid (PFOS)	ND	2.0	ng/L							U
Perfluorooctanesulfonamide (FOSA)	ND	2.0	ng/L							U
6:2 Fluorotelomersulfonic acid (6:2FTS A)	ND	2.0	ng/L							U
Perfluorononanoic acid (PFNA)	ND	2.0	ng/L							U
Perfluorodecanoic acid (PFDA)	ND	2.0	ng/L							U
Perfluorodecanesulfonic acid (PFDS)	ND	2.0	ng/L							U
N-EtFOSAA	ND	2.0	ng/L							U
8:2 Fluorotelomersulfonic acid (8:2FTS A)	ND	2.0	ng/L							U
Perfluoroundecanoic acid (PFUnA)	ND	2.0	ng/L							U
N-MeFOSAA	ND	2.0	ng/L							U
Perfluorododecanoic acid (PFDoA)	ND	2.0	ng/L							U
Perfluorotridecanoic acid (PFTrDA)	ND	2.0	ng/L							U
Perfluorotetradecanoic acid (PFTA)	ND	2.0	ng/L							U
Surrogate: 13C-PFHxA	42.6		ng/L	40.0		106	70-130			
Surrogate: 13C-PFDA	36.3		ng/L	40.0		90.8	70-130			
Surrogate: d5-NEtFOSAA	163		ng/L	160		102	70-130			
LCS (B259212-BS1)										
Prepared: 06/03/20 Analyzed: 06/10/20										
Perfluorobutanoic acid (PFBA)	2.36	2.0	ng/L	2.00		118	70-130			
Perfluorobutanesulfonic acid (PFBS)	1.90	2.0	ng/L	1.77		107	70-130			J
Perfluoropentanoic acid (PFPeA)	2.37	2.0	ng/L	2.00		119	70-130			
Perfluorohexanoic acid (PFHxA)	2.40	2.0	ng/L	2.00		120	70-130			
Perfluorohexanesulfonic acid (PFHxS)	2.07	2.0	ng/L	1.82		114	70-130			
Perfluoroheptanoic acid (PFHpA)	2.39	2.0	ng/L	2.00		119	70-130			
Perfluoroheptanesulfonic acid (PFHpS)	1.48	2.0	ng/L	1.90		77.8	50-150			J
Perfluorooctanoic acid (PFOA)	2.52	2.0	ng/L	2.00		126	70-130			
Perfluorooctanesulfonic acid (PFOS)	2.07	2.0	ng/L	1.85		112	70-130			
Perfluorooctanesulfonamide (FOSA)	2.60	2.0	ng/L	2.00		130	50-150			
6:2 Fluorotelomersulfonic acid (6:2FTS A)	1.74	2.0	ng/L	2.00		86.9	70-130			J
Perfluorononanoic acid (PFNA)	2.22	2.0	ng/L	2.00		111	70-130			
Perfluorodecanoic acid (PFDA)	2.43	2.0	ng/L	2.00		121	70-130			
Perfluorodecanesulfonic acid (PFDS)	1.73	2.0	ng/L	1.93		89.9	70-130			J
N-EtFOSAA	2.16	2.0	ng/L	2.00		108	70-130			
8:2 Fluorotelomersulfonic acid (8:2FTS A)	1.75	2.0	ng/L	1.92		91.1	50-150			J
Perfluoroundecanoic acid (PFUnA)	2.36	2.0	ng/L	2.00		118	70-130			
N-MeFOSAA	1.73	2.0	ng/L	2.00		86.6	70-130			J
Perfluorododecanoic acid (PFDoA)	1.65	2.0	ng/L	2.00		82.6	70-130			J
Perfluorotridecanoic acid (PFTrDA)	1.51	2.0	ng/L	2.00		75.6	70-130			J
Perfluorotetradecanoic acid (PFTA)	1.70	2.0	ng/L	2.00		85.1	70-130			J
Surrogate: 13C-PFHxA	46.4		ng/L	40.0		116	70-130			
Surrogate: 13C-PFDA	41.4		ng/L	40.0		103	70-130			
Surrogate: d5-NEtFOSAA	187		ng/L	160		117	70-130			

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FLAG/QUALIFIER SUMMARY

*	QC result is outside of established limits.
†	Wide recovery limits established for difficult compound.
‡	Wide RPD limits established for difficult compound.
#	Data exceeded client recommended or regulatory level
ND	Not Detected
RL	Reporting Limit is at the level of quantitation (LOQ)
DL	Detection Limit is the lower limit of detection determined by the MDL study
MCL	Maximum Contaminant Level
	Percent recoveries and relative percent differences (RPDs) are determined by the software using values in the calculation which have not been rounded.
	No results have been blank subtracted unless specified in the case narrative section.
J	Detected but below the Reporting Limit (lowest calibration standard); therefore, result is an estimated concentration (CLP J-Flag).
PF-01	Surrogate recovery is outside of control limits. Sample not re-extracted past holding time per method.
U	Analyte included in the analysis, but not detected

CERTIFICATIONS

Certified Analyses included in this Report

Analyte	Certifications
SOP 434-PFAAS in Water	
Perfluorobutanoic acid (PFBA)	NH-P
Perfluorobutanesulfonic acid (PFBS)	NH-P
Perfluoropentanoic acid (PFPeA)	NH-P
Perfluorohexanoic acid (PFHxA)	NH-P
Perfluorohexanesulfonic acid (PFHxS)	NH-P
Perfluoroheptanoic acid (PFHpA)	NH-P
Perfluorooctanoic acid (PFOA)	NH-P
Perfluorooctanesulfonic acid (PFOS)	NH-P
6:2 Fluorotelomersulfonic acid (6:2FTS A)	NH-P
Perfluorononanoic acid (PFNA)	NH-P
Perfluorodecanoic acid (PFDA)	NH-P
N-EtFOSAA	NH-P
8:2 Fluorotelomersulfonic acid (8:2FTS A)	NH-P
Perfluoroundecanoic acid (PFUnA)	NH-P
N-MeFOSAA	NH-P
Perfluorododecanoic acid (PFDoA)	NH-P
Perfluorotridecanoic acid (PFTrDA)	NH-P
Perfluorotetradecanoic acid (PFTA)	NH-P

The CON-TEST Environmental Laboratory operates under the following certifications and accreditations:

Code	Description	Number	Expires
AIHA	AIHA-LAP, LLC - ISO17025:2017	100033	03/1/2022
MA	Massachusetts DEP	M-MA100	06/30/2020
CT	Connecticut Department of Public Health	PH-0567	09/30/2021
NY	New York State Department of Health	10899 NELAP	04/1/2021
NH-S	New Hampshire Environmental Lab	2516 NELAP	02/5/2021
RI	Rhode Island Department of Health	LAO00112	12/30/2020
NC	North Carolina Div. of Water Quality	652	12/31/2020
NJ	New Jersey DEP	MA007 NELAP	06/30/2020
FL	Florida Department of Health	E871027 NELAP	06/30/2020
VT	Vermont Department of Health Lead Laboratory	LL015036	07/30/2021
ME	State of Maine	2011028	06/9/2021
VA	Commonwealth of Virginia	460217	12/14/2020
NH-P	New Hampshire Environmental Lab	2557 NELAP	09/6/2020
VT-DW	Vermont Department of Health Drinking Water	VT-255716	06/12/2020
NC-DW	North Carolina Department of Health	25703	07/31/2020
PA	Commonwealth of Pennsylvania DEP	68-05812	06/30/2020

I Have Not Confirmed Sample Container
Numbers With Lab Staff Before Relinquishing
Over Samples _____



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ANALYTICAL LABORATORY

Doc# 277 Rev 5 2017

Login Sample Receipt Checklist - (Rejection Criteria Listing - Using Acceptance Policy) Any False
Statement will be brought to the attention of the Client - State True or False

Client Horsley
Received By [Signature] Date 5/27/20 Time 1800

How were the samples received? In Cooler T No Cooler _____ On Ice T No Ice _____
Direct from Sampling _____ Ambient _____ Melted Ice _____

Were samples within Temperature? 2-6°C T By Gun # 5 Actual Temp - 4.0
By Blank # _____ Actual Temp - _____

Was Custody Seal Intact? n/a Were Samples Tampered with? n/a
Was COC Relinquished? T Does Chain Agree With Samples? T

Are there broken/leaking/loose caps on any samples? F

Is COC in ink/ Legible? T Were samples received within holding time? T
Did COC include all Client T Analysis T Sampler Name T
pertinent Information? Project T ID's T Collection Dates/Times T

Are Sample labels filled out and legible? T
Are there Lab to Filters? F Who was notified? _____
Are there Rushes? F Who was notified? _____
Are there Short Holds? F Who was notified? _____

Is there enough Volume? T
Is there Headspace where applicable? n/a MS/MSD? F
Proper Media/Containers Used? T Is splitting samples required? F
Were trip blanks received? F On COC? F
Do all samples have the proper pH? _____ Acid n/a Base n/a

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic	<u>2</u>	4oz Amb/Clear
Bisulfate-		Flashpoint		Col./Bacteria		2oz Amb/Clear
DI-		Other Glass		Other Plastic		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Unused Media

Vials	#	Containers:	#	#	#	#
Unp-		1 Liter Amb.		1 Liter Plastic		16 oz Amb.
HCL-		500 mL Amb.		500 mL Plastic		8oz Amb/Clear
Meoh-		250 mL Amb.		250 mL Plastic		4oz Amb/Clear
Bisulfate-		Col./Bacteria		Flashpoint		2oz Amb/Clear
DI-		Other Plastic		Other Glass		Encore
Thiosulfate-		SOC Kit		Plastic Bag		Frozen:
Sulfuric-		Perchlorate		Ziplock		

Comments:



ANALYTICAL REPORT

Lab Number:	L2032047
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	PA LANDERS/BMA/RAVEN
Project Number:	14105
Report Date:	09/23/20

The original project report/data package is held by Alpha Analytical. This report/data package is paginated and should be reproduced only in its entirety. Alpha Analytical holds no responsibility for results and/or data that are not consistent with the original.

