Final Environmental Impact Report
EEA No. 16640

# CAPE COD GATEWAY AIRPORT

## MASTER PLAN IMPROVEMENT PROJECTS

## APPENDICES A-J

CAPE COD GATEWAY AIRPORT

Epsilon ASSOCIATES INC.

September 16, 2024

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# Appendix A

Secretary's Certificate on the Draft EA/EIR

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February 16, 2024

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
ON THE
DRAFT ENVIRONMENTAL IMPACT REPORT

| | |
|---|---|
| PROJECT NAME | : Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan |
| PROJECT MUNICIPALITY | : Barnstable (Hyannis) |
| PROJECT WATERSHED | : Cape Cod |
| EEA NUMBER | : 16640 |
| PROJECT PROPONENT | : Cape Cod Gateway Airport |
| DATE NOTICED IN MONITOR | : December 22, 2023 |

Pursuant to the Massachusetts Environmental Policy Act (MEPA; M.G.L. c. 30, ss. 61-62L) and Section 11.08 of the MEPA regulations (301 CMR 11.00), I have reviewed the joint Draft Environmental Assessment (EA) and Draft Environmental Impact Report (DEIR) (Draft EA/EIR)[1] and hereby determine that it **adequately and properly complies** with MEPA and its implementing regulations. The Proponent may prepare and submit for review a Final Environmental Impact Report (FEIR) in accordance with the Scope included in this Certificate.

## Project Description

As described in the DEIR, the Proponent proposes several improvements to the Cape Cod Gateway Airport (Airport) in Hyannis as outlined in the 2022 Master Plan Update (MPU),[2] which evaluated aviation demand forecasts, facility requirements, airport access and geometry, and navigation aids over a 20-year planning horizon. According to the DEIR, the MPU recommendations are needed to meet Federal Aviation Administration (FAA) airport safety standards[3] as well as future aviation demand including rehabilitation of existing infrastructure. One of the main objectives of the Master Plan is to develop feasible and flexible alternatives to meet forecast demand. While the primary purpose of proposed improvements is safety, improvements also support future airport growth.

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[1] The filing was submitted to the MEPA Office as a joint Draft Environmental Assessment (EA) and DEIR. The Draft EA is prepared pursuant to the National Environmental Policy Act (NEPA). This Certificate will reference the "DEIR" for this joint document.

[2] The Master Plan was approved in May 2022 by the Cape Cod Gateway Airport Commission, the Massachusetts Department of Transportation (MassDOT) – Aeronautics Division and the FAA. See https://flyhya.com/master-plan/

[3] In particular, FAA Advisory Circular (AC) 150/5300-13B, Airport Design

Since the filing of the Environmental Notification Form (ENF) and based on comments received from the public during outreach meetings and Agency input, the projects included for consideration in the DEIR have been revised. Projects discussed in the DEIR only include those anticipated to receive federal and state funding in the near future (within five to seven years – Phase 1) and comprise extension of Runway 15, modification of taxiways (TWY) A, B and D, construction of a run-up area and noise wall, removal of TWY E, and aeronautical development within the North and East Ramp areas. Future projects anticipated to take place beyond a 7+ year timeframe (Phase 2), including terminal building improvements, are conceptual and not discussed in detail; however, the DEIR provides some analysis of these future projects and potential environmental impacts, such as traffic analysis and greenhouse gas (GHG) commitments related to building energy efficiency. The DEIR also presents the cumulative impacts of all phases at a conceptual level. To the extent full disclosures are not available as to individual Phase 2 components, one or more Notices of Project Change (NPC) filings may be required.

Components of the Master Plan (20-year period) include the following:

Airside[4]

- Runway 15-33 Extension (Phase 1)
    - Extend Runway 15 end by 895 feet (with a 695-foot displaced threshold[5]) to a total length of 6,150 feet from 5,255 feet
- Taxiway Modifications (Phase 1)
    - Construct new partial parallel TWY D with a 400-foot standard separation east of Runway 15-33 from proposed relocated TWY B to existing TWY A1
    - Remove portions of TWY D between existing TWY A and the new partial parallel TWY D and between Runway 6-24 and proposed relocated TWY B
    - Extend TWY A by 895 feet to provide a full-length parallel taxiway to Runway 15-33
    - Remove TWY E and the existing runup area and construct a new run-up area along the north side of the new partial parallel TWY D
    - Realign TWY B to a standard 400-foot separation south of Runway 6-24 and extend TWY B northward by 750 feet with two midfield taxiways to Runway 6-24 and a northern taxiway spanning Runway 6-24 to TWY C
    - Remove TWY C1 between TWY C and Runway 6-24
- Runway Safety Area Enhancement (Phase 2)
    - Install a ±200-foot by 400-foot engineered material arresting system (EMAS)[6] to the safety area beyond the end of Runway 24

Landside

- General Aviation (GA) improvements for apron and/or hangar development (Phase 1)
    - East Ramp: ±8.7 acres of land
    - North Ramp: ±31.3 acres of land
- Non-Aeronautical Land Use Development Areas (Phase 1)

[4] The DEIR notes airside facilities typically include runways, taxiways, airport lighting and markings, and navigational aids.
[5] A displaced threshold is a threshold located at a point on the runway other than the designated beginning of the runway. Displacement of a threshold reduces the length of runway available for landings. The portion of runway behind a displaced threshold is available for takeoffs in either direction and landings from the opposite direction.
[6] EMAS uses crushable material placed at the end of a runway to stop an aircraft that overruns the runway. The tires of the aircraft sink into the lightweight material and the aircraft is decelerated as it rolls through the material.

- Terminal Improvements to expand the existing 43,097 square foot (sf) terminal building for current and future demand (Phase 2)
- 20,000 sf Snow Removal Equipment (SRE) building (unclear if Phase 1 or Phase 2)

Airspace Safety Improvements

- Runway Safety Area (RSA) and Runway Object Free Area (ROFA) Avigation Easements (Phase 1)
- Airport control over Runway Protection Zone (RPZ) Properties (Phase 1)

The DEIR was required to clarify which project components are intended to support future growth in airport operations, and how implementation of each will be phased to accommodate growth projections over a specified time horizon. In response, the DEIR states that aeronautical development areas within the East and North Ramps (the area of GA improvements to support apron and hangar development) and Terminal Building enhancements (in Phase 2) are identified in the MPU as needed to support the future growth in airport operations (with a focus on operating safety and efficiency). Aeronautical development areas are on existing areas of the Airport sited for their proximity to existing infrastructure (terminal building, ramps, and fixed-base operators). Work proposed in these areas, such as runway extension and taxiway realignment, is largely proposed to support safety upgrades for current aircraft fleets, though the DEIR indicates that future airport operations may need to accommodate larger aircraft that are still in the current family of aircraft that use the Airport. The DEIR does not clearly describe the number of hangars that would be proposed, or any other development that is proposed on the East and North Ramps. The FEIR should provide this information.

Changes Since Filing the ENF

According to the DEIR, since the filing of the ENF, the Proponent has refined the project through conceptual design, additional needs analysis, and input from the community. The DEIR discusses additional alternatives evaluated for the project, including refined runway alternatives, options for an operational shift to Joint Base Cape Cod (JBCC), taxiway configurations, and airport terminal needs. The Proponent has shortened the proposed Runway 15-33 extension by 440 feet to address community concerns regarding noise and safety; no additional runway length is proposed to be added to the existing Runway 33-end. The Proponent has continued outreach to neighbors to provide updates on ongoing remediation efforts related to per- and poly-fluoroalkyl substances (PFAS).

The DEIR includes an updated noise analysis completed per FAA's required methodology which evaluates the updated preferred Runway 15-33 extension length. In addition, the DEIR describes minor changes to phasing of projects as annual Capital Improvement Plan (CIP) budgets are implemented at the state and federal level based on funding availability (Table 3.4-1 identifies the proposed project schedule from 2024 to 2029). Projects that have been determined to commence later than 2029 (including design phases) have been removed from the analysis provided in the DEIR (including any terminal modifications/expansion as well as the Runway 6 RSA enhancements). This analysis has been moved to Appendix C for information purposes only. Conceptual grading plans have progressed for the runway and taxiway projects, determining the limits of work, areas of new land disturbance, wetland impacts, and required safety area tree removal on Airport. An updated obstruction analysis for easement acquisition has also been completed.

Project Site

The Cape Cod Gateway Airport (the "Airport" or "project site") is located in Hyannis on Cape Cod. The Airport is bordered by a Massachusetts Fish and Wildlife designated conservation area and Route 6 to the north, Barnstable Road (Route 132) to the south, Yarmouth Road to the west, and an industrial park (Independence Park) to the east. The Airport is owned by the Town of Barnstable (Town) and provides commercial and GA services to Boston, New York and the islands of Martha's Vineyard and Nantucket. It is managed by the Cape Cod Gateway Airport Commission and airport staff. The Airport is zoned for Business and Industrial uses. Land uses surrounding the Airport property include agriculture, commercial, industrial, mixed uses, open land, and residential.

The Airport encompasses ±639 acres of land, of which ±140 acres is developed for airport facilities and operations including a single 43,097 sf Passenger Terminal Building, Air Traffic Control Tower (ATCT), parking facilities, aircraft ramps, hangars, runways, taxiways, an Airport Rescue and Fire Fighting (ARFF) building and an aircraft fuel farm. More than 45 private tenants lease space on parts of the Airport property. The Airport includes two runways: Runway 15-33 is 5,255 feet long by 150 feet wide and is aligned in a northwest to southeast direction and Runway 6-24 is 5,425 feet long by 150 feet wide and is aligned in a southwest to northeast direction. The Airport has seven taxiways designated A, A1, B, C, C1, D, and E. The Airport has three ramps (Terminal Ramp, East Ramp, and North Ramp), that provide ±369,500 sf of aircraft parking, fueling, and staging and maneuvering areas.

Approximately 460 acres of the Airport are undeveloped areas consisting of upland evergreen and deciduous forests, wetlands, and two ponds (Upper Gate Pond and Lewis Pond) to the north. The forested communities are located north of the intersection between the two runways, with smaller patches of forested lands northwest of the Runway 15 end and southeast of Runway 6-24. Wetland resources areas include Bordering Vegetated Wetlands (BVW), Land Under Water (LUW), and Bank. Several of the small, isolated freshwater wetlands located on or immediately adjacent to Airport property are identified as Potential Vernal Pools (PVPs). The project site is located within Cape Cod's public drinking water supply's wellhead protection areas (Zone II). According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, the majority of the Airport is within Zone X, an area of minimal flood hazard determined to be outside the 500-year flood (panels 25001C0566J and 25001C0567J, effective July 16, 2014); however, a small section of forested area near Mary Dunn Pond, within the Airport property, is within an area with a 0.2% annual chance of flood hazard.

The Airport contains areas mapped as Estimated Habitat of Rare Wildlife, Certified Vernal Pools and/or Priority Habitat of Rare Species as designated by the Massachusetts Natural Heritage and Endangered Species Program (NHESP). However, these areas are not within the limits of the proposed improvements described in the Master Plan. The northern portions of the ponds contain densely forested embankments, extending into the Hyannis Ponds Wildlife Management Area (WMA). No federally identified critical habitats are located at the Airport. The project site supports habitat for many bird species, both resident and migratory, including several birds that are protected under the Migratory Birds Treaty Act of 1918 and/or the Bald Eagle and Golden Eagle Protection Act of 1940.

The project site is within the Designated Geographic Area (DGA) of Environmental Justice (EJ) populations[7] located in whole or in part within 1 mile of the project site as stated in 301 CMR 11.02

[7] "Environmental Justice Population" is defined in M.G.L. c. 30, § 62 under four categories: Minority, Income, English Isolation, and a combined category of Minority and Income.

(definition of "DGA"). The project site is located within one EJ population characterized by Minority and Income; within 1 mile of 13 EJ populations characterized by Minority, Income, Minority and Income, and Minority, Income and English Isolation (10 in Barnstable and three in Yarmouth); and within 5 miles of ±20 EJ populations characterized by Minority, Income, Minority and Income, and Minority and English Isolation (13 in Barnstable and seven in Yarmouth).

Environmental Impacts and Mitigation

Table 1.5-1 provides a summary of potential impacts identified in the ENF and DEIR.

**Table 1.5-1 Summary of ENF vs DEIR Impacts**

| | Existing | Change ENF | DEIR Update |
|---|---|---|---|
| Total Site Acreage (in acres) | 639 | 0 | 0 |
| New acres of altered land (in acres) | -- | 63 | 50* |
| Acres of Impervious Area (in acres) | 167 | 27 | 40 |
| Square feet of new bordering vegetated wetlands alteration (in sf) | | 3,427 | 4,600 |
| Square feet of new other wetland alteration | | +/-23,000 | 12,700 sf LUW<br>300 lf Bank |
| Footprint of buildings (in acres) | 121 | 0.25 | 0.25** |
| Gross square footage | 43,097 | 55,000 | 55,000 |
| Internal roadways (in acres) | 902 | 21 | 14*** |
| Parking and other paved areas (in acres) | 50 | -- | 26.4 |
| Vehicle trips per day | 88 | 88 | 70 - 171**** |
| Parking spaces | 1,135 | 0 | 0 |
| Other altered areas (in acres) | 27 | -- | -- |
| Undeveloped areas (in acres) | 460 | -21 | -40 |
| Water Use (Gallons per day [GPD]) | 7,0004 | -- | -- |
| Water withdrawal (GPD) | 7,000 | -- | -- |
| Wastewater generation/treatment (GPD) | 13,000 | -- | -- |

* Overall footprint of the Proposed Action includes vegetation converted to impervious surface and impacts of grading.

** This number does not include potential hangars which may be up to a total of 5 acres. These 5 acres overlap with the impervious surface number under "other paved areas."

*** Paved apron and ramp space is now included in" other paved surfaces."

**** 100% growth scenario (increase in 200 peak hour passenger design capacity). Increased trips represent between a 0.51% and 1.30% increase in daily and peak hour volumes, respectively, along the major travel routes.

Future new buildings, expansions, or additions (i.e., the 30,600-sf terminal building expansion proposed for Phase 2 and addition of new hangars on the East and North Ramps in Phase 1 and a 20,000-sf Snow Removal Equipment (SRE) building in Phase 1 or 2) may generate new vehicle trips, increase water use, generate wastewater and emit greenhouse gasses (GHG) associated with energy use and transportation; these impacts were not quantified in the DEIR as the Proponent does not expect to construct any new buildings, expansions, or additions in the next five to seven years. The project will require tree clearing for Runway 15-33 Extension and Aeronautical Development at the East Ramp (hangar expansion at the East Ramp will require 6.11 acres of tree removal and 17.3 acres of new impervious area).

Measures proposed to avoid, minimize and mitigate environmental impacts include implementation of eight electric vehicle (EV) charging stations and electric aircraft charging infrastructure (as technology advances); construction of new or renovated buildings to meet the 2023 Stretch Code with 100% heat pump space heating; construction of 4,600 sf of wetland replication; construction of a stormwater management system to improve water quality, reduce flow rates and infiltrate runoff; implementation of Transportation Demand Management (TDM); monitoring of groundwater to track PFAS plume at the Airport; and construction-period Best Management Practices (BMPs) to minimize noise, air and water quality impacts including construction of a noise barrier along the proposed run-up pad for noise protection. Additional measures should be specified in the FEIR.

Permitting and Jurisdiction

The project is undergoing MEPA review and is subject to a mandatory EIR pursuant to 301 CMR 11.03(1)(a)(1) and 11.03(1)(a)(2) because it requires Agency Actions and will result in direct alteration of 50 or more acres of land and creation of 10 or more acres of impervious area, respectively. The project is also required to prepare an EIR pursuant to 301 CMR 11.06(7)(b) because it is located within a DGA (1 mile) around one or more EJ Populations. The project exceeds ENF thresholds at 11.03(6)(b)(3) for expansion of an existing runway at an airport, 11.03(6)(b)(4) for construction of a New taxiway at an airport, and 11.03(3)(b)(1)(f) for alteration of one-half or more acres of other wetlands (LUW). The project requires a Section 401 Water Quality Certification (WQC) from the Massachusetts Department of Environmental Protection (MassDEP). It is subject to the MEPA GHG Emissions Policy and Protocol.

The project will require an Order of Conditions from the Barnstable Conservation Commission (or in the case of an appeal, a Superseding Order of Conditions (SOC) from MassDEP); submittal of a pre-construction notification (PCN) to the U.S. Army Corps of Engineers (ACOE) seeking authorization under the General Permits for Massachusetts in accordance with Section 404 of the Clean Water Act; review by the Massachusetts Historical Commission (MHC), FAA and ACOE pursuant to Section 106 of the National Historic Preservation Act of 1966; review by FAA; Section 7 Consultation with the U.S. Fish and Wildlife Service (USFWS) under the U.S. Endangered Species Act; preparation and review of an Environmental Assessment (EA) under the National Environmental Policy Act (NEPA); a National Pollutant Discharge Elimination System (NPDES) Construction General Permit and Sole Source Aquifer Review from the U.S. Environmental Protection Agency (EPA); federal consistency review by the Massachusetts Office of Coastal Zone Management (CZM); and review by the Cape Cod Commission as a Development of Regional Impact (DRI). The Airport obtained coverage under the Multi-Sector General Permit (MSGP) for Stormwater Discharges Associated with Industrial Activity in 2021 (Appendix L).

The Proponent has received and may seek additional Financial Assistance through the Massachusetts Department of Transportation (MassDOT) Aeronautics Division ($7.5 million over a 20-year period). Therefore, MEPA jurisdiction is broad and extends to all aspects of the project that are likely, directly or indirectly, to cause Damage to the Environment, as defined in the MEPA regulations.

Review of the DEIR

The DEIR provides a brief description of the Airport and Master Plan (Chapter 1); a discussion of the purpose and need for the project (Chapter 2); a description of the project (Chapter 3); an expanded analysis of alternatives (Chapter 4); a description of existing environmental conditions (Chapter 5); an evaluation of environmental impacts associated with the project, the No Action alternative, and other alternatives considered for analysis (Chapter 6); measures to avoid, minimize and mitigate impacts (Chapter 7); a description of compliance with applicable federal, state, and local regulations (Chapter 8); and responses to comments received on the ENF (Chapter 10). The DEIR identifies changes to activities contemplated under the Master Plan, including changes in proposed phasing since the filing of the ENF. It includes plans of existing conditions and conceptual plans for all major project components on-site; no off-site work is proposed at this time. The DEIR describes existing avigation easements (Sheet 23 of the Airport Layout Plan in Appendix D) and proposed avigation easements that will be acquired.

To provide context for the proposed activities under the Master Plan, the DEIR provides an overview of the airport's functions and activities related to GA and commercial services, including operations and enplanement data. The DEIR provides information on the role that each of the project components will play in meeting the safety and efficiency goals of the Airport, as required by FAA and state aeronautical regulations and guidelines. It identifies applicable FAA design guidelines and/or standards to be addressed by each project. It provides a general description of airport operations, including hours of operation, conditions under which each runway is used, airplane taxiing and parking, and use of hangars and other Airport buildings. It includes data on past (2008 to 2023), current and projected levels of passenger volumes and aircraft operations on both an annual basis to justify the need to expand runway and taxiway capacity and to expand hangar space and other infrastructure to accommodate projected airport and passenger growth over time. Information was not provided specifically for peak summer months. Aeronautical development areas within the East and North Ramps and Terminal Building enhancements are identified in the MPU as needed to support the future growth in airport operations (with a focus on operating safety and efficiency). Specific project components intended to support future growth include proposed hangars at the East and North Ramps and terminal expansion. The DEIR notes that this development responds to Airport users waiting for hangars to be constructed on the airfield. Development of hangars (both size and configuration) is dependent on a private developer's need and business plan. Any future hangar development will be subject to the Airport's *Guidelines for Construction and Alteration at Cape Cod Gateway Airport.* The Airport Commission has worked with tenants for over 20 years to provide guidance on airport development for both new development and improvements to existing infrastructure that is either owned or leased by its tenants and associated businesses.

*Alternatives Analysis*

As stated in the ENF Certificate, project alternatives were conceptually reviewed in the ENF for all project components included in the MPU, including those related to Airside Alternatives, Terminal D Alternatives, Runway 6-24 Alternatives, and Terminal Building Alternatives. These alternatives were reviewed solely with respect to Level 1 and 2 screening criteria and did not comprehensively consider environmental impacts (Level 3 criteria). Supplemental evaluation of environmental criteria was required to be provided in the DEIR.

According to the DEIR, alternatives were analyzed consistent with the purpose and need for proposed projects (i.e., infrastructure constraints, FAA standards and facility requirements). The DEIR evaluates additional alternatives based on preliminary design concepts used to identify environmental impacts, community impacts and estimated cost. It states that the analysis on alternatives considers what effect changing the parameters of a project, or components, will have on the environment. The alternatives analysis describes the No Build Alternative, Preferred Alternative, and other alternatives for proposed projects within a 5–7-year time frame except for Landside projects. Given that Landside projects, most notably the hangar development in the East and North Ramps, are proposed in the 5-7-year time frame, an alternatives analysis as to all remaining project components should be provided in the FEIR. In addition, conceptual alternatives as to Phase 2 projects should be discussed; I note, in particular, that the Terminal Building Alternatives were reviewed in the ENF based on Level 1 and 2 screening criteria, so Level 3 criteria (environmental impacts) should be discussed in the FEIR. To the extent the Airport wishes to defer consideration of alternatives for Phase 2, a specific procedure for such consideration through a future NPC filing should be proposed in the FEIR. Any Phase 2 projects that are proposed to be deferred for later review should be clearly severable from other project components, and earlier phases should not preclude or constrain alternatives to be considered for Phase 2.

Airside Alternatives

Airside alternatives (related to arrival/departure of aircraft) were evaluated to identify potential solutions to non-standard FAA geometry or design conditions as identified in the MPU. FAA Advisory Circular (AC) 150/5300-13B, Airport Design contains standards and recommendations for the geometric layout and design of runways, taxiways, aprons, and other facilities at airports to ensure safety and efficiency. The MPU reviewed the design standards to ensure safety and efficiency of current and future Airport users and to identify basic aircraft characteristics which the Airport design will need to meet. The DEIR identifies the design critical aircraft[8] (determined by the MPU) which sets dimensional requirements on an airport (i.e., separation distance between taxiways and runways, and size of certain areas protecting the safety of aircraft operations and passengers). Aircraft operational area dimensions are matched to the most demanding aircraft that regularly use runways, taxiways, and apron areas. Existing and proposed design aircraft are reviewed on an individual basis per FAA AC 150/5325-4B *Runway Length Requirements for Airport Design*. However, the runway length analysis looked at the family of aircraft using the facility now and proposed to use the facility in the future. The MPU also reviewed the Airport's existing taxiway system with the design standards in AC 150/5300-13B to evaluate compliance with current standards for taxiway width, taxiway safety areas (TSA), taxiway object free areas (TOFAs), taxiway shoulders, taxiway gradient, and for parallel taxiways, the distance between the runway and taxiway centerlines.

*Runway 15-33 Extension*

As described in the DEIR, additional runway length is needed at the Airport to meet the requirements of the critical aircraft to enhance safety and efficiency of operations. Because Runway 15-33 is considered the "bad weather" runway at the Airport, it was selected for extension. The DEIR provides an expanded analysis of Runway 15-33 ENF Preferred Alternative (Alternative 4) that reviews two alternatives, both of which exclude the 440-feet expansion from the Runway 33 end that was proposed in Alternative 4.

Alternative 4A proposes a total runway length of 6,055 feet (801-foot extension only to Runway 15 end) including a 695-foot displaced threshold on the Runway 15 end. This alternative meets the runway length needs of critical aircraft for takeoff on both runways and limits and avoids off Airport impacts to surrounding communities. Compared to all other alternatives, Alternative 4A results in reduced obstruction impacts, less impervious area, reduced costs and off-site acquisitions to extend TWY A to the ends of the extended Runway 33 end and meets takeoff runway available (TORA) recommendations for critical aircraft. This alternative does not meet the facility requirements for landing needs for Runway 15-33.

Alternative 4B proposes a total runway length of 6,150 feet (895-foot extension only to the Runway 15 end) including a 695-foot displaced threshold on the Runway 15 end resulting in a TORA of 6,150 feet and an LDA of 5,455 feet. Runway 33 TORA would increase to 6,150 feet also, and more importantly, LDA would increase to 6,000 feet to provide a runway that meets the LDA for the critical aircraft. Alternative 4B results in similar impacts as Alternative 4A except for an increase in runway

[8] Critical aircraft is defined as "the most demanding aircraft type or grouping of aircraft (family of aircraft) with similar characteristics, which make regular use of the airport." Regular use is 500 annual operations, including both itinerant and local operations but excluding touch-and-go operations. An operation is either a takeoff or landing.

length by 94 feet (from 801 feet to 895 feet extension at the Runway 15 end) with additional land alteration and impervious area creation. However, Alternative 4B was selected as the Preferred Alternative as it meets the purpose and need of the runway length recommendation and would result in less land alteration, impervious area and community impacts than the ENF Preferred Alternative.

The DEIR includes an evaluation of the use of JBCC as a public-use airport, with the closure of the Cape Cod Gateway Airport. The Proponent dismisses the alternative to use JBCC because it would shift environmental impacts to another community and notes the property itself is owned by the Commonwealth of Massachusetts and leased by the Federal Government, and hosts five different military commands, which would complicate jurisdictional issues; JBCC is outside of the control of the Cape Cod Gateway Airport Commission, which is an agency of the Town of Barnstable; would require a major change in land use for Falmouth; may not be positively received by the public; and is farther for commuting to Nantucket. In addition, the DEIR identifies challenging constraints at the JBCC site and note that the Airport supports emergency response and provides economic benefits to the local economy.

*TWY D*

The DEIR reviews TWY D Alternatives that improve multiple existing non-standard geometry conditions associated with the taxiway intersection angle, high energy intersections, direct access and multiple taxiway crossings. The Preferred Alternative/Alternative 2 would construct a partial parallel taxiway east of Runway 15-33 with a 400-foot standard runway centerline to taxiway centerline separation. This alternative would also construct an engine run-up area along the north side of the proposed partial parallel TWY D and adjacent to the existing TWY E run-up pit, which would be removed. A blast fence/wall would be constructed next to the proposed run-up pit both for blast and noise protection. Proposed TWY D would result in impacts to BVW, Bank, and LUW associated with Upper Gate Pond. The DEIR evaluates design options for reducing wetland resource areas impacts including Alternatives 2A (4:1 slope), 2B/Preferred Alternative (2:1 slope), 2C (retaining wall), and 2D (bridge) as described in the Table 4.1-5.

**Table 4.1-5 Wetland Resource Area Impacts for Alternative 2 Options**

| Alternative | Resource Area Impacts | | |
|---|---|---|---|
| | BVW (sf) | Bank (lf) | LUW (sf) |
| Alternative 2A – 4:1 Slope | 11,790 | 540 | 27,980 |
| Alternative 2B – 2:1 Slope | 4,600 | 300 | 12,700 |
| Alternative 2C – Retaining Wall | 3,500 | 230 | 7,100 |
| Alternative 2D - Bridge | 0 | 100 (shadow) | 10,000 (shadow) |

Alternative 2A (standard side slope of 4:1) would result in the largest impacts on BVW, Bank, and LUW due to fill on the north side of the taxiway. Alternative 2B/Preferred Alternative (steeper side slope of 2:1) would result in lower impacts on BVW, Bank, and LUW due to the increased sides slopes to the north of TWY D and wider area of TSA and TOFA. Alternative 2C (retaining wall) would result in reduced impacts on BVW, Bank, and LUW) over the impacts from 2A and 2B, due to the ability to create steeper side slopes to the north of TWY D and wider area of TSA and TOFA. The DEIR asserts this alternative was dismissed because higher side slopes do not meet the TSA and TOFA standards, it would still result in impacts on Upper Gate Pond and be costly. Alternative 2D (bridge/elevated taxiway surface would construct a bridge component to TWY D at the segment crossing Upper Gate Pond, spanning the bottom of the taxiway side slopes and would result in the lowest direct impacts on Upper Gate Pond. This alternative was eliminated from consideration because it requires extensive structural design, significant amounts of new construction, as well as high costs.

The DEIR also evaluates Alternative 4 (Reduced Taxiway/Runway Separation) which would locate a parallel TWY D south of Upper Gate Pond closer to Runway 15-33, compared to prior alternatives, to avoid impacts associated with BVW, Bank and LUW entirely. In Alternative 4, TWY D would be located ±300 feet from the runway centerline instead of 400 feet. Additionally, there would be less tree removal required for obstructions. According to the DEIR, locating the taxiway less than 400 feet from Runway 15-33 would not meet FAA separation standards, which are based on the critical aircraft. Taxiway/Runway separation distances are a safety-based standard to protect the safety of the flying public. The DEIR asserts that this alternative results in a non-standard geometry on the airfield, which results in unsafe conditions, and would not be approved by FAA. Therefore, it was eliminated. As noted below, the FEIR should continue to assess alternatives to taxiway design to minimize wetland impacts.

*Environmental Justice*

As noted above, the project site is located within one EJ population characterized by Minority and Income; within 1 mile of 13 EJ populations characterized by Minority, Income, Minority and Income, and Minority, Income and English Isolation (10 in Barnstable and three in Yarmouth); and within 5 miles of ±20 EJ populations characterized by Minority, Income, Minority and Income, and Minority and English Isolation (13 in Barnstable and seven in Yarmouth). Within the census tracts containing the above EJ populations in the DGA, the following languages are identified as those spoken by 5% or more of residents who also identify as not speaking English very well: Portuguese or Portuguese Creole and Spanish or Spanish Creole.

The DEIR describes the public involvement plan that the Proponent has undertaken to engage with EJ Populations. A project website was created to provide information, updates, meeting notices, and presentation materials[9] and project-specific email was made available to allow the public to contact the Proponent with any questions or comments.[10] In accordance with the Scope, the Proponent obtained an updated "EJ Reference List" from the MEPA office, which included a list of Community Based Organizations (CBOs) and tribes/indigenous organizations. The Proponent held a public outreach meeting virtually at 2:00 PM (±35 attendees) and in-person at the Barnstable Town Hall at 6:00 PM (±40 attendees) on Thursday, June 21, 2023,[11] to provide an update on revisions to the project and share information on additional impact analyses conducted since the filing of the ENF. Efforts to promote the meeting included newspaper ads and emails to stakeholders, updates to the project website (after the meeting, the presentation was published on the website). Translation services were also offered in Spanish and Portuguese. On September 6, 2023, a FAA Noise Policy Letter was distributed to stakeholders notifying them of the opportunity to comment on FAA's Noise Policy Review Process, including evaluating use of Day-Night Average Sound Level (DNL) as the primary noise metric. The letter noted that the comment period opened on May 1, 2023, and ended on September 29, 2023. A second meeting was also held on December 12, 2023 (virtually at 2:00 PM (±35 attendees) and in-person meeting at 6:00 PM at Barnstable Town Hall (±15 to 20 attendees) to inform the public of studies conducted since the June 2023 meeting.[12] Advance notice of this meeting was communicated to the

[9] www.flyhya.com/environmentalassessment
[10] enviroHYA@epsilonassociates.com
[11] Email from Alyssa Jacobs, Epsilon Associates on behalf of the Proponent on February 13, 2024 to Purvi Patel (MEPA).
[12] Email from Alyssa Jacobs, Epsilon Associates on behalf of the Proponent on February 13, 2024 to Purvi Patel (MEPA).

public. Email notification was distributed to the EJ Reference List and larger project distribution list indicating that the DEIR is under MEPA review with opportunities for public involvement. The DEIR indicates that the Proponent remains committed to a comprehensive community outreach process and plans to continue efforts to engage with community members and groups to provide opportunities for the public to learn more about the project, ask questions, and share concerns as the project progresses.

The DEIR contains a baseline assessment of any existing unfair or inequitable Environmental Burden and related public health consequences impacting EJ Populations in accordance with 301 CMR 11.07(6)(n)1. and the MEPA Interim Protocol for Analysis of EJ Impacts. According to the DEIR, the data surveyed show some indication of an existing "unfair or inequitable" burden impacting identified EJ Populations. The DPH EJ Tool identifies two municipalities (Barnstable and Yarmouth) and census tracts within the one mile DGA as exhibiting "vulnerable health EJ criteria"; this term is defined in the DPH EJ Tool to include any one of four environmentally related health indicators that are measured to be 110% above statewide rates based on a five-year rolling average.[13] Specifically, within the Project's DGA, Barnstable, Yarmouth, and the identified census tracts meet the vulnerable health EJ criteria for the following parameters:

- Low birth weight (census tracts 25001012102 (Barnstable) and 25001015300 (Yarmouth))
- Childhood Asthma (Barnstable)

In addition, the DEIR indicates that the following sources of potential pollution exist within the one-mile DGA or within EJ block groups that are located partially within the one-mile DGA, based on the mapping layers available in the DPH EJ Tool:

- Major air and waste facilities: 2 large quantity toxic users and 17 large quantity generators
- M.G.L. c. 21E sites: 54 including 2 Tier 1 sites and 2 Tier 1D sites
- MassDEP sites with Activity Use Limitations (AULs): 1
- Underground storage tanks: 22
- EPA facilities: 19
- Road infrastructure: 3 (MassDOT roads – Routes 6, 28, and 132) and Boston to Cape Bikeway
- MBTA Bus and Rapid Transit: commuter rail station (Hyannis Transportation Center) and several parking lots (Hy-Line and Steamship Authority)
- Other transportation infrastructure: airports, freight yards, water taxis, railroad tracks and ferry routes
- Region transit agencies: 15 bus routes for the Regional Transit Authorities of Massachusetts and associated bus stops; Cape Cod Regional Transit Authority (CCRTA) with 27 stops
- Energy generation and supply: 1 power plant and 8 transmission lines

Although not required by the MEPA Interim Protocol for Analysis of EJ Impacts, the DEIR also surveyed environmental indicators tracked through the U.S. EPA's "EJ Screen," which shows a percentile measure of each indicator as compared to the MA statewide average. The DEIR evaluated the following indicators within the one-mile DGA:

[13] See https://matracking.ehs.state.ma.us/Environmental-Data/ej-vulnerable-health/environmental-justice.html. Four vulnerable health EJ criteria are tracked in the DPH EJ Viewer by municipality (heart attack hospitalization, childhood asthma, childhood blood lead, and low birth weight), and two (childhood blood lead, and low birth weight) are also available on a census tract level.

- Particulate Matter (PM): 5th percentile
- Ozone: 62nd percentile
- NATA Diesel Particulate Matter (DPM): 4th percentile
- NATA Air Toxics Cancer Risk: 0 percentile
- NATA Respiratory Hazard Index Ratio: 2nd percentile
- Toxic Release to Air: 6th percentile
- Traffic Proximity: 23rd percentile
- Lead Paint: 9th percentile
- Superfund Proximity: 45th percentile
- RMP Facility Proximity: 2nd percentile
- Hazardous Waste Proximity: 10th percentile
- Underground Storage Tanks: 20th percentile
- Wastewater Discharge: N/A

Based on the study of vulnerable health EJ criteria, the data shows that some EJ communities in the DGA are considered vulnerable or subject to at least some level of existing environmental burdens. The DEIR asserts that the project is not anticipated to impact or contribute to any of the listed potential sources of pollution described above nor add to them and will not materially exacerbate the existing health burden of the EJ communities around the project site. It further asserts that analysis of estimated risk ratings for climate parameters (e.g., temperature, precipitation) does not indicate elevated climate risks for EJ populations within the DGA and the project is not expected to produce any direct climate impacts that will affect EJ populations. The EJ Screen analysis results show that none of the indicators are shown to be 80th percentile or higher of statewide average within one mile of the project site.

