Barnstable AIRPORT HYANNIS

IMMEDIATE RESPONSE ACTION PLAN
Status Report 4

Barnstable Municipal Airport
Hyannis, Massachusetts

RTN 4-26347

October 2018

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

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

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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 fourth 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 April 2018 and October 2018 in the context of previous soil and groundwater sampling and analysis.

2.0 SUMMARY OF IRA PLAN

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 (DEP). The NOR requested that the Airport conduct additional field investigations to evaluate sources of two types of contaminants previously detected at the Airport and on adjacent properties, and to identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher wellfields.

The NOR specifically requests that the Airport investigate perfluoroalkyl substances (PFAS) including perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA) previously detected in groundwater at the Airport and several adjacent properties. DEP also requested further evaluation of 1, 4-dioxane, previously detected in a monitoring well downgradient of the Airport on the Maher wellfield property.

A proposed IRA plan was submitted for approval in response to the NOR. Subsequently, a meeting was held by DEP 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.

Background

Prior to issuance of the NOR, the Airport conducted investigations on both contaminants and provided results to DEP. In July 2015, HW sampled groundwater from seven wells for analysis of 1,4-dioxane. The contaminant was detected in well OW-9DD at a concentration of 0.93 ug/L, above the 0.30 ug/L groundwater standard for 1,4-dioxane. This well is screened from 77 to 87 feet below the ground surface. Samples taken from the other wells at the Airport did not contain 1,4-dioxane above laboratory reporting levels.

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, DEP issued a Request for Information (RFI) to the Airport requiring investigation of PFAS. On July 1 and 5, 2016, HW collected samples from six monitoring wells and submitted samples for laboratory analysis for the presence 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 concentrations were 0.084 and 0.12 ug/L respectively, above the EPA health advisory limit and DEP standard of 0.07 ug/L. Because of the extremely low detection requirements, HW collected confirmatory samples from these two wells. Results showed 0.16 ug/L in HW-3 and 0.12 ug/L in HW-5. The concentrations detected in all the other wells were below the standard. It should be noted that these compounds were also detected above the standard in monitoring well HW-1, located at the upgradient, western boundary of the Airport.

Actions Under the IRA Plan

A summary of the groundwater and soil sampling and analysis conducted to date for both 1,4-dioxane and the PFAS compounds is provided below. This includes activities conducted between April 2018 and October 2018 which included soil and groundwater sampling for PFAS and the installation of six monitoring wells at the Airport to delineate the source and extent of the groundwater contaminants. Soil and groundwater sampling results collected during this time period are pending and will be reported in the next IRA status report.

3.0 APPLICABLE MCP STANDARDS

In accordance with MCP Section 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).

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 Fire District Water Department, 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 site 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 this site.

Currently, there are no DEP soil standards for PFAS compounds.

4.0 FIELD INVESTIGATIONS – DECEMBER 2016 – OCTOBER 2018

The field work conducted since the November 2016 NOR was received by the Airport is summarized below:

- The installation of groundwater monitoring wells at six locations installed in April 2017: in the vicinity of potential sources of PFOA at the Airport Rescue and Fire Fighting (ARFF) Building, at the fire fighting training deployment area adjacent to the East Ramp, and at upgradient locations to evaluate potential off-site sources of PFAS and 1,4-dioxane. Groundwater flows from the northwest to southeast across the airport, approximately parallel to Runway 15/33.

- The first round of groundwater samples for PFAS and 1,4-dioxane were collected on April 5-7 and April 11, 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 taken on December 6, 2016 as reported in the first status report. One sample was taken from each location where it was determined that aircraft fire fighting foam (AFFF) had been used at the Airport, including the site of an airplane crash in 1991, the deployment area, and the drill location located along the dirt road adjacent to the deployment area.

- A second round of soil samples was taken on June 20, 2017 adjacent to the ARFF building and within the deployment area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further delineate the extent of PFAS in soils both horizontally and vertically, with samples taken at the ground surface and at two and four feet below grade.