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

320 Forbes Boulevard, Mansfield, MA 02048-1806
508-822-9300 (Fax) 508-822-3288 800-624-9220 - www.alphalab.com



Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2032047-01	LOAM STOCKPILE	SOIL	FOREST DALE/HYANNIS	08/07/20 08:30	08/07/20
L2032047-02	SAND STOCKPILE	SOIL	FOREST DALE/HYANNIS	08/07/20 09:00	08/07/20
L2032047-03	GEOMEMBRANE	SOLID	FOREST DALE/HYANNIS	08/07/20 11:35	08/07/20

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES
A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES
For any questions answered "No", please refer to the case narrative section on the following page(s).		

Please note that sample matrix information is located in the Sample Results section of this report.



Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Case Narrative (continued)

Report Revision

September 23, 2020: All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2032047-01 and -02: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

WG1397311-1, WG1397311-2, and WG1397311-3: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

The WG1397311-2 LCS recovery, associated with L2032047-01 and -02, is above the acceptance criteria for perfluorotetradecanoic acid (pfta) (135%); however, the associated samples are non-detect to the RL for this target analyte. The results of the original analysis are reported.

The WG1397311-3 LCSD recoveries, associated with L2032047-01 and -02, are above the acceptance criteria for perfluorotridecanoic acid (pftda) (161%) and perfluorotetradecanoic acid (pfta) (142%); however, the associated samples are non-detect to the RL for these target analytes. The results of the original analysis are reported.

SPLP Perfluorinated Alkyl Acids by Isotope Dilution

WG1398130-5: This blank represents the SPLP tumbling blank associated with L2032047-03.

The WG1398130-5 Method Blank, associated with L2032047-03, has a concentration above the reporting limit for PFBA. Since the sample(s) were non-detect to the RL for this target analyte, no further actions were taken.

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Case Narrative (continued)

The results of the original analysis are reported.

The WG1398130-2 LCS recoveries, associated with L2032047-03, are above the acceptance criteria for perfluorododecanoic acid (pfdoa) (162%) and perfluorotridecanoic acid (pftrda) (160%); however, the associated samples are non-detect to the RL for these target analytes. The results of the original analysis are reported.

The WG1398130-3 LCSD recoveries, associated with L2032047-03, are above the acceptance criteria for perfluorononanesulfonic acid (pfns) (160%), perfluorodecanesulfonic acid (pfd) (168%), perfluorododecanoic acid (pfdoa) (160%) and perfluorotridecanoic acid (pftrda) (160%); however, the associated samples are non-detect to the RL for these target analytes. The results of the original analysis are reported.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative

Date: 09/23/20

QC OUTLIER SUMMARY REPORT

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab								
LCMSMS-ID	Batch QC	WG1397311-2	Perfluorotetradecanoic Acid (PFTA)	LCS	135	69-133	01-02	potential high bias
LCMSMS-ID	Batch QC	WG1397311-3	Perfluorotridecanoic Acid (PFTrDA)	LCSD	161	66-139	01-02	potential high bias
LCMSMS-ID	Batch QC	WG1397311-3	Perfluorotetradecanoic Acid (PFTA)	LCSD	142	69-133	01-02	potential high bias
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab								
LCMSMS-ID	Batch QC	WG1398130-2	Perfluorododecanoic Acid (PFDoA)	LCS	162	67-153	03	potential high bias
LCMSMS-ID	Batch QC	WG1398130-2	Perfluorotridecanoic Acid (PFTrDA)	LCS	160	48-158	03	potential high bias
LCMSMS-ID	Batch QC	WG1398130-3	Perfluorononanesulfonic Acid (PFNS)	LCSD	160	48-150	03	potential high bias
LCMSMS-ID	Batch QC	WG1398130-3	Perfluorodecanesulfonic Acid (PFDS)	LCSD	168	38-156	03	potential high bias
LCMSMS-ID	Batch QC	WG1398130-3	Perfluorododecanoic Acid (PFDoA)	LCSD	160	67-153	03	potential high bias
LCMSMS-ID	Batch QC	WG1398130-3	Perfluorotridecanoic Acid (PFTrDA)	LCSD	160	48-158	03	potential high bias

ORGANICS

SEMIVOLATILES

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-01
Client ID: LOAM STOCKPILE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 08:30
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/12/20 06:42
Analyst: SG
Percent Solids: 91%

Extraction Method: ALPHA 23528
Extraction Date: 08/10/20 17:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.05	0.024	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.05	0.048	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.05	0.041	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.05	0.068	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.05	0.055	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.05	0.088	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.05	0.047	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.05	0.064	1
Perfluorooctanoic Acid (PFOA)	0.103	J	ng/g	1.05	0.044	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.05	0.189	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.05	0.144	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.05	0.079	1
Perfluorooctanesulfonic Acid (PFOS)	0.211	J	ng/g	1.05	0.137	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.05	0.071	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.05	0.302	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.05	0.314	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.05	0.212	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.05	0.049	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.05	0.161	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.05	0.103	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.05	0.089	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.05	0.074	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.05	0.215	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.05	0.057	1

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-01
Client ID: LOAM STOCKPILE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 08:30
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Surrogate (Extracted Internal Standard)	% Recovery		Qualifier	Acceptance Criteria		
Perfluoro[13C4]Butanoic Acid (MPFBA)	22		Q	60-153		
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	27		Q	65-182		
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	79			70-151		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	65			56-138		
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	24		Q	61-147		
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	27		Q	62-149		
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	83			63-166		
Perfluoro[13C8]Octanoic Acid (M8PFOA)	31		Q	62-152		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	66			32-182		
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	31		Q	61-154		
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	73			65-151		
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	39		Q	65-150		
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	82			25-186		
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	34		Q	45-137		
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	38		Q	64-158		
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	4			1-125		
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	52			42-136		
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	52		Q	56-148		
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	27			26-160		

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-02
Client ID: SAND STOCKPILE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 09:00
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/12/20 06:59
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 08/10/20 17:40

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.905	0.021	1
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	0.905	0.042	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.905	0.035	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.905	0.058	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.905	0.048	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.905	0.076	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.905	0.041	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.905	0.055	1
Perfluorooctanoic Acid (PFOA)	ND		ng/g	0.905	0.038	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.905	0.162	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.905	0.124	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.905	0.068	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.905	0.118	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.905	0.061	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.905	0.260	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.905	0.271	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.905	0.182	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.905	0.042	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.905	0.138	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.905	0.089	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.905	0.077	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.905	0.063	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.905	0.185	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.905	0.049	1

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-02
Client ID: SAND STOCKPILE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 09:00
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	77		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	84		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	84		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	63		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	76		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	77		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	86		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	75		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	66		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	78		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	68		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	70		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	57		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	53	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	66		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	69		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	71		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	30		26-160

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-03
Client ID: GEOMEMBRANE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 11:35
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Matrix: Solid
Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/15/20 19:56
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/12/20 16:40

TCLP/SPLP Ext. Date: 08/09/20 11:36

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	1.15	J	ng/l	1.75	0.358	1
Perfluoropentanoic Acid (PFPeA)	0.860	J	ng/l	1.75	0.347	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.75	0.209	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.75	0.396	1
Perfluorohexanoic Acid (PFHxA)	0.674	J	ng/l	1.75	0.288	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	1.75	0.215	1
Perfluoroheptanoic Acid (PFHpA)	0.368	J	ng/l	1.75	0.198	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.75	0.330	1
Perfluorooctanoic Acid (PFOA)	0.316	J	ng/l	1.75	0.207	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.75	1.17	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.75	0.604	1
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.75	0.274	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.75	0.442	1
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.75	0.267	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.75	1.06	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.75	0.982	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.75	0.568	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.75	0.228	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.75	0.860	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.75	0.509	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.75	0.705	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.75	0.326	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.75	0.287	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.75	0.218	1

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2032047-03
Client ID: GEOMEMBRANE
Sample Location: FOREST DALE/HYANNIS

Date Collected: 08/07/20 11:35
Date Received: 08/07/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	71		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	62		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	77		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	59		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	59		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	68		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	80		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	69		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	71		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	65		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	72		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	74		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	62		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	82		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	33		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	72		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	66		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	40		33-143

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Method Blank Analysis Batch Quality Control

Analytical Method: 134,LCMSMS-ID

Extraction Method: ALPHA 23528

Analytical Date: 08/12/20 00:54

Extraction Date: 08/10/20 17:40

Analyst: SG

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1397311-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/12/20 00:54
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 08/10/20 17:40

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-02 Batch: WG1397311-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	79		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	89		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	82		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	53	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	77		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	77		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	83		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	75		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	57		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	59	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	68		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	144	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	60	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	49		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	146	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	89		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	53		26-160

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Method Blank Analysis Batch Quality Control

Analytical Method: 134,LCMSMS-ID

Extraction Method: ALPHA 23528

Analytical Date: 08/15/20 19:06

Extraction Date: 08/12/20 16:40

Analyst: SG

TCLP/SPLP Extraction Date:

Parameter	Result	Qualifier	Units	RL	MDL
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab for sample(s): 03 Batch: WG1398130-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/l	2.00	0.408
Perfluoropentanoic Acid (PFPeA)	ND		ng/l	2.00	0.396
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	2.00	0.238
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	2.00	0.452
Perfluorohexanoic Acid (PFHxA)	0.364	JF	ng/l	2.00	0.328
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	2.00	0.245
Perfluoroheptanoic Acid (PFHpA)	ND		ng/l	2.00	0.225
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	2.00	0.376
Perfluorooctanoic Acid (PFOA)	ND		ng/l	2.00	0.236
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	2.00	1.33
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	2.00	0.688
Perfluorononanoic Acid (PFNA)	ND		ng/l	2.00	0.312
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	2.00	0.504
Perfluorodecanoic Acid (PFDA)	ND		ng/l	2.00	0.304
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	2.00	1.21
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	2.00	1.12
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	2.00	0.648
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	2.00	0.260
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	2.00	0.980
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	2.00	0.580
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	2.00	0.804
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	2.00	0.372
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	2.00	0.327
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	2.00	0.248

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Method Blank Analysis Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/15/20 19:06
Analyst: SG
TCLP/SPLP Extraction Date:

Extraction Method: ALPHA 23528
Extraction Date: 08/12/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab for sample(s): 03 Batch: WG1398130-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	75		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	65		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	77		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	57		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	61		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	70		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	80		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	69		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	67		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	78		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	74		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	68		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	67		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	83		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	46		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	74		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	71		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	63		33-143

Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20

Method Blank Analysis Batch Quality Control

Analytical Method: 134,LCMSMS-ID

Extraction Method: ALPHA 23528

Analytical Date: 08/15/20 17:10

Extraction Date: 08/12/20 16:40

Analyst: SG

TCLP/SPLP Extraction Date: 08/09/20 11:36

Parameter	Result	Qualifier	Units	RL	MDL
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab for sample(s): 03 Batch: WG1398130-5					
Perfluorobutanoic Acid (PFBA)	2.44		ng/l	1.80	0.368
Perfluoropentanoic Acid (PFPeA)	1.72	J	ng/l	1.80	0.357
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/l	1.80	0.215
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/l	1.80	0.408
Perfluorohexanoic Acid (PFHxA)	0.960	J	ng/l	1.80	0.296
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/l	1.80	0.221
Perfluoroheptanoic Acid (PFHpA)	0.628	J	ng/l	1.80	0.203
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/l	1.80	0.339
Perfluorooctanoic Acid (PFOA)	0.307	J	ng/l	1.80	0.213
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/l	1.80	1.20
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/l	1.80	0.621
Perfluorononanoic Acid (PFNA)	ND		ng/l	1.80	0.282
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/l	1.80	0.455
Perfluorodecanoic Acid (PFDA)	ND		ng/l	1.80	0.274
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/l	1.80	1.09
Perfluorononanesulfonic Acid (PFNS)	ND		ng/l	1.80	1.01
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/l	1.80	0.585
Perfluoroundecanoic Acid (PFUnA)	ND		ng/l	1.80	0.235
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/l	1.80	0.884
Perfluorooctanesulfonamide (FOSA)	ND		ng/l	1.80	0.523
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/l	1.80	0.726
Perfluorododecanoic Acid (PFDoA)	ND		ng/l	1.80	0.336
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/l	1.80	0.295
Perfluorotetradecanoic Acid (PFTA)	ND		ng/l	1.80	0.224

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Lab Number: L2032047
Report Date: 09/23/20

Method Blank Analysis Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 08/15/20 17:10
Analyst: SG
TCLP/SPLP Extraction Date: 08/09/20 11:36

Extraction Method: ALPHA 23528
Extraction Date: 08/12/20 16:40

Parameter	Result	Qualifier	Units	RL	MDL
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab for sample(s): 03 Batch: WG1398130-5					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	58		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	53		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	72		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	46		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	50		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	58		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	75		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	58		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	55		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	55		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	73		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	66		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	55		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	63		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	75		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	7		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	57		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	68		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	63		33-143

Lab Control Sample Analysis **Batch Quality Control**

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1397311-2 WG1397311-3								
Perfluorobutanoic Acid (PFBA)	98		100		71-135	2		30
Perfluoropentanoic Acid (PFPeA)	96		98		69-132	2		30
Perfluorobutanesulfonic Acid (PFBS)	93		94		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	93		94		62-145	1		30
Perfluorohexanoic Acid (PFHxA)	103		107		70-132	4		30
Perfluoropentanesulfonic Acid (PFPeS)	98		99		73-123	1		30
Perfluoroheptanoic Acid (PFHpA)	105		110		71-131	5		30
Perfluorohexanesulfonic Acid (PFHxS)	95		95		67-130	0		30
Perfluorooctanoic Acid (PFOA)	95		102		69-133	7		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	124		117		64-140	6		30
Perfluoroheptanesulfonic Acid (PFHpS)	105		123		70-132	16		30
Perfluorononanoic Acid (PFNA)	104		106		72-129	2		30
Perfluorooctanesulfonic Acid (PFOS)	93		102		68-136	9		30
Perfluorodecanoic Acid (PFDA)	108		108		69-133	0		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	105		115		65-137	9		30
Perfluorononanesulfonic Acid (PFNS)	92		100		69-125	8		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	104		106		63-144	2		30
Perfluoroundecanoic Acid (PFUnA)	87		105		64-136	19		30
Perfluorodecanesulfonic Acid (PFDS)	92		96		59-134	4		30
Perfluorooctanesulfonamide (FOSA)	99		104		67-137	5		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	102		104		61-139	2		30
Perfluorododecanoic Acid (PFDoA)	116		132		69-135	13		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-02 Batch: WG1397311-2 WG1397311-3								
Perfluorotridecanoic Acid (PFTrDA)	126		161	Q	66-139	24		30
Perfluorotetradecanoic Acid (PFTA)	135	Q	142	Q	69-133	5		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	79		72		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	88		80		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	84		74		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	57		52	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	76		69		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	76		69		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	84		74		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	76		67		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	61		52		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	60	Q	56	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	83		70		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	68		61	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	71		69		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	129		107		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	60	Q	48	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	31		9		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	133		110		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	91		70		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	52		45		26-160

Lab Control Sample Analysis **Batch Quality Control**

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab Associated sample(s): 03 Batch: WG1398130-2 WG1398130-3								
Perfluorobutanoic Acid (PFBA)	145		142		67-148	2		30
Perfluoropentanoic Acid (PFPeA)	139		136		63-161	2		30
Perfluorobutanesulfonic Acid (PFBS)	141		139		65-157	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	140		131		37-219	7		30
Perfluorohexanoic Acid (PFHxA)	150		146		69-168	3		30
Perfluoropentanesulfonic Acid (PFPeS)	125		128		52-156	2		30
Perfluoroheptanoic Acid (PFHpA)	144		140		58-159	3		30
Perfluorohexanesulfonic Acid (PFHxS)	140		139		69-177	1		30
Perfluorooctanoic Acid (PFOA)	151		150		63-159	1		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	158		156		49-187	1		30
Perfluoroheptanesulfonic Acid (PFHpS)	142		141		61-179	1		30
Perfluorononanoic Acid (PFNA)	144		143		68-171	1		30
Perfluorooctanesulfonic Acid (PFOS)	138		142		52-151	3		30
Perfluorodecanoic Acid (PFDA)	142		142		63-171	0		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	161		154		56-173	4		30
Perfluorononanesulfonic Acid (PFNS)	150		160	Q	48-150	6		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	155		130		60-166	18		30
Perfluoroundecanoic Acid (PFUnA)	135		133		60-153	1		30
Perfluorodecanesulfonic Acid (PFDS)	155		168	Q	38-156	8		30
Perfluorooctanesulfonamide (FOSA)	152		144		46-170	5		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	158		134		45-170	16		30
Perfluorododecanoic Acid (PFDoA)	162	Q	160	Q	67-153	1		30

Lab Control Sample Analysis **Batch Quality Control**

Project Name: PA LANDERS/BMA/RAVEN

Lab Number: L2032047

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab Associated sample(s): 03 Batch: WG1398130-2 WG1398130-3								
Perfluorotridecanoic Acid (PFTrDA)	160	Q	160	Q	48-158	0		30
Perfluorotetradecanoic Acid (PFTA)	124		119		59-182	4		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	77		79		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	66		68		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	76		80		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	60		64		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	62		65		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	72		74		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	80		85		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	71		72		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	68		72		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	65		66		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81		81		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	74		78		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	68		79		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	73		89		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	83		86		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	50		55		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	74		90		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	74		77		24-161
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	66		71		33-143

Lab Duplicate Analysis Batch Quality Control

Project Name: PA LANDERS/BMA/RAVEN

Project Number: 14105

Lab Number: L2032047

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab Associated sample(s): 03 QC Batch ID: WG1398130-4 QC Sample: L2032047-03 Client ID: GEOMEMBRANE						
Perfluorobutanoic Acid (PFBA)	1.15J	1.17J	ng/l	NC		30
Perfluoropentanoic Acid (PFPeA)	0.860J	0.818J	ng/l	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/l	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/l	NC		30
Perfluorohexanoic Acid (PFHxA)	0.674J	0.702J	ng/l	NC		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/l	NC		30
Perfluoroheptanoic Acid (PFHpA)	0.368J	0.342J	ng/l	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	ND	ng/l	NC		30
Perfluorooctanoic Acid (PFOA)	0.316J	0.280JF	ng/l	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/l	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/l	NC		30
Perfluorononanoic Acid (PFNA)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonic Acid (PFOS)	ND	ND	ng/l	NC		30
Perfluorodecanoic Acid (PFDA)	ND	ND	ng/l	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/l	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/l	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/l	NC		30
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ng/l	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/l	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/l	NC		30

Lab Duplicate Analysis

Batch Quality Control

Project Name: PA LANDERS/BMA/RAVEN

Project Number: 14105

Lab Number: L2032047

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab Associated sample(s): 03 QC Batch ID: WG1398130-4 QC Sample: L2032047-03 Client ID: GEOMEMBRANE						

N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/l	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/l	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/l	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/l	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	71		70		2-156
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	62		61		16-173
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	77		79		31-159
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	59		58		1-313
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	59		59		21-145
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	68		68		30-139
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	80		83		47-153
Perfluoro[13C8]Octanoic Acid (M8PFOA)	69		68		36-149
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	71		72		1-244
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	65		63		34-146
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	81		82		42-146
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	72		72		38-144
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	74		73		7-170
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	62		58		1-181
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	82		80		40-144
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	33		37		1-87
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	72		83		23-146
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	66		66		24-161

Lab Duplicate Analysis **Batch Quality Control**

Project Name: PA LANDERS/BMA/RAVEN

Project Number: 14105

Lab Number: L2032047

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
SPLP Perfluorinated Alkyl Acids by Isotope Dilution & EPA 1312 - Mansfield Lab Associated sample(s): 03 QC Batch ID: WG1398130-4 QC Sample: L2032047-03 Client ID: GEOMEMBRANE						

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	40		46		33-143

INORGANICS & MISCELLANEOUS

Project Name: PA LANDERS/BMA/RAVEN**Project Number:** 14105**Lab Number:** L2032047**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2032047-01**Client ID:** LOAM STOCKPILE**Sample Location:** FOREST DALE/HYANNIS**Date Collected:** 08/07/20 08:30**Date Received:** 08/07/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	91.2		%	0.100	0.100	1	-	08/09/20 13:29	121,2540G	SM