According to the transportation analysis presented in the DEIR, an addition of 200 peak hour passengers may result in a traffic volume increase between 13 and 31 vehicle trips per hour (0.51 to 1.3% increase in peak hour volumes along the major travel routes). The analysis reflects new traffic generation associated with the potential terminal expansion anticipated to occur beyond a 7+ year timeframe (Phase 2). The analysis does not appear to include traffic associated with the proposed hangars at the East and North Ramps. Potential terminal expansion is expected to result in up to +2,279 tons per year (tpy) increase in mobile source GHG emissions, as further discussed below. According to the DEIR, these components are not expected to result in a significant increase in vehicle and truck traffic and impacts on surrounding roadways are anticipated to be minor under future growth scenarios.

The DEIR states that the Airport is in a NAAQS attainment area and notes that minor project-related contributions from vehicles will not contribute to air pollutant concentrations that would result in an exceedance of the NAAQS; therefore, no disproportionate adverse effect on EJ populations is anticipated as a result of the project. Minor temporary air quality impacts (i.e., from fugitive dust and construction vehicles during construction) will be minimized and mitigated through use of construction period BMPs. While the DEIR indicates that no increase in airplane emissions will result from the project, this does not appear to account for projected future growth in airport activity or the expansion in hangar space and other infrastructure need to support airport expansion. This clarification should be provided in the FEIR.

The project will create ±40 acres of impervious area.[14] According to the DEIR, the project is not anticipated to contribute to additional risk to the surrounding areas and to EJ Populations relative to flooding because the project site has been designed to mitigate any impacts that are created as a result of the new impervious area. The Airport intends to install new leaching catch basins and infiltration chambers to enhance flood protection during storms and flooding events. The DEIR does not analyze the stormwater management system to specifically assess whether flooding risks may be exacerbated for nearby EJ populations under future climate conditions.

The DEIR discusses EPA's endangerment finding regarding emissions of lead from aircraft that operate on leaded fuel and associated air pollution which may endanger public health and welfare under the Clean Air Act[15] and upcoming proposal and promulgation of regulatory standards for lead emissions from certain aircraft engines. Concurrently, the FAA will develop standards that address the composition, chemical, or physical properties of an aircraft fuel or fuel additive to control or eliminate aircraft lead emissions. EPA and FAA have started work on regulatory options to address lead emissions from aircraft engines. According to the DEIR, aircraft that use leaded aviation gasoline are generally small piston-engine aircraft; jet aircraft used for commercial transport do not operate on leaded fuel. EPA notes that levels of airborne lead in the U.S. have declined 99% since 1980, while acknowledging that emissions from aircraft that operate on leaded fuel may still pose risks to nearby communities, including those with EJ concerns. The DEIR states that the project is not expected to increase piston aircraft operations.

The DEIR provides a discussion of reasonably foreseeable public health consequences from any environmental impacts of the project, including any impacts that might exacerbate the vulnerable health EJ criteria. According to the DEIR, the discussion also serves to identify and assess the potential health and safety risks that could disproportionately affect children, specifically related to air quality and noise.[16] The vulnerability criteria that are likely to be associated with air quality impacts from vehicular traffic include heart attacks and asthma. It is unclear if the traffic includes airplane traffic. Childhood asthma was exceeded in the EJ communities within the DGA of the project site. According to the DEIR, although outdoor air pollution could be a contributing factor, the air quality near the project site is improving and current levels are below the NAAQS that are protective of health effects such as asthma, with a margin of safety for protecting vulnerable population groups (e.g., children). The DEIR asserts that any project-related impacts will not contribute to an exceedance of these health-based standards. The DEIR states that there is little data to suggest that air quality is associated with the low-birth-weight criteria.

The DEIR states that the project is not expected to have disproportionate, adverse impacts on public health and on children's environmental health and safety, particularly nearby schools or camps. As noted, the FEIR should clarify the extent to which any proposed airport expansion will increase air and noise impacts in the surrounding neighborhoods. The FEIR should respond to comments requesting an update on efforts to clean up existing PFAS contamination near EJ neighborhoods.

[14] The DEIR includes discrepancies in the amount of impervious area that will be created (38.5 acres versus 40 acres).
[15] According to the DEIR, EPA's determination advances its *Lead Strategy to Reduce Lead Exposures and Disparities in U.S. Communities* aimed at reducing lead exposure in communities.
[16] In accordance with FAA's 1050.1F Desk Reference and Executive Order 13405, Protection of Children from Environmental Health Risks and Safety Risks.

*Noise*

The FAA is currently reviewing its noise policy to address aircraft noise.[17] As part of the review, FAA is looking at its current use of Day Night Average Sound Level (DNL) as the primary noise metric for assessing cumulative aircraft noise exposure; reviewing whether to continue to use the DNL 65 dB level as the metric and threshold for determining significant noise impacts in environmental reviews under the NEPA or the definition of the limit of residential land use compatibility; and considering if and how alternative noise metrics may be used in lieu of or in addition to DNL to better inform agency decisions and improve FAA's disclosure of noise impacts. As part of their engagement with the public and other stakeholders, the FAA issued a Federal Register Notice on May 1, 2023, seeking public comment on its Noise Policy Review (comment period open from May 1 to September 29, 2023). In September 2023, the Airport provided a notice to all airport stakeholders of FAA's current noise policy review and the solicitation of comments. The FAA received 4,857 comments from across the U.S. and is currently analyzing these comments to identify the range of input on noise metrics, noise thresholds, and other noise policy issues. This analysis will inform the development of any policy recommendations.

According to the DEIR, prior noise assessments at the Airport include a Federal Aviation Regulations (FAR) Part 150 Noise Study prepared in 1987 and approved by FAA in 1989, which was updated in 1998-99, resulting in additional practices being adopted. These studies analyzed existing and future noise levels at the Airport and in the vicinity resulting from aircraft operations and provided suggestions to reduce noise impacts, which are currently in effect as voluntary noise abatement flight procedures in good weather conditions. These procedures indicate priority runway use for noise abatement; identify known noise sensitive areas in the vicinity of the Airport; and provide optimum noise abatement arrival and departure paths for each runway. The procedures are to be followed unless otherwise directed by Air Traffic Control, or the pilot determines safety of the flight will be compromised (pilots are educated in these procedures via a handout and via airfield signage (also available on the Airport's website)). The Airport has established voluntary quiet hours between 10 PM and 6 AM, when airlines and GA operators are encouraged to limit their flights. In addition, training, touch-and-go and certification flights are prohibited without approval of the Airport.

The DEIR was required to respond to comments raised by the Town of Yarmouth and residents regarding existing and proposed aircraft noise including an aircraft noise analysis and noise mitigation. According to the DEIR, a detailed noise analysis was conducted in accordance with CFR Title 14, Part 150 with FAA-approved modeling software for predicting DNL impacts from airports. The DEIR states that under the current FAA noise policy, cumulative noise energy exposure of individuals to noise resulting from aviation activities must be established in terms of the DNL (as opposed to single-event aircraft noise). The DEIR provides details regarding this noise analysis on existing and proposed conditions. FAA guidelines indicate that all land uses are normally compatible with DNL noise levels less than 65 dBA; commercial land use areas are compatible with DNL levels below 70 dBA.

Existing noise conditions surrounding the Airport have been documented through noise exposure maps that include annual DNL contours computed using FAA's model for aircraft flights using operations data from 2019 to establish existing conditions DNL contours. According to the DEIR, using 2019 data for the baseline noise analysis is a conservative approach as the operations numbers (67,350) were ±50% more than the number of operations in 2022 (34,190). Input data required for the noise model includes aircraft fleet mix, runway geometry, runway use, number and type of aircraft operations

[17] https://www.faa.gov/noisepolicyreview

(departures and arrivals) by aircraft type, and number of daytime (7 am to 10 pm) and nighttime (10 pm to 7 am) aircraft operations for a typical average annual day at the Airport. The 70, 65, and 60 DNL noise contours are shown in Figure 5.9-1 for the 2019 Existing Condition; the 70 dBA DNL contour is entirely within Airport property. The 65 dBA contour generally falls within the Airport property but slightly extends into commercial land use east of Yarmouth Road. According to the DEIR, these results indicate that the existing condition of land use surrounding the Airport is noise compatible. All residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F.

The FAA model was used to assess future No Build conditions and generate DNL contours using future 2040 operations data developed in the MPU based on existing runway length conditions. Total operations forecasted for 2040 for all aircraft categories were 73,002, an increase of 5,652 operations, or 8.3% over the 2019 data (67,350). Of these, 5,564 were Touch and Go, accounting for 7.6% of Aircraft operations, a decrease of 1.6% from 2019 data (6,203). Based on the modeling, the 70 dBA DNL contour for the No Build condition is entirely within the Airport property (Figure 6.6-1) and the 65 dBA contour generally falls on Airport property but slightly extends into commercial land use across Yarmouth Road. According to the DEIR, the land use surrounding the Airport under the future No-Build Alternative is noise compatible as all residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F. Under this scenario, no changes in the number of flights, flight patterns, aircraft types, or other factors that may affect noise would occur. Noise levels would be similar to current noise levels.

According to the DEIR, proposed projects are not anticipated to generate an increase in different aircraft operational activity at the Airport as operations are forecasted to increase regardless of the implementation of these projects (Table 1.4-3 Annual Operations Forecast by Type). Therefore, impacts to community noise levels are not expected. Based on the future runway conditions using the above referenced operations data, FAA modeling indicates that the 70 and 75 dBA DNL contours are entirely within the Airport property, while the 65 dBA contour generally falls on Airport property but slightly extends into the commercial land use across Yarmouth Road, similar to No Build conditions (Figure 6.6-2). According to the DEIR, the land use surrounding the Airport under the future Build condition is noise compatible as all residences are exposed to noise levels below a DNL of 65 dBA and all commercial facilities are below a DNL of 70 dBA as described by the FAA's Order 1050.1F. Under this scenario, noise levels would be similar to current noise levels. I note, however, that these projections do not appear to account for project components that explicitly expand capacity of the airport to accommodate future growth, including the addition of proposed hangars and potential terminal expansion. This expansion in capacity could induce further demand for airplane and vehicular travel and should be accounted for in a calculation of impacts.

Other than aircraft operations, the DEIR does not identify all noise-generating activities and components of the project. It briefly discusses FAA regulations or policies that apply to noise impacts of airport operations; it only states that project activities will adhere to MassDEP's Noise Pollution Policy at 310 CMR 7.10 but does not address this policy or the project's consistency with it. The DEIR does not discuss whether noise impacts are likely to disproportionately affect surrounding EJ neighborhoods or other vulnerable populations (including those that may be considered "sensitive receptor"). It states that the projects do not exceed FAA noise thresholds and no mitigation is required.

The DEIR does not analyze the mitigation recommendations in the Town of Yarmouth's comments on the ENF, such as implementation of a standard instrument departure procedure for

Runway 15 to provide a definite flight path and altitudes that minimize noise impacts on residential land uses southeast of the Airport. The DEIR states that the FAA prohibits restrictions from the Airport on flight paths, hours of operation and restricted access to airports; federal law prohibits restricting the route by which an aircraft has access to the airport to aid in noise abasement. However, the DEIR indicates that the Airport will consult with FAA and primary Airport air taxi operators such as Cape Air on flight path modifications that may serve to minimize noise impacts. The DEIR does not analyze aircraft noise impacts by showing contours for the 55 DNL through 80 DNL in five-level increments, as well as single-event contours for the same DNL increments as applicable to a range of aircraft types as requested by the Town of Yarmouth in its comments on the ENF. It also does not present these contours for existing flight routes commonly flown at the Airport on each of the four runway ends, and for any future flight path recommended for aircraft noise mitigation measures. The Town of Yarmouth's comments on the ENF noted that the intent of these single-event aircraft noise is to better reflect the aircraft noise impact that residents experience on a daily basis.

*Land Alteration, Impervious Area and Stormwater*

The DEIR provides an updated table (Table 3.5-1) which quantifies land alteration and impervious area associated with each project including the amount of alteration in previously undisturbed areas. Cumulative land impacts include 67.6 acres of temporary disturbance to grassed areas; 46.15 acres of existing vegetated areas being converted to impervious surface and removal of 6.65 acres of impervious area for a net increase in impervious area of 39.47 acres. Net impervious area includes 3.78 acres for work associated with TWY D/E; 3.25 acres to extend Runway 15-33; 5.2 acres to relocate/extend TWY B; 1.69 acres to extend TWY A; 17.3 acres for East Ramp Development; and 8.25 acres for North Ramp Development. The project will remove a substantial number of existing mature trees from the site and within areas of proposed easements, which will be acquired. Table 6.4-2 provides a summary of tree cutting impacts by area for Aeronautical Development at the East Ramp (6.11 acres) and TWY D and Runup Pad Relocation (2.54 acres) for a total of 8.65 acres of tree removal including 0.70 acres of shrub/shrub. Six acres of tree removal and 9 acres of impervious area are attributed with the additional of proposed new hangars. The DEIR briefly discusses opportunities to minimize land alteration and impervious area. Removal of 440 feet from the Runway 33 end will remove a significant amount of impervious area. The DEIR provides an evaluation of TWY D alternatives to reduce impacts to wetlands as discussed above.

According to the DEIR, the Airport includes 460 acres of undeveloped areas (72%) that might otherwise be developed if the Airport were not in operation. Approximately 410 acres of the Airport will remain undeveloped post-construction and includes 110 acres of dense forest north of Upper Gate Pond and Lewis Pond adjacent to the Hyannis Pond WMA, of which 37.5 acres is identified in the MPU as Non-Aeronautical Development Areas. According to the DEIR, any necessary tree removal will occur during time periods that minimize impacts to any potential Northern Long Ear Bat populations (Federally protected species) (i.e., outside of the summer roosting period (April through September).

Each of the projects will be designed to comply with the MassDEP Stormwater Management Standards (SMS); however, the DEIR does not include a Stormwater Report, which will be developed for future permitting. The DEIR includes a high level analysis of treating stormwater runoff from new taxiway and runway pavements; it does not discuss stormwater management associated with Aeronautical Development at the North and East Ramps.

*Wetlands*

The Barnstable Conservation Commission will review the project for its consistency with the Wetland Protection Act (WPA), the Wetlands Regulations (310 CMR 10.00) and associated performance standards, including the SMS. According to the DEIR, impacts to wetland resource areas are associated with permanent fill from the relocation of TWY D and associated grading on Upper Gate Pond including 12,700 sf LUW, 4,600 sf of BVW, 300 lf of Bank and 3.8 acres of vegetated upland areas within the 200 feet of the pond. No other project components will impact wetland resource areas. The DEIR asserts that due to site constraints and FAA design requirements for airport geometry (400-foot separation), TWY D cannot be designed to fully avoid impacts to BVW. Impacts have been avoided and minimized to the maximum extent practicable through use of 2:1 side slope design with an engineered slope option. In addition, up to 5,200 cubic yards (cy) of excavation (dredge) of unconsolidated organic materials (i.e., "muck") along the pond bottom may be required to provide suitable base material for the taxiway slope. As part of the next phase of design, geotechnical engineers will further investigate this area to determine if excavation is recommended or if there are other options to adequately support the slope and meet FAA design criteria. Temporary impacts of 1,500 sf of BVW will involve a 5-foot horizontal area for construction access and work associated with TWY D; temporary impacts will be restored to pre-existing grades and seeded with a native wetland seed mix.

The DEIR provides updated wetlands calculations, including an updated summary table, which reflect the most recent design of the project and identifies temporary and permanent impacts to each wetland resource area and 200-foot buffer zone area. It describes how the project will comply with performance standards outlined in the WPA for each resource area. The DEIR includes analysis of an alternative to avoid impacts to wetland resource areas; however, this alternative was dismissed because it would not comply with FAA standards. The project will provide 4,600 sf of BVW replication in accordance with MassDEP's Inland Wetland Replication Guidelines, although it is unclear where this replication will be provided (i.e., on-site versus off-site). The FEIR should provide this information.

The project will require a 401 WQC from MassDEP due to the cumulative impacts to BVW and LUW. MassDEP will review the project for its consistency with Water Quality Regulations pursuant to 314 CMR 9.00. The DEIR provides information to describe cumulative impacts to "Waters of the Commonwealth" (BVW, Isolated Vegetated Wetland (IVW) and LUW) pursuant to 314 CMR 9.00 and identifies efforts to avoid, minimize, and mitigate impacts. The DEIR states that no impacts to federally jurisdictional IVWs are anticipated. As previously mentioned, up to 5,200 cy of proposed dredging will occur within upper Gate Pond as well as 4,600 sf of filling. The DEIR indicates that there is no practicable alternative available that has less adverse impact to the aquatic ecosystem based on the FAA standard that requires a 400-foot separation from Runway 15-33 and TWY D. As noted below, this issue should be further explored in the FEIR.

*Cultural Resources*

MHC comments on the ENF noted that the Airport contains two sites that are considered significant ancient Native American sites. No work is proposed at these archaeological site locations and as such, no impacts to these sites are anticipated. An Indian Trail site crosses north-south through the Airport property. Work areas in the vicinity of this former Indian Trail have previous heavy impacts related to the construction of the airfield and runways. The DEIR notes that preparation of an archaeological site avoidance and protection plan (ASAPP) in underway to describe how the archaeological sites will be protected and preserved from inadvertent construction-related impacts or future land use impacts. The ASAPP will be submitted to MHC for its review and comment. The ASAPP will address pre-construction, construction and post-construction activities. Avoidance and protection measures will include installing high-visibility temporary fencing (i.e., orange construction fence) around and barring access to the two significant sites (sensitive cultural resource areas).

*Water and Wastewater*

According to the DEIR, the Airport was the first airport in Massachusetts to purchase the ecologic unit to eliminate the need to use foam during annual firefighting equipment testing.

As previously noted, the Airport is located over a Sole Source Aquifer that is a source of drinking water for Cape Cod. Therefore, proposed improvements will be subject to review under EPA's Sole Source Aquifer Protection Program. The DEIR provides information responsive to the *EPA Region 1 Sole Source Aquifer Project Review Information* document to allow EPA to determine whether project construction and operation have the potential to contaminate the underlying aquifer. It describes existing groundwater conditions, identifies surface water discharges (Figure 5.4-4), and describes the location of USTs. According to the DEIR, the Airport continues to monitor PFAS concentrations in groundwater at and downgradient of the capped areas to measure their effectiveness. These results are presented every six months in status reports submitted to MassDEP. Comments from EPA identify recommendations related to the analysis of groundwater/aquifer protection, public drinking water sources, chemical storage and use, spill prevention control, and stormwater management. These issues should be more fully addressed in the FEIR.

*Climate Change*

*Adaptation and Resiliency*

The DEIR contains an updated output report from the MA Climate Resilience Design Standards Tool (the "MA Resilience Design Tool"),[18] which notes the project has a high exposure based on the project's location for extreme precipitation (urban and riverine flooding) and extreme heat. Based on the 60-year useful life and the self-assessed criticality of the terminal building, the Tool recommends a planning horizon of 2070 and a return period associated with a 100-year (1% chance) storm event when designing this asset. Based on a 20-year useful life and self-assessed criticality of runway and taxiways, the Tool recommended a planning horizon of 2050 and a return period associated with a 10-year (10% chance) storm event. This recommendation appears to be based on a "Low" criticality assessment, which is understated given the critical functions served by airport operations for regional travel. The FEIR should adjust the planning horizon and user inputs to generate revised recommendations for the design of runways and taxiways.

The DEIR provides a discussion of the Airport's vulnerabilities to climate change. According to the Town of Barnstable 2022 Hazard Mitigation Plan Update, the Town is vulnerable to several natural hazards including flooding, high winds, winter or extreme weather, coastal erosion, sea level rise, wildfire, and climate change and ocean acidification; windstorms and severe winter weather were identified as particularly threatening to the Airport. The Airport is not located within a mapped floodplain and no flooding is anticipated. Although the project will remove 8.65 acres of trees and convert this land to pavement, the DEIR asserts that heat island effects are not anticipated based on large

[18] https://resilientma.org/rmat_home/designstandards/

areas of forested lands (110 acres) in the northern portion of the Airport.

The project may reduce climate risks by improving stormwater management systems, using onsite energy generation/storage via a microgrid, and using "green" construction standards for airport tenants. The DEIR proposes to offset carbon releases and loss of carbon sequestration resulting from the project with tree planting/replanting, and preservation of forested areas north of the airport. According to the DEIR, the Airport has initiated the development of a smart microgrid[19] in conjunction with the Cape Cod Transit Authority (CCTA) and MassDOT Aeronautics Division to provide a supplementary source of reliable power with energy storage to allow for flexibility in peak conditions and enhance resiliency and sustainable energy at the Airport. The DEIR maintains that the project is consistent with, and responds to future climate scenarios (e.g., heat impacts) by adding runway length to maintain safe aircraft operations. The State Hazard Mitigation and Climate Adaptation Plan (SHMCAP, 2018) notes that "high temperatures may also impact airplane operations. If the length of existing runways is not sufficient under higher temperature conditions, planes may not be able to take off when there is less lift available [and] high temperatures and dense air conditions could lead to increased runway length requirements for aircraft due to diminished performance in such conditions."

All new projects will be designed to meet MassDEP stormwater standards at the time of design. All current and future upgrades to the stormwater management system will be designed and sized to accommodate the 10-year storm events and peak precipitation values derived from the National Regional Climate Center (NRCC) for each rain event to account for the predicted increase in rainfall quantities and frequency for the region. A copy of the final Stormwater Report for each project will be provided to DEP during the design phase for each project.

*Greenhouse Gas Emissions*

This project is subject to review under the May 5, 2010, MEPA GHG Policy, which requires Proponents to quantify carbon dioxide ($CO_2$) emissions and identify measures to avoid, minimize or mitigate such emissions.

<u>Stationary Sources</u>

The ENF described proposed construction of a 30,000-sf terminal expansion, which required a GHG analysis in the DEIR; however, the DEIR indicates that the Airport does not plan to build any expansions or additions for at least five years, if at all. Any potential expansion would be proposed as passenger demand necessitates. According to the DEIR, the project may also propose a 20,000-sf building for storage of existing maintenance and snow removal equipment (SRE). There are no current architectural plans or designs to model for energy use at this time. In lieu of the preparation of a GHG model, the Proponent is committing to GHG mitigation identified below.

The Airport is located in Barnstable, which is not a Stretch Code community. However, the DEIR states that the Proponent will commit to implementing 2023 Stretch Energy Code[20] measures to support the Airport's decarbonization goals. According to comments from the Massachusetts

[19] The MassDOT Aeronautics Division received a $1.95 million grant from the U.S. Department of Transportation's Strengthening Mobility and Revolutionizing Transportation (SMART) Program for planning of the microgrid at the Airport.
[20] https://www.mass.gov/info-details/stretch-energy-code-development-2022#final-code-language-for-stretch-code-update-and-new-specialized-stretch-code-

Department of Energy Resources (DOER), the DEIR was very responsive in committing to GHG mitigation measures and DOER has no further comments or recommendations as related to the terminal expansion component of the project. In addition to the terminal expansion, the Proponent is committing to the following series of GHG mitigation commitments for any new buildings, expansions, or additions, including the SRE:

- High performing envelope that complies with the 2023 Stretch Code envelope performance requirements
- 100% of building space heating will be provided by electric air source heat pumps
- Energy recovery ventilation per the 2023 Stretch Code update
- Electric domestic hot water heating (specific method to be determined) and heat pump domestic hot water heating will be analyzed
- Roof to be constructed solar photovoltaic (PV)-ready
- Install EV charging spaces (quantity to be determined but at minimum the number required by the 2023 Stretch Code)
- EV infrastructure for additional future EV-parking spaces to be installed (quantity to be determined)

The DEIR indicates that any new buildings, expansions, or additions including the terminal building and SRE will be constructed in accordance with C502.1 of the Stretch Code which requires application of prescriptive requirements of C401.3, C402 through C406, and Section C408 if less than 20,000-sf or in accordance with C401.2 Part 3, relative performance[21] if 20,000-sf or larger. Key mandatory sections in both pathways above include: C402.1.5 which establishes minimum, above-grade vertical envelope performance which cannot be "traded off" with other building improvements; C402.3 (solar readiness); C402.4 (revised fenestration performance of U-0.30/0.32); C402.5 (air leakage); C402.7 (thermal bridge derating); C403.5 (economizers); C403.7 (ventilation energy recovery); C405.13 (EV readiness); and C406 (additional energy efficiency).

The DEIR indicates that the project will comply with any future Energy Code Updates (beyond the 2023 Update) that occur prior to the commencement of proposed work. It states that specific GHG emissions reductions have not been quantified as there are no plans to conduct modeling, and DOER has indicated consent that the above commitments are sufficient to support an opt-out request in accordance with the MEPA GHG policy. Future terminal building enhancements are anticipated to be 100% electrically powered by the Airport's microgrid project which is currently in the planning phase and will use both battery storage and renewable energy sources (Airport's solar array). The Airport will reduce GHG emissions long-term by improving the energy efficiency of buildings on-site, evaluating the installation of solar canopies at the Airport parking lot, limiting idling by aircrafts, upgrading airport maintenance vehicles, requiring low sulfur diesel fuel use by contractors, and carrying out regular energy audits on on-site buildings. Upon completion of potential future buildings, additions, or expansions, the Proponent will submit a self-certification to the MEPA Office, prepared in accordance with the GHG Policy. This certification will identify the GHG mitigation measures incorporated into the building and will illustrate the degree of GHG emission reduction achieved. Details of the Proponent's implementation of operational measures will also be included in this certification.

The DEIR also identifies the ongoing GHG emissions commitments at the Airport including two

[21] which requires conformance with C401.3, C402.1.5, C402.2.8, C402.3, C402.4, C402.5, C402.6, C402.7, C403.5, C403.7, C405.2.4, C405.13, C406, C407.2, C408, and ASHRAE 90.1-2019 Appendix G (modified by C407.2)

solar fields occupying 25 acres of the site and producing 6.7 megawatts of energy to offset more than 5,000 metric tons of $CO_2$ emissions annually; eight EV charging stations in three parking lot locations; and roof-mounted solar arrays on two leased hangars.

The DEIR states additional information on implementation of electric aircraft charging stations is still preliminary; locations are identified on the Airport's terminal ramp but specific technologies would be identified as part of the newly awarded smart grid planning project. The microgrid will generate and distribute clean, reliable power, not only to the Airport, but for charging electric aircraft, and electric ground vehicles (including buses). The microgrid enhances the Airport's plans to implement electric aircraft charging infrastructure and pursue opportunities that are less reliant on external/conventional power sources. Phase I involves the study and planning of a microgrid placed at the Airport. Phase II will consist of funding to construct the microgrid infrastructure.

Mobile Sources / Air Quality

A mobile source emissions analysis was conducted to calculate the changes in $CO_2$ emissions as a result of the project and identifies potential reductions associated with improvements via TDM and other green initiatives at the Airport. An estimate of $CO_2$ emissions from mobile sources was calculated based on existing and estimated new trips, approximate distances traveled, and GHG emissions factors for vehicle trips. As with the traffic study, this calculation was provided based on the anticipated increase in vehicular trips only associated with the terminal expansion and did not account for any increase in airplane emissions associated with airport expansion. Potential reductions in mobile source $CO_2$ emissions may be achieved via TDM measures (e.g., subsidized bus passes, biking incentives). Direct emissions from transportation sources (e.g., fleet vehicles) are not included in the analysis because the Airport does not anticipate additional fleet vehicles as a result of the project.

The baseline condition is calculated from existing daily trips to the airport (472 vehicle trips). The project proposes a potential range of terminal building expansions in the future. In one scenario, the 100 peak hour passenger scenario for the terminal building would generate ±236 net new daily vehicle trips, which would increase annual $CO_2$ emissions by ±1,139 tons of $CO_2$ per year. The 150 peak hour passenger scenario for the terminal building would generate ±472 net new daily vehicle trips, which would increase annual CO2 emissions by ±2,279 tons of $CO_2$ per year (shown in Table 6-5.1).

**Table 6.4-1 Mobile Source CO2 Emissions**

| | Daily Trips | Miles/Round Trip | VMT/Day | Annual VMT | Annual CO2 Emissions (tons/year)[8,9] | Increase in GHG over baseline |
|---|---|---|---|---|---|---|
| **Existing (Baseline/No Build Condition)** | 472 | 30 | 14,160 | 5,168,400 | 2,279 | |
| **Vehicle Trips (Preferred Alternative -100 Peak Hour Passengers)** | 708 | 30 | 21,240 | 7,752,600 | 3,418 | +1,139 tons/year |
| **Vehicle Trips (Preferred Alternative -150 Peak Hour Passengers)** | 944 | 30 | 28,320 | 10,336,800 | 4,558 | +2,279 tons/year |

The Airport has committed to investigate several TDM strategies to reduce emissions from mobile sources such as providing airport and tenant employees with subsidized public transportation options (e.g., reduced CCRTA bus passes). The Airport will provide employee facilities (lockers and changing areas) to increase employee trips to the Airport by walking or biking. The future microgrid infrastructure (currently in planning) will allow the Airport to achieve additional TDM strategies, not yet feasible, including adding EV vehicle and bus charging infrastructure using onsite generated and stored renewable energy. The future microgrid is a key component to promoting trips to the airport using zero emissions vehicles. Energy created from the smart grid would support electric ground vehicles, including buses, and in the future, electric aircraft. This project is on collaboration with the Airport and CCRTA to support the transportation options of the community living in the area. The Airport has committed to providing eight EV charging stations. As noted, the Airport has preliminary plans to provide power to facilitate electric aircraft charging and should commit to strong measures in this regard to support future electrification of airplanes. The FEIR should also provide revised air quality analysis to account for increased airplane traffic associated with future capacity expansion.

Land Alteration

The project will alter ±50 acres of land, which includes conversion of vegetation to impervious surface and grading. The DEIR identifies tree removal proposed on ±8.65 acres of the site which is forested and ±3 acres of it is shrub-dominated. The only currently foreseeable off-site impact may be associated with potential obstruction removal in a runway approach area and/or RPZ, which will be verified with a future tree-top canopy mapping effort. At this time, it does not appear that any off-site tree clearing is required. There is a very small amount in the Runway 33 approach which is located on airport property. Table 6.4-2 provide a summary of tree clearing impacts.

**Table 6.4-2 Summary of Tree Cutting Impacts by Area**

| Project | Total Impacts | Tree Removal and Change to Pavement (acres) | Tree Removal with Vegetation Remaining (acres) | Brush/Shrub Removal and Change to Pavement (acres) | Proposed Work Components |
|---|---|---|---|---|---|
| Aeronautical Development (East Ramp) | 6.11 ac (266,151 sf) | 6.11 ac | 0 | 0 | Tree cutting and removal of vegetation for construction of future aircraft hangars |
| Taxiway D and Runup Pad Relocation | 2.54 ac (80,150 sf) | 0.96 ac | 0.88 ac | ~0.70 ac[a] | Tree cutting and removal within areas of proposed pavement - along Taxiway safety area and side slopes, tree removal area will be graded and restored to grass. |
| **TOTAL** | **8.65 ac (346,302 sf)** | **7.07 ac (307,969 sf)** | **0.88 ac (38,332)** | **0.70 ac (30,492 sf)** | |

a) The Airport currently maintains vegetation around the areas of Upper Gate Pond and Lewis Pond within the Runway Visibility Zone to prevent trees from visually obstructing this area. The proposed Taxiway D will result in approximately 3 acres of this area comprised of a shrub layer to be graded and maintained as grass within the side slopes adjacent to Upper Gate Pond. For the purposes of this analysis, grasses and shrub layers are assumed to provide comparable levels of carbon sequestration, as grasses sequester carbon year-round without releasing it. Of the total area, approximately 0.70 acres will be converted from a brush/shrub layer to pavement.

In accordance with the GHG Policy, projects that alter over 50 acres of land are required to analyze the carbon loss associated with removal of trees and soil disturbance during the construction period and loss of carbon sequestration. The purpose of this analysis is to develop an estimate, not an exact accounting of GHG emissions associated with land alteration, including removal of trees and release of sequestered carbon in soil. The DEIR describes the methodology for the analysis[22] and identifies associated impacts on GHG emissions. Table 6.4-3 provides estimates of carbon sequestration as a result of the project from tree removals within areas of the Airport being converted from forested area to pavement. The analysis estimates a loss to carbon sequestration of +6.52 metric tons (MT) Carbon in a year (14,374 lbs/year) and +195 MT Carbon over 30-year period.

**Table 6.4-3 Carbon Sequestration Estimates**

| Project | Area of Tree Removal and Conversion to Non-vegetated Land (Pavement) | Carbon Sequestration by Acre Per Year (MTs) (a)(b) | Total Change in Carbon Sequestration (MT) (c) |
|---|---|---|---|
| Aeronautical Development Areas (East Ramp) | 6.11 ac (266,151 sf) | -0.84 metric ton $CO_2$ acre/year | +5.13 MT Carbon/Year |
| Taxiway D and Runup Pad Relocation | 1.66 ac (72,309 sf) | -0.84 metric ton $CO_2$ acre/year | +1.40 MT Carbon/Year |
| **TOTAL** | **7.77 ac (338,461 sf)** | | **+6.52 MT Carbon/Year (14,374 lbs./Year) +195 MT Carbon over 30-Year Period** |

1 Metric Ton (1.1 Short Tons) = 2,204 lbs.
A carbon sequestration factor was derived from EPA's estimate in *U.S. Greenhouse Gas Emissions and Sinks: 1990–2020* of 0.57 metric tons of carbon sequestered per hectare per year (or 0.23 metric tons of carbon sequestered per acre per year). https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references, 9/7/2023.
a. The negative value in this equation indicates carbon sequestration. A positive value indicates a loss in carbon sequestration.

Tree cutting also results in a one-time release of carbon emissions due to the release of carbon stored within above ground and below ground forest related carbon stores. The DEIR provides a quantitative analysis of one-time carbon releases from tree clearing activities based on the EPA's emissions estimates of carbon stores for 1 acre of forest land (83 MT of carbon per acre composed of five carbon pools (i.e., above ground biomass, below ground biomass, dead wood, litter, and soil carbon. The analysis uses 22.26 MT/Carbon/Acre) for the above ground forest biomass store of carbon to arrive at an estimate of up to 175 MT/Carbon released from carbon stores due to cutting. The DEIR maintains that harvested wood products will continue to contain some carbon (e.g., lumber).