- 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. In November, 2017, five additional composite samples of soils from the runway redevelopment were taken from the storage location at Cape Cod Aggregates.

- On October 26, 2017, ten PFAS samples were taken to evaluate background conditions in surficial soils on the Airport and in nearby locations in Hyannis. Ten additional background samples from location across the Town of Barnstable were taken on December 14, 2017.

- Six PFAS soil samples were also analyzed for leaching potential using an SPLP test. 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. Results of these tests were provided to HW by the Laboratory in early January, 2018.

- On August 14, 2018, 24 PFAS surface soil samples were taken from the AFFF deployment location and the area near the ARFF building. PFAS compounds were previously detected at the deployment area site where AFFF training has been conducted. Results of these tests were provided to HW by the Laboratory in September 2018 and are currently being evaluated.

- In October 2018, soil borings were installed in the deployment area and the area near the ARFF Building in order to supplement the round of sampling from 2017. Soil samples were taken at five, ten, and fifteen feet below grade to further delineate the extent of PFAS in soils both horizontally and vertically. All soil borings were advanced using direct push methods. Results of the laboratory analysis for these samples are expected in October 2018.

- In early October 2018, six (6) monitoring wells were installed at the Airport. A cluster of three wells was installed at an upgradient location to evaluate potential off-site sources of PFAS. Three (3) additional wells were installed southeast of the deployment area adjacent to the East Ramp. Groundwater flows from the northwest to southeast across the Airport, approximately parallel to Runway 15/33. Groundwater sampling results for these wells are expected in late October 2018.

Groundwater samples were collected consistent with the Massachusetts Department of Environmental Protection Guidance on Sampling and Analysis for PFAS at Disposal Sites Regulated under the MCP, dated January 2017. A submersible pump was utilized to develop each monitoring well prior to sample collection. During well purging, a properly calibrated InSitu smarTroll MP multi-parameter meter was utilized to measure temperature, pH,

conductivity, DO, and oxidation reduction potential. Groundwater samples, including trip and equipment blanks were submitted to ESS Laboratory, Cranston, Rhode Island for 1,4-dioxane analyses and to Maxim Laboratory for the PFAS compounds. Trip blanks and equipment rinse samples were collected and analyzed for PFAS compounds along with the monitoring well samples.

Surface soil samples were taken directly with the sampling bottle. If necessary, a gloved hand was used to remove any surface vegetation and to place the sample directly into the bottle. Soil samples obtained from 4 to 5 feet below grade were collected using a hand auger that was decontaminated using Liquinox, and rinsed using Type II De-ionized water. Each boring was advanced to just above the desired depth of sample then the auger was decontaminated and rinsed again prior to sample collection, in order to minimize, to the greatest extent possible, cross contamination between samples/intervals. Each step was repeated in between each interval of sampling. Samples were collected by either shaking the sample directly from the hand auger into the bottle, or, if necessary, using a gloved hand to remove the sample from bottom of the auger and placing directly into bottle. Soil samples obtained deeper than 5 feet below grade were collected using direct push methods with an AMS Power Probe. A separate set of gloves was used for each sample.

Results of Groundwater and Soil Analyses

As indicated in Section 4.0, soil and groundwater samples were collected between August and October 2018. The results from these investigations will be documented in the next IRA Status Report. A discussion of previous sampling events and associated analytical data is included in previously submitted IRA Status reports.

As set forth in the Massachusetts Department of Environmental Protection Office of Research and Standards Final Recommendations for Interim Toxicity and Drinking Water Guidance Values for Perfluorinated Alkyl Substances Included in the Unregulated Chemical Monitoring Rule 3, dated June 8, 2018, the sum of PFOS, PFOA, perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), and perfluorohepatanoic acid (PFHpA) represent the total concentration of PFAS. To incorporate these recent changes, HW has updated the previously submitted groundwater table (Table 1 – Groundwater Results for PFAS Compounds) and an associated figure (Figure 2 – PFAS Results in Groundwater) to include total PFAS. Copies of the updated table and figure are attached.