Project Name: PA LANDERS/BMA/RAVEN**Project Number:** 14105**Lab Number:** L2032047**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2032047-02**Client ID:** SAND STOCKPILE**Sample Location:** FOREST DALE/HYANNIS**Date Collected:** 08/07/20 09:00**Date Received:** 08/07/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	98.4		%	0.100	0.100	1	-	08/09/20 13:29	121,2540G	SM



Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information**Cooler** **Custody Seal**

A Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2032047-01A	Plastic 8oz unpreserved	A	NA		3.1	Y	Absent		A2-537-ISOTOPE(14)
L2032047-01B	Plastic 2oz unpreserved for TS	A	NA		3.1	Y	Absent		A2-TS(7)
L2032047-02A	Plastic 8oz unpreserved	A	NA		3.1	Y	Absent		A2-537-ISOTOPE(14)
L2032047-02B	Plastic 2oz unpreserved for TS	A	NA		3.1	Y	Absent		A2-TS(7)
L2032047-03A	Plastic 8oz unpreserved	A	NA		3.1	Y	Absent		-
L2032047-03B	Plastic 2oz unpreserved for TS	A	NA		3.1	Y	Absent		-
L2032047-03X	Plastic 250ml unpreserved Extracts	A	NA		3.1	Y	Absent		A2-SPLP-537-ISOTOPE(14)
L2032047-03X1	Plastic 250ml unpreserved Extracts	A	NA		3.1	Y	Absent		A2-SPLP-537-ISOTOPE(14)
L2032047-03X2	Plastic 250ml unpreserved Extracts	A	NA		3.1	Y	Absent		A2-SPLP-537-ISOTOPE(14)
L2032047-03X3	Plastic 250ml unpreserved Extracts	A	NA		3.1	Y	Absent		A2-SPLP-537-ISOTOPE(14)
L2032047-03X9	Tumble Vessel	A	NA		3.1	Y	Absent		-

Project Name: PA LANDERS/BMA/RAVEN
Project Number: 14105

Serial_No:09232019:14
Lab Number: L2032047
Report Date: 09/23/20

PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSAs)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESAs)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCAs)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonafluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20

GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
	Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: DU Report with 'J' Qualifiers

Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20

- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenzo(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

Report Format: DU Report with 'J' Qualifiers



Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20**Data Qualifiers**

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Report Format: DU Report with 'J' Qualifiers

Project Name: PA LANDERS/BMA/RAVEN**Lab Number:** L2032047**Project Number:** 14105**Report Date:** 09/23/20

REFERENCES

- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.
- 134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Alpha Analytical, Inc.Facility: **Company-wide**Department: **Quality Assurance**Title: **Certificate/Approval Program Summary**ID No.: **17873**

Revision 17

Published Date: 4/28/2020 9:42:21 AM

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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, SM4500CI-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.

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MANSFIELD, MA
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FAX: 508-822-3288

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 Terms and Conditions. See reverse side.



ANALYTICAL REPORT

Lab Number:	L2039248
Client:	Horseley & Witten, Inc. Sextant Hill Office Park 90 Route 6A Sandwich, MA 02563
ATTN:	Brian Massa
Phone:	(508) 833-6600
Project Name:	BARNSTABLE AIRPORT
Project Number:	14105
Report Date:	09/23/20

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Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L2039248-01	A17	SOIL	HYANNIS, MA	09/17/20 13:15	09/18/20
L2039248-02	A16	SOIL	HYANNIS, MA	09/17/20 12:51	09/18/20
L2039248-03	HW-P(M)[8-10]	SOIL	HYANNIS, MA	09/18/20 09:46	09/18/20
L2039248-04	HW-P(M)[18-20]	SOIL	HYANNIS, MA	09/18/20 09:59	09/18/20

Project Name: BARNSTABLE AIRPORT

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MADEP MCP Response Action Analytical Report Certification

This form provides certifications for all samples performed by MCP methods. Please refer to the Sample Results and Container Information sections of this report for specification of MCP methods used for each analysis. The following questions pertain only to MCP Analytical Methods.

An affirmative response to questions A through F is required for "Presumptive Certainty" status		
A	Were all samples received in a condition consistent with those described on the Chain-of-Custody, properly preserved (including temperature) in the field or laboratory, and prepared/analyzed within method holding times?	YES
B	Were the analytical method(s) and all associated QC requirements specified in the selected CAM protocol(s) followed?	YES
C	Were all required corrective actions and analytical response actions specified in the selected CAM protocol(s) implemented for all identified performance standard non-conformances?	YES
D	Does the laboratory report comply with all the reporting requirements specified in CAM VII A, "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data?"	YES
E a.	VPH, EPH, and APH Methods only: Was each method conducted without significant modification(s)? (Refer to the individual method(s) for a list of significant modifications).	N/A
E b.	APH and TO-15 Methods only: Was the complete analyte list reported for each method?	N/A
F	Were all applicable CAM protocol QC and performance standard non-conformances identified and evaluated in a laboratory narrative (including all "No" responses to Questions A through E)?	YES
A response to questions G, H and I is required for "Presumptive Certainty" status		
G	Were the reporting limits at or below all CAM reporting limits specified in the selected CAM protocol(s)?	YES
H	Were all QC performance standards specified in the CAM protocol(s) achieved?	YES
I	Were results reported for the complete analyte list specified in the selected CAM protocol(s)?	YES
For any questions answered "No", please refer to the case narrative section on the following page(s).		

Please note that sample matrix information is located in the Sample Results section of this report.



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Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

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Case Narrative (continued)

Report Revision

September 23, 2020: All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

MCP Related Narratives

Report Submission

All MCP required questions were answered with affirmative responses; therefore, there are no relevant protocol-specific QC and/or performance standard non-conformances to report.

Non-MCP Related Narratives

Perfluorinated Alkyl Acids by Isotope Dilution

L2039248-01, -02, -03, and -04: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

The WG1412383-4 MS recovery, performed on L2039248-01, is outside the acceptance criteria for n-methyl perfluorooctanesulfonamidoacetic acid (nmefosaa) (151%).

WG1412383-4 and WG1412383-5: Extracted Internal Standard recoveries were outside the acceptance criteria for individual analytes. Please refer to the surrogate section of the report for details.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature:

Tiffani Morrissey - Tiffani Morrissey

Title: Technical Director/Representative

Date: 09/23/20

QC OUTLIER SUMMARY REPORT**Project Name:** BARNSTABLE AIRPORT**Lab Number:** L2039248**Project Number:** 14105**Report Date:** 09/23/20

Method	Client ID (Native ID)	Lab ID	Parameter	QC Type	Recovery/RPD (%)	QC Limits (%)	Associated Samples	Data Quality Assessment
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab								
LCMSMS-ID	Batch QC (L2039248-01)	WG1412383-4	N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	MS	151	63-144	01-04	potential high bias

ORGANICS

SEMIVOLATILES

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-01
Client ID: A17
Sample Location: HYANNIS, MA

Date Collected: 09/17/20 13:15
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/21/20 23:00
Analyst: SG
Percent Solids: 93%

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	2.03		ng/g	0.960	0.022	1
Perfluoropentanoic Acid (PFPeA)	3.73		ng/g	0.960	0.044	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.960	0.037	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.960	0.062	1
Perfluorohexanoic Acid (PFHxA)	1.22		ng/g	0.960	0.050	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.960	0.080	1
Perfluoroheptanoic Acid (PFHpA)	1.07		ng/g	0.960	0.043	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.960	0.058	1
Perfluorooctanoic Acid (PFOA)	0.989		ng/g	0.960	0.040	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.960	0.172	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.960	0.131	1
Perfluorononanoic Acid (PFNA)	0.774	J	ng/g	0.960	0.072	1
Perfluorooctanesulfonic Acid (PFOS)	0.573	J	ng/g	0.960	0.125	1
Perfluorodecanoic Acid (PFDA)	0.147	J	ng/g	0.960	0.064	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.960	0.276	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.960	0.287	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	0.193	J	ng/g	0.960	0.193	1
Perfluoroundecanoic Acid (PFUnA)	0.228	J	ng/g	0.960	0.045	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.960	0.147	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.960	0.094	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	0.245	J	ng/g	0.960	0.081	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.960	0.067	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.960	0.196	1
Perfluorotetradecanoic Acid (PFTA)	0.068	J	ng/g	0.960	0.052	1

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-01
Client ID: A17
Sample Location: HYANNIS, MA

Date Collected: 09/17/20 13:15
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	35	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	31	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	84		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	44	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	31	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	36	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	96		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	39	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	51		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	46	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	90		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	55	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	57		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	9	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	66		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	38		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	13	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	64		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	43		26-160

Project Name: BARNSTABLE AIRPORT
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Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-02
Client ID: A16
Sample Location: HYANNIS, MA

Date Collected: 09/17/20 12:51
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/21/20 23:33
Analyst: SG
Percent Solids: 95%

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	0.165	J	ng/g	0.948	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.229	J	ng/g	0.948	0.044	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.948	0.037	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.948	0.061	1
Perfluorohexanoic Acid (PFHxA)	0.148	J	ng/g	0.948	0.050	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.948	0.079	1
Perfluoroheptanoic Acid (PFHpA)	0.067	J	ng/g	0.948	0.043	1
Perfluorohexanesulfonic Acid (PFHxS)	0.085	J	ng/g	0.948	0.057	1
Perfluorooctanoic Acid (PFOA)	0.088	J	ng/g	0.948	0.040	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.948	0.170	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.948	0.129	1
Perfluorononanoic Acid (PFNA)	0.119	J	ng/g	0.948	0.071	1
Perfluorooctanesulfonic Acid (PFOS)	2.02	F	ng/g	0.948	0.123	1
Perfluorodecanoic Acid (PFDA)	0.074	J	ng/g	0.948	0.064	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.948	0.272	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.948	0.284	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.948	0.191	1
Perfluoroundecanoic Acid (PFUnA)	0.136	J	ng/g	0.948	0.044	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.948	0.145	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.948	0.093	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.948	0.080	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.948	0.066	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.948	0.194	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.948	0.051	1

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-02
Client ID: A16
Sample Location: HYANNIS, MA