The DEIR asserts that project-related carbon releases and loss in carbon sequestration are proposed to be offset from the Airport's undeveloped forested areas north of the airfield with ±110 acres of dense forest north of Upper Gate Pond and Lewis Pond, adjacent to the Hyannis Pond WMA (365 acres). Within the 110-acre area, ±37.5 acres is identified in the Master Plan/Airport Layout Plan as Non-Aeronautical Development Areas. Using the above factors for carbon sequestration (-0.84 MT/Carbon/Acre) the Airport's forest land within this area results in 92.40 MT of carbon sequestration per year. The Airport indicates that this will fully offset the GHG emissions associated with tree clearing. The FEIR should clarify how non-development of the specified areas will be enforced, and whether conservation restrictions (CRs) can be considered to ensure permanent protection. The FEIR should explore additional ways to directly mitigate the GHG emissions of land clearing, including through tree replanting efforts, reuse of felled wood, and CRs placed on conservation areas within EJ communities.

[22] A carbon sequestration factor was derived from EPA's estimate in *U.S. Greenhouse Gas Emissions and Sinks: 1990–2020* of 0.57 metric tons of carbon sequestered per hectare per year (or 0.23 metric tons of carbon sequestered per acre per year). https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-andreferences, 9/7/2023.

*Solid and Hazardous Waste*

The DEIR states that the Proponent is not able to estimate volumes of solid waste to be generated by the project at this time. It does not describe handling, reuse, recycling and disposal of solid waste but indicates that these activities will be conducted in compliance with applicable laws and regulations.

The Airport includes disposal sites regulated by M.G.L. c. 21E, the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000) because releases of oil and hazardous materials (OHM) have occurred at the site. According to the DEIR, a total of 64 Sites with documented releases of OHM to soil and/or groundwater were identified on or adjacent to the Airport property, of which 13 Sites are adjacent to proposed activities as follows: TWY B (five Sites); TWY D (one Site); Runway 33 (two Sites); Aviation Development Area near TWY A (two Sites); Aviation Development Area near TWY B (one Site); and Proposed Electric Aircraft Charging Areas (two Sites). The DEIR discusses the Sites in relation to proposed or potential Airport improvements. It notes each project area will be evaluated independently, and as required, work will be performed in accordance with either the Preliminary or Comprehensive Response Actions of the MCP. It includes a plan that identifies the location of disposal sites and project elements (Figure 6.13-1).

The DEIR describes potential excavation or disturbance in disposal sites. It is estimated that up to ±200,000 cy of soil may be generated over the course of the various projects being executed and potentially contaminated soil or groundwater may be encountered. Excavation and management of soil contaminated with, or potentially contaminated with, OHM will be conducted in general accordance with Response Action Performance Standards (RAPS) (i.e., testing, disposal, mitigation, etc.) defined in the MCP. It is anticipated that excess soil or sediment will either be reused on-site during construction (especially PFAS-impacted soil due the limited options for offsite disposal), stockpiled in accordance with the MCP for future reuse, or transported offsite for reuse, recycling, or disposal. Stockpiled soils will be stabilized to minimize potential fugitive dust and include secondary containment to prevent sediment migration. While it is not expected that significant groundwater will be encountered as part of the project, if groundwater and surface water are encountered, they will either be treated and discharged to surface water in accordance with requirements of the NPDES DRGP, recharged in accordance with local, state, and federal regulations, or collected and transported offsite for disposal.

The Proponent is working with MassDEP to continue PFAS remediation at the site. The DEIR notes that an "Ecologic Cart" system is used to prevent the discharge of firefighting foam onto the ground surface during required testing of the foam. The DEIR does not specifically reference preparation of a Release Abatement Measure (RAM) Plan prior to construction for any of the proposed projects; instead, it generally notes that work will be performed under the Preliminary or Comprehensive Response Action provisions of the MCP, as applicable. It states that when development begins for TWY A and TWY B, MCP submittals will include a plan to sample and test disturbed soil in areas not previously sampled for PFAS and describe how PFAS-containing soils will be managed, if identified. The DEIR confirms that existing monitoring wells will be maintained for future assessment of groundwater for PFAS, 1,4-dioxane, and potentially other contaminants. Wells that cannot be maintained due to their location will be decommissioned and replaced, if necessary.

The DEIR identifies projects that may occur within areas where PFAS has been identified. The Airport currently routinely tests for 20 to 24 PFAS compounds which include the six PFAS compounds currently regulated by MassDEP. Investigations are ongoing and status reports documenting response actions at the Airport are submitted to MassDEP Bureau of Waste Site Cleanup (BWSC) every six months. The DEIR addresses areas to be excavated that may contain soil or groundwater contaminated by PFAS. Groundwater monitoring by the Airport will continue to track the PFAS plume migration and document the reduction in concentration over time until regulatory closure is achievable (estimated to be completed by 2029). A majority of the PFAS impacted soil within the two effected areas have been capped to reduce infiltration and groundwater impacts. The caps are inspected bi-annually to verify their effectiveness. The actual time for treatment will be based on collection of analytical samples for laboratory analysis. Groundwater monitoring beyond 2029 may be conducted at the Airport as part of an annual activity and use limitation (AUL) inspection or if plume concentrations have not dropped below the applicable GW-1 standard. Bi-annual reports will continue to be uploaded to MassDEP until a permanent solution can be obtained. According to the DEIR, the Town of Barnstable through the Hyannis Water System will continue to operate the Maher Wells treatment plant and provide drinking water that meets the regulatory drinking water standards. MassDEP periodically inspects the Maher Treatment plant under the water supply/drinking water program.

The MPU has developed an emergency response plan, which is discussed in the DEIR. The DEIR discusses generation of hazardous waste and/or waste oil at the Airport and identifies potential measures to reduce, recover and reuse hazardous waste. It identifies the Airport's Spill Prevention, Control, and Countermeasure (SPCC) Plan and regular maintenance of management facilities to address prevention and management of potential releases of OHM from pre- and post-construction activities.

*Construction Period*

Construction activities must be managed in accordance with applicable MassDEP regulations regarding Air Pollution Control (310 CMR 7.01, 7.09-7.10), and Solid Waste Facilities (310 CMR 16.00 and 310 CMR 19.00, including the waste ban provision at 310 CMR 19.017). According to the DEIR, the selected contractor will apply relevant and practicable procedures to allow for the reuse and recycling of construction materials. A Construction Waste Management Plan (CWMP) will be developed to ensure the minimum amount of waste debris is disposed in landfills. Non-recyclable solid waste will be transported in covered trucks to an approved solid waste facility. The DEIR does not identify a percentage commitment for C&D recycling activities to divert waste from landfills, but states that the Airport ensures compliance with all regulations including 310 CMR 19.017 through the contracting process.

The DEIR generally describes construction period impacts and associated mitigation (listed in draft Section 61 Findings). The Airport will identify these impacts and proposed mitigation in greater detail relative to wetlands, stormwater, noise, air quality, water quality, and traffic commensurate with the commitments made in the DEIR. The DEIR does not specifically describe truck routes and other mitigation measures to minimize impacts to residential areas by trucks travelling to the site during the construction period. Construction period traffic will be managed to minimize off-airport impacts including coordination with the Town of Barnstable to discuss transportation-related impacts; designation of truck routes; police details; submission of a Construction Period Traffic Management Plan to the Town identifying designated truck routes and temporary roadway improvements to accommodate truck traffic while maintaining safe passage for all modes of travel; avoiding full or partial street closures to the extent possible (any partial street closures will be limited to off-peak hours); and parking for construction workers on-site, (parking will be prohibited along adjacent roadways). The Proponent will require use of equipment retrofitted with diesel emissions control devices and confirms that Ultra Low Sulfur Diesel fuel will be used for trucks and construction equipment.

The Proponent is reminded that any contaminated material encountered during construction must be managed in accordance with the MCP and with prior notification to MassDEP. Each project component will develop a SWPPP in accordance with its NPDES CGP to manage stormwater during the construction period. The DEIR describes stormwater BMPs that will be implemented during construction; dewatering activities will be identified as part of permitting processes.

## SCOPE

### General

The FEIR should follow Section 11.07 of the MEPA regulations for outline and content and include the additional information and analyses required by this Scope. It should clearly demonstrate that the Proponent will pursue all feasible measures to avoid, minimize and mitigate Damage to the Environment to the maximum extent feasible.

### Project Description and Permitting

The FEIR should describe any changes to the project since the filing of the DEIR. It should MEPA 01
identify, describe, and assess the environmental impacts of any changes to the project that have occurred between the preparation of the DEIR and FEIR. The FEIR should also include an updated list of MEPA 02
required Permits, Financial Assistance, and other state, local and federal approvals and provide an update on the status of each of these pending actions. It should also describe a mechanism for conducting more detailed reviews of future projects through the filing of NPCs.

The FEIR should include plans of existing and proposed conditions at a legible scale that identify MEPA 03
all major project components (existing and proposed buildings, access roadways, runways, taxiways, etc.), public areas, impervious areas, subsurface utilities, surface elevations, wetland resource areas, ownership of parcels including easements, and stormwater and utility infrastructure. Conceptual plans should be provided for on-site work as well as any proposed off-site work for transportation or utility improvements that will benefit the project.

The information and analyses identified in this Scope should be addressed within the main body of the FEIR and not in appendices. In general, appendices should be used only to provide raw data, such as drainage calculations, TSS removal rates, traffic counts, capacity analyses and energy modelling, etc. that are otherwise adequately summarized with text, tables, and figures within the main body of the FEIR. Information provided in appendices should be indexed with page numbers and separated by tabs, or, if provided in electronic format, include links to individual sections. Any references in the FEIR to materials provided in an appendix should include specific page numbers to facilitate review.

The FEIR should clarify whether the project itself is anticipated to, directly or indirectly, result MEPA 04
in an increase in Airport operations and associated increase in airplane or jet activity. If so, the FEIR should explain the methodology used to quantify the projected increase in Airport operations. The FEIR MEPA 05
should provide updated air quality, noise, and GHG emissions analyses that account for the forecasted MEPA 06
increase in Airport operations. The FEIR should include all impacts associated with activities asserted to

qualify as "Replacement Project" and "Routine Maintenance" work for which no advisory ruling has been issued by the MEPA Office.

Alternatives Analysis

The objective of the MEPA review process is to provide disclosures of all feasible measures to avoid, minimize and mitigate Damage to the Environment. The Proponent should review the requirements in 314 CMR 9.06 and determine whether a practicable alternative is available that has less adverse impact to the aquatic ecosystem. Specifically, the alternatives analysis should include a thorough analysis to demonstrate why the separation distance (taxiway centerline to runway centerline) cannot be reduced from the recommended 400 feet for TWY D to decrease wetland impacts. The FEIR should identify the distance between Runway 15-33 and TWY D at which there would be no impacts to BVW, LUW and Bank. It should also review an alternative that minimizes impacts to wetland resource areas and identify the separation distance from Runway 15-33. MEPA 07 MEPA 08 MEPA 09

In the event impacts to wetlands cannot be justifiably avoided, the FEIR should propose appropriate mitigation measures to demonstrate consistency with the WQC regulations. It should identify the location of any proposed wetland replication. MEPA 10

The FEIR should include additional alternatives analysis for project components not discussed in the DEIR, including the hangar development in the North and East Ramps and other Phase 2 projects that were excluded from the DEIR. To the extent the Airport wishes to defer review of Phase 2 components, a procedure for review through the filing of NPCs should be proposed in the FEIR. The supplemental alternatives analysis should justify the need for hangar development, whether it is supported by current or future forecasted demand, and whether this increase in capacity will induce more demand for airplane and vehicular travel. The analysis should include a No Build Alternative, and also identify any alternative configurations or locations for proposed hangars and other development at the North and East Ramps that would avoid or minimize impacts to land alteration and impervious area. The alternatives analysis and project narrative should support the selection of the Preferred Alternative that includes all feasible measures to avoid Damage to the Environment, or to the extent Damage to the Environment cannot be avoided, to minimize and mitigate Damage to the Environment to the maximum extent practicable. MEPA 11 MEPA 12

Environmental Justice

The FEIR, or a summary thereof, should be distributed to the EJ Reference List that was used to provide notice of the DEIR. The Proponent should obtain a revised EJ Reference List from the MEPA Office to ensure that contact information is updated. The same efforts to notice the project should be made prior to the submission of the FEIR. The FEIR should provide an update on any outreach conducted since the filing of the DEIR, and identify any changes made to the project design in response to this outreach. MEPA 13 MEPA 14

The FEIR should respond to comments from the Sierra Club regarding unfair and inequitable burdens on EJ communities in the vicinity of the Airport, particularly as related to ongoing cleanup of PFAS contamination in the surrounding community. MEPA 15

As noted, while the DEIR indicates that several project components, such as new hangar space and terminal expansion, are intended to support future growth, it does not attribute any noise or air

quality increase in impacts (other than a modest increase in vehicular traffic) to this project, asserting
that future growth would occur anyway with or without the project. This is not satisfactory, given that
the DEIR unequivocally states that the project will increase capacity of Airport operations to support
future expansions. The FEIR should clearly explain why an increase in infrastructure capacity, including MEPA 16
hangar space, runway and taxiway extensions, and terminal expansion, should not be presumed to
induce additional demand for airport operations, and should cite academic literature or other sources to
support this explanation. Alternatively, the FEIR should present revised estimates of noise, traffic, and MEPA 17
air quality/mobile source that include certain assumed increases from No Build to Build conditions as a
result of the project components that are described as capacity expansions to support growth. Based on
this assumed increase, the FEIR should update all conclusions relative to the extent of increased impacts
and detail the extent to which each category impact is likely to impact surrounding EJ populations. The MEPA 18
FEIR should consider additional mitigation measures to address noise and air quality impacts, including
strong measures to support future electrification of aircraft and use of sustainable aviation fuels (SAFs)
and noise abatement measures such as those suggested by the Town of Yarmouth. The FEIR should MEPA 19
consider whether real-time data related to noise and air monitoring could be made available to the
surrounding communities for added transparency. The FEIR should provide information regarding a MEPA 20
Scope of Work to review potential modifications to Airport departure procedures including coordination
with residents and EJ populations.

Consistent with the Scope related to Climate Change and Land Alteration below, analysis of the
stormwater management system should assess whether flooding risks may be exacerbated for nearby EJ
Populations, including under future climate conditions, and whether existing conditions would be MEPA 21
worsened or improved by the project design. The FEIR should update analyses related to air emissions
and noise to account for the increase in airplane activity that is anticipated from the proposed hangar
expansion or other work that may result in an increase in Airport capacity. As discussed below, the MEPA 22
FEIR should provide all the information requested in the EPA comment letter as to anticipated impacts
to groundwater and the SSA, including from stormwater, associated with the project. The FEIR should MEPA 23
assess whether any increase in pollutant loading in groundwater is anticipated to impact the identified EJ
Population based on the results of groundwater modeling or other analysis.

<u>Public Health / Sole Source Aquifer (SSA)</u>

The FEIR should fully address comments from EPA. As requested in EPA's comments, the MEPA 24
FEIR should include a plan showing groundwater depth, contours, and flow directions to better describe
the context, existing location and subsurface environment for areas potentially affected by the project.
The plan should detail the location of existing and proposed monitoring wells, public and private water
supply wells, and surface water supply sources within five miles of the Project. The plan should be MEPA 25
accompanied by a narrative to explain how groundwater contours were developed. The FEIR should
provide additional hydrogeologic information as it relates to the flow of potential contaminants from the
project, including from increased wastewater flows, stormwater discharges, and construction activities,
and the potential impact, including groundwater flow continuing off-site, to existing or proposed public
or private water supplies. Distances and time of travel (if times are readily available) to nearest water
supplies should also be provided.

The FEIR should include a list describing the expected annual loading of potential contaminants MEPA 26
of groundwater (as compared to baseline conditions at the Airport) from construction and project-related
operations including information on fuel-related contaminants and loadings such as volatile organic
compounds, metals, and polyaromatic hydrocarbons. It should provide a description of any past

contamination events at the airport along with baseline groundwater contaminant conditions. It should also include an expanded description of measures and best management practices to reduce the release of contaminants and provide aquifer protection during construction and airport operations, with a specific focus on how the Airport will protect groundwater from contaminated runoff, spills, or accidents at the airport.

The FEIR should include a monitoring plan that describes how and when soil and groundwater MEPA 27
will be monitored for potential contaminants of concern and how baseline soil and groundwater contaminant conditions will be established. The monitoring plan should detail the frequency of sampling and how the sampling results, along with needed and executed response actions, will be shared with appropriate water department officials in the project area.

Land Alteration, Impervious Area and Stormwater

The Proponent should continue to evaluate opportunities to avoid and minimize land alteration
and impervious area creation. The FEIR should further clarify how the project is designed to avoid and MEPA 28
minimize land alteration and impervious area. It should provide a comprehensive evaluation of all measures to preserve open space and tree cover, to reduce the amount of land alteration, and to convert impervious areas to pervious materials, including reductions in pavement associated with runways and taxiways, reductions in size of aprons and hangars, and supplemental landscaping or tree planting to mitigate impacts associated with clearing. The DEIR notes that 410 acres of the Airport will remain
undeveloped, of which 110 acres is densely forested. The FEIR should confirm the amount of open MEPA 29
space that will remain undisturbed and/or restored upon completion of construction. It should include site plans that clearly locate and delineate areas proposed for development and those to be left
undisturbed. The FEIR should indicate whether a CR could be considered for non-development areas of MEPA 30
the airport, and how non-development commitments will be enforced. As the design for runway and MEPA 31
taxiway modifications is finalized, the Proponent should identify any new areas where vegetated buffers can be maintained or re-established to protect nearby surface waters and incorporate these locations in landscaping and maintenance plans.

The DEIR includes a high-level review of stormwater for several, not all, project components. MEPA 32
The FEIR should provide a copy of the Stormwater Report for the project which identifies all measures that will be employed to protect the water quality of the SSA, describes the proposed stormwater management system for each project/phase, and identifies BMPs that will be incorporated into its design. It should describe how the proposed stormwater management system will fully comply with the
SMS. The FEIR should provide details on the size, location, and design of proposed stormwater MEPA 33
systems. The Airport should take all feasible measures to manage stormwater runoff, including by exceeding stormwater management standards and incorporating Low Impact Design (LID) strategies and green infrastructure wherever practicable; such measures should be described in the FEIR. Green infrastructure is an effective way to treat stormwater generated by impervious surfaces and provide cooling and other benefits for the community and should be incorporated to the maximum extent possible. LID designs should be carefully considered, and where not used, the FEIR should provide a
thoughtful explanation as to why they are infeasible for implementation on-site. The FEIR should MEPA 34
commit to ongoing maintenance and monitoring to ensure stormwater is adequately treated before entering surface and groundwater bodies.

As described further below, the FEIR should discuss how the stormwater management system MEPA 35
will be designed to accommodate larger storm events. The FEIR should consult the rainfall volumes that

are provided by the MA Resilience Design Tool as indicative of future climate conditions and describe how the project will consider future conditions in design. It should include a plan showing the location of BMPs and describe whether sufficient space is being provided to allow for future retrofits as needed to accommodate large storms.

Climate Change

*Adaptation and Resiliency*

The FEIR should describe the precipitation data used for the design of the stormwater management system and clearly discuss how it will be sized to address future climate conditions. The MA Resilience Design Tool provides rainfall volumes associated with a 24-hour storm for the Project as input by the user. The FEIR should discuss whether the proposed stormwater design is anticipated to meet the recommended 2050 10-year return period (24-hour rainfall volume of 6.1 inches) from the Tool for the runway extension and taxiways. It should also discuss the 2070 100-year return period volume for aviation hangars and buildings (24-hour rainfall volume of 11.0 inches). Estimates can be provided in lieu of exact calculations, to the extent stormwater design is not advanced enough by the time of the DEIR. To the extent the project is unable to accommodate future year storm scenarios, the DEIR should discuss whether the project has engaged in flexible adaptative strategies, and whether current designs allow for future upgrades to be made to adapt to climate change. MEPA 36 MEPA 37 MEPA 38

*Stationary Source GHG Emissions*

Comments from DOER reference the proposed terminal expansion only and do not opine on any other expansions, new buildings, or additions, including the SRE. The FEIR should identify all proposed new buildings, expansions, or additions, including hangars that may be developed in the 20-year timeframe and discuss GHG commitments for these components. The Proponent should consult with the MEPA Office regarding the requirement to prepare separate GHG analyses for future new buildings, expansions, or additions, including the SRE. MEPA 39

*Mobile Sources and Air Quality*

The DEIR notes eight EV charging stations will be installed. The FEIR should commit to providing designated parking spaces for these vehicles. The DEIR states that information regarding implementation of electric aircraft charging stations is still preliminary. While locations are identified on the Airport's terminal ramp, specific technologies would be identified as part of the newly awarded smart grid planning project. The FEIR should provide an update regarding implementation of electric aircraft charging stations and implementation of conduits to facilitate future stations. It should provide a clear timeline for planning and construction of the microgrid infrastructure. It should include strong measures to facilitate a transition to electrification of airplanes and use of SAFs. For instance, the FEIR should consider whether conduits can be installed to facilitate electric charging stations for aircrafts. Any new infrastructure such as hangar spaces should be fully equipped with electric wiring and solar PV where feasible. The FEIR should describe how many aircraft charging stations will be proposed. MEPA 40 MEPA 41

*Land Alteration*

The FEIR should describe efforts to minimize tree and shrub clearing and land disturbance to the extent practicable and mitigate impacts when unavoidable. The FEIR should clearly explain the MEPA 42 MEPA 43

Proponent's plan for disposition of the trees cleared through the project, including the process for
identifying potential markets for reuse of wood. The Proponent should commit to reuse of cleared trees
for long-lived wood products to the greatest extent practicable and should indicate how the ultimate
disposition of the trees will be tracked and documented. As noted, the use of CRs should be considered MEPA 44
to ensure permanent protection of non-development areas. The FEIR should describe the proposed MEPA 45
location of tree planting and the number of trees onsite or off-site in the Town of Barnstable. The FEIR MEPA 46
should explore additional ways to directly mitigate the GHG emissions of land clearing, including
through tree replanting efforts, reuse of felled wood, and CRs placed on conservation areas within EJ
communities.

Solid and Hazardous Waste

As requested in EPA's comments, the FEIR should provide a list of chemicals used at the MEPA 47
Airport, and a description of where and how they will be stored and managed on airport property. The
list should be accompanied by a discussion of aircraft or vehicle maintenance practices/activities that
can pollute runoff along with measures that will be implemented to reduce and control pollutants.

The Proponent should review MassDEP's comment letter for solid waste handling and disposal MEPA 48
requirements. MassDEP comments reiterate that one or more RAM Plans or possibly a modified Phase
IV Remedy Implementation Plan may be necessary for the various construction activities proposed in
the DEIR. The FEIR should describe how the project will comply with all applicable requirements. The MEPA 49
FEIR should confirm if a RAM Plan will be required under 310 CMR 40.0000 for any project activities
based on review of proposed projects by a Licensed Site Professional (LSP). The Proponent and LSP
should evaluate whether the sampling/analytical results obtained from soil management under this
project affect the remediation options as described in the Phase III Remedial Action Plan under RTN 4-
0026347. The Proponent and the LSP should work together to ensure that future RAMs for the airport
construction activities do not exacerbate contamination. In particular, it should be demonstrated that any
excavation of, or introduction of, soil beneath the caps will not exacerbate groundwater contamination.
The Proponent should work with MassDEP to resolve any issues regarding PFAS before conducting any MEPA 50
work for the project. The FEIR should provide a detailed response to comments from the Association to
Preserve Cape Cod and the Sierra Club regarding PFAS contamination and further response actions. The MEPA 51
FEIR should identify if the Proponent qualifies as a generator of hazardous waste and/or waste oil.

Construction

I refer the Proponent to the comprehensive review of construction-period regulatory requirements in MassDEP's letter (i.e., air quality, idling, asbestos containing material (ACM), etc.). The FEIR should describe how the project will comply with all applicable requirements.

Mitigation and Draft Section 61 Findings

The FEIR should include a separate chapter summarizing all proposed mitigation measures including construction-period measures. This chapter should also include a comprehensive list of all commitments made by the Proponent to avoid, minimize and mitigate the environmental and related public health impacts of the project, and should include a separate section outlining mitigation commitments relative to EJ populations. The filing should contain clear commitments to implement these mitigation measures, estimate the individual costs of each proposed measure, identify the parties responsible for implementation, and contain a schedule for implementation. The list of commitments should be provided in a tabular format organized by subject matter (traffic, water/wastewater, GHG, EJ, etc.) and identify the Agency Action or Permit associated with each category of impact. Draft Section 61 Findings should be separately included for each Agency Action to be taken on the project. The filing should clearly indicate which mitigation measures will be constructed or implemented based upon project phasing, either tying mitigation commitments to overall project square footage/phase or environmental impact thresholds, to ensure that adequate measures are in place to mitigate impacts associated with each development phase.

The FEIR should include a commitment to provide a GHG self-certification to the MEPA Office upon expansion of the terminal building signed by an appropriate professional indicating that all of the GHG mitigation measures, or equivalent measures that are designed to collectively achieve identified reductions in stationary source GHG emission and transportation-related measures, have been incorporated into the project. If equivalent measures are adopted, the project is encouraged to commit to achieving the same level of GHG emissions (i.e., "carbon footprint") identified in the Preferred Alternative expressed as a volumetric measure (tpy) in addition to a percentage GHG reduction from Base Case. The commitment to provide this self-certification in the manner outlined above should be incorporated into the draft Section 61 Findings included in the FEIR. MEPA 52

Responses to Comments

The FEIR should contain a copy of this Certificate and a copy of each comment letter received. To ensure that the issues raised by commenters are specifically addressed, the FEIR should include direct responses to comments to the extent they are within MEPA jurisdiction; references to a chapter or sections of the FEIR alone are not adequate and should only be used, with reference to specific page numbers, to support a direct response. This directive is not intended, and shall not be construed, to enlarge the scope of the FEIR beyond what has been expressly identified in this certificate.

Circulation

In accordance with 301 CMR 11.16, the Proponent should circulate the FEIR to those parties who commented on the ENF and DEIR, each Agency from which the project will seek Permits, Land Transfers or Financial Assistance, and to any other Agency or Person identified in the Scope. Pursuant to 301 CMR 11.16(5), the Proponent may circulate copies of the FEIR to commenters in a digital format (e.g., CD-ROM, USB drive) or post to an online website. However, the Proponent should make available a reasonable number of hard copies to accommodate those without convenient access to a computer to be distributed upon request on a first come, first served basis. The Proponent should send correspondence accompanying the digital copy or identifying the web address of the online version of the FEIR indicating that hard copies are available upon request, noting relevant comment deadlines, and appropriate addresses for submission of comments. A copy of the FEIR should be made available for review in the Barnstable and Yarmouth Public Libraries.

February 16, 2024
Date

Rebecca L. Tepper

Comments received:

12/15/2023 TJ Sully
01/22/2024 Diane LeDuc
02/02/2024 Association to Preserve Cape Cod, Inc. (APCC)
02/04/2024 Linda Bolliger, Hyannis Park Civic Association
02/07/2024 Betty Ludtke
02/07/2024 Massachusetts Department of Energy Resources (DOER)
02/07/2024 Galileo Faria
02/07/2024 Helyne Medeiros
02/08/2024 Walter Spokowski
02/09/2024 U.S. Environmental Protection Agency (EPA) New England – Region 1
02/09/2024 Cape Cod Commission
02/09/2024 Massachusetts Department of Environmental Protection (MassDEP) – Southeast Regional Office (SERO)
02/09/2024 Sierra Club – Cape and Islands Group
02/09/2024 Chris Greeley
02/09/2024 Thomas Collier
02/09/2024 Karen Ingemie

RLT/PPP/ppp

## Patel, Purvi (EEA)

**From:** MEPA (EEA)
**Sent:** Thursday, December 28, 2023 12:46 PM
**To:** Patel, Purvi (EEA)
**Subject:** Fw: EEA #16440 Joint Draft Environmental Assessment/Environmental Impact Report (Draft EA/EIR), Hyannis, MA

I didn't see your name in the list of recipients for this comment. - Jen

---

**From:** tjsully46@comcast.net <tjsully46@comcast.net>
**Sent:** Friday, December 15, 2023 5:29 PM
**To:** MEPA (EEA) <mepa@mass.gov>; Corinne Snowdon <CSnowdon@epsilonassociates.com>
**Cc:** MEPA-EJ (EEA) <MEPA-EJ@mass.gov>; Boccadoro, Helena (DEP) <helena.boccadoro@mass.gov>; Zoto, George (DEP) <george.zoto@mass.gov>; Hobill, Jonathan (DEP) <jonathan.hobill@mass.gov>; MassDOT PPDU <massDOTPPDU@dot.state.ma.us>; cheryl.j.quaine@faa.gov <cheryl.j.quaine@faa.gov>; Mailloux, Colleen P (FAA) <Colleen.P.Mailloux@faa.gov>; jacobs.kira@epa.gov <jacobs.kira@epa.gov>; McConarty, Cindy (DOT) <Cindy.McConarty@dot.state.ma.us>; McKenna, Steve (EEA) <stephen.mckenna@mass.gov>; Ormond, Paul (ENE) <paul.ormond@mass.gov>; Schluter, Eve (FWE) <eve.schluter@mass.gov>; DeCarlo, Jeffrey (DOT) <Jeffrey.DeCarlo@dot.state.ma.us>; Matz, James B. (DOT) <James.B.Matz@dot.state.ma.us>; ksenatori@capecodcommission.org <ksenatori@capecodcommission.org>; regulatory@capecodcommission.org <regulatory@capecodcommission.org>; cynthia.lovell@town.barnstable.ma.us <cynthia.lovell@town.barnstable.ma.us>; darcy.karle@town.barnstable.ma.us <darcy.karle@town.barnstable.ma.us>; thomas.mckean@town.barnstable.ma.us <thomas.mckean@town.barnstable.ma.us>; Hans.Keijser@town.barnstable.ma.us <Hans.Keijser@town.barnstable.ma.us>; rwhritenour@yarmouth.ma.us <rwhritenour@yarmouth.ma.us>; kwilliams@yarmouth.ma.us <kwilliams@yarmouth.ma.us>; bdirienzo@yarmouth.ma.us <bdirienzo@yarmouth.ma.us>; jgardiner@yarmouth.ma.us <jgardiner@yarmouth.ma.us>; hpl_mail@clamsnet.org <hpl_mail@clamsnet.org>; jcain@yarmouth.ma.us <jcain@yarmouth.ma.us>; phalanpaul@gmail.com <phalanpaul@gmail.com>; sulkoskis@gmail.com <sulkoskis@gmail.com>; greeleyc@comcast.net <greeleyc@comcast.net>; bettyludtke@verizon.net <bettyludtke@verizon.net>; lisbuja@gmail.com <lisbuja@gmail.com>; Linda.bolliger0@gmail.com <Linda.bolliger0@gmail.com>; Maureen@ProducerToProducer.com <Maureen@ProducerToProducer.com>; richard.mikolajczak@gmail.com <richard.mikolajczak@gmail.com>; suza100@hotmail.com <suza100@hotmail.com>; sfbrita@gmail.com <sfbrita@gmail.com>; grassflowerknits@gmail.com <grassflowerknits@gmail.com>; timmermann.timothy@epa.gov <timmermann.timothy@epa.gov>; donald.w.englert@gmail.com <donald.w.englert@gmail.com>; be97@stanford.edu <be97@stanford.edu>; kareningemie@comcast.net <kareningemie@comcast.net>; gdoblebh@gmail.com <gdoblebh@gmail.com>; danielledolan@massriversalliance.org <danielledolan@massriversalliance.org>; juliablatt@massriversalliance.org <juliablatt@massriversalliance.org>; Elvis Mendez <elvis@n2nma.org>; ben@environmentmassachusetts.org <ben@environmentmassachusetts.org>; claire@uumassaction.org <claire@uumassaction.org>; cluppi@cleanwater.org <cluppi@cleanwater.org>; Deb Pasternak <deb.pasternak@sierraclub.org>; Heather Clish <hclish@outdoors.org>; Heidi Ricci <hricci@massaudubon.org>; kelly.boling@tpl.org <kelly.boling@tpl.org>; kerry@msaadapartners.com <kerry@msaadapartners.com>; ngoodman@environmentalleague.org <ngoodman@environmentalleague.org>; rob@oceanriver.org <rob@oceanriver.org>; robb@massland.org <robb@massland.org>; Staci Rubin <srubin@clf.org>; Sylvia Broude <sylvia@communityactionworks.org>; tribalcouncil@chappaquiddick-wampanoag.org <tribalcouncil@chappaquiddick-wampanoag.org>; crwritings@aol.com <crwritings@aol.com>; Peters, John (EOHLC) <john.peters@mass.gov>; acw1213@verizon.net <acw1213@verizon.net>; melissa@herringpondtribe.org <melissa@herringpondtribe.org>; rockerpatriciad@verizon.net <rockerpatriciad@verizon.net>; rhalsey <rhalsey@naicob.org>; Coradot@yahoo.com <Coradot@yahoo.com>; Solomon.Elizabeth@gmail.com <Solomon.Elizabeth@gmail.com>; thpo@wampanoagtribe-nsn.gov <thpo@wampanoagtribe-nsn.gov>; Brian.Weeden@mwtribe-nsn.gov <Brian.Weeden@mwtribe-nsn.gov>;

info@capecodclimate.org <info@capecodclimate.org>; info@cacci.cc <info@cacci.cc>; Maureen@ProducerToProducer.com <Maureen@ProducerToProducer.com>; Jacobs, Alyssa <ajacobs@epsilonassociates.com>; Nathan Rawding <nrawding@epsilonassociates.com>; Hiromi M. Hashimoto <hhashimoto@epsilonassociates.com>
**Subject:** Re: EEA #16440 Joint Draft Environmental Assessment/Environmental Impact Report (Draft EA/EIR), Hyannis, MA



This Report is a Complete Whitewash, Especially on the so-called Part 150 noise study. You can't do a Noise study from a Computer to get the effects of noise on the Residents. This Draft should be Rejected and the Gateway Airport be made to have a real part 150 study done. TS 01
The Ed e sd should be no runway extension or other construction at the airport until All ground water poll is Removed from the Airport. In fact, the Sirport should be Closed Permanently.
On Dec 15, 2023 at 2:38 PM -0500, Corinne Snowdon <CSnowdon@epsilonassociates.com>, wrote:

> Dear Secretary Tepper:
>
> On behalf of Cape Cod Gateway Airport Commission attached please find the EEA #16440 Joint Draft Environmental Assessment/Environmental Impact Report (Draft EA/EIR) for the Airport's Master Plan Improvement Projects in Hyannis, Massachusetts.
>
> **Please use this link to download a PDF of the Draft EA/EIR: https://epsilon.sharefile.com/d-s22ca345c5ebf47c28fcb65ee260e9682**
>
> Please notice the Draft EA/EIR in the Environmental Monitor to be published on December 22, 2023. We would like to request an extended Public Comment period through February 9, 2024, and would anticipate that the Certificate will be issued on February 16, 2024.
>
> By copy of this email, I am advising recipients of the Draft EA/EIR that written comments may be filed during the comment period, to:
>
> Rebecca L. Tepper, Secretary
> Executive Office of Energy and Environmental Affairs
> 100 Cambridge Street, Suite 900
> Boston, MA 02114
>
> You may also comment directly online at the MEPA's Web site: https://eeaonline.eea.state.ma.us/EEA/PublicComment/UI/searchcomment
>
> If you would like a paper copy of the document, please e-mail Corinne Snowdon at csnowdon@epsilonassociates.com.
>
> If there are any issues accessing the PDF, please let me know.
>
> Thank you,
> Corinne
>
> **Corinne A. Snowdon** | Production Manager

**Epsilon Associates, Inc.**
3 Mill & Main Place, Suite 250
Maynard, Massachusetts 01754
978.897.7100 | 978.461.6239 (direct)
csnowdon@epsilonassociates.com

## Patel, Purvi (EEA)

**From:** enviroHYA <enviroHYA@epsilonassociates.com>
**Sent:** Monday, January 22, 2024 2:39 PM
**To:** Diane LeDuc; enviroHYA
**Cc:** Diane LeDuc; Jacobs, Alyssa; Servis, Katie (KHYA); Patel, Purvi (EEA)
**Subject:** RE: CC Gateway Airport expansion plan



Hi Diane,

Thank you for your email. To help you navigate to the MEPA comment page, please use the following link to access the MEPA eMonitor home page: https://eeaonline.eea.state.ma.us/EEA/MEPA-eMonitor/home On the tabs on the top, you'll need to click on "Projects Under Review" and then again on "Environmental Impact Report". From there, you will then see Project #16640, Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan Projects. You can then click on "the comment button". See below for the screen capture showing you how to navigate the screen.