5.0 GROUND WATER MODELING AND CONTAMINANT TRANSPORT ANALYSIS

DEP 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 informed by the results of the groundwater sampling and water level data collected under this IRA plan. 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.

6.0 MANAGEMENT OF REMEDIAL WASTE

No remedial waste has been generated to date as a result of the work conducted under the IRA Plan.

7.0 UPGRADES TO AFFF TESTING PROTOCOLS AT THE AIRPORT

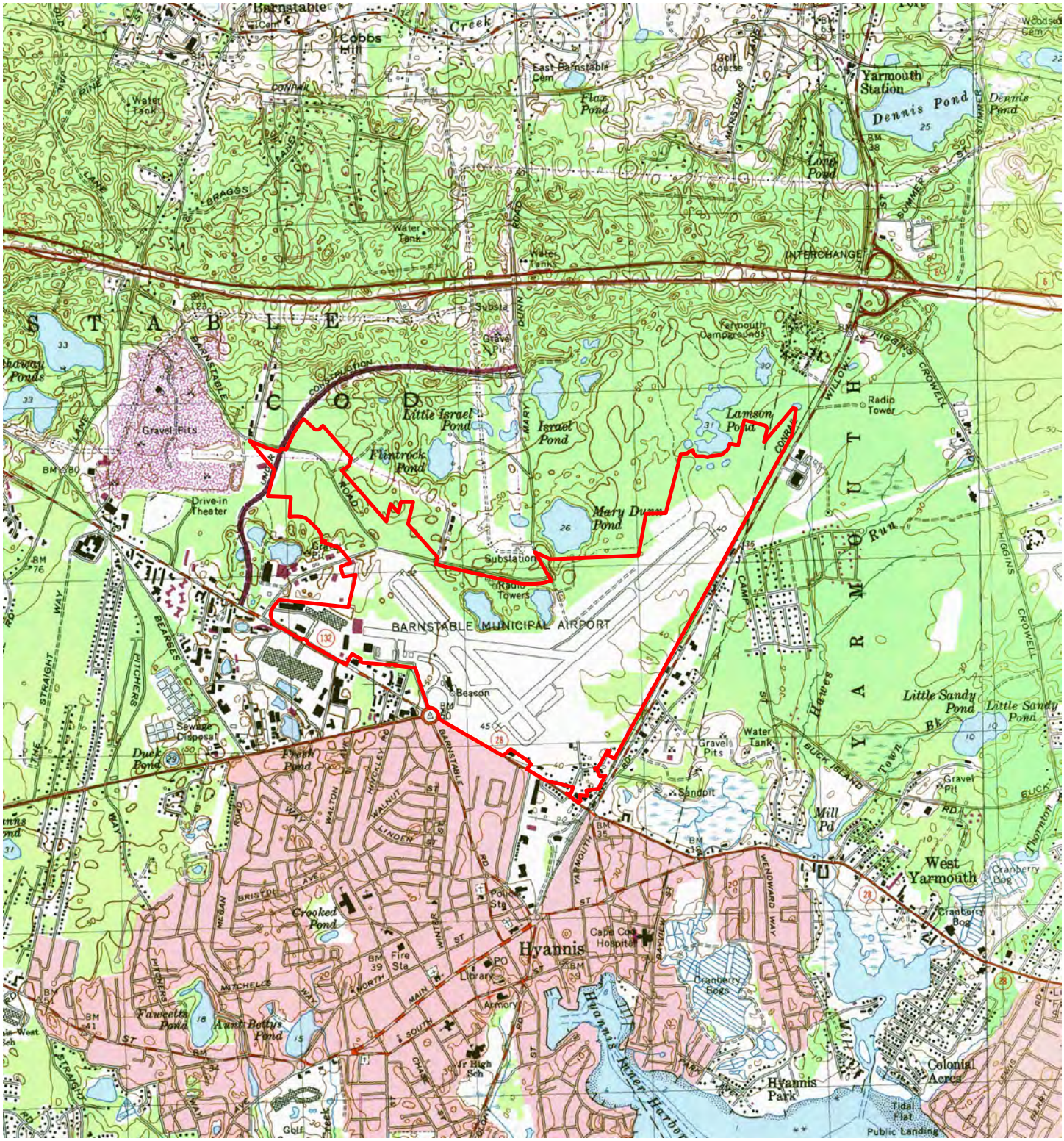
The Airport has purchased two Ecologic Foam Test Systems to allow the Airport to test the AFFF delivery systems on their fire trucks without having to discharge the foam into the environment. These new systems meet the Federal Aviation Administration requirements for the regular testing of AFFF usage.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