Date Collected: 09/17/20 12:51
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	39	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	37	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	88		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	48	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	39	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	48	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	98		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	54	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	55		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	70		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	17	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	83		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	41		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	31	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	53		26-160

Project Name: BARNSTABLE AIRPORT
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Lab Number: L2039248
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SAMPLE RESULTS

Lab ID: L2039248-03
Client ID: HW-P(M)[8-10]
Sample Location: HYANNIS, MA

Date Collected: 09/18/20 09:46
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/22/20 00:07
Analyst: SG
Percent Solids: 97%

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.975	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.046	J	ng/g	0.975	0.045	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.975	0.038	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.975	0.063	1
Perfluorohexanoic Acid (PFHxA)	0.055	J	ng/g	0.975	0.051	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.975	0.081	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.975	0.044	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.975	0.059	1
Perfluorooctanoic Acid (PFOA)	0.089	J	ng/g	0.975	0.041	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	0.221	J	ng/g	0.975	0.175	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.975	0.133	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.975	0.073	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.975	0.127	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.975	0.065	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.975	0.280	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.975	0.292	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.975	0.196	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.975	0.046	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.975	0.149	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.975	0.096	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.975	0.082	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.975	0.068	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.975	0.199	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.975	0.053	1

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-03
Client ID: HW-P(M)[8-10]
Sample Location: HYANNIS, MA

Date Collected: 09/18/20 09:46
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	73		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	78		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	92		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	51	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	84		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	94		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	91		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	58		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	95		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	100		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	92		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	17	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	100		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	29		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	17	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	93		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	62		26-160

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-04
Client ID: HW-P(M)[18-20]
Sample Location: HYANNIS, MA

Date Collected: 09/18/20 09:59
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Matrix: Soil
Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/22/20 00:23
Analyst: SG
Percent Solids: 98%

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						
Perfluorobutanoic Acid (PFBA)	ND		ng/g	0.956	0.022	1
Perfluoropentanoic Acid (PFPeA)	0.044	J	ng/g	0.956	0.044	1
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	0.956	0.037	1
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	0.956	0.062	1
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	0.956	0.050	1
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	0.956	0.080	1
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	0.956	0.043	1
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	0.956	0.058	1
Perfluorooctanoic Acid (PFOA)	0.046	J	ng/g	0.956	0.040	1
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	0.956	0.172	1
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	0.956	0.130	1
Perfluorononanoic Acid (PFNA)	ND		ng/g	0.956	0.072	1
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	0.956	0.124	1
Perfluorodecanoic Acid (PFDA)	ND		ng/g	0.956	0.064	1
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	0.956	0.274	1
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	0.956	0.286	1
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	0.956	0.192	1
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	0.956	0.045	1
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	0.956	0.146	1
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	0.956	0.094	1
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	0.956	0.081	1
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	0.956	0.067	1
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	0.956	0.195	1
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	0.956	0.052	1

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

SAMPLE RESULTS

Lab ID: L2039248-04
Client ID: HW-P(M)[18-20]
Sample Location: HYANNIS, MA

Date Collected: 09/18/20 09:59
Date Received: 09/18/20
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab						

Surrogate (Extracted Internal Standard)	% Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	19	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	22	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	92		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	49	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	25	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	31	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	106		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	35	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	55		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	43	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	97		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	48	Q	65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	70		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	3	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	60	Q	64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	19		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	4	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	60		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	52		26-160

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/21/20 20:14
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-04 Batch: WG1412383-1					
Perfluorobutanoic Acid (PFBA)	ND		ng/g	1.00	0.023
Perfluoropentanoic Acid (PFPeA)	ND		ng/g	1.00	0.046
Perfluorobutanesulfonic Acid (PFBS)	ND		ng/g	1.00	0.039
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND		ng/g	1.00	0.065
Perfluorohexanoic Acid (PFHxA)	ND		ng/g	1.00	0.053
Perfluoropentanesulfonic Acid (PFPeS)	ND		ng/g	1.00	0.084
Perfluoroheptanoic Acid (PFHpA)	ND		ng/g	1.00	0.045
Perfluorohexanesulfonic Acid (PFHxS)	ND		ng/g	1.00	0.061
Perfluorooctanoic Acid (PFOA)	ND		ng/g	1.00	0.042
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND		ng/g	1.00	0.180
Perfluoroheptanesulfonic Acid (PFHpS)	ND		ng/g	1.00	0.136
Perfluorononanoic Acid (PFNA)	ND		ng/g	1.00	0.075
Perfluorooctanesulfonic Acid (PFOS)	ND		ng/g	1.00	0.130
Perfluorodecanoic Acid (PFDA)	ND		ng/g	1.00	0.067
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND		ng/g	1.00	0.287
Perfluorononanesulfonic Acid (PFNS)	ND		ng/g	1.00	0.299
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND		ng/g	1.00	0.202
Perfluoroundecanoic Acid (PFUnA)	ND		ng/g	1.00	0.047
Perfluorodecanesulfonic Acid (PFDS)	ND		ng/g	1.00	0.153
Perfluorooctanesulfonamide (FOSA)	ND		ng/g	1.00	0.098
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND		ng/g	1.00	0.085
Perfluorododecanoic Acid (PFDoA)	ND		ng/g	1.00	0.070
Perfluorotridecanoic Acid (PFTrDA)	ND		ng/g	1.00	0.204
Perfluorotetradecanoic Acid (PFTA)	ND		ng/g	1.00	0.054

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Lab Number: L2039248
Report Date: 09/23/20

Method Blank Analysis
Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 09/21/20 20:14
Analyst: SG

Extraction Method: ALPHA 23528
Extraction Date: 09/21/20 09:30

Parameter	Result	Qualifier	Units	RL	MDL
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-04 Batch: WG1412383-1					

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	92		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	92		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	103		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	56		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	102		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	110		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	115		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	105		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	60		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	105		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	105		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	67		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	107		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	24		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	66		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	93		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	67		26-160

Lab Control Sample Analysis **Batch Quality Control**

Project Name: BARNSTABLE AIRPORT

Lab Number: L2039248

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 Batch: WG1412383-2 WG1412383-3								
Perfluorobutanoic Acid (PFBA)	102		102		71-135	0		30
Perfluoropentanoic Acid (PFPeA)	106		106		69-132	0		30
Perfluorobutanesulfonic Acid (PFBS)	104		103		72-128	1		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	126		118		62-145	7		30
Perfluorohexanoic Acid (PFHxA)	105		104		70-132	1		30
Perfluoropentanesulfonic Acid (PFPeS)	92		90		73-123	2		30
Perfluoroheptanoic Acid (PFHpA)	100		101		71-131	1		30
Perfluorohexanesulfonic Acid (PFHxS)	100		103		67-130	3		30
Perfluorooctanoic Acid (PFOA)	102		99		69-133	3		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	117		114		64-140	3		30
Perfluoroheptanesulfonic Acid (PFHpS)	102		107		70-132	5		30
Perfluorononanoic Acid (PFNA)	105		105		72-129	0		30
Perfluorooctanesulfonic Acid (PFOS)	110		114		68-136	4		30
Perfluorodecanoic Acid (PFDA)	101		101		69-133	0		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	108		114		65-137	5		30
Perfluorononanesulfonic Acid (PFNS)	111		118		69-125	6		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	97		108		63-144	11		30
Perfluoroundecanoic Acid (PFUnA)	107		108		64-136	1		30
Perfluorodecanesulfonic Acid (PFDS)	128		131		59-134	2		30
Perfluorooctanesulfonamide (FOSA)	94		95		67-137	1		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	114		119		61-139	4		30
Perfluorododecanoic Acid (PFDoA)	102		102		69-135	0		30

Lab Control Sample Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Lab Number: L2039248

Project Number: 14105

Report Date: 09/23/20

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 Batch: WG1412383-2 WG1412383-3								
Perfluorotridecanoic Acid (PFTrDA)	100		98		66-139	2		30
Perfluorotetradecanoic Acid (PFTA)	114		118		69-133	3		30

Surrogate (Extracted Internal Standard)	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	86		82		60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	88		84		65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	102		99		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	58		59		56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	98		91		61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	107		100		62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	113		110		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	102		99		62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	61		61		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	105		101		61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	106		102		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	101		100		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	67		69		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	68		63		45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	104		103		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	6		15		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	70		66		42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	98		97		56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	69		67		26-160

Matrix Spike Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 14105

Lab Number: L2039248

Report Date: 09/23/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG1412383-4 QC Sample: L2039248-01 Client ID: A17												
Perfluorobutanoic Acid (PFBA)	2.03	4.78	7.14	107		-	-		71-135	-		30
Perfluoropentanoic Acid (PFPeA)	3.73	4.78	9.04	111		-	-		69-132	-		30
Perfluorobutanesulfonic Acid (PFBS)	ND	4.24	4.49	106		-	-		72-128	-		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	4.47	5.84	131		-	-		62-145	-		30
Perfluorohexanoic Acid (PFHxA)	1.22	4.78	6.34	107		-	-		70-132	-		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	4.49	4.27	95		-	-		73-123	-		30
Perfluoroheptanoic Acid (PFHpA)	1.07	4.78	5.91	101		-	-		71-131	-		30
Perfluorohexanesulfonic Acid (PFHxS)	ND	4.37	4.45	102		-	-		67-130	-		30
Perfluorooctanoic Acid (PFOA)	0.989	4.78	6.04	106		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	4.55	5.57F	122		-	-		64-140	-		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	4.55	4.93	108		-	-		70-132	-		30
Perfluorononanoic Acid (PFNA)	0.774J	4.78	5.87	123		-	-		72-129	-		30
Perfluorooctanesulfonic Acid (PFOS)	0.573J	4.44	5.40F	122		-	-		68-136	-		30
Perfluorodecanoic Acid (PFDA)	0.147J	4.78	5.15	108		-	-		69-133	-		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	4.59	4.53F	99		-	-		65-137	-		30
Perfluorononanesulfonic Acid (PFNS)	ND	4.6	5.32	116		-	-		69-125	-		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	0.193J	4.78	7.24	151	Q	-	-		63-144	-		30
Perfluoroundecanoic Acid (PFUnA)	0.228J	4.78	5.37	112		-	-		64-136	-		30
Perfluorodecanesulfonic Acid (PFDS)	ND	4.61	5.62	122		-	-		59-134	-		30
Perfluorooctanesulfonamide (FOSA)	ND	4.78	4.85F	101		-	-		67-137	-		30
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	0.245J	4.78	4.94	103		-	-		61-139	-		30
Perfluorododecanoic Acid (PFDoA)	ND	4.78	4.97	104		-	-		69-135	-		30