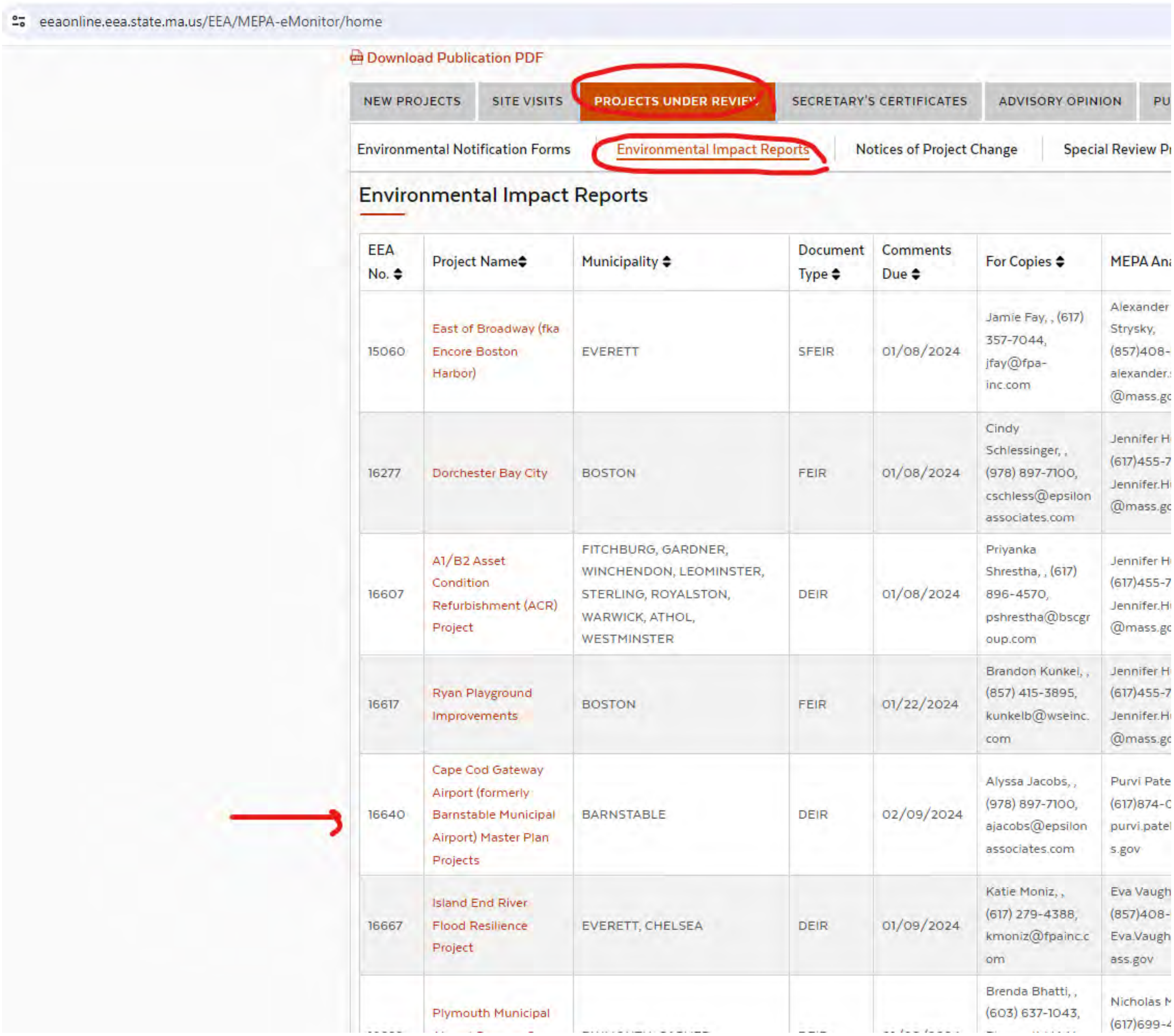
I've copied Purvi Patel, the MEPA Analysis for the project, (617)874-0668, purvi.patel@mass.gov, here as well, as you can send comments to her directly. Just make sure to include Project #16640 in the subject line. I also think she would be best to address you question about using the MEPA webpage, and ability to comment via the link provided.

Also, you can use the following link to learn more about how to provide MEPA a comment https://www.mass.gov/info-details/submitting-comments There are instructions for providing a comment be regular mail if that is preferred by you.

Lastly, we have already extended the comment period by an additional month beyond what would have been required.

Sincerely,

The HYA project team



eeaonline.eea.state.ma.us/EEA/MEPA-eMonitor/home

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Environmental Notification Forms | Environmental Impact Reports | Notices of Project Change | Special Review Pr

## Environmental Impact Reports

| EEA No. | Project Name | Municipality | Document Type | Comments Due | For Copies | MEPA Ana |
|---|---|---|---|---|---|---|
| 15060 | East of Broadway (fka Encore Boston Harbor) | EVERETT | SFEIR | 01/08/2024 | Jamie Fay, , (617) 357-7044, jfay@fpa-inc.com | Alexander Strysky, (857)408- alexander. @mass.gc |
| 16277 | Dorchester Bay City | BOSTON | FEIR | 01/08/2024 | Cindy Schlessinger, , (978) 897-7100, cschless@epsilonassociates.com | Jennifer H (617)455-7 Jennifer.H @mass.gc |
| 16607 | A1/B2 Asset Condition Refurbishment (ACR) Project | FITCHBURG, GARDNER, WINCHENDON, LEOMINSTER, STERLING, ROYALSTON, WARWICK, ATHOL, WESTMINSTER | DEIR | 01/08/2024 | Priyanka Shrestha, , (617) 896-4570, pshrestha@bscgroup.com | Jennifer H (617)455-7 Jennifer.H @mass.gc |
| 16617 | Ryan Playground Improvements | BOSTON | FEIR | 01/22/2024 | Brandon Kunkel, , (857) 415-3895, kunkelb@wseinc.com | Jennifer H (617)455-7 Jennifer.H @mass.gc |
| 16640 | Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan Projects | BARNSTABLE | DEIR | 02/09/2024 | Alyssa Jacobs, , (978) 897-7100, ajacobs@epsilonassociates.com | Purvi Pate (617)874-0 purvi.patel s.gov |
| 16667 | Island End River Flood Resilience Project | EVERETT, CHELSEA | DEIR | 01/09/2024 | Katie Moniz, , (617) 279-4388, kmoniz@fpainc.com | Eva Vaugh (857)408- Eva.Vaugh ass.gov |
| | Plymouth Municipal | | | | Brenda Bhatti, , (603) 637-1043, | Nicholas M (617)699-4 |


**Nathan Rawding**
*Senior Scientist, Ecological Sciences*

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Maynard, Massachusetts 01754
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nrawding@epsilonassociates.com
www.epsilonassociates.com


---

**From:** Diane LeDuc <capecodgreenenergy@gmail.com>
**Sent:** Friday, January 19, 2024 5:00 PM
**To:** enviroHYA <enviroHYA@epsilonassociates.com>
**Cc:** Diane LeDuc <dianejleduc@comcast.net>
**Subject:** CC Gateway Airport expansion plan

Greetings,
I've been trying to submit my comments about the Airport Expansion plan to the **.gov** site set up to receive comments but the "thinking wheel" just keeps spinning. I'd like to think that the site is on the verge of crashing because so many people want to submit their comments. I'm wondering if the deadline will be extended for submissions. Who gets to make that call?

I have several environmental scientist friends who wrote fantastic comments. I'm not a scientist. I'd like to take a "human touch" approach.

The airport in Hyannis should never have been built there. Expanding it is a ridiculous idea. It's become a fueling station DL 01
for planes. Ridership has been, and continues to decline. The people who live near the airport are being poisoned by the DL 02
soot and the chemicals that have migrated to their wells. The noise is awful too. The man in charge of the Airforce Base
in Bourne has said he'd be open to a conversation about moving the operation there. DL 03

DL 04

I'm so sick of MONEY winning out over people's health that I could spit.

Please urge the decision makers to STOP and think about the big picture. **Money isn't everything**. I'm guessing that they don't actually need more money - they've just been programmed to seek more and more and more. Greed will be the death of us all and I mean that literally.

Thank you for allowing me the opportunity to express my feelings.

Sincerely,
Diane LeDuc
Harwich, MA

APCC
Association to Preserve Cape Cod
Preserving the Very Nature of Cape Cod



February 2, 2024

Rebecca Tepper, Secretary
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
Purvi Patel, EEA No. 16640
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: Cape Cod Gateway Airport Master Plan Projects Draft Environmental Impact Report

Dear Secretary Tepper:

The Association to Preserve Cape Cod (APCC) has reviewed the Draft Environmental Impact Report (DEIR) for the Cape Cod Gateway Airport project (EEA # 16640) and submits the following comments.

Founded in 1968, APCC is the Cape region's leading nonprofit environmental advocacy and education organization, working for the adoption of laws, policies and programs that protect, preserve and restore Cape Cod's natural resources. APCC focuses our efforts on the protection of groundwater, surface water, and wetland resources, preservation of open space, the promotion of responsible, planned growth and the achievement of an environmental ethic.

APCC has focused our comments for this DEIR on the areas of wetland impacts, groundwater protection, and carbon sequestration mitigation related to proposed tree clearing.

Wetland Impacts

APCC is extremely concerned about the proposed significant impacts to Upper Gate Pond, which, according to MassGIS, is mapped by the Natural Heritage and Endangered Species Program as BioMap Core Habitat (Rare Species Core) and Critical Natural Landscape. According to the DEIR, a new Taxiway D would directly and permanently adversely impact Upper Gate Pond and its surrounding wetland buffer.

Wetland impacts include:

- Approximately 12,700 sf of Land Under Water (nearly a third of an acre) in the pond to be permanently filled.
- Approximately 4,600 sf of Bordering Vegetated Wetlands to be permanently filled.
- 3.78 acres of 200-ft. wetland buffer to be impacted by the construction of 1.13 acres of additional pavement.
- 0.1 acre of bordering vegetated wetland to be impacted by .01 acre of additional pavement.
- 1.85 acres of 100-ft. wetland buffer to be impacted by .52 acres of additional pavement.

The project applicant's preferred alternative includes either an engineered slope or a retaining wall that will be constructed within Upper Gate Pond to "minimize impacts" to the pond. A vegetated earthen berm would be constructed along the top of the pond slope in an attempt to prevent stormwater runoff from causing erosion. Given that the taxiway will fill in part of the pond and destroy portions of the 100 and 200 ft. wetland buffer, it is difficult to envision that the taxiway's extremely close proximity to what remains of the wetland after construction will not lead to increased stormwater impacts to the pond. AAPC 01

The DEIR states that there is the potential for up to 5,200 cubic yards of unconsolidated organic materials along the pond bottom to be excavated in order to provide suitable base material for the taxiway slope. Polycyclic aromatic hydrocarbons and lead are contaminants known to be present in Upper Gate Pond sediments, likely as a result of airport stormwater runoff. APCC recalls from airport projects in the previous decade, which required study of Upper Gate Pond and Lewis Pond, that the airport's environmental consultants determined it would be unwise to dredge the pond bottom in an attempt to remove contaminated sediments because it would release and distribute contaminants and further degrade pond water quality. APCC also questions whether releasing contaminants into the water body may impact groundwater. AAPC 02

The project applicant has proposed, in very general, non-specific terms, possible mitigation for the wetland impacts that includes potential wetland replication on airport property (with limitations on what is acceptable to FAA guidelines) and/or on a property or properties elsewhere in the town of Barnstable. The DEIR states that the mitigation "will be designed in the subsequent permitting phases of the project." Given the scarcity of detailed information regarding any specific proposed mitigation actions, it is APCC's position that the mitigation measures described in Section 7 of the DEIR are inadequate in relation to the substantial impacts created by the work proposed in and adjacent to Upper Gate Pond and its wetland buffer. It is impossible for the public to adequately review and comment on the AAPC 03 appropriateness of the mitigation for these significant wetland impacts if the mitigation plan is not provided in the MEPA review process.

Lastly, the applicant in the DEIR states, "Based on the proposed avoidance, minimization, and mitigation, in Section 6.1.5., there are no significant impacts on wetlands and surface water beyond the existing condition as a result of the Proposed Action." APCC completely rejects the suggestion that the impacts to Upper Gate Pond will not be significant. AAPC 04

<u>Groundwater Protection</u>

APCC would like to see more assurances in the next EIR filing that the airport project construction and operation will not adversely impact the underlying aquifer, which is a source of public drinking water. It has been well-documented that the airport is a source of PFAS contamination in groundwater that has impacted public drinking water supplies. The airport has taken steps to address PFAS contamination from the airport, including capping contaminated soil areas and conducting groundwater monitoring. To ensure continued remediation of existing PFAS contamination and to prevent additional contamination in the future, MassDEP should require, and the applicant should commit to, expanded sampling and monitoring of the airport property for the presence of PFAS and other contaminants, including within the proposed project area. AAPC 05 AAPC 06

Additionally, the project's future EIR filing should provide more detail about proposed stormwater management, and should describe where and how LID and green infrastructure will be utilized, and where and how conventional stormwater treatment will be used. Where conventional stormwater treatment is proposed, the applicant should explain in detail why more modern LID and green infrastructure approaches are not feasible. AAPC 07

<u>Tree Removal Mitigation</u>

The DEIR states that approximately 1.54 acres of forested upland areas and approximately 3.37 acres of shrub-scrub upland areas will be impacted for the construction of the airport project. The tree clearing will result in a loss of carbon sequestration estimated as equal to an increase of 6.52 metric tons of carbon per year, or 195 metric tons over a 30-year period. As proposed mitigation for this loss, the applicant claims that the carbon sequestration loss will be "offset" by the airport's existing forested areas north of the airfield.

APCC maintains that the above proposal is not appropriate mitigation for lost carbon sequestration. The existing forest is not adding new sequestration benefits lost by the planned tree cutting. No new sequestration value will be gained by maintaining the status quo of the remaining forested area. Existing forest does not replace the loss of cleared trees; it still results in a carbon sequestration deficit. The applicant should commit, at a minimum, to replacing the AAPC 08 number of trees that will be lost. Ideally, the sequestration value of new tree plantings should be calculated to confirm that an equal carbon sequestration value will be preserved by the replacements. A sapling will not provide the same current level of environmental benefit as a mature tree.

Conclusion

Based on the information provided in the DEIR, APCC must conclude that the objectionable loss of wetlands and critical habitat due to the filling of Upper Gate Pond and destruction of wetland buffer, combined with the absence of meaningful mitigation for the carbon sequestration loss due to tree removal, provide no path for the project, as currently proposed, to proceed and still be environmentally acceptable.

Thank you for the opportunity to provide comments on this proposed project.

Sincerely,

Andrew Gottlieb
Executive Director

**TO:** MEPA
**FROM:** Linda Bolliger, on behalf of Hyannis Park Civic Association
**RE:** Cape Cod Gateway Airport Master Plan EA/EIR Public Comment
**DATE:** February 2, 2024

*The following comments are a compilation and distillation of the thoughts of the community of Yarmouth's Hyannis Park.*

Hyannis Park is grateful for all the public meetings that Cape Cod Gateway Airport (CCGA) has afforded the public throughout the entire Master Plan process. The Environmental Assessment Phase has particular impact on our community due to our proximity to CCGA's operations. We recognize a long history of coexistence with the Airport; however, Master Plans by definition denote change. We welcome changes to the Airport's operation, but our acceptance ends at those changes which negatively affect our community's quality of life.

**NOISE**

Our community is pleased that CCGA has promised to consider flight procedures that circumvent our neighborhood. Noise has been the number one issue for the majority of LB 01
Hyannis Park residents, since it universally affects neighbors. The regular interruption of our lives by low-flying aircraft either taking off or landing along current flight paths is incompatible with our coastal village way of life. The inability to leave windows or doors open may seem inconsequential. It is not. Furthermore, it is much more than inconvenient for all of us to curtail conversations on our porches and patios. It is a consistent life interruption for us.

Flight procedures in avoidance of residential areas is not an anomaly. In fact, many airports have these procedures in place. Let us not make CCGA an "unfriendly" airport and ignore the opportunity to be a good neighbor.

**PFAS AND OTHER CONTAMINANTS** LB 02

Complete clean-up of contamination of groundwater is critical especially to a community south-southeast (i.e., downgradient) of the CCGA like Hyannis Park. We understand the importance on various levels of forensic analysis regarding accountability. The existence of a second source at the former Barnstable Fire Training Academy complicates the accountability and ownership of clean-up for the Airport. Let us be clear—Hyannis Park requires (1) timely containment of *all* identified PFAS plumes, and (2) the timely remediation of contaminated groundwater and affected soil at the source and downgradient from both sources. This will entail a close and well-defined collaboration of CCGA and the former Barnstable Fire Training Academy. This appears to be currently lacking. Both sources need to demonstrate a complete, clean-up commitment to the public at large and Hyannis Park in particular.

Hyannis Park's Grist Mill Village which is made up of 44 homes along Mill Creek have had their 65-year historical way of life on the Creek abruptly upended. We are discouraged from swimming, fishing (other than catch and release), and shell-fishing in our beloved river. This is no small wrinkle. This has been a way of life for many of us for 2+ generations. Grist Mill Village is frustrated over the knowledge that our river is contaminated with no possible remediation options on the horizon.

Scientists are predicting that this is just the beginning of an awakening for down-gradient communities like Hyannis Park. The acknowledgement of possible lead contamination and other yet unidentified contaminants are possible in the years ahead. The Airport's handling of PFAS is being closely watched as a prelude to further clean-up projects that will surely be part of its future.

**PLANE EMISSIONS AND PUBIC HEALTH**

With studies emerging from academic sources like Tufts University School of Engineering (see Hudda N, Durant LW, Fruin SA, Durant JL. Impacts of Aviation Emissions on Near-Airport Residential Air Quality. Environ Sci Technol. 2020 Jul 21;54(14):8580-8588. doi: 10.1021/acs.est.0c01859. Epub 2020 Jul 8. PMID: 32639745.), the next major concern is the effects of plane emissions on human populations under flight paths. This may not be on the Airport's list of concerns, but it certainly is included on Hyannis Park's. With a simple change in flight procedures, the Airport can put our communities concerns to rest. LB 04

**CONCLUSION**

Hyannis Park will continue to press the Airport to minimize the impacts of its Master Plan by altering flight paths through the process of establishing “friendly” flight procedures circumventing our community. Hyannis Park wants to see the Airport adopt the recommendations provided by Mr. Ronald Price of QED Aviation. He is the Town of Yarmouth's consultant in matters of evaluating CCGA's Master Plan. We appreciate CCGA's open discussions with Mr. Price. But now is the time to adopt his recommendations into the Master Plan.

# View Comment

## Comment Details

**EEA #/MEPA ID**
16640

**Comments Submit Date**
2-7-2024

**Certificate Action Date**
2-9-2024

**Reviewer**
Purvi Patel, (617)874-0668, purvi.patel@mass.gov

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**Zip Code**
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**Organization**
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**Affiliation Description**
Individual

**Status**
Opened

## Comment Title or Subject

**Topic**: Insuffucient Analysis

## Comments

Segoe UI 10 pt Paragraph

It would be one thing for Cape Cod Gateway Airport to only analyze themselves as they seek to enlarge their operation, but it is quite another for Mass DoT Aviation and the FAA to join in this effort. One only has to look at the alternatives analysis to see that the Cape Cod Gateway airport is completely encroached. The preferred alternative is the only viable alternative because of encroachment. Then what? What does Gateway do after this expansion? Build more ramp space to accommodate more corporate jets? What does the next 100 years look like?

The collective "you" need to study air service for Cape Cod and the Islands regionally. I read the Mass DoT Aviation and FAA documents regarding airport assets in Massachusetts. Neither entity, in their documents, has accounted for any of the assets at Joint Base Cape Cod. It is as if the airfield there does not exist. Perhaps there were good reasons to have done that when those documents were created, but there are no good reasons now. BL 01

In the alternative analysis provided for JBCC, included in this document, that absence of asset recognition continues even though the mission of JBCC has been drastically changed by BRAC actions. You discuss every obstacle you can muster and again rely on jurisdictional barriers owing to the structure of the Cape Cod Gateway airport as to why it is just "too difficult" to study airfield operations at JBCC. And when asked if you ever spoke with anyone at JBCC, you answered no.

I am not sure why you cannot bring yourselves to recognize how encroached Cape Cod Gateway Airport is. Just as I cannot understand why you won't even look at consolidating air operations at the largest airfield complex on Cape Cod. The proposed displaced threshold ought to provide some insight into the level of encroachment you face at Gateway Airport. There are viable alternatives to the Gateway expansion recommended in this study. Those have not been studied to the level required to make this Environmental Assessment adequate to the task.

## Attachments

## Update Status

**Status**

Opened

SUBMIT

## Share Comment

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COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF
ENERGY AND ENVIRONMENTAL AFFAIRS
**DEPARTMENT OF ENERGY RESOURCES**
100 CAMBRIDGE ST., SUITE 1020
BOSTON, MA 02114
Telephone: 617-626-7300
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23 January 2023

Rebecca Tepper, Secretary
Executive Office of Energy & Environmental Affairs
100 Cambridge Street
Boston, Massachusetts 02114
Attn: MEPA Unit

RE: Cape Cod Gateway Airport, Hyannis, EEA #16640

Cc: Jo Ann Bodemer, Director of Energy Efficiency, Department of Energy Resources
Elizabeth Mahony, Commissioner, Department of Energy Resources

Dear Secretary Tepper:

We've reviewed the Draft Environmental Impact Report (DEIR) for the proposed project. The project includes construction of a 30,000-sf terminal expansion (this size may change). The project was very responsive to include GHG mitigation measures, which are summarized below. The DOER has no further comments or recommendations.

**Key Commitments**

The addition will be built to Stretch Code standards, available here: https://www.mass.gov/info-details/stretch-energy-code-development-2022#final-code-language-for-stretch-code-update-and-new-specialized-stretch-code- and will have efficient electrification of space heating with 100% heat pump space heating.

In summary:

- The addition will be built in accordance with C502.1 of the Stretch Code which requires:

- If the addition is less than 20,000-sf, the prescriptive requirements of C401.3, C402 through C406, and Section C408 apply.

- If the addition is 20,000-sf or larger, the addition shall be built in accordance with C401.2 Part 3, relative performance, which requires conformance with C401.3, C402.1.5, C402.2.8, C402.3, C402.4, C402.5, C402.6, C402.7, C403.5, C403.7, C405.2.4, C405.13, C406, C407.2, C408, and ASHRAE 90.1-2019 Appendix G (modified by C407.2).

- Key mandatory sections in both pathways above include:

  - C402.1.5 which establishes minimum, above-grade vertical envelope performance which cannot be "traded off" with other building improvements.

  - C402.3, solar readiness

  - C402.4, revised fenestration performance of U-0.30/0.32

  - C402.5, air leakage

  - C402.7, thermal bridge derating

  - C403.5, economizers

  - C403.7, ventilation energy recovery

  - C405.13, electric vehicle readiness

  - C406, additional energy efficiency

- 100% of building space heating will be provided by electric air source heat pumps.

Sincerely,

Paul F. Ormond, P.E.
Energy Efficiency Engineer
Massachusetts Department of Energy
Resources

# View Comment

## Comment Details

**EEA #/MEPA ID**
16640

**Comments Submit Date**
2-7-2024

**Certificate Action Date**
2-9-2024

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**Organization**
Atlantic Aviation

**Affiliation Description**
Proponent

**Status**
Accepted

## Comment Title or Subject

**Topic**: Relocation of Cape Cod Gateway Airport to Otis Airforce Base

## Comments

Segoe UI 10 pt Paragraph

GF 01

I am a Atlantic Aviation employee who has worked and participated in multiple airport operations and development. I can not understand the idea behind relocating the Cape Cod Gateway Airport to Otis Airforce Base are multiple levels. Simply the cost of relocating the airport ranging from FAA grants, to private company's who operate within this airport would be so massive that I am not even sure how the Town could possible even entertain this idea. I understand and sympathy's with people who bring noise in the the picture as a influential topic to this debate, but I also struggle with how this argument is valid as they are simple shifting the issue to someone else, for this instance it would be the residents of Mashpee. I will certainly be participating in Town meets regarding this topic in the future and want to make it clear that I do not support the idea of relocating the Cape Cod Gateway Airport to Otis Airforce Base.

## Attachments

## Update Status

**Status**

Accepted

SUBMIT

## Share Comment

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## Comment Details

| | | | |
|---|---|---|---|
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| **Comments Submit Date** 2-7-2024 | **Last Name** Medeiros | **Address Line 2** -- | **Affiliation Description** Proponent |
| **Certificate Action Date** 2-9-2024 | **Phone** -- | **State** MASSACHUSETTS | **Status** Accepted |
| **Reviewer** Purvi Patel, (617)874-0668, purvi.patel@mass.gov | **Email** helyne.medeiros@atlanticaviation.com | **Zip Code** 02648 | |

## Comment Title or Subject

**Topic**: Relocation of Cape Cod Gateway Airport to Otis Airforce Base

## Comments

Segoe UI 10 pt Paragraph

In the argument of relocating the Cape Cod Gateway Airport to Otis Airforce Base I would like to give my opinion on why I believe it would be beneficial for the Airport to remain where it currently is. First I want make clear how important this airport is to our community ranging from life saving medical treatment with Med Flight which is conveniently located in the Center of Cape Cod to even the season economic commerce we all experience living here on Cape Cod. It is literally a gate way for people who want to visit Cape Cod for vacation or to see family. As well as I am not really sure how the Airport would be able to relocate when there is so much FAA grant money invested here as well as private business who exist sole on this airfield. I want to make it clear that I do not support the Cape Cod Gateway Airport relocating to Otis Airforce Base. HM 01

## Attachments

## Update Status

Status

Accepted

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## Comment Details

**EEA #/MEPA ID**
16640

**Comments Submit Date**
2-8-2024

**Certificate Action Date**
2-9-2024

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**Affiliation Description**
Proponent

**Status**
Opened

## Comment Title or Subject

**Topic**: Support for Cape Cod Gateway Airport Master Plan

## Comments

WS 01

For several generations, the Cape Cod Gateway Airport (CCGA) has provided a crucial link in connecting Marine Home Center (MHC) operations on the islands with skilled, highly sought after workforce living in Barnstable County and the South Shore.

The Hyannis airport has become a true partner to the Cape's economic engine governed by a locally appointed Commission that balances both aviation needs *and* community impacts. The CCGA commitment to Aviation Safety is paramount, with continuous runway, navigation and environmental improvements. It's adoption of "Quiet Flying" is a first defense opportunity in mitigating the impacts to the population of Barnstable County. The CCGA's 20-year Master Plan represents a thoughtful and balanced approach to airport operations. Simply having a plan provides a valuable component to any long-term partnership.
Its location is absolutely critical to the viability of the MHC business model. Other methods simply do not work. The aviation department of MHC alone has invested over $6 million in the past year in operations upgrades.

Marine Home Center has demonstrated for over 40 years that the Hyannis airport is the *only* viable solution to its complex business model. It's commitment to safety, location, commuter access, reliability and environmental awareness make it the ideal partner for the future. - Walt Spokowski, President, Marine Home Center

## Attachments

## Update Status

**Status**

Accepted

SUBMIT

## Share Comment

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REGION 1
BOSTON, MA 02109

February 9, 2024

Cheryl Quaine
Federal Aviation Administration
New England Division
12 New England Executive Park
Burlington, MA 01803

Rebecca L. Tepper, Secretary
Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

RE: EPA comments on the Draft Environmental Assessment and Draft Environmental Impact Report (EEA File Number: 16640) for the Cape Cod Gateway Airport, Hyannis, Massachusetts

Dear Secretary Tepper and Ms. Quaine:

We are writing in response to the Draft Environmental Assessment (EA) and Draft Environmental Impact Report (DEIR) for the Cape Cod Gateway Municipal Airport project located in the Town of Hyannis, Massachusetts. We submit the following comments on the EA/DEIR in accordance with our responsibilities under the National Environmental Policy Act (NEPA), Section 309 of the Clean Air Act, and the Safe Drinking Water Act.

The EA/DEIR describes several capital improvement projects at the Cape Cod Gateway Municipal Airport that will be completed in the next five to seven years. The proposed projects are intended to meet facility requirements, enhance safety and efficiency of the airfield, and achieve compliance with Federal Aviation Administration (“FAA”) standards (FAA AC 150/5300-13B, Airport Design). The report states that the proposed projects are based on the recent 2022 Airport Master Plan (AMP) and Airport Layout Plan (ALP). The proposed project includes extension of Runway 15, modification of taxiways A, B and D, construction of a run-up area and noise wall, removal of Taxiway E, and aeronautical development within the North and East ramp areas.

EPA reviewed the EA/DEIR and offers the following comments and recommendations related to the analysis of groundwater/aquifer protection, public drinking water sources, chemical storage and use, spill prevention control, and stormwater management. We request that these issues be more fully addressed in the final EA/EIR for the project.

**Cape Cod Sole Source Aquifer**

The Cape Cod Gateway Municipal Airport project is located over the Cape Cod Sole Source Aquifer. EPA's review of the EA/DEIR focused primarily on the project's potential to impact the underlying aquifer pursuant to our responsibilities under Section 1424 (e) of The Safe Drinking Water Act (SDWA). The SDWA provides EPA discretionary authority to review federally funded projects within Sole Source Aquifers. In this case, a portion of the funding for the project is being supplied by the Federal Aviation Administration. The Cape Cod Sole Source Aquifer was designated on July 13, 1982 (Federal Register Notice: 47 FR 30282 also see https://www3.epa.gov/region1/eco/drinkwater/capecod.html)

The Cape Cod Aquifer provides 100% of the Cape's drinking water, and its highly permeable aquifer deposits make it one of the most productive groundwater systems in New England. These water supplies are susceptible to contamination from development and land uses within their watersheds. Based on previous groundwater investigations, groundwater flows in a southeasterly direction from the airport towards Lewis Bay. Nearly the entire airport and most of the land area between Route 132, Route 6, and Yarmouth Road, is situated within a zone of groundwater contribution to public water supplies.

Based on our review we found that the EA/DEIR lacks sufficient information to fully assess the potential for groundwater impacts associated with the project. The comments and recommendations in this letter highlight the information necessary to support conclusions regarding potential impacts to groundwater.

EPA intends to review the responses provided to our comments in the final EA/EIR to determine if additional information is required to understand potential impacts to groundwater or if any follow-up groundwater assessment is recommended. We encourage the airport and the FAA to coordinate with us directly during the preparation of the final EA for any clarification regarding our recommendations.

**Public and Private Drinking Water Sources and Coordination with Water Systems**

The airport has been a source of contamination in the past. One example of many provided in the EA/DEIR highlights numerous contaminants discovered in the soil and groundwater:

*Barnstable Municipal Airport, Hanger Bay #1 RTN: 4-12048: Airline Realty Trust submitted a DPS for releases of chlorinated solvents and petroleum compounds to soil and groundwater. The release was attributed to several upgradient sources including leaching pits at the Cape Air Hanger and Griffin Air, and jet fuel contamination associated with former USTs. This RTN was linked to RTN 4-823 in October 1997. RTN 4-823 was associated with releases at the Cape Air Hanger and response actions included disposal of petroleum containing liquid and solids from leaching pits, installation of a soil vapor extraction and air sparging system to treat petroleum-contaminated soil and groundwater, additional soil and groundwater sampling, and injection of remedial additives to treat the chlorinated solvents and petroleum compounds.*

PFAS contamination of groundwater is highlighted in the EA/DEIR as a significant issue associated with both on-airport and off-airport sources. Currently known on-airport sources include the aircraft rescue and firefighting/snow removal equipment (ARFF/SRE) building and deployment area. EPA acknowledges that the airport is working closely with MassDEP's Waste Site Cleanup program to remediate existing contamination and to install institutional controls.

*Public Water Sources*

As discussed in the EA/DEIR, public drinking water wells are located to the north and east of the airport. The Maher Wellfield is located approximately 0.1 miles southeast of the airport and consists of three production wells that supply approximately 30 to 35 percent of the Town of Barnstable's Water Supply Division service connections in Hyannis and Hyannis Port. The Maher Wellfield has been contaminated by numerous contaminants as described in chapter 5 of the EA/DEIR.

Existing wells proximate to the airport are operated by the Barnstable Water Company and the Barnstable Fire District. Additional wells operated by the Yarmouth Water Department are located east of Willow Street in Yarmouth. The report also described potential future well locations, including two locations leased by the airport to the Barnstable Water Company, and two locations on airport property that are identified as future well sites on the Town of Barnstable's zoning map. It is imperative that current and future water supplies be protected. Barnstable is a highly developed community and the ability to locate new water supplies is severely limited.

MassDEP regulations protect both Zone I and Zone II of public water supplies. The Zone I area is a protective area – usually a 400-foot radius - which must be owned or controlled by the public water supplier. Zone II protection is provided through local wellhead protection zoning, passed by cities and towns under impetus from MassDEP.

As outlined in the EA/DEIR, the airport is located within wellhead protection areas which underly the entire airport property. Areas within Zone II reflect areas of highest sensitivity due to their direct connection to existing drinking water supplies. In addition, Barnstable has adopted local regulations EPA 01
which impose stronger restrictions on the five-year "time of travel" area for the aquifer. The Barnstable Groundwater Protection Overlay District is referred to under local zoning as the Wellhead Protection (WP) Overlay District.

**Recommendation:**

- EPA recommends that the final EA/EIR provide more information about how the Airport plans to meet the restrictions required in the Barnstable WP Overlay District.

**Aquifer Protection**

As noted above, the airport is located within the wellhead protection areas (Zone II areas) of several public drinking water supply wells. Wellhead protection areas represent the land area where rain soaks into the ground, enters groundwater, and flows to one of the wells. EPA has concerns about construction and operation impacts associated with the proposed projects at the airport and whether any of the proposed work will conflict with any of the on-site cleanups currently in progress and overseen by the Massachusetts Department of Environmental Protection (MassDEP).