8.0 PLANS FOR NEXT REPORTING PERIOD

Further testing of soil and groundwater is planned as described in the Phase II Scope of Work included within the Phase I – Initial Site Investigation and Tier Classification Report submitted to DEP November 10, 2017. In addition, as mentioned above, the Airport will be moving forward to remove and dispose of soils from the deployment area in order to minimize leaching of PFAS compounds to groundwater. This work will be based on the results of the soil analyses conducted this fall.

DEP asked the Airport to investigate whether or not there are private wells downgradient of the airport and potential source areas for 1,4-dioxane and PFAS compounds. In the IRA Plan, HW identified four properties in Yarmouth that, while connected to public water, also were identified as having an onsite well. Given that they are connected to public water it is likely that these wells are used for non-drinking water purposes and/or abandoned. In addition, upcoming actions include the installation of a new monitoring well for 1,4 dioxane. Groundwater sampling will be conducted at the new well next year.

HW will continue this evaluation upon receipt of our groundwater sampling data and upon completion of our groundwater modeling analysis to determine if any additional areas need to be investigated for the presence of private wells. If any private wells are identified, further analysis will be conducted to determine if private well sampling is needed.



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Legend

Airport Property Line

*Hyannis Topographic Quadrangle

N

Miles

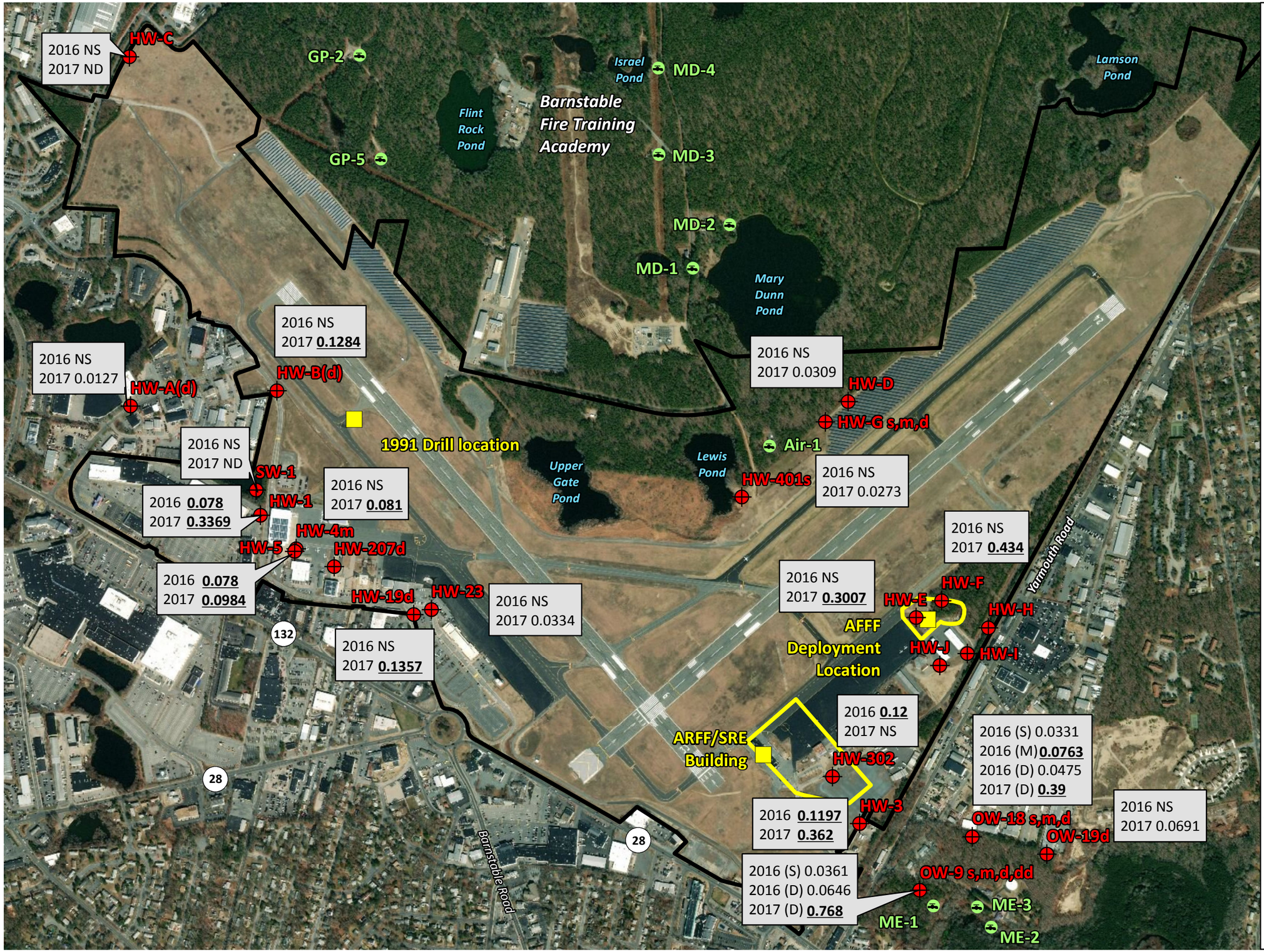
0.5

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