Matrix Spike Analysis

Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 14105

Lab Number: L2039248

Report Date: 09/23/20

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab				Associated sample(s): 01-04		QC Batch ID: WG1412383-4		QC Sample: L2039248-01		Client ID: A17		
Perfluorotridecanoic Acid (PFTrDA)	ND	4.78	5.01	105		-	-		66-139	-		30
Perfluorotetradecanoic Acid (PFTA)	0.068J	4.78	5.54	116		-	-		69-133	-		30

Surrogate (Extracted Internal Standard)	MS % Recovery	Qualifier	MSD % Recovery	Qualifier	Acceptance Criteria
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	63				25-186
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	47	Q			56-138
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	51				32-182
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	12	Q			42-136
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	5	Q			45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	72				64-158
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	60	Q			65-150
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	42	Q			61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	47	Q			62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	95				63-166
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	68				56-148
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	44				26-160
Perfluoro[13C4]Butanoic Acid (MPFBA)	47	Q			60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	44	Q			65-182
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	56				1-125
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	88				65-151
Perfluoro[13C8]Octanoic Acid (M8PFOA)	49	Q			62-152
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	57	Q			61-154
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	84				70-151

Lab Duplicate Analysis Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 14105

Lab Number: L2039248

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG1412383-5 QC Sample: L2039248-02 Client ID: A16						
Perfluorobutanoic Acid (PFBA)	0.165J	0.158J	ng/g	NC		30
Perfluoropentanoic Acid (PFPeA)	0.229J	0.227J	ng/g	NC		30
Perfluorobutanesulfonic Acid (PFBS)	ND	ND	ng/g	NC		30
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ng/g	NC		30
Perfluorohexanoic Acid (PFHxA)	0.148J	0.149J	ng/g	NC		30
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	ng/g	NC		30
Perfluoroheptanoic Acid (PFHpA)	0.067J	0.070J	ng/g	NC		30
Perfluorohexanesulfonic Acid (PFHxS)	0.085J	0.090J	ng/g	NC		30
Perfluorooctanoic Acid (PFOA)	0.088J	0.099J	ng/g	NC		30
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	ND	ND	ng/g	NC		30
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ng/g	NC		30
Perfluorononanoic Acid (PFNA)	0.119J	0.109J	ng/g	NC		30
Perfluorooctanesulfonic Acid (PFOS)	2.02F	2.00F	ng/g	1		30
Perfluorodecanoic Acid (PFDA)	0.074J	0.075J	ng/g	NC		30
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	ND	ND	ng/g	NC		30
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ng/g	NC		30
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA)	ND	ND	ng/g	NC		30
Perfluoroundecanoic Acid (PFUnA)	0.136J	0.148J	ng/g	NC		30
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ng/g	NC		30
Perfluorooctanesulfonamide (FOSA)	ND	ND	ng/g	NC		30

Lab Duplicate Analysis Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 14105

Lab Number: L2039248

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG1412383-5 QC Sample: L2039248-02 Client ID: A16						

N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA)	ND	ND	ng/g	NC		30
Perfluorododecanoic Acid (PFDoA)	ND	ND	ng/g	NC		30
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ng/g	NC		30
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ng/g	NC		30

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[13C4]Butanoic Acid (MPFBA)	39	Q	37	Q	60-153
Perfluoro[13C5]Pentanoic Acid (M5PFPEA)	37	Q	34	Q	65-182
Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS)	88		94		70-151
1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS)	48	Q	54	Q	56-138
Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA)	39	Q	35	Q	61-147
Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA)	48	Q	45	Q	62-149
Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS)	98		104		63-166
Perfluoro[13C8]Octanoic Acid (M8PFOA)	54	Q	49	Q	62-152
1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS)	55		64		32-182
Perfluoro[13C9]Nonanoic Acid (M9PFNA)	64		59	Q	61-154
Perfluoro[13C8]Octanesulfonic Acid (M8PFOS)	92		99		65-151
Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA)	70		70		65-150
1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS)	61		64		25-186
N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA)	17	Q	21	Q	45-137
Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA)	83		84		64-158
Perfluoro[13C8]Octanesulfonamide (M8FOSA)	41		27		1-125
N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA)	31	Q	27	Q	42-136
Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA)	77		80		56-148

Lab Duplicate Analysis Batch Quality Control

Project Name: BARNSTABLE AIRPORT

Project Number: 14105

Lab Number: L2039248

Report Date: 09/23/20

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-04 QC Batch ID: WG1412383-5 QC Sample: L2039248-02 Client ID: A16						

Surrogate (Extracted Internal Standard)	%Recovery	Qualifier	%Recovery	Qualifier	Acceptance Criteria
Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA)	53		55		26-160

INORGANICS & MISCELLANEOUS

Project Name: BARNSTABLE AIRPORT**Project Number:** 14105**Lab Number:** L2039248**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2039248-01**Client ID:** A17**Sample Location:** HYANNIS, MA**Date Collected:** 09/17/20 13:15**Date Received:** 09/18/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	93.4		%	0.100	0.100	1	-	09/20/20 13:07	121,2540G	JW



Project Name: BARNSTABLE AIRPORT**Project Number:** 14105**Lab Number:** L2039248**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2039248-02**Client ID:** A16**Sample Location:** HYANNIS, MA**Date Collected:** 09/17/20 12:51**Date Received:** 09/18/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	95.2		%	0.100	0.100	1	-	09/20/20 13:07	121,2540G	JW



Project Name: BARNSTABLE AIRPORT**Project Number:** 14105**Lab Number:** L2039248**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2039248-03**Client ID:** HW-P(M)[8-10]**Sample Location:** HYANNIS, MA**Date Collected:** 09/18/20 09:46**Date Received:** 09/18/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	96.5		%	0.100	0.100	1	-	09/20/20 13:07	121,2540G	JW



Project Name: BARNSTABLE AIRPORT**Project Number:** 14105**Lab Number:** L2039248**Report Date:** 09/23/20**SAMPLE RESULTS****Lab ID:** L2039248-04**Client ID:** HW-P(M)[18-20]**Sample Location:** HYANNIS, MA**Date Collected:** 09/18/20 09:59**Date Received:** 09/18/20**Field Prep:** Not Specified**Sample Depth:****Matrix:** Soil

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
General Chemistry - Mansfield Lab										
Solids, Total	97.8		%	0.100	0.100	1	-	09/20/20 13:07	121,2540G	JW



Project Name: BARNSTABLE AIRPORT**Lab Number:** L2039248**Project Number:** 14105**Report Date:** 09/23/20**Sample Receipt and Container Information**

Were project specific reporting limits specified?

YES

Cooler Information**Cooler** **Custody Seal**

A Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L2039248-01A	Plastic 8oz unpreserved	A	NA		2.5	Y	Absent		A2-537-ISOTOPE(14)
L2039248-01B	Plastic 2oz unpreserved for TS	A	NA		2.5	Y	Absent		A2-TS(7)
L2039248-02A	Plastic 8oz unpreserved	A	NA		2.5	Y	Absent		A2-537-ISOTOPE(14)
L2039248-02B	Plastic 2oz unpreserved for TS	A	NA		2.5	Y	Absent		A2-TS(7)
L2039248-03A	Plastic 8oz unpreserved	A	NA		2.5	Y	Absent		A2-537-ISOTOPE(14)
L2039248-03B	Plastic 2oz unpreserved for TS	A	NA		2.5	Y	Absent		A2-TS(7)
L2039248-04A	Plastic 8oz unpreserved	A	NA		2.5	Y	Absent		A2-537-ISOTOPE(14)
L2039248-04B	Plastic 2oz unpreserved for TS	A	NA		2.5	Y	Absent		A2-TS(7)

Project Name: BARNSTABLE AIRPORT
Project Number: 14105

Serial_No:09232019:14
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PFAS PARAMETER SUMMARY

Parameter	Acronym	CAS Number
PERFLUOROALKYL CARBOXYLIC ACIDS (PFCAs)		
Perfluorooctadecanoic Acid	PFODA	16517-11-6
Perfluorohexadecanoic Acid	PFHxDA	67905-19-5
Perfluorotetradecanoic Acid	PFTA	376-06-7
Perfluorotridecanoic Acid	PFTrDA	72629-94-8
Perfluorododecanoic Acid	PFDoA	307-55-1
Perfluoroundecanoic Acid	PFUnA	2058-94-8
Perfluorodecanoic Acid	PFDA	335-76-2
Perfluorononanoic Acid	PFNA	375-95-1
Perfluorooctanoic Acid	PFOA	335-67-1
Perfluoroheptanoic Acid	PFHpA	375-85-9
Perfluorohexanoic Acid	PFHxA	307-24-4
Perfluoropentanoic Acid	PFPeA	2706-90-3
Perfluorobutanoic Acid	PFBA	375-22-4
PERFLUOROALKYL SULFONIC ACIDS (PFSA's)		
Perfluorododecanesulfonic Acid	PFDoDS	79780-39-5
Perfluorodecanesulfonic Acid	PFDS	335-77-3
Perfluorononanesulfonic Acid	PFNS	68259-12-1
Perfluorooctanesulfonic Acid	PFOS	1763-23-1
Perfluoroheptanesulfonic Acid	PFHpS	375-92-8
Perfluorohexanesulfonic Acid	PFHxS	355-46-4
Perfluoropentanesulfonic Acid	PFPeS	2706-91-4
Perfluorobutanesulfonic Acid	PFBS	375-73-5
FLUOROTELOMERS		
1H,1H,2H,2H-Perfluorododecanesulfonic Acid	10:2FTS	120226-60-0
1H,1H,2H,2H-Perfluorodecanesulfonic Acid	8:2FTS	39108-34-4
1H,1H,2H,2H-Perfluorooctanesulfonic Acid	6:2FTS	27619-97-2
1H,1H,2H,2H-Perfluorohexanesulfonic Acid	4:2FTS	757124-72-4
PERFLUOROALKANE SULFONAMIDES (FASAs)		
Perfluorooctanesulfonamide	FOSA	754-91-6
N-Ethyl Perfluorooctane Sulfonamide	NEtFOSA	4151-50-2
N-Methyl Perfluorooctane Sulfonamide	NMeFOSA	31506-32-8
PERFLUOROALKANE SULFONYL SUBSTANCES		
N-Ethyl Perfluorooctanesulfonamido Ethanol	NEtFOSE	1691-99-2
N-Methyl Perfluorooctanesulfonamido Ethanol	NMeFOSE	24448-09-7
N-Ethyl Perfluorooctanesulfonamidoacetic Acid	NEtFOSAA	2991-50-6
N-Methyl Perfluorooctanesulfonamidoacetic Acid	NMeFOSAA	2355-31-9
PER- and POLYFLUOROALKYL ETHER CARBOXYLIC ACIDS		
2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid	HFPO-DA	13252-13-6
4,8-Dioxa-3h-Perfluorononanoic Acid	ADONA	919005-14-4
CHLORO-PERFLUOROALKYL SULFONIC ACIDS		
11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid	11Cl-PF3OUdS	763051-92-9
9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid	9Cl-PF3ONS	756426-58-1
PERFLUOROETHER SULFONIC ACIDS (PFESA's)		
Perfluoro(2-Ethoxyethane)Sulfonic Acid	PFEEESA	113507-82-7
PERFLUOROETHER/POLYETHER CARBOXYLIC ACIDS (PFPCA's)		
Perfluoro-3-Methoxypropanoic Acid	PFMPA	377-73-1
Perfluoro-4-Methoxybutanoic Acid	PFMBA	863090-89-5
Nonfluoro-3,6-Dioxaheptanoic Acid	NFDHA	151772-58-6