**Recommendations:**

- EPA recommends that the groundwater section of the final EA/EIR be expanded to provide additional hydrogeologic information as it relates to the flow of potential contaminants from construction and operation of the proposed project and the potential impact, including groundwater flow continuing off-site, to existing or proposed public or private water supplies. We recommend that distances and time of travel (if times are readily available) to nearest water supplies be provided. We also recommend that the EA describe past and proposed future coordination with public water supply systems regarding drinking water resources. EPA 02

- We recommend that the EA/DEIR be expanded to fully support any conclusions reached regarding direct or cumulative groundwater impacts to include the following: EPA 03

  - A map showing groundwater depth, contours, and flow directions to better describe the context, existing location and subsurface environment for areas potentially affected by the proposed project. Please show the location of existing and proposed monitoring wells and include a narrative to explain how groundwater contours were developed. We recommend that the locations of public and private water supply wells and surface water supply sources within 5 miles of the proposed project be included in the maps.

  - A list describing the expected annual loading of potential contaminants to groundwater (as compared to baseline conditions at the airport—see below) from construction and project-related operations including information on fuel-related contaminants and loadings such as volatile organic compounds, metals, and polyaromatic hydrocarbons.

  - A description of baseline groundwater contaminant conditions.

  - An expanded description of measures and best management practices to reduce the release of contaminants and provide aquifer protection during construction and airport operations. We specifically recommend additional detail regarding how the airport will protect groundwater from contaminated runoff, spills, or accidents at the airport.

**Chemical Storage and Use**

**Recommendations:**

- We recommend that the final EA/EIR provide a list of chemicals and de-icing products used at the airport, and a description of where and how they will be stored and managed on airport property. A full discussion of aircraft or vehicle maintenance practices/activities that can pollute runoff along with measures that will be implemented to reduce and control pollutants is recommended. EPA 04

- We also recommend that the final EA/EIR include a list of past and current firefighting foam products (which might contain per- and polyfluoroalkyl substances PFAS/PFOA/PFOS) which will be used in association with the proposed project. EPA 05

**Monitoring Plan**

**Recommendations:**

- We recommend that the final EA/EIR consider the development of multi-media monitoring as a means of determining the effectiveness of pollution prevention measures aimed at preventing or minimizing the potential for the proposed project to contaminate the aquifer. We request that the final EA/EIR include a monitoring plan that describes how and when soil and groundwater will be monitored for potential contaminants of concern and how baseline soil and groundwater contaminant conditions will be established. We recommend that the monitoring plan detail the frequency of sampling and how the sampling results, along with needed and executed response actions, will be shared with appropriate water department officials in the project area. We recommend annual reporting. EPA 06

**Spill Prevention Control and Countermeasure Plan**

**Recommendation:**

- Given the location of the proposed project above a Sole Source Aquifer, EPA recommends that the airport's Spill Prevention, Control and Countermeasure (SPCC) Plan be updated prior to construction to account for all aspects of the proposed project's construction and operations. The current plan (Revision 4) is dated 2020. EPA 07

For more specific information about requirements with the SPCC rule, refer to *www.epa.gov/oil-spills-prevention-and-preparedness-regulations/spill-prevention-control-and-countermeasure-19.* Please direct questions regarding the SPCC rule to EPA's Joe Canzano at canzano.joseph@epa.gov or 617-918-1763.

**Stormwater Management**

The NPDES Construction General Permit (CGP) authorizes stormwater discharges from construction activities that result in a total land disturbance of equal to or greater than one acre, where those discharges enter Waters of the U.S. or a municipal separate storm sewer system (MS4) leading to Waters of the U.S. subject to the conditions set forth in the CGP. As noted in the EA/DEIR, compliance with the CGP is required.

The EA/DEIR notes that the airport maintains a Stormwater Pollution Prevention Plan (SWPPP) in accordance with EPA's National Pollutant Discharge Elimination System (NPDES) Stormwater Multi-Sector General Permit (MSGP) issued on January 15, 2021 (Airport NPDES ID MAR 053164, see Appendix F). The majority of stormwater collected on impervious surfaces at the airport is managed through a network of 300 catch basins discharging to surface water outfalls, seven bioretention basins which discharge to infiltration basins, vegetated swales, and Class V injections wells (see below for more information about Class V well requirements).

The report states that the majority of Airport property is pervious vegetated airfield surfaces in areas characterized by little to no potential for potential pollutants to be exposed to stormwater.

**Recommendation**:

- We recommend that the final EA/EIR provide additional detail to explain why there is only limited potential for pollutants to be exposed to stormwater. EPA 08

The EA/DEIR describes oversight of erosion and sediment controls to mitigate the impacts of proposed construction. Stormwater from a portion of the airport may be discharged near the Maher Wellfield, which is located near the intersection of Route 28 and Yarmouth Road.

**Recommendation:**

- EPA recommends that the airport's erosion and sediment control plan, including stormwater runoff controls and Best Management Practices (BMPs) include consideration of groundwater resources at the site, and adjacent public drinking water supply wells. The final EA/EIR should detail any necessary changes to reflect this focus and include a description of monitoring wells and advanced stormwater BMPs needed for spill control. We also recommend that all stormwater BMPs described include a description of pretreatment capabilities as required by Massachusetts stormwater requirements. EPA 09

The EA/DEIR states that the proposed stormwater design will treat stormwater using a combination of BMPs. The current stormwater BMPs rely on the Vortech system, a below-ground, engineered stormwater treatment device that combines swirl concentration and flow controls into a single treatment unit. As discussed in the report, Vortech is used for capturing and retaining trash, debris, sediment, and hydrocarbons from stormwater runoff. Stormwater technologies can be very effective but need to be maintained adequately.

**Recommendation:**

- EPA requests more information about the proposed BMPs that will be developed for the airport, and regarding the operations and maintenance of the Vortech system. Also, given the location of the proposed project above a Sole Source Aquifer, EPA encourages the use of monitoring wells. EPA 10

**Underground Injection Control**

EPA's Underground Injection Control (UIC) program is administered by MassDEP and, as such, UIC systems are regulated by MassDEP. Infiltration best management practices used to drain stormwater runoff or other wastewater are regulated as "Class V" underground injection wells under Massachusetts UIC regulations (310 CMR 27.02) if they include any of the following:

- a bored, drilled, or driven shaft, a dug hole, or seepage pit whose depth is greater than its largest surface dimension; or,

- an improved sinkhole; or,
- any subsurface structure that has a soil absorption system (SAS) with a subsurface fluid distribution line and aggregate. Note: This refers to subsurface infiltration enhancement systems but does not include underdrains designed to collect and convey stormwater to a surface outfall or a storm drain network.

Any new UIC wells need to be approved by MassDEP. MassDEP needs a UIC registration application with the required UIC Stormwater Technical Compliance Form, site plans, and cross-sectional plans showing the proposed UIC well structures. For more information, please contact: EPA 11

Joe Cerutti
MassDEP Drinking Water Program
UIC Program Coordinator
joseph.cerutti@mass.gov
781-465-4123

Please contact us during the development of the final EA/EIR for clarification of any of the comments and recommendations provided above. EPA requests the opportunity to be kept informed about any activities that might affect the Sole Source Aquifer during project design, construction, or operation. Please communicate directly with the EPA Region 1 Sole Source Aquifer Coordinator, Kira Jacobs. She can be reached at jacobs.kira@epa.gov or 617-918-1817.

Sincerely,

Timothy Timmermann, Director
Office of Environmental Review

3225 MAIN STREET • P.O. BOX 226
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CAPE COD COMMISSION

**Via Email**

February 9, 2024
Rebecca Tepper, Secretary of Energy and Environmental Affairs
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office, Purvi Patel, Environmental Analyst
100 Cambridge Street, Suite 900, Boston, MA 02114

Re: Draft Environmental Impact Report
EEA No. 16640 (Cape Cod Commission File No. 22033)
Cape Cod Gateway Airport Master Plan Projects, Barnstable

Dear Secretary Tepper:

Thank you for the opportunity to provide comments on the above-referenced Draft Environmental Impact Report ("DEIR"). Because this Project requires an Environmental Impact Report ("EIR"), it is deemed a Development of Regional Impact ("DRI") under § 12(i) of the Cape Cod Commission Act, c. 716 of the Acts of 1989. Cape Cod Commission staff previously submitted comments on this Project's 2022 ENF. We offer the following additional suggestions as Cape Cod Gateway Airport ("the Applicant") completes the MEPA process and prepares for DRI review.

The Cape Cod Gateway Airport 2022 Master Plan proposes multiple improvements to be completed in three phases over 20 years. This DEIR encompasses the improvements anticipated to receive funding within the next five to seven years, including extending runway 15-33, modifying taxiways A, B, and D, removing taxiway E, constructing a run-up area and noise wall, and new hangar development ("the Project"). Our comment letter on the ENF highlighted the amount of new land alteration, increased impervious surfaces, wetlands disturbance, and vegetation clearing associated with construction as areas of concern. We encouraged the Applicant to assess design alternatives to minimize negative impacts to natural resources while fulfilling applicable Federal Aviation Administration ("FAA") requirements.

The DEIR includes a detailed alternatives analysis and some beneficial modifications, such as a decrease in the total acreage of new land alteration—from approximately 63 acres in the ENF to CCC 01 less than 50 as currently proposed. The Applicant should continue assessing any alternatives that might be less detrimental to sensitive resources.

The proposed Taxiway D relocation will involve earthwork and construction of paved surfaces in Upper Gate Pond's buffer, impacting surface waters, wetlands and NHESP BioMap Core Habitat and Critical Natural Landscape areas. Over time, stormwater runoff, debris, and frequent nearby vegetation management have decreased this pond's habitat function and contaminated its sediments. Previous DRI decisions on the Airport property required an undisturbed natural buffer surrounding Upper Gate and other freshwater ponds, with only limited vegetation removal allowed. The DEIR indicates that locating the new Taxiway D closer to Runway 15-33 is not possible due to FAA separation standards, and work within wetlands and open water cannot be avoided. Among the identified alternatives, the retaining wall (2C) and bridge/elevated taxiway surface (2D) CCC 02
both appear less impactful to Upper Gate Pond than the preferred 2:1 side slope. These options warrant further evaluation in light of their potential wetland resource benefits. The cost and feasibility of providing mitigation for wetlands impacts, potentially at other locations, should be considered as part of this analysis.

The Runway 15-33 extension alternatives analysis notes that the preferred alternative adds only CCC 03
the minimum pavement necessary to meet runway length needs. We support the modification of the design initially selected in the ENF, which would have added more pavement than the current proposal. Even with that design change, the Project is expected to increase impervious surface coverage by about 40 acres, requiring additional measures to manage and treat runoff. As the CCC 04
design for runway and taxiway modifications is finalized, the Applicant should identify any new areas where vegetated buffers can be maintained or re-established to protect nearby surface waters and incorporate these locations in landscaping and maintenance plans. The DEIR indicates that new leaching catch basins will be installed to capture stormwater, and a Vortechs water quality unit will be relocated. Details on the size, location, and design of these stormwater systems should be provided if available. The Applicant should plan for ongoing maintenance and CCC 05
monitoring to ensure stormwater is adequately treated before entering surface and groundwater bodies.

As proposed, the Project anticipates clearing 8.65 acres of land with a mixture of forest and shrubs. Tree removal will be timed to avoid negative impacts on potential bat populations: outside of the summer roosting period (April through September), and when possible, between October and March. This schedule is a good construction practice which is likely to protect other wildlife including breeding bird species. The Applicant should still aim to minimize tree and shrub clearing CCC 06
and land disturbance to the extent possible and mitigate when unavoidable. The DEIR proposes to CCC 07
offset carbon releases and loss of carbon sequestration resulting from the Project with tree planting/replanting, and preservation of forested areas north of the airport. Commission staff encourage the Applicant to pursue permanent protection of existing forest via conservation restriction where feasible and identify locations on-site and elsewhere in the Town of Barnstable that might be appropriate for new planting.

The proposed improvements will involve construction and disturbance in several locations that are near known archaeological sites and may be archaeologically sensitive. The DEIR states the Applicant will prepare an avoidance plan for review by Massachusetts Historical Commission to address known archaeological sites in the area. The potential for unexpected discoveries should also be addressed by an unexpected discoveries plan and general monitoring of cultural resources during the construction process. CCC 08

The Project is not expected to generate a significant increase in vehicular traffic volume on the adjacent roadway network and construction-related impacts will be temporary. Any increases in traffic volume to and from the Airport are likely to be gradual, resulting from market and operational factors. The Applicant commits to implementing a Transportation Demand Management ("TDM") program as part of the Master Plan. Commission staff support the inclusion of a TDM program as a method to reduce single-occupancy vehicle trips to the Airport and promote alternative transportation options. The DEIR notes several planned roadway infrastructure projects in the vicinity of the Project site, including but not limited to, the MassDOT Airport Rotary improvements and the Town of Barnstable Route 132 Corridor Improvements. We encourage the Applicant to review and coordinate with MassDOT and the Town of Barnstable to ensure multimodal connectivity is provided to the Airport from these roadways and major intersections. CCC 09 CCC 10

Thank you for the opportunity to provide comments on the Project. Commission staff are available to answer any questions you might have about these comments.

Sincerely,

Kristy Senatori

Kristy Senatori
Executive Director

Cc: Project File
Alyssa Jacobs, Epsilon Associates
Katie Servis, Airport Manager, Cape Cod Gateway Airport
Elizabeth Jenkins, Director, Barnstable Planning & Development
Barnstable Cape Cod Commission Representative, via email
Cape Cod Commission Chair, via email
Cape Cod Commission Committee on Planning and Regulation Chair, via email

MassDEP
Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs
# Department of Environmental Protection
Southeast Regional Office • 20 Riverside Drive, Lakeville MA 02347 • 508-946-2700



February 9, 2024

Rebecca L. Tepper
Secretary of Energy and Environment
Executive Office of Energy and
Environmental Affairs
Boston, MA 02114
ATTN: MEPA Office
100 Cambridge Street, Suite 900

RE: DEIR Review. EOEEA 16640
BARNSTABLE Cape Cod Gateway Airport
at 480 Barnstable Rd

Dear Secretary Tepper,

The Southeast Regional Office of the Department of Environmental Protection (MassDEP) has reviewed the Draft Environmental Impact Report (DEIR) for the Cape Cod Gateway Airport at 480 Barnstable Rd, Barnstable, Massachusetts (EOEEA #16640). The Project Proponent provides the following information for the Project:

**Consistent with its safety mission, the proposed Projects, included in the Airport's recent Master Plan (2022) update, are needed to meet facility requirements, enhance safety and efficiency of the airfield, and achieve compliance with Federal Aviation Administration ("FAA") standards (FAA AC 150/5300-13B, Airport Design)**

**Since the filing of the ENF (filed November 30, 2022) and based on comments received from the public during outreach meetings and agency input, the Projects included for consideration in this joint draft EA/EIR have been revised. Projects discussed in the Draft EA/EIR only include those anticipated to receive federal and state funding in the near future (next 5 to 7 years). The Projects include the extension of Runway 15, modification of taxiways A, B and D, construction of a run-up area and noise wall, removal of Taxiway E, and aeronautical development within the North and East Ramp areas. Future projects anticipated to take place beyond a 7+ year timeframe, including terminal building improvements, are excluded from discussion.**

**This Draft EA/EIR provides extensive and detailed analysis of the Projects and potential environmental impacts, alternatives considered, and proposed environmental mitigation measures.**

***Bureau of Water Resources (BWR)Comments***

**Wetlands**. The Project Proponent has adequately addressed the Wetland's Program comments submitted in response to the ENF. The Proponent discussed compliance with the applicable performance standards to each of the resource areas' anticipated impacts in Chapter 8 and quantified permanent impacts in the most recent design in relation to site constraints and the proposed realignment of Taxiway D. Mitigation measures include a wetland replication area to be designed and constructed per MassDEP's Inland Wetland Replication Guidelines. According to the DEIR, it is anticipated the Proponent will seek an Order of Conditions from the Barnstable Conservation Commission and a Section 401 Water Quality Certification from the Department. Adherence to the respective performance standards will be reviewed during these permitting processes."

**Drinking Water**. Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan recommends improvements needed to meet the goals of the Airport and its users. The Projects, constructed over the next 7 years, include the extension of Runway 15, modification of taxiways A, B and D, construction of a run-up area and noise wall, removal of Taxiway E, and aeronautical development within the North and East Ramp areas.

The Airport Property abuts several properties containing municipal Public Water Supply sources. Each source has a designated Zone 1 and Zone II protection area as required by the Massachusetts Drinking Water Regulations (310 CMR 22.00). After review of the included figures in the DEIR, the MassDEP Drinking Water Program has determined that these projects do not interfere with, or intrude on, the Zone 1 of any of the public water supply sources. The entire airport property is within a Zone II, but the regulations do not preclude this construction activity. Activities within the Zone II are subject to local bylaws which are required by the Massachusetts Drinking Water Regulations. MassDEP's Drinking Water Program concludes that the proposed project will not impact the public water supply sources adjacent to the airport property.

**Stormwater Comments:**

*National Pollutant Discharge Elimination System (NPDES) Construction General Stormwater Permit.*

The Project Proponent acknowledges that its activities will require filing a Notice of Intent (NOI) with the United States Environmental Protection Agency (US EPA). Access to information regarding the NPDES Stormwater requirements and an application for the Construction General Permit is obtained by completing and submitting a Notice of Intent (NOI) to EPA via the Stormwater Discharges from Construction Activities | National Pollutant Discharge Elimination System (NPDES) | US EPA.

The Proponent is advised to consult with Margarita Chatterton at Chatterton.Margarita@epa.gov or by phone at 601-918-1034 for questions regarding EPA's NPDES Construction General Permit requirements.

*Industrial Stormwater Permit*

The Project Proponent has acknowledged its requirement for an EPA NPDES Multi Sector General Permit (Industrial Stormwater) Program (https://www.epa.gov/sites/production/files/2016-04/documents/sector_s_airtransmaint.pdf).

Under the 2015 Multi-Sector General Permit for Stormwater Discharges Associated with Industrial Activity (MSGP), EPA has updated the requirements for Sector S to incorporate the Airport deicing effluent limitation guidelines and new source performance standards. Airlines and airports conduct deicing operations on aircraft and airfield pavement to ensure the safety of passenger and cargo flights. In the absence of controls, deicing chemicals are widely dispersed causing pollutants to enter nearby rivers, lakes, streams, and bays. On May 16, 2012, EPA published the Airport Deicing ELG in the Federal Register to control the discharge of pollutants from airport deicing operations to surface waters. See 40 CFR Parts 9 and 449. The requirements largely apply to wastewater associated with the deicing of airfield pavement at primary airports. The rule also established NSPSs for wastewater discharges associated with aircraft deicing for a subset of new airports. These guidelines are implemented in discharge permits issued by states and EPA Regional Offices under the NPDES program. Therefore, the 2015 MSGP is incorporating the requirements from the Airport ELG that are appropriate to the kinds of discharges the permit authorizes. Additional information regarding this EPA permit may be found at: https://www3.epa.gov/npdes/pubs/sector_s_airtransmaint.pdf .

The Proponent is advised to consult with Abed Ragab at ragab.abdulrahman@epa.gov or 617-918-1695 and Michelle Vuto at vuto.michelle@epa.gov or 617-918-1222 for any of its questions regarding EPA's NPDES stormwater permitting requirements.

*Underground Injection Control*

The Proponent acknowledges that each of its UICs will be registered with the UIC program.
The Project Proponent is reminded that these structures must be registered through the submittal of a BRP WS-06 UIC Registration application through MassDEP's electronic filing system, eDEP. The statewide UIC program contact is Joe Cerutti, who can be reached at (617) 292-5859 or at joseph.cerutti@state.ma.us . All information regarding on-line (eDEP) UIC registration applications may be obtained at the following web page under the category "Applications & Forms": https://www.mass.gov/underground-injection-control-uic.

**Waste Water Management**. Cape Cod Gateway Airport is required to demonstrate the ability to apply extinguishing agent as part of its FAA Part 139 safety certification. The capital improvements to the airport should include provisions to collect the wastewater containing the extinguishing agents generated during these demonstrations and/or training events so that proper treatment and/or disposal can occur in conformance with Massachusetts requirements. DEP 01

***Bureau of Waste Site Cleanup (BWSC) Comment***
Based upon the information provided, the Bureau of Waste Site Cleanup (BWSC) searched its databases for disposal sites and release notifications that have occurred at or might impact the proposed project area. A disposal site is a location where there has been a release to the environment of oil and/or hazardous material that is regulated under M.G.L. c. 21E, and the Massachusetts Contingency Plan [MCP – 310 CMR 40.0000].

Five releases have been reported at or within the vicinity of the project area since the submittal of the ENF in January 2023. One release identified as Release Tracking Number 4-0030077 occurred at 714 Iyannough Road approximately 300 feet from the Cape Cod Gateway Airport. This release is currently open; however, based on the type and volume of oil released it is unlikely to impact the proposed project. Four other releases (4-0029977, 4-0029946, 4-0029870, 4-0029807) have been closed with Permanent Solution Statements with No Conditions; three of the releases occurred at Cape Cod Gateway Airport. Any soil excavated within a Disposal Site Boundary of either an open or closed site is considered remediation waste and must be handled as such.

Interested parties may view a map showing the location of BWSC disposal sites using the MassGIS data viewer at MassMapper. Under the Available Data Layers listed on the right sidebar, select "Regulated Areas", and then "DEP Tier Classified 21E Sites". MCP reports and the compliance status of specific disposal sites may be viewed using the BWSC Waste Sites/Reportable Release Lookup at: https://eeaonline.eea.state.ma.us/portal#!/search/wastesite

BWSC has reviewed the DEIR for the Cape Cod Gateway Airport and offers the following comments: Section 6.13.10 Impact Summary, states that the project does not have the potential to involve a contaminated site. However, portions of the project are located within the Disposal Site Boundary of RTN 4-0026347 which contains PFAS contamination.

The DEIR describes the measures the Proponent plans to take to comply with MGL C. 21E and the MCP for this project. MassDEP agrees with the proposed work as described in the DEIR for hazardous materials/MCP disposal sites with the following additional comments: MassDEP reiterates that one or more RAM Plans or possibly a modified Phase IV Remedy Implementation Plan may be necessary for the various construction activities as proposed in the DEIR. MassDEP also reiterates that the Proponent and LSP should evaluate whether the sampling/analytical results obtained from soil management under this project affect the remediation options as described in the Phase III Remedial Action Plan under RTN 4-0026347. All remediation waste shall be properly managed per the MCP. DEP 02 DEP 03

MassDEP also directs the Proponents attention to the portions of the MCP that state that remedial activities shall not result in the exacerbation of contamination. The Proponent and the LSP should work together to ensure that future RAMs for the airport construction activities do not exacerbate contamination. In particular, it should be demonstrated that any excavation of, or introduction of, soil beneath the caps will not exacerbate groundwater contamination. DEP 04

All requirements of the MCP shall be followed during this project.

*The Project Proponent is advised that if oil and/or hazardous material are identified during the implementation of this project, notification pursuant to the Massachusetts Contingency Plan (310 CMR 40.0000) must be made to MassDEP, if necessary. A LSP should be retained to determine if notification is required and, if need be, to render appropriate opinions. The LSP may evaluate whether risk reduction measures are necessary if contamination is present. The BWSC may be contacted for guidance if questions arise regarding cleanup.*

**Spills Prevention and Control**. The Department acknowledges that Cape Gateway Master Plan - reporting: "In accordance with Code of Federal Regulations 40, Subpart 112 (40 CFR 112), a Spill Prevention, Control, and Countermeasure Plan (SPCCP) is maintained by the Airport to minimize the risk associated with bulk storage and transfer of Oil and Hazardous Materials (OHM)." The DEIR further reports: "During construction, all potential contaminants will be stored, handled and disposed of so that accidental releases to the environment are avoided. Spill prevention and control measures will be implemented consistent with the Airport's Spill Prevention, Control and Countermeasure Plan (SPCCP), and will include measures to prevent spills, provide emergency response measures and training of all construction personnel."

The Project Proponent is advised that a spills contingency plan addressing prevention and management of potential releases of oil and/or hazardous materials from pre- and post-construction activities should be presented to workers at the site and enforced. The plan should include but not be limited to, refueling of machinery, storage of fuels, and potential on-site activity releases. Information related to spills prevention best practices may be obtained at the following web page: https://www.mass.gov/files/spill_prevention.pdf? DEP 05

**<u>Hazardous Waste Management</u>**. The Department acknowledges that Cape Gateway Master Plan, in has developed an emergency response plan, which is discussed in the NPC.

If any occupant of the Project generates hazardous waste and/or waste oil, that entity must register with the MassDEP or EPA to obtain a permanent identification number, as applicable, in accordance with 310 CMR 30.000 for legally generating and managing regulated waste. The Proponent is advised to consult at this MassDEP website https://www.mass.gov/guides/hazardous-waste-generation-generators to determine if the Proponent qualifies as a generator of hazardous waste and/or waste oil. DEP 06

***Bureau of Air and Waste (BAW) Comments***

**<u>Air Quality</u>**.

*Construction and/or Demolition Air/Noise Pollution*

Construction and demolition activity must conform to current Massachusetts Air Pollution Control regulations governing nuisance conditions at 310 CMR 7.01, 7.09 and 7.10 and not cause or contribute to a condition of air pollution due to dust, odor or noise. As such, the proponent should propose measures to prevent and minimize dust, noise, and odor nuisance conditions, which may occur during construction. DEP 07

To determine the appropriate requirements please refer to:
310 CMR 7.09 Dust, Odor, Construction, and Demolition
310 CMR 7.10 Noise

*Air Pollution*

.
The Project Proponent reports: "The construction phases of each proposed action are expected to temporarily increase air emissions from both fugitive dust generated from earth moving activities and the exhaust of non-road construction equipment. Emissions from the operation of construction machinery (i.e., carbon monoxide [CO], nitrogen oxide [NOx], particulate matter [PM10, PM2.5], volatile organic compounds [VOCs], and GHG emissions) are short-term and not generally considered substantial."

Several strictly enforced measures would be used by contractors to reduce potential emissions and minimize impacts including:

- Using wetting agents on areas of exposed soil on a scheduled basis;
- Using covered trucks;
- Monitoring actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site;
- Periodic street and sidewalk cleaning with water to minimize dust accumulations; and
- The contractor would comply with the National Emission Standards for Hazardous Pollutants (NESHAP) throughout demolition and construction activities."

MassDEP requests that all non-road diesel equipment rated 50 horsepower or greater meet EPA's Tier 4 emission limits, which are the most stringent emission standards currently available for off- DEP 08 road engines. If a piece of equipment is not available in the Tier 4 configuration, then the Proponent should use construction equipment that has been retrofitted with appropriate emissions reduction equipment. Emission reduction equipment includes EPA-verified, CARB-verified, or MassDEP-approved diesel oxidation catalysts (DOCs) or Diesel Particulate Filters (DPFs). The Proponent should maintain a list of the engines, their emission tiers, and, if applicable, the best available control technology installed on each piece of equipment on file for Departmental review.

The Proponent is advised that the Department's Air Quality regulations (310 CMR 7.11(3) Aircraft) specifies that "No person owning or operating an airport shall cause, suffer, allow, or permit routine warmups, testing, or other operation of aircraft while on the ground, in such a manner as to cause or contribute to a condition of air pollution, outside of the property lines of the airport, that in the opinion of the Department are unreasonable and feasibly preventable." To further clarify, this means that all DEP 09
aircraft, once on the ground, should cease to operate its engines until such time when departure is warranted. Alternatively, to running these engines on idle, when warranted to maintain comfort within these aircraft during the warm summer months, plug in stations should be provided by the airport as an alternative to the greenhouse gas emissions, air pollutant emissions and noise that are emitted while these engines continue to operate while on the ground to keep onboard systems (refrigeration, air conditioning, etc.) running.

*Noise*

MassDEP's noise policy establishes a 10 dB(A) increase in sound as the maximum sound impact which cannot be exceeded at the property line or the nearest receptor. Sound increases are evaluated in accordance with the MassDEP Noise Pollution Policy Interpretation. The Proponent is reminded that the 10 dB(A) is not a design standard but a performance standard. Sound impacts should be mitigated to DEP 10
extent practicable.

*Massachusetts Idling Regulation*

The ENF reports that the Project Proponent proposes to maintain an idle free work area.

MassDEP reminds the Proponent that unnecessary idling (i.e., in excess of five minutes), with limited exception, is not permitted during the construction and operations phase of the Project (Section 7.11 of 310 CMR 7.00). Regarding construction period activity, typical methods of reducing idling include driver training, periodic inspections by site supervisors, and posting signage. In addition, to ensure compliance with this regulation once the Project is occupied, MassDEP requests that the Proponent DEP 11
install permanent signs limiting idling to five minutes or less on-site.

**Solid Waste Management.** The DEIR states: "It is estimated that up to approximately 200,000 cubic yards of soil may be generated over the course of the various projects being executed. As discussed above several Sites with documented releases of OHM are located within or adjacent to areas of proposed Airport improvements. Based on the location of these Sites, it is anticipated that potentially contaminated soil or groundwater maybe encountered during the implementation of the various projects..."

Additionally, the DEIR states that the proponent's "selected contractor will apply relevant and practicable procedures to allow for the reuse and recycling of construction materials. Prior to construction, the contractor will develop a Construction Waste Management Plan to ensure that a minimal amount of waste debris is disposed in landfills. For materials that cannot be recycled, solid waste will be transported in covered trucks to an approved solid waste facility per the DEP Regulation for Solid Waste Facilities, 310 CMR 16.00."

As a reminder, the Project Proponent is advised of the following requirements:

1. Reuse of any material requires submittal of MassDEP's BWP SW41 – Beneficial Use Determination – Restricted Applications. The permit is intended to protect public health, safety, and the environment by comprehensively regulating the reuse of waste materials as effective substitutes for a commercial product or commodity. Information pertaining to this requirement is available *at* https://www.mass.gov/doc/instructions-sw-39-40-41-42-beneficial-use-determinations/download.

2. *Compliance with Waste Ban Regulations*: Waste materials discovered during construction that are determined to be solid waste (e.g., construction and demolition waste) and/or recyclable material (e.g., metal, asphalt, brick, and concrete) shall be disposed, recycled, and/or otherwise handled in accordance with the Solid Waste Regulations including *310 CMR 19.017: Waste Bans*. Waste Ban regulations prohibit the disposal, transfer for disposal, or contracting for disposal of certain hazardous, recyclable, or compostable items at solid waste facilities in Massachusetts, including, but not limited to, metal, wood, asphalt pavement, brick, concrete, and clean gypsum wallboard. The goals of the waste bans are to: promote reuse, waste reduction, or recycling; reduce the adverse impacts of solid waste management on the environment; conserve capacity at existing solid waste disposal facilities; minimize the need for construction of new solid waste disposal facilities; and support the recycling industry by ensuring that large volumes of material are available on a consistent basis. Further guidance can be found at: https://www.mass.gov/guides/massdep-waste-disposal-bans.
   MassDEP recommends the Proponent consider source separation or separating different recyclable DEP 12
   materials at the job site. Source separation may lead to higher recycling rates and lower recycling costs. Further guidance can be found at: https://recyclingworksma.com/construction-demolition-materials-guidance/

   For more information on how to prevent banned materials from entering the waste stream the Proponent should contact the RecyclingWorks in Massachusetts program at (888) 254-5525 or via email at info@recyclingworksma.com. RecyclingWorks in Massachusetts also provides a website that includes a searchable database of recycling service providers, available at http://www.recyclingworksma.com.

3. *Asphalt, brick, and concrete (ABC) rubble* associated with the removal of existing structure must be handled in accordance with the Solid Waste regulations. These regulations allow, and MassDEP encourages, the recycling/reuse of ABC rubble. The Proponent should refer to MassDEP's Information Sheet, entitled " Using or Processing Asphalt Pavement, Brick and Concrete Rubble, Updated February 27, 2017 ", that answers commonly asked questions about ABC rubble and identifies the provisions of the solid waste regulations that pertain to recycling/reusing ABC rubble. This policy can be found on-line at the MassDEP website: https://www.mass.gov/files/documents/2018/03/19/abc-rubble.pdf.

4. *Tree removal/land clearing/clean wood:* As defined in 310 CMR 16.02, clean wood means "discarded material consisting of trees, stumps and brush, including but limited to sawdust, chips, shavings, bark, and new or used lumber"…etc. Clean wood does not include wood from commingled construction and demolition waste, engineered wood products, and wood containing

or likely to contain asbestos, chemical preservatives, or paints, stains or other coatings, or adhesives. The Proponent should be aware that wood is not allowed to be buried or disposed of at the Site pursuant to 310 CMR 16.00 & 310 CMR 19.000 unless otherwise approved by MassDEP. Clean wood may be handled in accordance with 310 CMR 16.03(2)(c)7 which allows for the on-site processing (i.e., chipping) of wood for use at the Site (i.e., use as landscaping material) and/or the wood to be transported to a permitted facility (i.e., wood waste reclamation facility) or other facility that is permitted to accept and process wood.

If you have any questions regarding the Solid Waste Management Program comments above, please contact Jennifer Wharff at Jennifer.Wharff@mass.gov or Mark Dakers at Mark.Dakers@mass.gov for solid waste comments.

**Asbestos**. The Project Proponent reports that "Due to the age and material at the Airport, it is suspected that asbestos may be present in materials if installed before 1981.

As a reminder, the Project Proponent is advised of the following requirements:

1. *Asbestos Survey Requirements.* Prior to conducting any demolition or renovation activities, MassDEP's Asbestos Regulations at 310 CMR 7.15(4) requires any owner or operator of a building or facility to employ or engage a Department of Labor Standards (DLS) licensed asbestos inspector to thoroughly inspect the facility using US EPA approved procedures and methods to identify the presence, location and quantity of any ACM or suspect ACM and to prepare a written asbestos survey report. The survey shall identify and assess suspect ACM located in all areas that will be breached or otherwise affected by the demolition activities, including, but not limited to wall cavities, pipe chases, subsurface conduits, areas above ceilings and under/between multiple layers of flooring. Adequate and representative samples must be collected of all suspect asbestos containing building materials and sent to a DLS certified laboratory for analysis, using US EPA approved analytical methods.

   The written asbestos survey report shall contain an inventory of the exact locations of the ACM or suspect ACM from which samples were collected, analytical results of all samples taken, the date(s) such samples were collected, the name(s) of the persons who provided asbestos analytical services, and a blueprint, site map, diagram or written description of the facility and locations(s) thereof subject to demolition or renovation. This documentation shall clearly identify each location subject to demolition and/or renovation and the corresponding footage (square and/or linear) of any ACM or suspect ACM in each location.
2. *Asbestos Abatement Requirements.* The owner or operator must hire a DLS licensed asbestos abatement contractor to remove and dispose of any asbestos containing material(s) from the facility or facility component, prior to conducting any demolition or renovation activities. The removal and handling of asbestos from the facility or facility components must adhere to the Specific Asbestos Abatement Work Practice Standards required at 310 CMR 7.15(7).