USGS Locus
Barnstable Municipal Airport
Hyannis, MA

Date: 4/17/2018

Figure 1



Legend

- Monitoring Wells
- PFOS/PFOA Soil Samples
- ND — Not Detected
- NS — No Sample Collected
- .02 — Total Under MA DEP Limit (.070 ug/L)
- **.08** — Total Over MA DEP Limit (.070 ug/L)
- Drinking Water Wells
- Barnstable Municipal Airport Property Boundary

Note: Total = Five (5) combined PFAS compounds (PFHpA + PFHxS + PFNA + PFOS +PFOA)

N

0 750

1 in = 750 feet

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

PFAS Results in Groundwater Barnstable Municipal Airport Hyannis, MA

Date: 10/22/2018 Figure 2

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TABLES

Table 1. Groundwater Results for PFAS Compounds

	North Ramp							Lewis Pond		
	HW-1 7/1/2016	HW-1 6/20/2017	HW-4M 4/5/2017	HW-5 7/1/2016	HW-5 4/7/2017	HW-23 6/20/2017	HW-19D 6/20/2017	HW-D 4/7/2017	HW-401S 4/7/2017	HW-C 4/7/2017
Perfluorobutanesulfonic acid (PFBS)	0.009 ND	0.02	0.005J	0.009 ND	0.0048 ND	0.0051J	0.0081J	0.0048 ND	0.0048 ND	0.0048 ND
Perfluoroheptanoic acid (PFHpA)	0.01	0.0042J	0.007J	0.01	0.0084J	0.0045J	0.0052J	0.0033 ND	0.0043J	0.0033 ND
Perfluorohexanesulfonic acid (PFHxS)	0.018	0.065	0.02	0.018	0.018J	0.021	0.046	0.0089J	0.011J	0.0034 ND
Perfluorononanoic acid (PFNA)	0.002 ND	0.0057J	0.0046 ND	0.002 ND	0.0046 ND	0.0038 ND	0.0065J	0.0046 ND	0.0046 ND	0.0046 ND
Perfluorooctane sulfonate (PFOS)	0.017	**0.24**	0.043	0.017	0.052	0.0079J	0.061	0.022	0.012J	0.0026 ND
Perfluorooctanoic acid (PFOA)	0.033	0.022	0.011J	0.033	0.020J	0.0046 ND	0.017J	0.0046 ND	0.0046 ND	0.0046 ND
Total	**0.078**	**0.3369**	**0.081**	**0.078**	**0.0984**	0.0334	**0.1357**	0.0309	0.0273	ND