Project Name: BARNSTABLE AIRPORT
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GLOSSARY

Acronyms

DL	- Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
EDL	- Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).
EMPC	- Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.
EPA	- Environmental Protection Agency.
LCS	- Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LCSD	- Laboratory Control Sample Duplicate: Refer to LCS.
LFB	- Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.
LOD	- Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
LOQ	- Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
	Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)
MDL	- Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
MS	- Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.
MSD	- Matrix Spike Sample Duplicate: Refer to MS.
NA	- Not Applicable.
NC	- Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.
NDPA/DPA	- N-Nitrosodiphenylamine/Diphenylamine.
NI	- Not Ignitable.
NP	- Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.
RL	- Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.
RPD	- Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.
SRM	- Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.
STLP	- Semi-dynamic Tank Leaching Procedure per EPA Method 1315.
TEF	- Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.
TEQ	- Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.
TIC	- Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: DU Report with 'J' Qualifiers



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- 1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PAH Total: With respect to Alkylated PAH analyses, the 'PAHs, Total' result is defined as the summation of results for all or a subset of the following compounds: Naphthalene, C1-C4 Naphthalenes, 2-Methylnaphthalene, 1-Methylnaphthalene, Biphenyl, Acenaphthylene, Acenaphthene, Fluorene, C1-C3 Fluorenes, Phenanthrene, C1-C4 Phenanthrenes/Anthracenes, Anthracene, Fluoranthene, Pyrene, C1-C4 Fluoranthenes/Pyrenes, Benz(a)anthracene, Chrysene, C1-C4 Chrysenes, Benzo(b)fluoranthene, Benzo(j)+(k)fluoranthene, Benzo(e)pyrene, Benzo(a)pyrene, Perylene, Indeno(1,2,3-cd)pyrene, Dibenzo(ah)+(ac)anthracene, Benzo(g,h,i)perylene. If a 'Total' result is requested, the results of its individual components will also be reported.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

The target compound Chlordane (CAS No. 57-74-9) is reported for GC ECD analyses. Per EPA, this compound "refers to a mixture of chlordane isomers, other chlorinated hydrocarbons and numerous other components." (Reference: USEPA Toxicological Review of Chlordane, In Support of Summary Information on the Integrated Risk Information System (IRIS), December 1997.)

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

- A** - Spectra identified as "Aldol Condensates" are byproducts of the extraction/concentration procedures when acetone is introduced in the process.
- B** - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).
- C** - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.
- D** - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.
- E** - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.
- F** - The ratio of quantifier ion response to qualifier ion response falls outside of the laboratory criteria. Results are considered to be an estimated maximum concentration.
- G** - The concentration may be biased high due to matrix interferences (i.e. co-elution) with non-target compound(s). The result should be considered estimated.
- H** - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.
- I** - The lower value for the two columns has been reported due to obvious interference.
- J** - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).
- M** - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.
- ND** - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.
- NJ** - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

Report Format: DU Report with 'J' Qualifiers



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Data Qualifiers

- P** - The RPD between the results for the two columns exceeds the method-specified criteria.
- Q** - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)
- R** - Analytical results are from sample re-analysis.
- RE** - Analytical results are from sample re-extraction.
- S** - Analytical results are from modified screening analysis.

Report Format: DU Report with 'J' Qualifiers



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REFERENCES

- 121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.
- 134 Determination of Selected Perfluorinated Alkyl Acids in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) using Isotope Dilution. Alpha SOP 23528.

LIMITATION OF LIABILITIES

Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.



Alpha Analytical, Inc.Facility: **Company-wide**Department: **Quality Assurance**Title: **Certificate/Approval Program Summary**ID No.: **17873**

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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, SM4500CI-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.

APPENDIX C

Construction Worker Short Form

Method 3 Risk Assessment for Chemicals in Soil - Construction Worker Shortform 2012 (sf12cw)

Index

Tab

EPCs	Table CW-1: Select chemicals and enter Exposure Point Concentrations (EPCs). Estimated risks are shown to the right.
C Eq	Table CW-2: Equations to calculate cancer risks
NC Eq	Table CW-3: Equations to calculate noncancer risks
Exp	Table CW-4: Definitions and exposure factors
Chem	Table CW-5: Chemical-specific data
Cyanide	Table CW-6: Cyanide Calculations

Spreadsheets designed by Andrew Friedmann, MassDEP

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Construction Worker - Soil: Table CW-1
Exposure Point Concentration (EPC) and Risk
Based on Construction Worker 18-25 years of age

ShortForm Version 10-12

Vlookup Version v0315

****Do not insert or delete any rows****

Click on empty cell below and select OHM using arrow.

ELCR (all chemicals) =

HI (all chemicals) = 6.0E-02

Oil or Hazardous	EPC	ELCR	ELCR	ELCR	ELCR		Subchronic				
Material (OHM)	(mg/kg)	ingestion	dermal	inhalation GI	inhalation pulmonary	ELCR _{total}	HQ _{ing}	HQ _{derm}	HQ _{inh-GI}	HQ _{inh}	HQ _{total}
zzPERFLUORODECANOIC ACID (PFDA)	7.8E-03						1.9E-03	1.9E-03	5.0E-05	1.5E-05	3.9E-03
zzPERFLUOROHEPTANOIC ACID (PFHpA)	1.8E-03						4.4E-04	4.5E-04	1.1E-05	3.4E-06	9.0E-04
zzPERFLUOROHEXANESULFONIC ACID (PFHxS)	2.5E-02						6.2E-03	6.2E-03	1.6E-04	4.7E-05	1.3E-02
zzPERFLUOROOCTANOIC ACID (PFOA)	4.6E-02						1.1E-02	1.1E-02	2.9E-04	8.6E-05	2.3E-02
zzPERFLUOROOCTANESULFONIC ACID (PFOS)	2.9E-02						7.1E-03	7.2E-03	1.9E-04	5.4E-05	1.5E-02
zzPERFLUORONONANOIC ACID (PFNA)	9.6E-03						2.4E-03	2.4E-03	6.1E-05	1.8E-05	4.8E-03

Construction Worker - Soil: Table CW-2

Equations to Calculate Cancer Risk for Construction Worker

Vlookup Version v0315

Cancer Risk from Ingestion

$$ELCR_{ing} = LADD_{ing} * CSF_{oral}$$

$$LADD_{ing} = \frac{EPC * IR * RAF_{c-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Dermal Absorption

$$ELCR_{derm} = LADD_{derm} * CSF_{oral}$$

$$LADD_{derm} = \frac{EPC * SA * AF * RAF_{c-derm} * EF * ED_{derm} * EP * C1}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$ELCR_{inh-GI} = LADD_{inh-GI} * CSF_{oral}$$

$$LADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{c-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Cancer Risk from Particulate Inhalation - Pulmonary Absorption

$$ELCR_{inh} = LADD_{inh} * CSF_{inhalation}$$

$$LADD = \frac{EPC * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{c-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{lifetime}}$$

Parameter	Value	Units
CSF	OHM-specific	(mg/kg-day) ⁻¹
LADD	age/OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{c-ing}	OHM-specific	dimensionless
RAF _{c-derm}	OHM-specific	dimensionless
RAF _{c-inh}	OHM-specific	dimensionless
EF	0.714	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _(lifetime)	25,550	days
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM ₁₀	60	μg/m ³

Construction Worker - Soil: Table CW-3

Equations to Calculate Noncancer Risk for Construction Worker

Vlookup Version v0315

Noncancer Risk from Ingestion

$$HQ_{ing} = \frac{ADD_{ing}}{RfD_{oral-subchronic}}$$

$$ADD_{ing} = \frac{EPC * IR * RAF_{nc-ing} * EF * ED_{ing} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Dermal Absorption

$$HQ_{derm} = \frac{ADD_{derm}}{RfD_{oral-subchronic}}$$

$$ADD_{dermal} = \frac{EPC * SA * AF * RAF_{nc-derm} * EF * ED_{dermal} * EP * C1}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Gastrointestinal Absorption

$$HQ_{inh-GI} = \frac{ADD_{inh-GI}}{RfD_{oral-subchronic}}$$

$$ADD_{inh-GI} = \frac{EPC * RCAF_{inh-gi} * PM_{10} * VR_{work} * RAF_{nc-ing} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Noncancer Risk from Particulate Inhalation - Pulmonary Absorption

$$HQ_{inh} = \frac{ADD}{RfD_{inhalation-subchronic}}$$

$$ADD_{inh} = \frac{EPC_{soil} * RCAF_{inh} * PM_{10} * VR_{work} * RAF_{nc-inh} * EF * ED_{inh} * EP * C2 * C3 * C4}{BW * AP_{noncancer}}$$