   If any proposed alterations or exemptions to Specific Asbestos Abatement Work Practice Standards required at 310 CMR 7.15(7) are proposed, the owner or operator must submit a Non-Traditional Asbestos Abatement Work Practice Plan (NTWP) to MassDEP for approval in accordance with 310 CMR 7.15 (14). As part of an NTWP submittal package, MassDEP will require pre- and post- abatement inspections to ensure alternate work practices specified in the approved NTWP are adhered to. The AQ 36 Non-Traditional Asbestos Abatement Work Practice Approval application form (AQ 36) and instructions for submitting the NTWP and AQ 36, can be found at the following links: Application: https://www.mass.gov/how-to/aq-36-non-traditional-asbestos-abatement-work-practice-approval Instructions: https://www.mass.gov/doc/instructions-aq-36/download

3. *Asbestos Notification Requirements.*
   In accordance with 310 CMR 7.15 (6), the asbestos contractor is required to submit a BWP ANF-001 Asbestos Notification Form to MassDEP at least ten (10) working days prior to beginning any abatement or removal of asbestos containing materials from the facility. The AQ 04 (ANF 001) notification form, and instructions for completing an ANF 001, can be found at the following links:

   Notification Form: https://www.mass.gov/how-to/file-an-aq-04-anf-001-asbestos-removal-notification
   Instructions: https://www.mass.gov/doc/bwp-aq-04-anf-001-asbestos-removal-notification-instructions-july-2015- 0/download

If you have any questions regarding the Asbestos Program comments above, please contact Colleen Ferguson at Colleen Ferguson@mass.gov..

***Other Comments/Guidance***

The MassDEP Southeast Regional Office appreciates the opportunity to comment on this DEIR. If you have any questions regarding these comments, please contact George Zoto at George.Zoto@mass.gov or Jonathan Hobill at Jonathan.Hobill@mass.gov.

Very truly yours,

Jonathan E. Hobill,
Regional Engineer,
Bureau of Water Resources

JH/GZ

Cc: DEP/SERO

ATTN: Millie Garcia-Serrano, Regional Director
Gerard Martin, Deputy Regional Director, BWR
John Handrahan, Deputy Regional Director, BWSC
Seth Pickering, Deputy Regional Director, BAW
Jennifer Viveiros, Deputy Regional Director, ADMIN
Maissoun Reda, Chief, Wetlands and Waterways, BWR
Brendan Mullaney, Waterways, BWR

Daniel DiSalvio, Chief, Compliance and Enforcement, BAW
Joseph Cerutti, Underground Injection Control, BWR/Boston
Jim McLaughlin, Chief, Drinking Water, BWR
Michelle Regon, Drinking Water, BWR
Mark Dakers, Solid Waste, BAW
Jennifer Wharff, Solid Waste Management, BAW
Angela Gallagher, Audits, BWSC
Amanda Cantara, Site Management, BWSC

**Patel, Purvi (EEA)**

**From:** Chris Powicki <chrisp@weeinfo.com>
**Sent:** Friday, February 9, 2024 3:42 PM
**To:** Patel, Purvi (EEA)
**Subject:** Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan Projects (#16640) - Sierra Club Comments

**Importance:** High



*Thank you for the opportunity for Sierra Club's Cape Cod & Islands Group, representing members and supporters in Barnstable, Dukes, and Nantucket counties, to submit comments on the Draft Environmental Impact Report (DEIR) for Cape Cod Gateway Airport (formerly Barnstable Municipal Airport) Master Plan Projects (#16640).*

Sierra Club concludes that the Airport's DEIR is incomplete as submitted, and that additional analysis and reporting are required before judgment can be made as to whether MEPA requirements have been satisfied. Two main concerns exist:

**First, the DEIR does not acknowledge or in any way mitigate historical and continuing unfair and inequitable burdens imposed on designated environmental justice (EJ) communities in the vicinity of the Airport.** In particular, decades of handling and use of aqueous film-forming firefighting foams (AFFF) at and around the Airport resulted in inadvertent but extensive PFAS contamination of public water supply wells and exposed Hyannis residents, students, workers, and visitors to significant but unknown amounts of hazardous but unknown chemical mixtures for significant but unknown time periods with potentially significant but unknown health consequences. PFAS-contaminated soil and the associated plumes flowing onto and emanating from Airport property continue to pose risks. SC 01

Sierra Club appreciates that the Airport has ceased use of AFFF except in emergency situations, that control measures are in place for when AFFF use is required, and that groundwater drawn from Hyannis-area wells is designated "safe" under the current state drinking water standard based on the granular activated carbon (GAC) treatment systems installed at various locations, including within the Maher wellfield located on property downgradient from the Airport owned by the town of Barnstable. However, this does not change the history of contamination and exposure in the Hyannis area nor erase current and future concerns facing EJ and other communities. SC 02

No controls are in place for the PFAS that, prior to the initiation of GAC treatment, was distributed through the drinking water supply network serving EJ and other communities and then discharged into the environment via septic leaching and wastewater treatment plant effluent injection; nor for PFAS passing from the Maher wellfield into Mill Creek, Lewis Bay, and the associated ecological and human communities; nor for individuals who consume shellfish and other species harvested from PFAS-contaminated surface waters. The state's current PFAS6 standard is subject to change pending federal action to ratchet down maximum contaminant levels across this entire class of "forever" chemicals, some of which have just been proposed for hazardous waste designation. Sierra Club's position is that no level of PFAS in drinking water is safe.

The DEIR indicates that the Airport's proposed runway expansion and reconfiguration projects will utilize heavy machinery in moving hundreds of thousands of cubic yards of soil, including in locations coincident with and adjacent to temporary caps installed to prevent precipitation from mobilizing PFAS in soil contaminated by the Airport's own storage and use of AFFF. The DEIR asserts that precautions will be taken to ensure that these caps remain intact during construction and that the PFAS-contaminated soil will remain in place indefinitely, like a ticking time bomb. This is not acceptable. SC 03

Sierra Club recommends that the Airport be required to address these concerns by updating and expanding the DEIR as follows:

- To characterize unfair and inequitable AFFF-related burdens imposed on designated EJ communities to the fullest extent possible based on available and emerging sources of data, including the federally funded "Massachusetts PFAS and Your Health Study" involving blood and urine sampling, exposure assessment, and neurobehavioral assessment of Hyannis residents led by Silent Spring Institute; and SC 04
- To incorporate a permanent cleanup solution, to be implemented as a form of mitigation within the scope of the Airport's proposed projects, that will leverage the onsite availability of earth-moving equipment to remove AFFF-contaminated soil under the Airport's temporary caps for offsite transport, final disposition, and elimination of what would otherwise represent a "forever" source of risk to Hyannis-area communities. SC 05

**Second, the DEIR does not provide detail on or in any way mitigate aviation-related greenhouse gas emissions associated with long-term Airport operations, particularly those attributable to fuel sales at and around the Airport and to fuel consumption by commercial and private aircraft flying into and out of the Airport.** These emissions are not accounted for because the Airport asserts that proposed runway extensions and facility upgrades, designed for the purpose of facilitating safe and economically viable operation through 2040 and beyond, will have no impact on the number of arrivals SC 06 and departures relative to current Airport usage. No other future usage scenarios are considered, and transportation solutions that could be applied for reducing near-term reliance on the Airport and the most carbon-intensive form of travel to and from the Cape & Islands—such as electrified bus service and expanded vehicle charging infrastructure—are only addressed in the context of facilitating Airport usage. This is not acceptable.

Sierra Club recommends that the Airport be required to address these concerns by updating and expanding the DEIR as follows:

- To present a current and detailed emission inventory for the Airport across all gases and sources, to apply these and other data in evaluating changes in aviation-related emissions attributable to the post-2005 expansion in fast-ferry service to the Islands, and to estimate future emissions under varying Airport usage scenarios including a no-build alternative; and SC 07
- To incorporate a climate mitigation plan consistent with state policies and targets aimed at eliminating or minimizing aviation-related emissions across the time periods encompassed by the Airport's Master Plan and the anticipated lifetime of the proposed projects. SC 08

Addressing these concerns and recommendations is essential to ensure that public interests in a stable climate, clean water, environmental justice, and public health are met in Hyannis and across the Commonwealth.

Thank you for the careful consideration of Sierra Club's comments.

Sincerely,

Chris Powicki
Chair, Executive Committee
Sierra Cape Cod & Islands Group
774.487.4614

**Christine K. Greeley**
48 Glenwood Street
West Yarmouth, Massachuset s 02673

Purvi Patel
Rebecca L. Tepper
Executive Office of Energy and Environmental Affairs
100 Cambridge Street- Suite 900
Boston, MA 02114
February 8, 2024

**Re: 16640**
**Cape Cod Gateway Airport (Barnstable Municipal Airport) Master Plan Projects**

I am writing to express my concerns about the proposed expansion of the airport and extension of Runway 15/33. I believe that any such plan should be denied, and additional review undertaken.

I have been a home owner in West Yarmouth since 1981 and an actively concerned citizen about airport operations and proposed expansions since the mid-1980's. Nothing since then has changed my opinion that the airport is operating in an area of serious environmental concern and a danger to the significant human population residing around it. This proposed expansion increases these dangers.

This expansion appears predicated by their commitment to the idea that "if we build it, they will come" and truly ignores the tremendous loss in carrier traffic over several decades of "improvements" that have not led to achieving anything they had claimed would happen.

Instead:

1. Still unaddressed is the significant damage to land extending into the Mahar CG 01
Wells and all the way down into Mill Creek in West Yarmouth draining finally into Lewis Bay. While some at empts have been made on catchments etc., there is still significant finger pointing going on between the airport and the Fire Fighting Academy over whose fault it is and what will be done to address all the issues. It doesn't mat er whose fault it is, as the issue is

there, and there is significant work still not accomplished on airport land. A stream from an “unknown industrial source” is noted by the Wendy’s Restaurant which is also proximal to the Cape Air Hangers property and doesn’t seem appropriately addressed.

Of note is that Nantucket Airport is currently dealing with PFAS pollution on their airport acknowledging that it has come from airport operations- they never had an academy!

2. The need for a larger terminal facility seems absurd when the current terminal is empty most days and the airport has been trying to seek interested lessors for unoccupied space including restaurant/snack bar space. If not for the car rental counters at the far end of the terminal there are not even employees behind counters. And the parking lots are glaringly empty. CG 02

   The airport staff have been at ending national conferences at empting to get airlines to consider operations into here. So far, they have atr acted a seasonal operator able to use current runway capacity, a helicopter tour company and flight training school- all of which will lead to noisier operations at the airport and surrounding neighborhoods.

3. Although PFAS contamination is being discussed, there is a significant issue of environmental pollution that has not been discussed, let alone addressed- the emissions clearly visible from the landing and departing aircraft. This is significant as recent studies show that it is particularly bad from smaller planes, which are heavy users of this airport. These emissions are very visible to the naked eye and are falling on the heavily populated areas around the runways. Barnstable has been allowing significant development of residential apartment complexes for several years now at the northern end of the airport, while Hyannis is a significant commercial town. Of note is that other airports, I believe Bedford, are beginning to explore this issue as the scientific reports are emerging on this danger to humans. CG 03

4. There should be a great concern about the enlargement of the airport as Barnstable approved, and now has, the 1st power transfer station for the CG 04

Vineyard Wind ocean based turbines. The issues about the dialectic fluids needed at the site required significant engineering and containment plans as any leakage of even a few gallons could destroy the aquifer. This facility sits in a direct line at the end of 15/33 and would be an environmental disaster for Cape Cod should an aircraft ever crash into it.

5. Of additional concern is the fact that the airport needs to seek "easements" CG 05
in order to complete their proposals. This comes after years of being told this would never be needed and development by our town should not encroach on the airport. These easements will be needed on environmentally fragile land and should not be allowed.

6. The final issues include the flight paths and procedures that compromise CG 06
the quality of life for so many residential properties especially at the southern end of 15/33. For years we have been seeking a bet er design and compliance and have only ever got en responses saying "It's voluntary" or the "FAA doesn't require." Looking at current noise complaint data from the airport is meaningless as people have given up calling! They claim it's pointless and they get the same answer every time with no results.

   At this time the Town of Yarmouth is at empting to work with the airport on developing serious responsive flight procedures- but increasing runways is not the best solution at this time to the significant issue of noise pollution. Noise pollution studies are now emerging that show it to be a significant public health issue.

I do not believe that this proposed Master Plan and its design for increasing Runway 15/33 and the terminal should be approved at this time. There are too many significant issues still to be addressed that will have a directly permanent negative effect on the natural environment and lives of the residents of this area for very few positive results for the airport.

Sincerely,

Christine K. Greeley

# View Comment

## Comment Details

**EEA #/MEPA ID**
16640

**Comments Submit Date**
2-9-2024

**Certificate Action Date**
2-9-2024

**Reviewer**
Purvi Patel, (617)874-0668, purvi.patel@mass.gov

**First Name**
Thomas

**Last Name**
Collier

**Phone**
--

**Email**
info@griffinavionics.com

**Address Line 1**
630 Barnstable Rd

**Address Line 2**
--

**State**
MASSACHUSETTS

**Zip Code**
02601

**Organization**
Griffin Avionics Inc.

**Affiliation Description**
Individual

**Status**
Accepted

## Comment Title or Subject

**Topic**: EEA#16640

## Comments

Segoe UI 10 pt Paragraph

Comments in attached file.

## Attachments

MEPAcomment.docx(null)

## Update Status

**Status**

Accepted

SUBMIT

## Share Comment

SHARE WITH A REGISTERED USER

BACK TO SEARCH RESULTS

I would like to submit my comments about the proposed Airport project. For full disclosure, I have been a Cape Cod resident since the early 80’s and have been employed by Griffin Avionics at the Airport for almost 30 years. I have reviewed the draft environmental impact report (DEIR) as well as other comments that were submitted about this project.

First, I am continually amazed that each time the Airport seeks to undertake a new project, there is always talk of moving the Airport operations over to Joint Base Cape Cod. The logistics and the expense of moving not just the Airport facilities but the airfield tenants such as Cape Air, Gull Air and even Griffin Avionics, make it economically unfeasible nor even practical. TC 01

Secondly and most important is the environmental impact of the current airport operation and proposed expansion. Again, as someone who has been here quite some time, the negative knee jerk reaction to “new development” is quite understandable. However, when you consider that the airport sits on 639 acres of land, which is zoned commercial/industrial, and has only developed a paltry 140 acres, this is probably the least developed commercial property in the area. Imagine how much more developed it would be for regular commercial use, which would bring much more noise and pollution from vehicles and other activity. TC 02

Not to dismiss concerns from submitters about noise and pollution, but this Airport’s administration, more than any previous, led by the efforts of Katie Servis, the Airport Manager, have been a model for the rest of Cape Cod in new Green Technology and carbon footprint reduction actions. Indeed, this project includes even more green technology, which would almost make their operations carbon neutral, which would be much less than the pollution from a parking lot of a local grocery store. (and no one is asking them to move to a military air base) TC 03

Lastly, the land clearing effect on the environment is addressed extensively in their plan with off-setting mitigation strategies that would reduce any impact to a bare minimum. I strongly support the proposal to move ahead with the full plan and would kindly remind our neighbors of the 2000 jobs that are supported by the Airport as well as over 200 million in annual economic output, that is a benefit to our community, not a detraction. TC 04

# View Comment

## Comment Details

| EEA #/MEPA ID | First Name | Address Line 1 | Organization |
|---|---|---|---|
| 16640 | Karen | -- | -- |

| Comments Submit Date | Last Name | Address Line 2 | Affiliation Description |
|---|---|---|---|
| 2-9-2024 | Ingemie | -- | -- |

| Certificate Action Date | Phone | State | Status |
|---|---|---|---|
| 2-9-2024 | -- | MASSACHUSETTS | Accepted |

| Reviewer | Email | Zip Code | |
|---|---|---|---|
| Purvi Patel, (617)874-0668, purvi.patel@mass.gov | kareningemie@gmail.com | 02673 | |

## Comment Title or Subject

**Topic**: MEPA - #16640 CAP COD GATEWAY AIRPORT - MASTER PLAN PROJECTS COMMENTS

## Comments

Segoe UI 10 pt Paragraph

Attached is my statement of concerns living near the airport. The screenshots of aircraft flying over homes as low as 150' and the videos were taken sitting outside on my deck to show the high levels of aviation noise from aircraft arriving and departing from Cape Cod Gateway Airport.

Please review my comments, data and watch the videos to understand the anxiety and stress myself and residents living near the airport are dealing with. Thank you!

## Attachments

Aug634320.MOV(null)

MEPA Cape Cod Gateway.docx(null)

A-Jul2435820.MOV(null)

Aug822620.MOV(null)

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low plane 419pm.MOV(null)

150' jan 19 .png(null)

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2023 Aug 6, 534pm.MOV(null)

AUG2030920.MOV(null)

## Update Status

Status

Accepted

SUBMIT

## Share Comment

SHARE WITH A REGISTERED USER

BACK TO SEARCH RESULTS

**MEPA - #16640 CAPE COD GATEWAY AIRPORT**
**(formerly Barnstable Municipal Airport)**
**Master Plan Projects -- Comment Date: February 8, 2023**

I am a Cape Cod resident, concerned about my health, well-being and safety living near the CC Gateway Airport. It is impossible to be outside without the stress and anxiety of aircraft noise. I find myself and guests having to block our ears outside due to the jet noise, impeding the peace and quiet living in a home that I invested my hard-earned money into. If I knew the airport traffic would grow to be this constant and loud, I would have built my forever dream home somewhere else.

My hope is, that the flight paths can be changed or some other alternative resolution can be reached. Ref: John Wayne Airport Noise Abatement (General Aviation Noise Ordinance including Abatement Guide, Noise Monitoring Stations and General Aviation VFR Traffic Pattern Procedures)

No one should have to live with the noise and the constant flow and exposure to high levels of aviation noise and exhaust emissions from aircraft flying over. Our fundamental quality of life has been violated by destroying the enjoyment, peace and tranquility living in the Hyannis Park neighborhood.
Aircraft are flying some days every 2 to 5 minutes as low as 150' with decibel readings over 100. (This is documented by hundreds of videos, flight tracker, and decibel data captured using 2 devices, handheld BAFX digital sound meter and NIOSH sound level meter for DBL readings).

The FAA's current metric for quantifying aviation noise exposure, Day-Night Average Sound Level (DNL), as well as the sound level assessment including computer modeling to predict future sound levels by placing sound receptors at the airport does not adequately capture the true effects of aircraft noise in our daily lives. The current metric needs to be changed and sound receptors need to be placed in residential areas for an accurate noise reading. August 28, 2022 documented 5 planes flying over in ½ hour, decibel average of 83.1, on June 29, 2023 documented 10 planes in 1 ½ hours, decibel average 80.1 (Other dates documented as well)

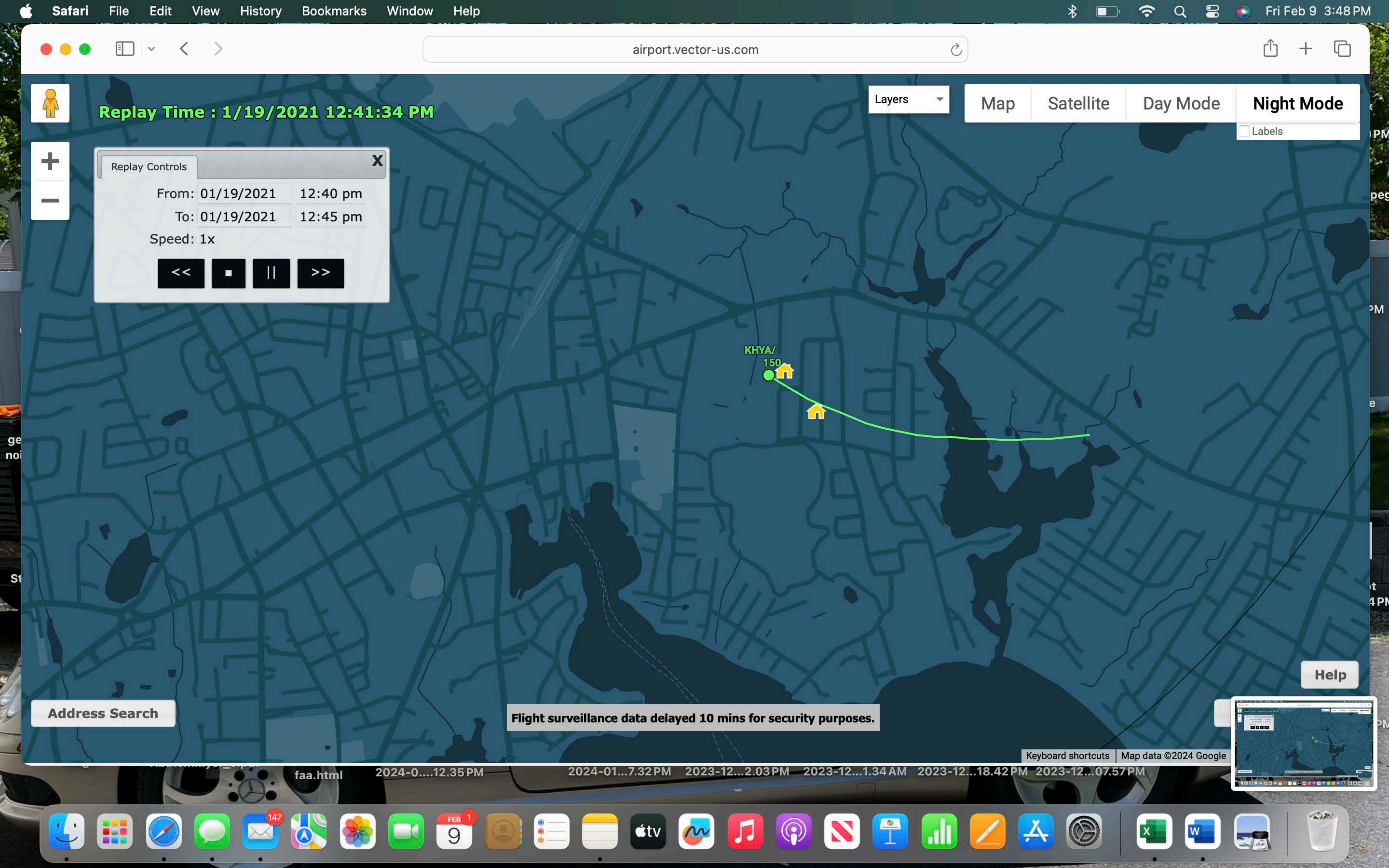
Airplanes are flying at altitudes documented as low as 150 feet over residents, the hospital, medical facilities, businesses and flying lower over traffic on Rt 28, a state highway where one of the incidents below took place (near TJ Max spilling fuel). Some of the incidents have been minor, some fatal. What is considered a safe altitude flying over residential homes? I have asked multiple times and have not received any answers. Below listed are the number of Cape Cod incidents from local papers. Not if, but when there is an incident in our neighborhood, who will be held accountable?
24 plane incidents from 1990 – 2002
7 plane incidents from 2008 – 2021
9 plane incidents from 2021 - 2023

I have attended Cape Cod Gateway Airport public meetings, have contacted the noise abatement coordinator for years regarding these issues without resolution. I gave up complaining!!!!

- increased traffic, helicopters, larger jets, (charters, private, commercial) no notification KI 01
- risk incident factor of low altitude jets KI 02
- the frequency and chronic exposure to noise levels and air emission pollution KI 03
- the airports noise abatement procedures and defined flight paths KI 04
- the airports vector tracking system not reflecting the correct flight path of aircraft flying over residents. I have documented videos and tracking system screenshots. KI 05

**Please consider reviewing Cape Cod Gateway Airports Flight/Noise Abatement Procedures and potential flight path changes for arrival and departures to minimize aircraft noise and incident risk in the Hyannis Park residential area.**

**Regards, a concerned citizen, West Yarmouth, Ma.**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airport.vector-us.com
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Day Mode
Night Mode
Labels
Replay Controls
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150
Help
Address Search
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Keyboard shortcuts
Map data ©2024 Google
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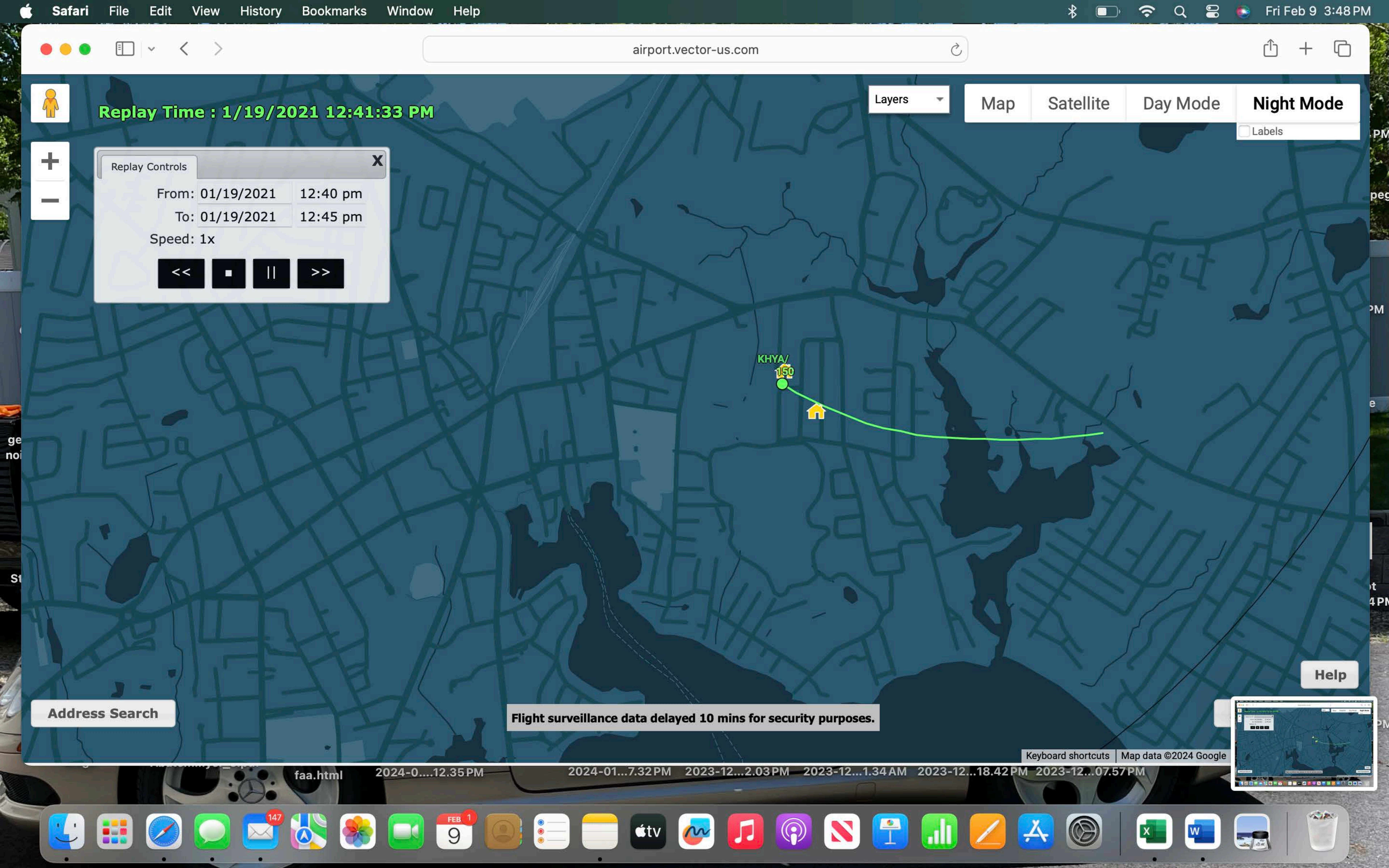
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airport.vector-us.com
Replay Time : 1/19/2021 12:41:33 PM
Layers
Map
Satellite
Day Mode
Night Mode
Labels
Replay Controls
X
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To: 01/19/2021 12:45 pm
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Help
Address Search
Flight surveillance data delayed 10 mins for security purposes.
Keyboard shortcuts
Map data ©2024 Google
faa.html
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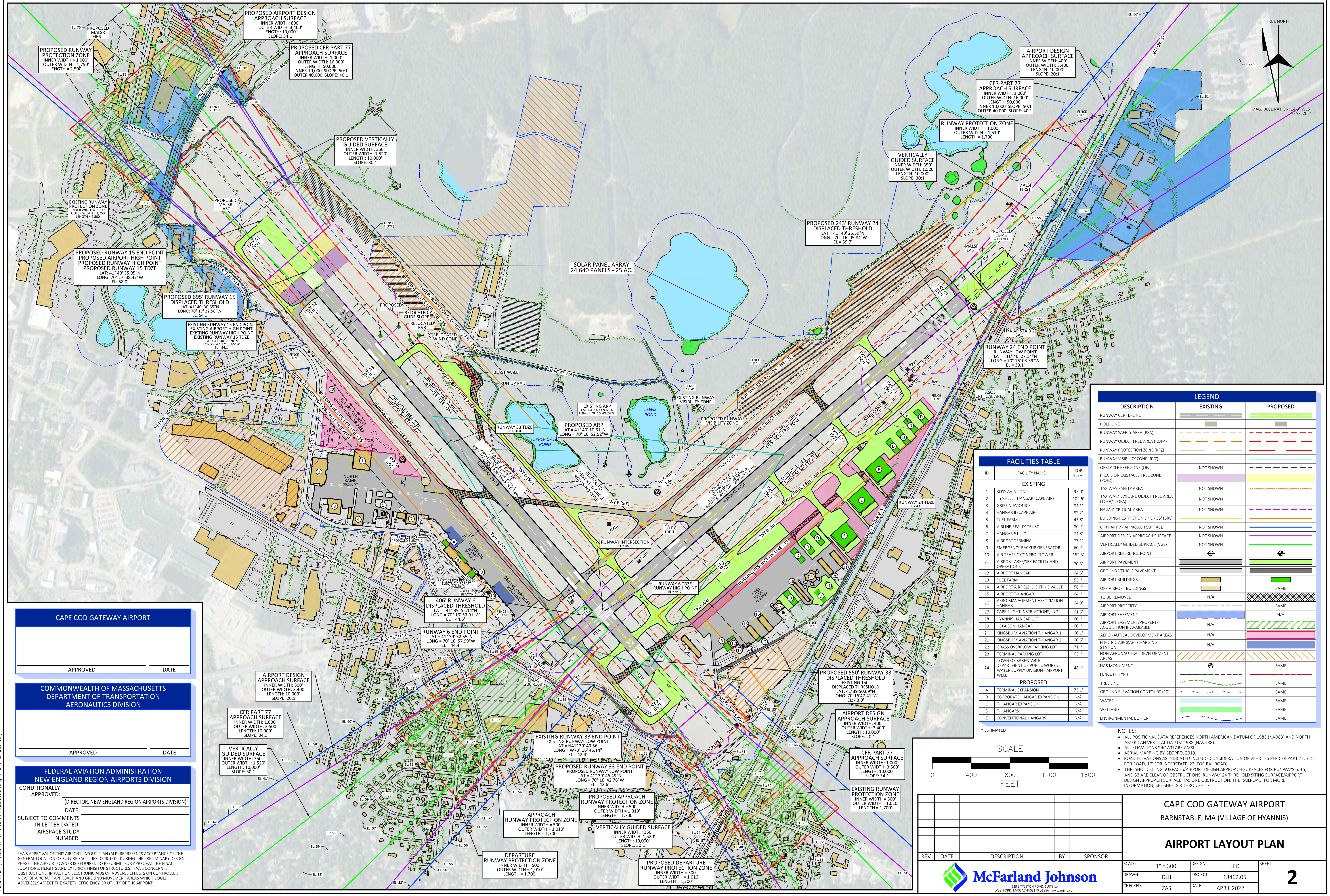
2024-01...7.32 PM
2023-12...2.03 PM
2023-12...1.34 AM
2023-12...18.42 PM
2023-12...07.57 PM

# Appendix B

Airport Layout Plan




## CAPE COD GATEWAY AIRPORT

APPROVED ____________ DATE ____________

## COMMONWEALTH OF MASSACHUSETTS DEPARTMENT OF TRANSPORTATION AERONAUTICS DIVISION

APPROVED ____________ DATE ____________

## FEDERAL AVIATION ADMINISTRATION NEW ENGLAND REGION AIRPORTS DIVISION

CONDITIONALLY APPROVED: ____________
(DIRECTOR, NEW ENGLAND REGION AIRPORTS DIVISION)

DATE: ____________

SUBJECT TO COMMENTS IN LETTER DATED: ____________

AIRSPACE STUDY NUMBER: ____________

FAA'S APPROVAL OF THIS AIRPORT LAYOUT PLAN (ALP) REPRESENTS ACCEPTANCE OF THE GENERAL LOCATION OF FUTURE FACILITIES DEPICTED. DURING THE PRELIMINARY DESIGN PHASE, THE AIRPORT OWNER IS REQUIRED TO RESUBMIT FOR APPROVAL THE FINAL LOCATIONS, HEIGHTS AND EXTERIOR FINISH OF STRUCTURES. FAA'S CONCERN IS OBSTRUCTIONS, IMPACT ON ELECTRONIC AIDS OR ADVERSE EFFECTS ON CONTROLLER VIEW OF AIRCRAFT APPROACH AND GROUND MOVEMENT AREAS WHICH COULD ADVERSELY AFFECT THE SAFETY, EFFICIENCY OR UTILITY OF THE AIRPORT.