	Steamship Parking Lot						Airfield		Airport Road	
	HW-2 7/1/2016	HW-3 7/1/2016	HW-3 4/5/2017	HW-300 7/1/2016	HW-301 7/1/2016	HW-302 7/1/2016	HW-E 4/5/2017	HW-F 4/5/2017	HW-A 4/7/2017	HW-B 4/7/2017
Perfluorobutanesulfonic acid (PFBS)	0.009 ND	0.009 ND	0.0048 ND	0.009 ND	0.009 ND	0.009 ND	0.0048 ND	0.0048 ND	0.017J	0.0077J
Perfluoroheptanoic acid (PFHpA)	0.0071	0.016	0.1	0.0096	0.002	0.019	0.15	0.34	0.0048J	0.049
Perfluorohexanesulfonic acid (PFHxS)	0.0035	0.0043	0.020J	0.012	0.038	0.006.3	0.042	0.019J	0.0079J	0.044
Perfluorononanoic acid (PFNA)	0.002 ND	0.0063	0.027	0.002 ND	0.002 ND	0.054	0.0087J	0.0046 ND	0.0046 ND	0.0046 ND
Perfluorooctane sulfonate (PFOS)	0.012	**0.084**	**0.15**	0.017	0.011	0.014	0.047	0.0026 ND	0.0026 ND	0.026
Perfluorooctanoic acid (PFOA)	0.0063	0.0091	0.065	0.0052	0.0037	0.033	0.053	**0.075**	0.0046 ND	0.0094J
Total	0.0289	**0.1197**	**0.362**	0.0438	0.0547	**0.12**	**0.3007**	**0.434**	0.0127	**0.1284**

	Maher Wells									Surface Water
	OW-9S 7/5/2016	OW-9D 7/5/2016	OW-9D 4/11/2017	OW-18S 7/5/2016	OW-18M 7/5/2016	OW-18D 7/5/2016	OW-18D 4/11/2017	OW-18D Duplicate 7/5/2016	OW-19D 4/11/2017	Kmart 6/20/2017
Perfluorobutanesulfonic acid (PFBS)	0.009 ND	0.009 ND	0.0048 ND	0.009 ND	0.009 ND	0.009 ND	0.016J	0.009 ND	0.0055J	0.00.8 ND
Perfluoroheptanoic acid (PFHpA)	0.014	0.0028	0.034	0.00.1	0.0029	0.0071	0.015J	0.0063	0.0051J	0.0033 ND
Perfluorohexanesulfonic acid (PFHxS)	03 (ND)	0.012	0.12	0.0068	0.016	0.01	0.13	0.011	0.029	0.0034 ND
Perfluorononanoic acid (PFNA)	0.0077	0.0036	0.059	0.002 ND	0.0076	0.0065	0.0046 ND	0.0058	0.006J	0.0043 (NA)
Perfluorooctane sulfonate (PFOS)	0.0074	0.041	**0.5**	0.0083	0.044	0.018	**0.22**	0.019	0.029	0.0026 ND
Perfluorooctanoic acid (PFOA)	0.007	0.0052	0.055	0.018	0.0058	0.0059	0.025	0.0059	0.0046 ND	0.0046 ND
Total	0.0361	0.0646	**0.768**	0.0331	**0.0763**	0.0475	**0.39**	0.048	0.0691	ND

J= Results between RDL and MDL

Results in ug/L, mmicrograms per liter

ND= Not detected by method

MDL= method detection limit

Shaded/ Bold results above DEP GW-1 standard (0.07 ug/L)

Total = Five (5) combined PFAS compounds (PFHpA + PFHxS + PFNA + PFOS +PFOA)

Note: Totals include estimated values. Totals do not include PFBS.