Parameter	Value	Units
RfD	OHM-specific	mg/kg-day
ADD	OHM-specific	mg/kg-day
EPC	OHM-specific	mg/kg
IR	100	mg/day
RAF _{nc-ing}	OHM-specific	dimensionless
RAF _{nc-derm}	OHM-specific	dimensionless
RAF _{nc-inh}	OHM-specific	dimensionless
EF	0.714	event/day
ED _{ing & derm}	1	day/event
ED _{inh}	0.333	day/event
EP	182	days
C1	1.0E-06	kg/mg
C2	1.0E-09	kg/μg
C3	1440	min/days
C4	1.0E-03	m ³ /L
BW	58.0	kg
AP _{noncancer}	182	days
VR _{work}	60	L/min
AF	0.29	mg/cm ²
SA	3473	cm ² /day
RCAF _{inh-gi}	1.5	dimensionless
RCAF _{inh}	0.5	dimensionless
PM10	60	μg/m ³

Construction Worker - Soil: Table CW-4

Definitions and Exposure Factors

Vlookup Version v0315

Parameter	Value	Units	Notes
ELCR - Excess Lifetime Cancer Risk	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhilation)
HI - Hazard Index	chemical specific	dimensionless	Pathway specific (ing =ingestion, derm=dermal, inh=inhilation)
CSF - Cancer Slope Factor	chemical specific	(mg/kg-day) ⁻¹	see Table CW-5.
RfD - Reference Dose	chemical specific	mg/kg-day	see Table CW-5.
LADD - Lifetime Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-2.
ADD - Average Daily Dose	chemical specific	mg/kg-day	Pathway specific. See Table CW-3.
EPC - Exposure Point Concentration	chemical specific	mg/kg	see Table CW-1.
IR - Soil Ingestion Rate	100	mg/day	MADEP. 2002. Technical Update: Calculation of an Enhanced Soil Ingestion Rate. (http://www.mass.gov/dep/ors/orspubs.htm).
RAF _c - Relative Absorption Factor for Cancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
RAF _{nc} - Relative Absorption Factor for Noncancer Effects	chemical specific	dimensionless	Pathway specific - see Table CW-5.
EF - Exposure Frequency	0.714	event/day	5 events (days) / 7 events (days) in a week; MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-38.
ED _{ing,derm} - Exposure Duration for ingestion or dermal exposure	1	day/event	
ED _{inh} - Exposure Duration for inhalation exposure	0.333	day/event	Represents 8 hours / event.
EP - Exposure Period	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
BW - Body Weight	58.0	kg	U.S. EPA. 1997. Exposure Factors Handbook. Table 7-7, Females, ages 18 - 25.
AP _(lifetime) - Averaging Period for lifetime	25,550	days	Represents 70 years
AP _(noncancer) - Averaging Period for noncancer	182	days	6 months; MADEP 1995 Guidance for Disposal Site Risk Characterization.
AF - Adherence Factor	0.29	mg/cm ²	MA DEP. 2002 Technical Update: Weighted Skin-Soil Adherence Factors. (http://www.mass.gov/dep/ors/orspubs.htm)
VR _{work} - Ventilation Rate during work (heavy exertion)	60	L/min	Table B-4 MADEP 1995 Guidance for Disposal Site Risk Characterization.
SA - Surface Area	3473	cm ² /day	MADEP. 1995. Guidance for Disposal Site Risk Characterization. 50th percentile for females. Appendix Table B-2.
IFAF _{inh-gi} - Ingestion Fraction Adjustment Factor, gastrointestinal	1.5	dimensionless	MADEP 2007. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
IFAF _{inh} - Inhalation Fraction Adjustment Factor, inhalation	0.5	dimensionless	MADEP 2002. Characterization of Risks Due to Inhalation of Particulates by Construction Workers
PM ₁₀ - Concentration of PM ₁₀	60	µg/m ³	MADEP 1995 Guidance for Disposal Site Risk Characterization pg B-11

Construction Worker - Soil: Table CW-5
Chemical-Specific Data

Vlookup Version v0315

Oil or Hazardous Material	Oral CSF (mg/kg-day) ⁻¹	RAF _{c-ing}	RAF _{c-derm}	RAF _{c-inh}	Inhalation CSF (mg/kg-day) ⁻¹	Subchronic Oral RfD mg/kg-day	Subchronic RAF _{nc-ing}	Subchronic RAF _{nc-derm}	Subchronic RAF _{nc-inh}	Subchronic Inhalation RfD
zzPERFLUORODECANOIC ACID (PFDA)						5.0E-06	1	0.1	1	5.7E-06
zzPERFLUOROHEPTANOIC ACID (PFHpA)						5.0E-06	1	0.1	1	5.7E-06
zzPERFLUOROHEXANESULFONIC ACID (5.0E-06	1	0.1	1	5.7E-06
zzPERFLUOROOCTANOIC ACID (PFOA)						5.0E-06	1	0.1	1	5.7E-06
zzPERFLUOROOCTANESULFONIC ACID (5.0E-06	1	0.1	1	5.7E-06
zzPERFLUORONONANOIC ACID (PFNA)						5.0E-06	1	0.1	1	5.7E-06

Construction Worker - Soil: Table CW-6 Cyanide Calculations

The soil cyanide concentration limit set to protect a construction worker against an acute, potentially lethal one-time dose of cyanide from incidental ingestion of contaminated soil is 12,000 mg/kg_{soil}. This is the concentration of available cyanide in soil below which acute human health effects would not be expected following a one-time exposure. This soil concentration is calculated using the equation below with a one-time soil ingestion estimate of 50 mg_{soil} and an available cyanide dose limit of 0.01 mg/kg_{body weight}.

MassDEP's guidance on evaluating the risk from a one-time cyanide dose considers cyanide's potentially lethal effects as well as information on cyanide metabolism:

Cyanides are detoxified rapidly by the body, and a large acute dose which overwhelms the detoxification mechanism is potentially more toxic than the same dose distributed over a period of hours. (MassDEP *Background Documentation for the Development of an Available Cyanide Benchmark Concentration*, originally dated October 1992, Modified August 1998)

Assessment of a potential one-time dose requires an estimate of the maximum soil concentration the trespasser could contact at any one time. The average soil concentration within a typical exposure area will underestimate the potential one-time dose. Therefore, to assess the acute risk of a one-time potentially lethal dose, the EPC for cyanide should be a conservative estimate of the maximum concentration.

The construction worker soil concentration limit to protect against adverse effects from an acute (one-time) exposure to cyanide is 12,000 mg/kg.

Acute Concentration Calculation for Cyanide

$$\text{Concentration} = \frac{\text{HQ} \times \text{Acute Dose Limit} \times \text{BW}}{\text{IR} \times \text{RAF} \times \text{Conversion Factor}}$$

Parameter	Value	Units
HQ (Hazard Quotient)	1	(unitless)
Acute Dose Limit	0.01	mg avail. CN/ kg BW
BW (Body Weight) ¹¹⁻¹²	58	kg
IR ^(1-time reasonable max)	50	mg
Conversion Factor	1.0E-06	kg soil / mg soil
RAF	1	(unitless)

The toxicological basis for estimating an allowable one-time dose is documented in MassDEP's 1992 *Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration*, which is published at:
<http://www.mass.gov/eea/docs/dep/toxics/stypes/dscyanide.pdf>

APPENDIX B

Photographic Documentation of Cap Area

Photo Log- PFAS Mitigation Cap Project



Photo 1: ARFF Building Area prior to construction of PFAS mitigation cap. Typical dust monitoring station is shown in the background.



Photo 2: Excavation of soils within the ARFF Building Area in preparation of subgrade placement and asphalt cap. Excavated soils were transported to the Deployment Area for use in grading and shaping prior to cap placement in that area.

Photo Log- PFAS Mitigation Cap Project

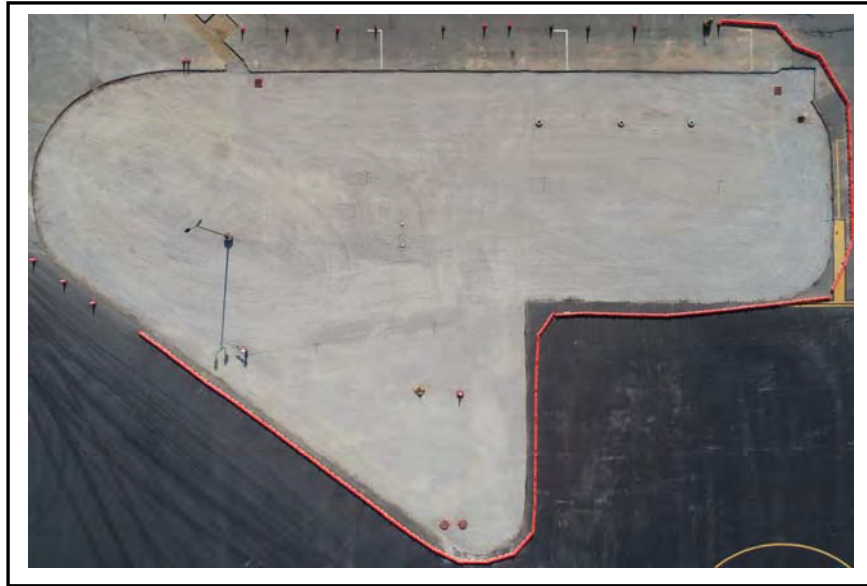


Photo 3: Final placement of subgrade material in ARFF Building Area in preparation of asphalt pavement placement.



Photo 4: Asphalt cap area within the ARFF Building Area.

Photo Log- PFAS Mitigation Cap Project



Photo 5: Deployment Area before placement of ARFF Building Area soils, sand, geomembrane and loam.



Photo 6: Aerial view of geomembrane liner placement in the Deployment Area.

Photo Log- PFAS Mitigation Cap Project



Photo 7: Aerial view of geomembrane liner placement in the Deployment Area.



Photo 8: Placement of the sand buffer layer after completion of Deployment Area cap.