K:\Barnstable\T-18462.05 HYA Master Plan\Draw\Drawings\Sheet Files\ALP.dwg

## FACILITIES TABLE

| ID | FACILITY NAME | TOP ELEV. |
|---|---|---|
| | **EXISTING** | |
| 1 | ROSS AVIATION | 97.0' |
| 2 | HYA FLEET HANGAR (CAPE AIR) | 102.6' |
| 3 | GRIFFIN AVIONICS | 84.1' |
| 4 | HANGAR II (CAPE AIR) | 82.2' |
| 5 | FUEL FARM | 43.8' |
| 6 | AIRLINE REALTY TRUST | 80' * |
| 7 | HANGAR 51 LLC | 74.8' |
| 8 | AIRPORT TERMINAL | 73.1' |
| 9 | EMERGENCY BACKUP GENERATOR | 60' * |
| 10 | AIR TRAFFIC CONTROL TOWER | 152.3' |
| 11 | AIRPORT ARFF/SRE FACILITY AND OPERATIONS | 70.5' |
| 12 | AIRPORT HANGAR | 64.5' |
| 13 | FUEL FARM | 55' * |
| 14 | AIRPORT AIRFIELD LIGHTING VAULT | 56' * |
| 15 | AIRPORT T-HANGAR | 64' * |
| 16 | AERO MANAGEMENT ASSOCIATION HANGAR | 64.0' |
| 17 | CAPE FLIGHT INSTRUCTIONS, INC | 61.6' |
| 18 | HYANNIS HANGAR LLC | 60' * |
| 19 | HEXAGON HANGAR | 60' * |
| 20 | KINGSBURY AVIATION T-HANGAR 1 | 66.1' |
| 21 | KINGSBURY AVIATION T-HANGAR 2 | 60.6' |
| 22 | GRASS OVERFLOW PARKING LOT | 71' * |
| 23 | TERMINAL PARKING LOT | 63' * |
| 24 | TOWN OF BARNSTABLE DEPARTMENT OF PUBLIC WORKS WATER SUPPLY DIVISION - AIRPORT WELL | 48' * |
| | **PROPOSED** | |
| A | TERMINAL EXPANSION | 73.1' |
| B | CORPORATE HANGAR EXPANSION | N/A |
| C | T-HANGAR EXPANSION | N/A |
| D | T-HANGARS | N/A |
| E | CONVENTIONAL HANGARS | N/A |

* ESTIMATED

## LEGEND

| DESCRIPTION | EXISTING | PROPOSED |
|---|---|---|
| RUNWAY CENTERLINE | | |
| HOLD LINE | | |
| RUNWAY SAFETY AREA (RSA) | | |
| RUNWAY OBJECT FREE AREA (ROFA) | | |
| RUNWAY PROTECTION ZONE (RPZ) | | |
| RUNWAY VISIBILITY ZONE (RVZ) | | |
| OBSTACLE FREE ZONE (OFZ) | NOT SHOWN | |
| PRECISION OBSTACLE FREE ZONE (POFZ) | | |
| TAXIWAY SAFETY AREA | NOT SHOWN | |
| TAXIWAY/TAXILANE OBJECT FREE AREA (TOFA/TLOFA) | NOT SHOWN | |
| NAVAID CRITICAL AREA | NOT SHOWN | |
| BUILDING RESTRICTION LINE - 35' (BRL) | | |
| CFR PART 77 APPROACH SURFACE | NOT SHOWN | |
| AIRPORT DESIGN APPROACH SURFACE | NOT SHOWN | |
| VERTICALLY GUIDED SURFACE (VGS) | NOT SHOWN | |
| AIRPORT REFERENCE POINT | | |
| AIRPORT PAVEMENT | | |
| GROUND VEHICLE PAVEMENT | | |
| AIRPORT BUILDINGS | | |
| OFF-AIRPORT BUILDINGS | | SAME |
| TO BE REMOVED | N/A | |
| AIRPORT PROPERTY | | SAME |
| AIRPORT EASEMENT | | N/A |
| AIRPORT EASEMENT/PROPERTY ACQUISITION IF AVAILABLE | N/A | |
| AERONAUTICAL DEVELOPMENT AREAS | N/A | |
| ELECTRIC AIRCRAFT CHARGING STATION | N/A | |
| NON-AERONAUTICAL DEVELOPMENT AREAS | | |
| NGS MONUMENT | | SAME |
| FENCE (7' TYP.) | | |
| TREE LINE | | SAME |
| GROUND ELEVATION CONTOURS (10') | 40 | SAME |
| WATER | | SAME |
| WETLAND | | SAME |
| ENVIRONMENTAL BUFFER | | SAME |

NOTES:

- ALL POSITIONAL DATA REFERENCES NORTH AMERICAN DATUM OF 1983 (NAD83) AND NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
- ALL ELEVATIONS SHOWN ARE AMSL.
- AERIAL MAPPING BY GEOPRO, 2019.
- ROAD ELEVATIONS AS INDICATED INCLUDE CONSIDERATION OF VEHICLES PER CFR PART 77. (15' FOR ROAD, 17' FOR INTERSTATE, 23' FOR RAILROAD)
- THRESHOLD SITING SURFACES/AIRPORT DESIGN APPROACH SURFACES FOR RUNWAYS 6, 15, AND 33 ARE CLEAR OF OBSTRUCTIONS. RUNWAY 24 THREHOLD SITING SURFACE/AIRPORT DESIGN APPROACH SURFACE HAS ONE OBSTRUCTION: THE RAILROAD. FOR MORE INFORMATION, SEE SHEETS 8 THROUGH 17.

SCALE

0 400 800 1200 1600

FEET

| REV | DATE | DESCRIPTION | BY | SPONSOR |
|---|---|---|---|---|
| | | | | |

McFarland Johnson
239 LITTLETON ROAD, SUITE 1A
WESTFORD, MASSACHUSETTS 01886 www.mjinc.com

# CAPE COD GATEWAY AIRPORT

BARNSTABLE, MA (VILLAGE OF HYANNIS)

# AIRPORT LAYOUT PLAN

| | | | | |
|---|---|---|---|---|
| SCALE: | 1" = 300' | DESIGN: | LFC | SHEET: 2 |
| DRAWN: | DJH | PROJECT: | 18462.05 | |
| CHECKED: | ZAS | DATE: | APRIL 2022 | |

# Appendix C

Phase IV Report

# FINAL Immediate Response Action (IRA) Status Report 14, IRA Completion Statement, Phase IV Final Inspection Report and Completion Statement, and Phase V Status Report

Cape Cod Gateway Airport

Hyannis, Massachusetts

RTN 4-26347

April 2024

*Prepared for:*

**Cape Cod Gateway Airport**
480 Barnstable Road Hyannis,
MA 02840

*Prepared by:*

**Horsley Witten Group, Inc.**
90 Route 6A
Sandwich, MA 02563

IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT 14, IRA COMPLETION STATEMENT, PHASE IV FINAL INSPECTION REPORT AND COMPLETION STATEMENT, AND PHASE V STATUS REPORT

CAPE COD GATEWAY AIRPORT
480 BARNSTABLE ROAD
HYANNIS, MASSACHUSETTS
RELEASE TRACKING NUMBER 4-26347

# Table of Contents

**FIGURES**



**TABLES**



APPENDICIES

**IMMEDIATE RESPONSE ACTION (IRA) STATUS REPORT 14, IRA COMPLETION STATEMENT, PHASE IV FINAL REPORT AND COMPLETION STATEMENT, AND PHASE V STATUS REPORT**

**CAPE COD GATEWAY AIRPORT**
**480 BARNSTABLE ROAD**
**HYANNIS, MASSACHUSETTS**
**RELEASE TRACKING NUMBER 4-26347**

## 1.0 INTRODUCTION

The Horsley Witten Group, Inc. (HW) has been retained by the Cape Cod Gateway Airport (the "Airport") to prepare this Immediate Response Action (IRA) Status Report 14, IRA Completion Statement, Phase IV Final Report and Completion Statement, and Phase V Status Report (the "Report") for its property located at 480 Barnstable Road, Hyannis, Massachusetts. For the purpose of this report, the term "Airport" specifically refers to the Cape Cod Gateway Airport property located at 480 Barnstable Road, as set forth above, and the term "Disposal Site" refers to the area impacted by the release of oil and/or hazardous material (OHM) subject to Release Tracking Number (RTN) 4-26347. A Site Locus Map and the Estimated Disposal Site Map are provided as Figures 1 and 2.

The Report focuses on the implementation of the chosen remedial action alternative to address a release of per- and poly-fluoroalkyl substances (PFAS) in soil and groundwater relating to the Airport's historic use of a fluorotelomer based aqueous film forming foam (AFFF). As documented in the report titled *Final Phase IV Implementation of the Selected Remedial Action Alternative* prepared by HW and submitted to the Massachusetts Department of Environmental Protection (MassDEP) in January 2023 (the "Final Phase IV Report"), the chosen remedial action to achieve either a Permanent or Temporary solution are soil caps to prevent and/or reduce leaching of PFAS into groundwater, and treatment at the Maher Wells to provide drinking water to the community that meets the regulatory standards promulgated by the MassDEP. The Airport is compensating the Town of Barnstable for its allocated portion of responsibility for groundwater treatment that is occurring at the Maher Wells.

This Report has been prepared in accordance with the requirements of the Massachusetts Contingency Plan (MCP). Consistent with the *Final Public Involvement Plan* for the Airport dated September 16, 2019, all persons identified on Table 1, Community Notification List, were notified of the availability of this Report.

Considering this is the last phased report until a Permanent or Temporary Solution is submitted, a IRA Status Report 14, DRAFT IRA Completion Statement, and DRAFT Phase IV Completion Report was submitted to MassDEP and notifications were distributed to all persons identified on Table 1, Community Notification List October 11, 2023. The Airport send a subsequent notification on

November 13, 2023 to all persons identified on Table 1, Community Notification List, about an in person meeting on December 18, 2023. After the meeting, the Airport provided an additional 45-day review period for the public and MassDEP to review the PFAS related investigation completed by the Airport. A Phase V Status report has also been included in this Report due to the extended comment period and the required regulatory submittals needed to satisfy the requirements of the Massachusetts Contingency Plan. Questions and Comments received by the public (the Siera Club, Hyannis Park Civic Association and Mr. Thomas Cambareri) are detailed below. Copies of the submitted questions/comments are included in Appendix A.

Sierra Club

(1) *Acknowledgment that the Airport's records regarding historical AFFF use are inadequate and that its fingerprinting and source attribution conclusions, which are presented as authoritative, are based on limited and highly caveated analytical findings.*

As detailed in the Revised Phase II Comprehensive Site Assessment dated January 2022 and prepared by HW ("Phase II Report"), the Airport has a complete record of AFFF purchase records going back 20 years that clearly document the quantity and type of AFFF usage at the Airport. Additionally, the Airport's analytical data set includes over 200 groundwater samples collected from 2016 to 2024. These groundwater samples along with multiple other lines of evidence including groundwater flow direction, contaminant fate and transport, groundwater modeling and environmental forensics all support the fact that the Airport PFAS plume impacted the Maher Wells in 2022. Forensics also supports the chemical signature as being related to fluorotelomer based AFFF, which corelates to the Airports purchase records. The analytical data was processed by a Massachusetts certified laboratory and is not limited or highly caveated. Additionally, environmental forensics is routinely utilized by environmental professionals for source identification and is not uncommon or unusual. At the October 2023 UMass Soils Conference, multiple case studies and scientific methods using PFAS forensics were presented by various consultants and regulatory agencies including MassDEP for source identification and differentiation.

(2) *Independent and transparent evaluation of the Airport's public assertions that AFFF handling and use at the airport did not become a source of PFAS contaminating the town's Maher wells until 2022.*

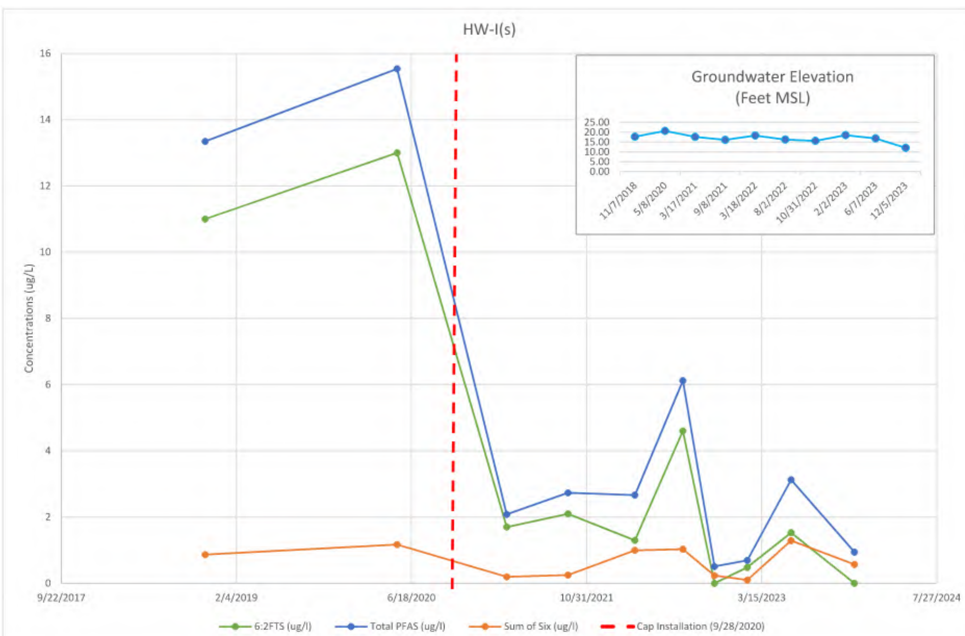
These details have been included in multiple reports that are available to the public at any time for review. MassDEP and the public have been given opportunities at various points in the regulatory timeline to review and comment on several of these reports including the Phase II, Phase III and Phase IV Reports. As previously stated, hundreds of analytical samples have been collected by the Airport in support of this determination which is also supported by hundreds of samples collected off-Airport by others.

Reports submitted to the MassDEP can be accessed at:

- https://flyhya.com/airport-info/pfas/
- https://eeaonline.eea.state.ma.us/EEA/FileViewer/Rtn.aspx?rtn=4-0026347

(3) *Commitment to investigate, understand, and mitigate historical and continuing PFAS-related health burdens imposed on designated environmental justice communities in the Hyannis area.*

The Airport is managing the PFAS plumes associated with its historical use of fluorotelomer based AFFF. The Airport is not required to investigate or remediate non-Airport related PFAS plumes. The Airport has controlled its PFAS source areas with engineered barriers ("caps") to reduce potential groundwater impacts. As presented in multiple IRA Status reports available on MassDEPs website and the Airport's website (see above), the caps have significantly reduced migration of PFAS from soil into groundwater (depicted below). The Airport is not responsible for controlling non-airport related PFAS plumes or soil impacts. It is the regulatory agencies and/or the Responsible Party(s) that will need to investigate sources that are outside of the Airport's responsibility. Additionally, the Airport's PFAS plume reached Maher Wells after the construction of the new treatment was completed and as such, no exposure to the community is believed to have occurred.




(4) *Development of a final cleanup solution involving removal of PFAS-contaminated soil at the town's airport as a "forever" source of risk to Hyannis-area communities.*

Removal of all PFAS impacted soil relating to the Airports historic use of AFFF is currently economically infeasible. As indicated in the Final Phase III Report dated June 2022 and prepared by HW (the “Phase III Report”):

“[T]he excavation of PFAS contaminated soils currently located below the two capped areas would result in approximately 3,000 trucks transporting approximately 105,000 tons of soil with an estimated transportation and disposal costs in excess of 75 million dollars. As such, large scale excavation is not justified by the benefits according to the Massachusetts Contingency Plan.”

The Phase III Report concludes that the existing caps along with potential future limited excavation and/or capping, is the final remedy for managing PFAS impacted soil at the Airport and as approved by the state agencies overseeing the remediation process. The caps are inspected and groundwater data is collected every six months to document the effectiveness of the caps. This information is submitted to MassDEP every six months and is available online from MassDEP or the Airport’s website.

Hyannis Park Civic Association

(1) *Yarmouth requires monitoring wells to be installed and monitored beyond the Maher Wells along the Yarmouth town line. We need assurances that the PFAS plumes are indeed contained before they reach our community. We need data that no overflow from the Maher wells exists now or in the future. The admission that the installed caps at the disposal sites are temporary begs the question—when can we expect a true remediation effort of these sites?*

As indicated in the Final Phase IV Report dated January 2023 and prepared by HW (the “Phase IV Report”, the Airports PFAS plume is modeled to be below the regulatory standards as it passes by Maher Well 2 (ME-2). The Airports PFAS plume is less than the GW-3 standard which is protective of surface water. Additionally, monitoring wells beyond the Maher Wells is not necessary for the purposes of delineating the nature and extent of the Airport’s PFAS plume consistent with the Massachusetts Contingency Plan. Installation of monitoring wells by Responsible Parties for non-Airport related PFAS sources in Yarmouth may be necessary. These additional wells would be the responsibility of others, not the Airport. As an example, of the 131 soil samples and 210 groundwater samples collected at the Airport to determine Airport responsibility, the highest concentration of PFAS Sum of 6 on Airport was 1.2902 micrograms per liter (ug/l). The MassDEP regulatory limit for Sum of 6 PFAS in GW-1 areas is 0.02 ug/l. Other off airport locations include the following and their associated PFAS laboratory levels collected to date:

- The Barnstable Fire Training Academy levels thus far collected were 320 ug/l,
- The Industrial Park area (Airport Road) was at 0.0574 ug/l, and
- The Rotary (near Wendy’s) was at 0.0987 ug/l.

Additionally, the caps are being referred to as "temporary" until Phase V is complete, and a Permanent or Temporary Solution is achieved. As indicated in the Phase IV Report:

*"Fluctuations in the concentration of PFAS is expected as the groundwater level rises and falls over the next several years and contaminants are flushed from the capillary fringe zone. After flushing is complete, concentrations associated with the Airports PFAS Plume are expected to decline. The effectiveness of the caps will be documented through the collection of groundwater samples until a Permanent or Temporary Solution can be achieved. The caps will be inspected twice annually and maintained as necessary until a Permanent or Temporary Solution can be achieved. Assuming that the future Permanent or Temporary Solution relies on the caps to maintain a level of no significant risk, the caps will be maintained and inspected in the future as part of an AUL".*

The caps were designed consistent with the requirements of a permanent engineered barrier. A copy of the engineering design plans for the two caps are included in Appendix B of the Phase IV Report.

(2) *The question of an "orphaned" plume behind Wendy's needs addressing. It is not enough to say that some vague external source is the culprit. Clean it up.*

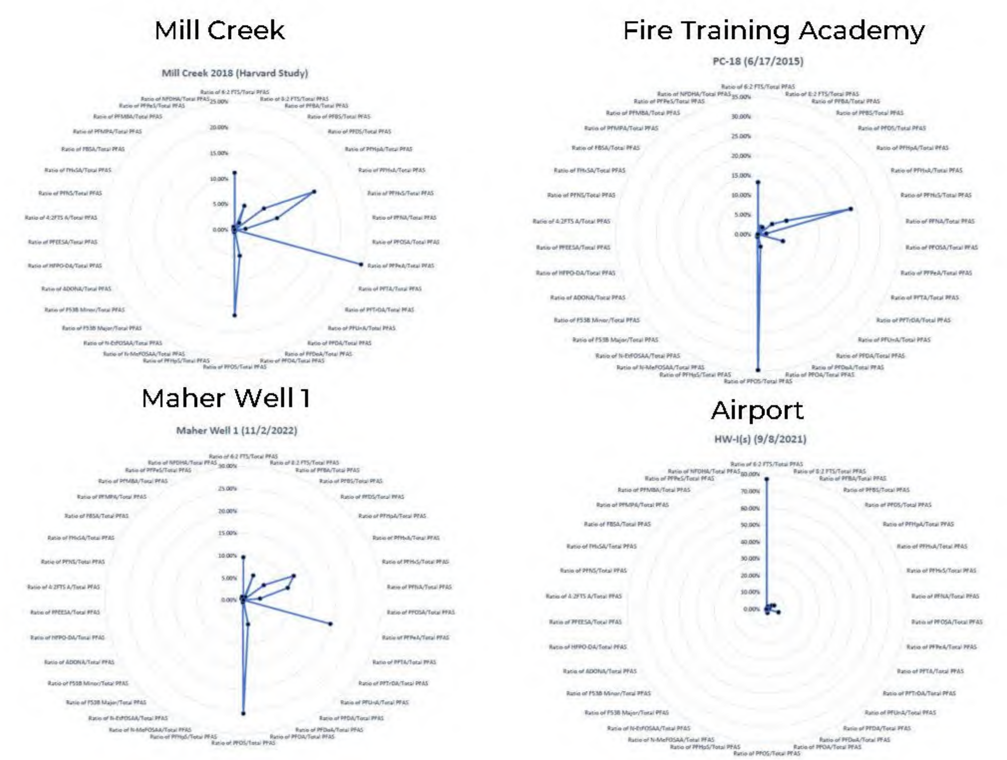
During it's investigation, the Airport identified several non-Airport PFAS related plumes that are located hydraulically upgradient, downgradient, and/or cross-gradient of the Airport but not on Airport property, thus from other industrial/commercial sites. These plumes are not related to the Airports PFAS plume and are the responsibility of others. These plumes have been brought to the attention of MassDEP and others by the Airport. If a Responsible Party can be identified by the MassDEP, they will issue a Notice of Responsibility requiring the Responsible Party to initiate investigation and cleanup activities. The Airport is not responsible for PFAS plumes relating to non-Airport sources. It is now in the hands of MassDEP to identify other sources and/or determine next steps.

(3) *There seems no urgency on the part of the Airport or BFTA to collaborate toward a clean up solution of the BFTA's PFAS that exists on the Airport property. One would think that the Airport would be pushing for BFTA to clean it up. Certainly, the BFTA should take the blame. But where is the Airport's collaboration plan for the clean-up of contamination caused by BFTA?*

The BFTA is responsible for the investigation and cleanup of its PFAS plume consistent with the Massachusetts Contingency Plan. The treatment system at the Maher Wells provides safe drinking water to the Airport that meets the regulatory standards for PFAS. As such, the risk of PFAS exposure through drinking water by Airport staff and visitors is being managed by the treatment occurring at Maher Wells. It is not the Airport's responsibility to respond to PFAS contamination not related to the Airport PFAS plume. Additionally, all Airport data is available to the public and to the BFTA for use in BFTA's own investigations. The Airport and the BFTA have separate Massachusetts Contingency Plan responses. Additionally, the BFTA has not advanced a remedial strategy that requires Airport collaboration as they currently are still progressing towards Phase II requirements of the Massachusetts Contingency Plan. The Airport is now advancing to Phase V.

(4) *Mill Creek remains a problem for both BFTA and the Airport. The Airport's signature compound has been detected in the Creek along with BFTA's fingerprint. Can we get a collaborative agreement that should a cost-effective solution present itself in the future, that both these source entities will pay for the clean-up? Yarmouth residents would like to see accountability for damages.*

The Airport's PFAS plume is below the MassDEP GW-3 standard in all locations, which is protective of potential discharges to surface water. Additionally, the forensic signature generated from the Harvard study in 2018 is not consistent with the airport PFAS plume. This is also supported by analytical data and modeling indicating that the Airport's plume didn't reach the Maher Wells until 2022. It is anticipated that the Airport plume will enter Mill Creek, but at concentrations below the GW-1 and GW-3 standards as predicted by the fate and transport models. Forensic signatures of Mill Creek, Maher Well 1, BFTA and the Airport are presented below.



As such, consistent with the Massachusetts Contingency Plan, the Airport's PFAS plume is not a risk to surface water. The Airport is not responsible for PFAS entering Mill Creek that may be above the GW-3 standard from others. Responsible parties associated with PFAS plumes impacting this area above regulatory criteria are not the responsibility of the Airport. This has been brought to the attention of MassDEP and others by the Airport. If a Responsible Party can be identified by the MassDEP, they will issue a Notice of Responsibility requiring the Responsible Party to initiate investigation and cleanup activities. The Airport is not responsible for PFAS plumes relating to non-Airport sources. It is now in the hands of MassDEP to determine next steps.

Thomas Cambareri

The following are responses to Mr. Cambareri's general comments on the investigations at the Airport and his specific questions on the information contained in the Report.

(1) *The Airport indicates that PFAS from the use of Aqueous Film Forming Foam (AFFF) began in the 1990s. That is a truncated period relative to the Airport's site history going back decades to its time as a Naval station in the 50's, a Presidential Airport for the Kennedy Summer White House in the 60's and a transportation hub for the rapid growth in the 70's and 80's. It seems reasonable to assume there was emergency response capability at the Airport prior to the 1990's. It also stands that AFFF equipment was stored and used on site, and staff was well trained during those decades. This earlier history is important given the broad impact of "forever" PFAS compounds in the Hyannis area community.*

As documented on page 8 of the Phase II:

- *Historical Airport purchase records indicate that a fluorotelomer-based AFFF (ChemGuard 3% mil spec) has been purchased by the Airport over the last twenty years, and interviews with staff indicated that this type of foam was also purchased as early as the 1980s. With the exception of the events detailed below, AFFF was not intentionally sprayed due to cost and limited supply of AFFF.*
    - *Further information regarding foam use was provided through interviews with Art Jenner and Bob Holzman who have worked at the Airport since the 1980's. Both are firefighters and first responders and stated that fluorotelomer based foam was purchased by the Airport since the 1980s. Additionally, according to the ITRC document titled "Aqueous Film-Forming Foam (AFFF)" dated August 2020, fluorotelomer-based AFFF has been available since the 1970s and other AFFF formulations have been available since the late 1960s.*

- *FAA regulations require a Tri-Annual Drill which is a full-scale live exercise that simulates a major airport disaster to test the emergency coordination and response skills of the Airport* *and other first responders. AFFF was used at the Deployment Area between 1994 and 2004 for triannual drills and between 2004 and 2015 for annual AFFF mixture testing. Two firefighting personnel, employed by the Airport since the 1980's, indicated that foam was not used prior to 1991 due to cost, limited availability, and lack of an FAA requirement mandating foam usage.*

The use of the Airport by the Navy in the 50s is irrelevant to the PFAS investigation since AFFF is reported by ITRC to have been developed in the late 1960's as indicated above. Additionally, documents suggest that President Kenedy flew into Otis and not the Cape Cod Gateway Airport.

As indicated above, the Airport did have emergency capabilities prior to 1991 and two fire fighters who have worked at the Airport since the 1980s indicated that AFFF was not used for non-emergencies prior to 1991 due to cost, limited availability, and lack of an FAA requirement mandating AFFF usage for emergency use training (Mass Casualty Incident Training) and verifying AFFF consistency. Additionally, as indicated in the revised Phase II Report:

- *The current ARFF/SRE Building was constructed in 1996, and PFAS is assumed to have been released in this area through what is presumed to be incidental spillage, dripping from fire hoses hung to dry, and cleaning of equipment in the event of accidentally engaging the foam pump button. Prior to 1996, the Airport fire truck was housed in the former ARFF/SRE Building located adjacent to the former terminal along the North Ramp. This building was demolished in 2011.*

- *Based on interviews with two firefighting staff who have worked at the Airport since the 1980s, AFFF containers were also stored in this building. The building did have two floor drains that were closed prior to 1997 (discharge location unknown) and a third-floor drain that was traced to a catch basin that discharged to Upper Gate Pond. The former building was surrounded in its entirety by asphalt and, according to stormwater plans from 1999, storm drains in proximity to the building also discharge to Upper Gate Pond. Investigation conducted in the vicinity of the former ARFFF/SRE Building did not identify any of the regulated Six PFAS analytes in soil above the laboratory reporting limit (HW-X(m) [7-9]). Groundwater testing in the area did identify concentrations of the Sum of Six PFAS (HW-X[s] and HW-X[m]) above the applicable Method 1 GW-1 Standard, however the impacts are not consistent with the Airports AFFF release. The detections appear to be related to the off Airport PFAS source(s) that are migrating onto the Airport. Additionally, testing of surface water from Upper Gate Pond did not identify any of the Sum of Six PFAS analytes above the laboratory reporting limit.*

The facts detailed above have been confirmed with multiple rounds of soil and groundwater testing and the Conceptual Site Model supports the statement by the two fire fighters that AFFF was not used prior to 1991 for non-emergencies.

(2) *It is entirely possible that a rapid leaching rate would have resulted in prior slugs of PFAS slugs moving through the aquifer after each release event leaving residual concentrations as the source. The last major AFFF training event was in 2015 with a higher amount of AFFF than typically used. Targeted sampling of shallow groundwater beneath the Deployment area beginning in 2017-2018 found high concentrations of both telomer and legacy AFFF PFAS just two years later.*

It is more likely that the variable water table in this area is responsible for the increase and decrease in PFAS concentration as groundwater interacted with soil in the capillary fringe zone. Between 2017 and 2022, groundwater at HW-F (within the deployment Area) fluctuated 4.9 feet with an average depth of 19.6 feet.

Based on the Conceptual Site Model and details included in multiple reports submitted to the MassDEP, AFFF was first used in the Deployment Area in 1994 and reached groundwater in approximately 2014. Annually, approximately 43 inches of rain is received in the Hyannis area. Using the retardation rate formula included in the Phase II Report and a TOC of 1,350 ppm (median TOC value from the samples collected in the Deployment Area), it is assumed that PFAS moved through the soil column in the Deployment Area at a rate of approximately 10.5 inches per year. This rate correlates with the analytical data collected and the fate and transport model developed for the Airport.

Additionally, as documented in the research article titled "A Mathematical Model for the Release, Transport, and Retention of PFAS in the Vadose Zone" and published in the Water Resources Research Volume 56, Issue 2 and dated February 2020, it can take decades for PFAS to move as little as 15 feet in a sandy soil column. The article relates this partially to the lower water content caused by greater gravity drainage and weaker capillary retention in the sand. This results in higher retardation rates than other soils and PFAS tend to accumulate at air-water interfaces and may stay in the vadose zone for long periods before contaminating groundwater. It is important to distinguish between the Airport's infrequent use of AFFF for training exercises in relation to the BFTA. Groundwater contamination at the BFTA was likely accelerated through PFAS being directly discharged to Flint Rock Pond, shallower depth to groundwater, and more soil saturation events due to continuous fire training exercises with high water usage.

(3) *The Airport's signature compound 6:2 FTS was identified in the Maher #1 well directly downgradient of the Air Rescue Fire Facility (ARFF) prior to it recently showing up in the Maher #2 well from the Deployment Area.*

The detection of 6:2 FTS does not automatically indicate that the Airport is the source. Forensic signatures need to be reviewed by qualified individuals and must also consider dilution, plume comingling, groundwater flow, and PFAS analyte ratios.

6:2 FTS is present in the BFTA plume in multiple locations and concentrations and is also associated with other non-AFFF sources. It has also been detected at several cross-gradient and upgradient locations. As indicated on the radar plots provided above, the PFAS signature detected in Maher Well 1 (6:2 FTS = 10%) and Mill Creek (6:2 FTS = 11%) is more consistent with the BFTA (13%) than the Airport (79%). Again, multiple lines of evidence were included in the investigation to conclude that the Airport's PFAS plume impacted the Maher Wells (ME-2 only) in 2022.

(4) *The Airport indicates that PFAS contamination from the ARFF where equipment was used for years (where AFFF equipment is prepped, cleaned, rinsed, and stored) is the result of a single event in 1996.*

The statement above is incorrect. As indicated in the Phase II and Phase IV Reports:

*"The current Airport Rescue and Firefighting/Snow Removal Equipment (ARFF/SRE) Building was constructed in 1996, and PFAS is assumed to have been released in this area through what is presumed to be incidental spillage, drips from fire hoses that are hung to dry, and cleaning of equipment in the event of accidentally engaging the foam pump button. Interior floor drains within the ARFF/SRE building historically discharged to the adjacent grass area that was capped in the fall of 2020 to reduce infiltration of stormwater. The interior floor drains were closed in the 2000's and connected to a permitted discharge to the Barnstable Wastewater Treatment Plant".*

The exact date of the release(s) from this area are unknown.

(5) *The Phase 3 and 4 reports do not provide a plausible explanation that the PFAS in the Maher #1 Well was not from the AFFF use at the ARFF. Modeling results by the Airport contain areas for further clarification as commented on the attached.*

As indicated above, the detection of 6:2 FTS does not automatically indicate the Airport is the source. Impacts at Maher Well 1 are consistent with the BFTA signature (i.e., PC-18) and near Wendy's (HW-U[d]). Additional details regarding this are presented in the response to questions below.

(6) *The former ARFF, used until 1996, was also located upgradient of the Maher Wells on the west end of the terminal prior to recorded procurements of AFFF beginning in 2000.*

As indicated above, this area was investigated and determined to not be a source of PFAS consistent with the Airport's release.

(7) PFAS studies at the Martha's Vineyard Airport identified both legacy PFOS and Telomer PFAS compounds in plumes over 2 miles in length. The Gateway airport is similar in many instances, including its use of AFFF, level of flight activity, hydrogeology, and has a

concurrent period of operation to the MV Airport. How is it that PFAS leached into groundwater so much faster in Martha's Vineyard resulting in broad downgradient areas of contamination while the Cape Cod Airport did not? The difference is a major pumping supply well downgradient of the Cape Cod Airport that made the evidence disappear. But it did not really disappear. It was transported away through the water system.

Every Disposal Site and Conceptual Site Model is different and is based on Site specific details that are thoroughly evaluated by a Licensed Site Professional (LSP). The Airport has not been following the PFAS investigation at the Martha's Vineyard Airport because it is not relevant to it's investigation. However, based on a cursory review of the Phase II Comprehensive Site Assessment prepared by Tetra Tech and dated November 18, 2022, the Airport offers the following substantial differences that may account for the large length of the groundwater plume and why it occurred quicker than the Cape Cod Gateway Airport:

- The Martha's Vineyard Airport reported using 100 to 400 gallons of AFFF concentrate during its bi-annual testing, which creates approximately 3,300 to 13,200 gallons of AFFF. The Cape Cod Gateway Airport used 80 gallons of AFFF annually, which created approximately 2,670 gallons of AFFF. This indicates the volume of AFFF discharged at the Martha's Vineyard Airport is anywhere from 2 to 10 times more AFFF usage than the Cape Cod Gateway Airport during apparatus testing.
- AFFF was used on the paved asphalt aprons which discharge to catch basins and ultimately to either underground infiltration galleries or a stormwater outfall. Sheet flow from the paved areas would direct substantial quantities of water concentrated into these small areas with potentially significant PFAS contamination. This scenario would mobilize the contaminants through the soil column at a significantly higher rate than would be expected from a surface release migrating through the subsurface only through contact with precipitation.
- As previously indicated, the Cape Cod Gateway Airports PFAS plume impacted the Maher Well area in 2022 after PFAS treatment was installed. The drinking water provided by Maher Wells meets the MassDEP drinking water criteria. It is much more likely that the impacts detected at Maher Wells prior to 2022 are from other non-airport sources such as the BFTA.

(8) *6:2 FTS has been identified in Mill Creek by Harvard researchers in 2018 and more recently in 2023 sampling by DEP for the Town of Yarmouth. The Airport did not provide an investigation of PFAS in Mill Creek. The Maher wells were basically shut down from 2016 to 2020 due to PFAS contamination which would allowed contaminated groundwater to continue to flow to the creek.*

As indicated above, the PFAS detected in Mill Creek is not consistent with the Airports PFAS release. Additionally, the Airport's PFAS plume has never exceeded GW-3 and has been modeled to be below the GW-1 standard (based on the Airport's PFAS contribution only). As such, investigation into the PFAS detected in Mill Creek above regulatory standards in the responsibility of others. The Airport has not been provided with the data collected by MassDEP. This has been brought to the attention of MassDEP and others by the Airport. If a Responsible Party can be identified by the MassDEP, they will issue a Notice of Responsibility requiring the Responsible Party to initiate investigation and cleanup activities. The Airport is not responsible for PFAS plumes relating to non-Airport sources. It is now in the hands of MassDEP to identify other sources and/or determine next steps.

(9) The initial proposed remedial monitoring program and the recent IRA status report did not include regular testing and reporting of the Maher wells to the Bureau of Waste Site Clean-up as required in the MCP in order to prove both capture and treatment of PFAS to the impacted public. PFAS testing at the Maher Wells should include a broad suite of compounds including the Airport' signature 6:2 FTS and other compounds and present them in the body of the report. The submittal of regular monitoring reports should be notified to the PIP.

The Airport competed sampling of Maher Wells on 9/17/2020, 7/29/2022, 11/2/2022, 2/2/2023, 5/26/2023, and 12/6/2023. As indicated in the DRAFT Phase IV Completion Report:

*"The groundwater treatment system is managed by the Town of Barnstable/Hyannis Water System consistent with MassDEP requirements. As part of the Plant's compliance testing, samples of the treated groundwater are collected quarterly and submitted to a laboratory for analysis of multiple contaminants including PFAS. The Plant also collects process control samples monthly from multiple locations throughout the Plant process including the untreated groundwater, before filtration, after the lead GAC vessel, after the lag GAC vessel and at the treated tap. This information is used to adjust the treatment process as necessary and to determine when GAC replacement is needed. In addition, the Plant has an emergency generator in the event of a power failure".*

*The testing detailed in the paragraph above is completed by the Town of Barnstable/Hyannis Water System and not by the Airport.*

Groundwater monitoring by the Airport will be conducted bi-annually to monitor the effect of the soil caps on the Airports PFAS Plume. At a minimum, groundwater samples will be collected from the following wells for PFAS analysis:

- HW-I(s)
- HW-I(m)
- H-I(d)
- HW-S (s)

- HW-S (m)
- HW-P(s)
- HW-P(m)
- HW-302
- HW-3
- ME-1 (untreated intake water from Maher Drinking Water Well 1)
- ME-2 (untreated intake water from Maher Drinking Water Well 2)
- ME-3 (untreated intake water from Maher Drinking Water Well 3)

Groundwater sampling will occur in May and November. Consistent with PIP requirements, Public comments on monitoring reports is not required. The public can review all reports on-line through either the MassDEP or the Airport's website. Additionally, drinking water quality reports for Hyannis can be obtained from the Town of Barnstable.

(10) It was stated that the preparation, cleaning and rinsing of the AFFF equipment was done only at the Deployment Area rather than at the ARFF Station where 800 gallons of AFFF are routinely stored. The designated area for cleaning equipment as discussed in the Phase II was the ARFF. PFAS6 found in soils and groundwater beneath and downgradient of the ARFF including both legacy and telomer types of AFFF argue that preparation and maintenance of AFFF equipment was at the Fire Station built for that purpose.

The use of AFFF and the subsequent rinsing of apparatus after usage did take place in the Deployment Area. A fire hydrant is located in this area that would allow staff to purge the system of AFFF after usage. It is believed the statement that is being referred to in the Phase II Report is the following:

"The current Airport Rescue and Firefighting/Snow Removal Equipment (ARFF/SRE) Building was constructed in 1996, and PFAS is assumed to have been released in this area through what is presumed to be incidental spillage, drips from fire hoses that are hung to dry, and cleaning of equipment in the event of accidentally engaging the foam pump button. Interior floor drains within the ARFF/SRE building historically discharged to the adjacent grass area that was capped in the fall of 2020 to reduce infiltration of stormwater. The interior floor drains were closed in the 2000's and connected to a permitted discharge to the Barnstable Wastewater Treatment Plant".

The statement above that was included in the Phase II Report is speculation on how the ARFF/SRE Building area may have been impacted with PFAS since no documented release of AFFF in this area was documented. As indicated above, a fire hydrant is in the Deployment Area that was historically used to wash out equipment after AFFF usage.

(11) The second is the insertion that PFAS from the Barnstable County Fire Training Academy (BCFTA), which contaminated the Mary Dunn wells (estimated by HW as occurring) in

1970), was subsequently collected in the sewered areas served by the water supply and discharged by the Hyannis wastewater plant (WPCF) to travel in groundwater over 32 years to the Maher Wells.

When multiple PFAS plumes were identified in the vicinity of the Airport, multiple potential scenarios were evaluated as part of the Conceptual Site Model. The Airport is not required to identify the upgradient source(s) responsible for contamination or to investigate or delineate the extent of these impacts. The Conceptual Site Model has evaluated the BFTA as a potential significant source of PFAS in the area. Considering that Mary Dunn Wells are located within approximately 1,800 feet downgradient of the BFTA, it is entirely possible that PFAS could have impacted the Marry Dunn wells in the late 1970s if AFFF was applied to Flint Rock Pond anytime between the mid 1960's and early 1970s. Travel time from Flint Rock Pond to these wells is less than seven years. For comparison purposes, the highest detected PFAS Sum of 6 in soil at the Airport is almost five times lower than the sediment detections in Flint Rock Pond.

Details included in the report titled *Immediate Response Action Status & Remedial Monitoring Report No. 64 & Interim Phase II CSA Status Report*, prepared by BETA and dated April 2023 document PFAS Sum of 6 in Flint Rock Pond in 2022 as 493.9 ng/l (surface water) and 1,000 ug/kg (sediment) in Mary Dunn Pond at 53 ng/l, and in ground water as high as 303,000 ng/l (PFOS only). These high concentrations and consistent detection of the BFTAs signature in the area supports this statement.

(12) *The ARFF HW-3 monitoring well identified as a downgradient ARFF plume should have been included in the forensic analysis.*

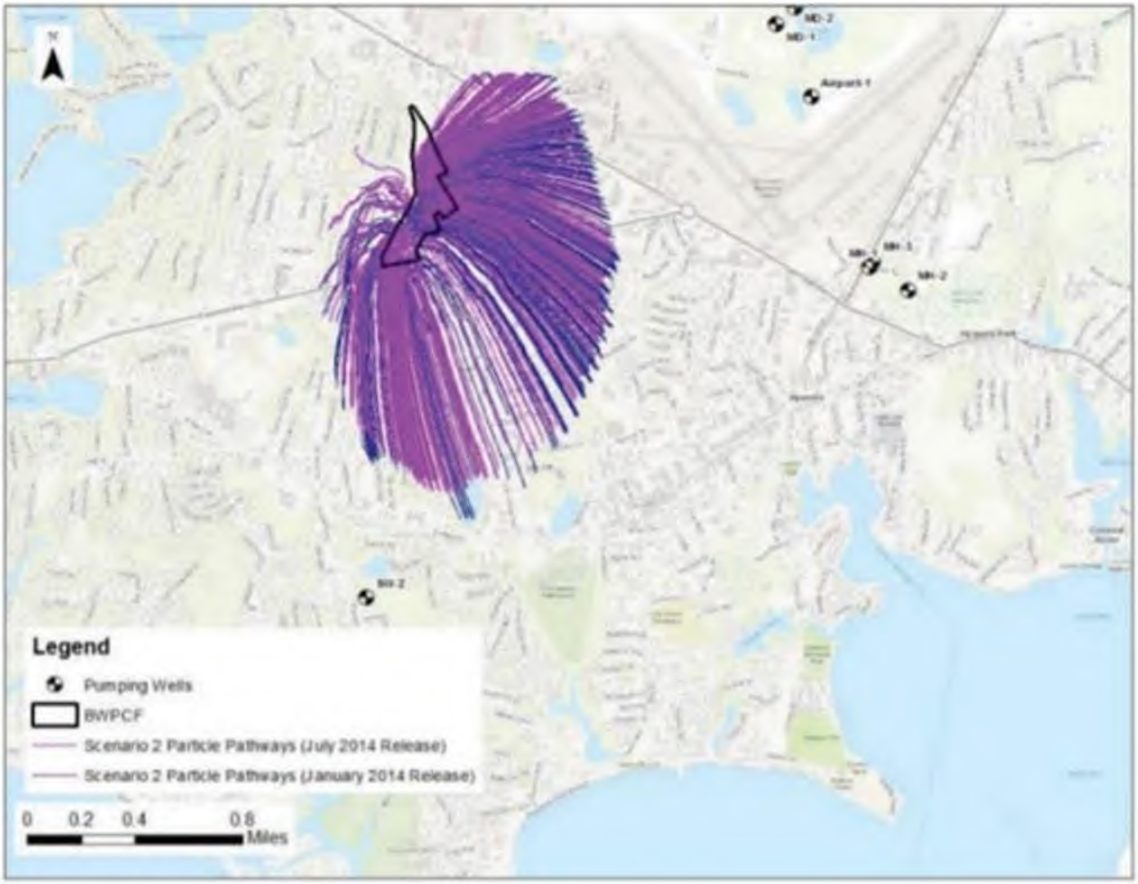
As indicated above, the Airport utilized its entire groundwater data set and included groundwater analytical data collected by others (i.e., BFTA) in the forensic analysis. Additional details are included in the response below, and radar plots and cross-sections for HW-3 are included in the Phase II Report.

(13) *The contamination of a broad area of the Hyannis aquifer with 1-4 Dioxane is similar to PFAS. While both legacy and telomer AFFF was used extensively at the BCFTA, 1-4 dioxane was not. 1-4 Dioxane is a major component of airplane deicing fluid. Like MTBE, Perchlorate, TCE and Benzene, 1-4 Dioxane moves readily, often leaving no trace at its source. Thus, its absence in source area samples is not de facto proof that it was never used, always contained, and never released. Its presence in downgradient wells and associated resources indicates it was released into the environment. The drainage connection of the deicing pads to the WPCF sewer is also a reasonable area for investigation.*

A substantial number of details on why the Airport is not the source of 1,4 dioxane was presented in the Phase II Report. The source of the 1,4-dioxane was identified hydraulically upgradient to the Airport in the vicinity of Cape Cod Gun Works (HW-V[m]). Refer to Cross Section 2 in the Phase II Report on page 120 for a graphical depiction of the 1,4-dioxane plume that is impacting the Airport from an unknown off-site source. Additionally, SDS sheets for the deicing fluid utilized at the Airport indicated 1,4-dioxane at a concentration of less than 5 parts per billion. Considering this very low concentration, 1,4-dioxane is not a “major component of airport deicing fluid”.

(14) *The actual area of impact of the WPCF was not addressed. Groundwater modeling at its average discharge rate of 1.7 MGD indicates that effluent entrained in groundwater from the WPCF does not migrate to the Maher Wells. A number of modeling studies, including the USGS who delineated the MEP coastal watersheds, that are the basis of the $1.2 Billion-dollar CWMP, do not include nitrogen from the WPCF in the Mill Creek (Maher Well) watershed. Meaning there is no present connection between the WPFC effluent plume and the Maher Wells.*

Particle tracking included in the report titled “The Distribution and Composition of PFAS in Select Water Supply Wells and Surface Waters of Barnstable” dated September 20, 2021 and prepared by Sole Source Consulting includes particle tracking from the wastewater plant as indicated below.




Based on the particle tracks shown above, it would be reasonable to conclude that PFAS discharged at the Wastewater Plant would mix with groundwater as it travels towards the Airport and continues towards Maher Wells. Nitrogen does not act the same as PFAS and it is not unreasonable to conclude that the Wastewater Plant is a potential source of PFAS detected at Maher Wells. The significant investigation completed by the Airport has identified non-Airport related PFAS plumes cross-gradient and upgradient that may or may not be related to the Wastewater Plant. Additionally, it would be the responsibility of others to determine if the PFAS from the BFTA was recirculated by the Wastewater Plant or if the impacts are from other non-AFFF sources.

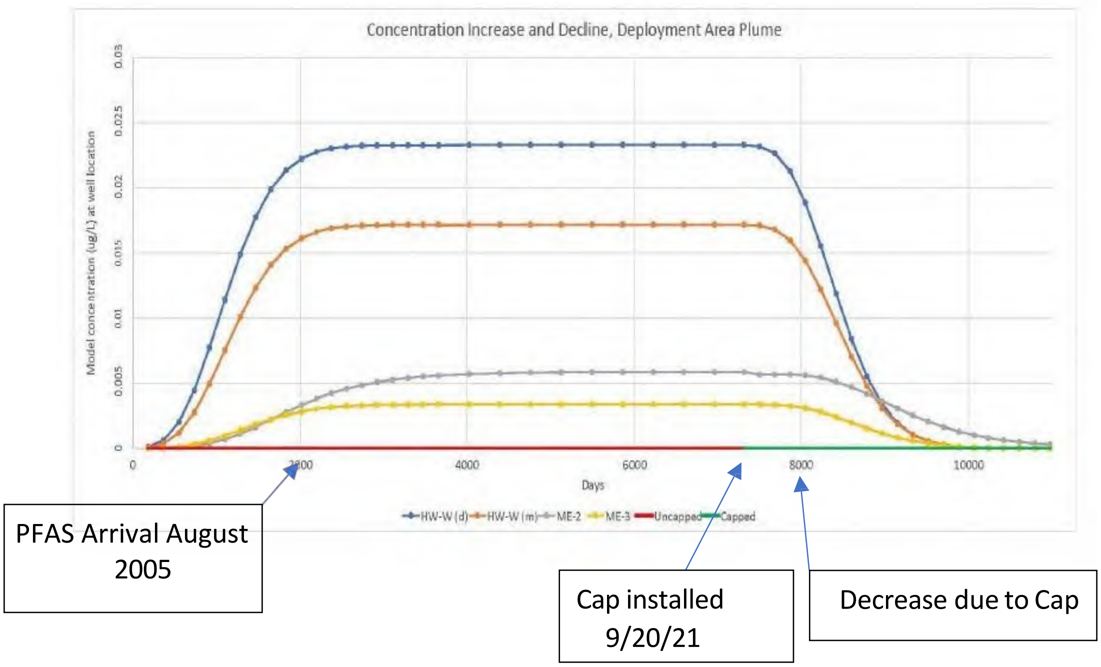
Below are comments provided by Mr. Cambareri on the PFAS Modeling in the Phase II Report.

(1) *The Airport's model graph for the Deployment Area PFAS6 plume indicates that it arrives at the monitoring well HW-W in August 2005. The well is ~1875 feet downgradient from the deployment area. Back calculating to the entrainment of PFAS6 in groundwater beneath the Deployment Area, using the report's estimated migration rate of 1.09, PFAS6 would*

*have been entrained in groundwater in the year 2000. That is significantly earlier than the Airport's start of start of the recent Deployment Plume in 2015.*

*Alternatively, the modeling figure indicates that the decrease of PFAS6 As a result of the effect of capping in 2020 is observed at HW-W after 700 days. HW-W is approximately 1875 feet downgradient of the Deployment area. The results show that the effect of the cap is seen 1875 ft downgradient in 700 days indicating a groundwater travel of over 2.6 feet per day. A very fast migration time supporting fast migration of PFAS slugs.*

*Airport-model output of PFAS travel from the Deployment area source to selected monitoring wells. Monitoring Well HW-W is 1,875 feet downgradient from the Deployment Area. Calculations use the time in days and date of capping as a reference.*




The graph included in the Phase IV Report is being misinterpreted. The graph depicts a transient model that simulates 20 years of recharge (red line on x-axis) with a PFAS Sum of 6 concentration of 1.172 ug/l (direct concentration applied to the aquifer) followed by 10 years of recharge (green line on x-axis) without any PFAS entering the aquifer. As a conservative approach, a 1.5 multiplier was also applied to the model output to overestimate the scenario. For additional context, the 1.172 ug/l was the highest Sum of 6 PFAS detected at the Airport when the model was created.

The model introduces the Sum of 6 PFAS contaminant directly into the groundwater over an area of 9,000 square feet (Deployment Area). The contaminant is then allowed to continuously leach for 20 years (an extreme overestimate and not representative of what occurred) at the 1.172 ug/l concentration. The model reached equilibrium after approximately 7.5 years. The model is used to predict resulting plume responses and does not represent when contaminates entered the groundwater.

The scenario presented above shows that after approximately 7.5 years (~2,750 days), the concentration of PFAS reaches equilibrium and the model becomes a steady state. This is also the approximate amount of time it would take for the plume to reach Maher Well 2 once it enters groundwater and is traveling approximately 285 feet per year. Once a steady state has been reached, the model continues to run for 12.5 years (this is where the red line meets the green on the plot above). Next, the model stops adding PFAS and the model continues for another 10 years. The model predicts that after the cap is installed and flushing in the capillary fringe is complete, PFAS would drop to zero within approximately seven to ten years. Again, the model was used as a worst-case prediction tool and does not represent when contaminates entered the groundwater.

*(2) The Airport's model for the ARFF used double the highest PFAS6 plume concentration of 362 ng/l that was sampled from the monitoring well HW-3, some 875 downgradient of the ARFF as the source. The ARFF source well HW-P had residual PFAS6 concentrations ranging from 248 ng/l* **(this number is incorrect and should be 65.9 ng/l)** *to 30 ng/l* **(this number is incorrect and should be 7.56 ng/l)***. The modeled plume graph does not include the HW-3 well A much higher source concentration should have been used at the source to duplicate the high concentration of 362 ng/l found at the downgradient well HW-3. Because the ARFF plume had migrated to HW-3 with PFAS6 at 362 ng/l and 6:2 FTS at 470 ng/l, it likely would have been drawn into the Maher Wells just 700 feet further. Samples from the Maher Well #1, closest to the ARFF, had 253 ng/l PFAS6 and 70 ng/l 6:2 FTS.*

The use of twice the Sum of 6 PFAS concentration for HW-3 is an extremely conservative value. For example, the ratio of the PFAS Sum of 6 to 6:2 FTS for the Deployment Area plume before the cap at its highest concentration was approximately 9 percent (6:2 FTS = 13 ug/l and PFAS 6 = 1.172 ug/l). The ratio used for the ARFF/SRE Area was 154 percent. Also, as indicated in the Phase IV Report, the source of this plume was likely a single event, or several small finite events and this area is also impacted with Sum of 6 PFAS over the applicable standards from non-Airport related sources. Additionally, the Sum of 6 PFAS plume depicted does not extend to HW-3 because the concentration is less than half the GW-1 standard by the time it travels to that location. HW-3 has been included within the Disposal Site boundary based on forensics and the detection of 6:2 FTS consistent with the Airports PFAS plume. Refer to the cross-sections included in the Phase II Report.

## 2.0 BACKGROUND

The Airport is located in Hyannis, Massachusetts, and provides scheduled airline service, general aviation services, and other aviation related activities. The Airport is owned by the Town of

Barnstable and is managed through the Barnstable Municipal Airport Commission (BMAC). The Airport began as a private airport consisting of a single grass runway before being given to the Town of Barnstable in the 1930's. With the outbreak of World War II, the Airport was taken over by the federal government for wartime training and defense purposes. During the 1940's, the United States Navy used the Airport and expanded the airfield to include three runways. In 1946, the Airport was returned to a two-runway municipal airport (each runway has a designation at each end, being 15-33 and 6-24). In 1948, the Airport was conveyed by the United States government (pursuant to the Surplus Property Act of 1944) to the Town of Barnstable, acting by and through its Airport Commission.

Currently, the Airport is comprised of approximately 645 acres of land, with approximately 140 acres that are impervious (e.g., paved areas such as parking lots, runways, taxiways, aircraft parking aprons, concrete walkways, and building rooftops). The Airport's structures include the main terminal and the Air Traffic Control Tower (ATCT), which are located south of the runways and taxiways, as well as several hangars used for general aviation and operations services. In addition, the current Airport Rescue and Fire Fighting/Snow Removal Equipment (ARFF/SRE) Building is located in the southeast corner of the property. The Airport is situated in an area of Hyannis zoned for Business and Industrial uses.

## 2.1 Disposal Site Regulatory History

The evaluation to determine the nature and extent of PFAS impacts resulting from the Airports historic use of AFFF began in August 2016, when the Airport conducted an initial round of groundwater sampling at the request of MassDEP. Subsequently, a Notice of Responsibility (NOR), dated November 10, 2016, was issued to the Airport by MassDEP. The NOR requested that the Airport conduct additional field investigations to evaluate:

- The source(s) of PFAS including PFOS and PFOA detected in groundwater at the Airport;
- The source(s) of 1,4-dioxane detected in a monitoring well downgradient of the Airport on the Maher Well field property[1]; and
- To identify potential impacts to public water supply wells operated by the Hyannis Water District at the Mary Dunn and Maher Well fields.

1. *As indicated in the report titled "Final Phase IV Implementation of the Selected Remedial Action Alternative"* prepared by HW, dated January 2023, the Airport is not the source of 1,4-dioxane detected at the Maher Wells and as such the remedial and investigation efforts will focus only on PFAS.

A proposed IRA Plan was submitted to MassDEP 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, MassDEP issued a Request for Modified IRA Plan/Interim Deadline, dated June 18, 2019 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 Airport's response is documented in the report titled "*Final Immediate Response Action Plan Modification",* prepared by HW and dated December 2019 (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 ARFF/SRE Building Area as indicated on Figure 2. The two capped areas total approximately 94,100-square feet and represent a majority of the known PFAS source areas at the time of the report relating to the historic use of AFFF. The caps were completed in September 2020 and their construction is documented in the report titled "*Immediate Response Action Plan Status Report 8".* The surficial extent of the two capped areas is indicated on Figure 3.

Refer to Figures 3 through 7 for PFAS sampling locations and to the Revised Phase II Report prepared by HW and dated January 2022 for additional details on the Disposal Site regulatory history and investigations relating to the nature and extent of PFAS relating to the Airports historic use of AFFF. Tabulated analytical results for all analysis collected as part of the investigation are included on Tables 2 through 9.

## 3.0 FINAL IRA MONITORING REPORT 14

Considering that the Airport has completed Phase IV activities, IRA activities are now considered complete and future monitoring of the Airports PFAS plume and cap areas (the Remedial Monitoring Program) will be documented in future Phase V Status Reports submitted every six months. Additional details on the monitoring program are included Section 9.0, and the Phase V Status Report for this period is included in Section 10.0.

### 3.1 IRA Field Investigation Activities Completed Between 2016 and 2023

A general description of field investigations conducted at the Airport since the November 2016 NOR and the final IRA samples collected in May and June 2023 are summarized below:

- Three soil samples were collected on December 9, 2016. One sample was taken from each location where it was determined that AFFF had been used at the Airport. The areas included the MCI Drill Area, the Deployment Area, and the 1991 Drill Location.
- One sample of AFFF concentrate was collected on December 9, 2016 and analyzed for PFAS

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

- The installation of groundwater monitoring wells at six locations in April 2017: in the vicinity of potential sources of PFAS at the ARFF/SRE Area, at the Deployment Area and at upgradient locations outside of the Airport to evaluate potential off-site sources of PFAS and 1,4-dioxane.
- 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.
- A second round of soil samples were collected on June 20, 2017 adjacent to the ARFF/SRE Building and within the Deployment Area to begin to determine the extent of PFAS within the surface soils. Based on the results of these analyses, a third round of samples from these two locations were collected on September 26, 2017. The third round of sampling was designed to further delineate the extent of PFAS in soils both vertically and horizontally, with samples taken at the ground surface and at two and four feet below ground surface (bgs).
- Six soil samples were analyzed for PFAS leaching potential using a synthetic precipitation leaching procedure (SPLP) test between September and October 2017. The chosen samples included four samples from the Deployment Area and two samples from runway reconstruction soils stockpiled at the Airport.
- In October 2017, 20 surface samples were collected both on and off Airport property to determine the concentration of PFAS in the area (i.e., Background PFAS Concentrations).
- In October 2017, three composite soil samples were taken from piles of soil associated with the redevelopment of Runway 15/33. These piles were located on Airport property at the site of the former Mildred's Restaurant and were analyzed for PFAS compounds to evaluate if soil removed from the Airport as part of this redevelopment contained PFAS.
- On August 14, 2018, 24 PFAS surface soil samples were collected in proximity to the ARFF/SRE Building Area and the Deployment Area. PFAS compounds were previously detected in these areas and additional samples were collected to determine the vertical extent of PFAS impacts in soil and to refine the soil disposal site boundary at the Airport.
- In October 2018, three soil borings (DL11, DL14 and HW-F) were advanced in the Deployment Area. One soil boring (ARFF3) was advanced, and one surface soil sample (HW-3) was collected near the ARFF/SRE Building in order to further delineate the extent of PFAS in soils both horizontally and vertically.
- 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)) were 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. The analysis was inconclusive in tracing the contribution of pond water in the 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/SRE 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 well 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 to verify that the valve mechanism that controls the mixing of AFFF with water was working appropriately. PFAS should not be detected in the spray water. Although the spray water is not considered drinking water,

PFAS was detected in each of the six samples collected above the GW-1 standard.

- On September 27, 2019, HW collected groundwater samples from six monitoring wells located on the Airport for 1,4-dioxane analysis.
- In November 2019, the Airport replaced the valve mechanism in the fire truck to ensure that AFFF was no longer mixing with the water despite the mechanism not being engaged. In December 2019, HW resampled the six discharge locations from the fire truck at the Airport. PFAS was detected at various concentrations at each location, but all were below the GW-1 standard.
- Between May 5th and May 21st, 2020, HW collected 16 groundwater samples PFAS analysis.
- Between May 5th and May 13th, 2020, HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.
- Between August 17, 2020 and September 28, 2020, HW oversaw the installation of the asphalt cap in the ARFF/SRE Building Area and the geomembrane cap in the Deployment Area. Approximately 850 cubic yards of soil from the ARFF/SRE Building Area generated during cap construction was used for grading and shaping of the cap area in the Deployment Area. This soil was completely covered by the geomembrane. Refer to IRA Status Report 8 for additional details.
- Between September 14th and September 24th, 2020, HW and Desmond Well Drilling installed 13 monitoring wells.
- On September 17, 2020, HW collected groundwater samples from the three Maher Wells (ME-1 through ME-3) for PFAS analysis.
- Between September 14th and September 30th, 2020, HW collected 23 soil samples for PFAS analysis.
- Between October 1 and October 7, 2020, HW collected groundwater samples from 16 monitoring wells for PFAS.
- On October 2 and 7, 2020 HW collected groundwater samples from four monitoring wells for 1,4-dioxane analysis.
- Between November 5 and 6, 2020, HW collected five groundwater samples for PFAS analysis.
- On November 17, 2020, HW collected two roof samples (rubber membrane and asphalt shingle) from the ARFF/SRE building for SPLP PFAS. The testing was completed to determine if roofing materials were a potential source of PFAS in groundwater through stormwater infiltration. PFAS was detected in each of the samples collected. Although the leachate is not considered drinking water, the concentration of the MassDEP Sum of 6 was below the Method 1 GW-1 and GW-3 standards.
- On February 18 and 19th, 2021 HW conducted hydraulic conductivity testing at three

monitoring well locations. Refer to the Revised Phase II Report for additional details.

- Between March 17th and March 19, 2021, HW collected 21 groundwater samples for PFAS analysis as part of the first round of post-cap semiannual monitoring.
- Between April 5th and April 7th, 2021, HW and Desmond Well Drilling installed monitoring wells HW-U(s), HW-U(m), HW-W(m), HW-W(d), and HW-W (dd).
- Between April 6th and 19th, 2021, HW collected 17 soil samples for total organic carbon (TOC) analysis. The TOC samples were collected from various depths between the ground surface and 65 feet below grade. The TOC data was used to determine plume migration.
- On April 19, 2021, HW sampled the recently installed monitoring wells HW-U(s), HW- U(m) HW-W(m), HW-W(d), and HW-W (dd) for further analysis of PFAS compounds in groundwater.
- On September 7, 2021, HW and New England Geotech installed monitoring wells HW- X(s) and HW-X(m). The monitoring wells were installed adjacent to the former ARFF/SRE Building.
- On September 7, 2021, HW collected a soil sample from HW-X (m) and submitted it for PFAS analysis. None of the MassDEP six regulated PFAS compounds were detected above the laboratory method detection limit.
- On September 10, 2021, HW collected groundwater samples from HW-X (s) and HW- X(m) and submitted them for PFAS and 1,4-dioxane analysis.
- Between September 1 and September 11, 2021, HW collected 26 groundwater samples as part of the second round of post cap semiannual monitoring.
- On September 10, 2021, HW collected two groundwater samples from monitoring wells HW-E and HW-J located in the Deployment Area for 1,4-dioxane. 1,4-dioxane was not detected above the laboratory reporting limit.
- On March 2nd and 4th, 2022, HW collected six surficial composite soil samples from Runway 6-24 and submitted them to Alpha Analytical for PFAS analysis. Redevelopment of Runway 6-24 began in April 2023 and was completed in October 2023. The soil testing was conducted to evaluate how soil removed from the areas around the runway would need to be managed if they were taken off site. None of the MassDEP six regulated PFAS compounds were detected above the applicable Method 1 Standard.
- Between March 15th and March 31st, 2022, HW collected 29 groundwater samples for PFAS analysis.
- On May 18th, 2022, HW collected three groundwater samples for PFAS analysis.
- Between July 29 and August 8th, 2022, HW collected eight groundwater samples for PFAS analysis.

- Between October 31 and November 2, 2022, HW collected groundwater samples from the three Maher Wells (ME-1, ME-2 and ME-3) and monitoring wells HW-W(m), HW-I(s), HM-I(m), HW-I(d), HW-3, HW-P(s), and HW-P(m) for PFAS analysis.
- On February 2, 2023, HW collected groundwater samples from the three Maher Wells (ME-1, ME-2 and ME-3) and monitoring wells HW-I(s) and HW-P(s) for PFAS analysis.
- On March 16 and 17, 2023, HW and Desmond Well Drilling reinstalled monitoring wells HW-H and HW-R (Figure 4) that were destroyed by the Lawrence Lynch Corporation (road work construction company) during the Mary Dunn Way road paving/sewer line installation project. It is estimated that the wells were destroyed during the week of July 12, 2022. It should be noted that these wells are used to track the groundwater plume from the Deployment Area. The soils in the vicinity of Mary Dunn Way have not been impacted by the Airports historic use of AFFF. Refer to Figure 2, soil samples A7, A8, A9, A11, A12, D10, D11, DL19, DL20, and DL21.
- The Airport submitted groundwater samples from HW-I(s), HW-I(m), HW-I(d) and ME-1 through ME-3 (Maher Wells 1 through 3) for forensic PFAS analysis at Battelle. As indicated in previous reports, HW-I(s) is representative of the Airports PFAS Plume, and HW-I(m) and HW-I(d) are representative of upgradient non-airport related sources (i.e., the Barnstable Fire Training Academy and others). The forensic report prepared by Battelle concluded that sample ***"HW-I(d) seems most like the ME samples"***.
- The final quarterly sampling event of the Maher Wells (ME -1 through ME-3) occurred in May 2023.
- HW collected groundwater samples from nine monitoring wells for PFAS in June 2023, and from three monitoring wells in December 2023.
- HW will continue to sample select wells in the vicinity of the Deployment Area, ARFF/SRE Building and other select locations bi-annually as part of the on-going evaluation of the cap and PFAS plume monitoring during Phase V (see additional details below in Section 9).

Analytical results are included on Table 2 through 9, and laboratory reports not previously submitted to the MassDEP are included in Appendix B. PFAS in groundwater trend graphs for select wells in the vicinity of the caps are included in Appendix C.

## 4.0 IRA COMPLETION STATEMENT

Pursuant to 310 CMR 40.0427, an IRA shall be considered complete when the release, threat of release and/or site conditions which give rise to the need for that IRA, as described in 310 CMR 40.0412, have been assessed and, where necessary, remediated in a manner and to a degree that will ensure, at a minimum:

- The accomplishment of any necessary stabilization of site conditions.

*As indicated above and in the Final Phase IV Report, the installation of the two caps have significantly decreased the concentration of total PFAS in the vicinity of the Deployment Area and ARFF/SRE Area as indicated on the time plots included in Appendix B. As such, the majority of the PFAS impacted soil at the Airport is currently capped and stabilized. Groundwater monitoring and cap inspections will continue bi-annually as part of Phase V to document that disposal site is stable.*

- The elimination or control of any Imminent Hazards to health, safety, public welfare and the environment, without the continued operation and maintenance of Active Remedial Systems or Active Exposure Pathway Mitigation Measures or the incorporation of ongoing response actions to eliminate or control the Imminent Hazard into the Phase IV Remedy Implementation Plan for the disposal site.

*Considering that no private drinking water wells have been identified hydraulically downgradient of the Airport, and that the Town of Barnstable is providing drinking water that meets the required state drinking water standards and guidelines for PFAS, an imminent hazard as defined by 310 CMR 40.0006 is currently being prevented. Additionally, the Airport is compensating the Town of Barnstable for its allocated portion of responsibility for groundwater treatment that is occurring at the Maher Wells. This payment ensures that the burden of treatment at the Maher Wells resulting from the PFAS impacts from the Airport (Maher Well 2 only) does not fall on the public.*

- The completion of time-critical measures addressing the elimination, prevention or mitigation of Critical Exposure Pathway(s) as documented with an LSP Opinion concluding that:
    - The Critical Exposure Pathway(s) have been eliminated using passive measures;
    - A feasibility study, as specified at 310 CMR 40.0414(3) and (4), supports the conclusion that it is not feasible to eliminate, prevent, or mitigate the Critical Exposure Pathway(s);
    - A feasibility study, conducted as part of a Phase III evaluation of Comprehensive Remedial Alternatives as specified in 310 CMR 40.0860, supports the conclusion that it is not feasible to eliminate, prevent, or mitigate the Critical Exposure Pathway(s) as part of the Comprehensive Remedial Alternative; or
    - Mitigation of Critical Exposure Pathway(s) is continuing by incorporation of ongoing response actions to address the Critical Exposure Pathway(s) into the Phase IV Remedy Implementation Plan for the disposal site.

*IRA activities have been completed including the installation of two caps to prevent the further leaching of PFAS into groundwater. The Maher Wells groundwater treatment system operated by the Town of Barnstable is providing treated drinking water to the community eliminating the risk associated with ingestion of drinking water containing PFAS above the MassDEP regulatory limits. It should be noted that based on environmental forensics and fate and transport mechanisms documented in the Updated Phase II Report and Final Phase IV Report, the Airports PFAS plume* *impacted the Maher Wells (ME-2 only) after the Town of Barnstable installed a treatment system designed to treat for PFAS. As such, mitigation of the Critical Exposure Pathway is being managed as part of Phase V activities.*

*The IRA has been successful in delineating the nature and extent of PFAS impacts in soil and groundwater relating to the Airports historic use of AFFF. Additionally, the Airport has reduced the potential for PFAS to leach into the underlying groundwater from its two source areas (ARFF/SRE Building Area and Deployment Area) and has discontinued the application of AFFF with the exception of an emergency situation.*

*Pursuant to 310 CMR 40.0427(5), the LSP Opinion, certification of submittal, and indication that the IRA is complete and Phase V activities will be conducted as part of the Comprehensive Response Action are set forth on the Comprehensive Response Action Transmittal Forms (BWSC-105 and BWSC-108) being submitted to the MassDEP concurrently with report.*

## 5.0 REMEDIAL WASTE FROM THE IRA AND PHASE IV

Soil

As set forth in Final Phase IV Report, soil caps were previously installed at the Site and details regarding soil management relating to the cap construction were included in the *Immediate Response Action Plan Status Report 8*. Any future soil excavation within the areas indicated on Figure 5 as "Area of PFAS Impacts in Soil" will be documented in a Release Abatement Measure (RAM) Plan submitted to the MassDEP consistent with the MCP. There is currently no remedial waste stored at the Airport.

Groundwater

As part of the groundwater treatment process at the Maher Wells Drinking Water Plant (the Plant), granulated activated carbon (GAC) will require periodic replacement and disposal. The replacement and disposal of the GAC will be completed by the Town of Barnstable/Hyannis Water System staff consistent with its operating requirements and MassDEP registration (Appendix D). HW will not be involved in the operation, management or disposal of materials associated with the Plant considering it is adequately regulated under the MassDEP.

## 6.0 PHASE IV REMEDY IMPLEMENTATION

Site specific engineering concepts and design criteria used for the design and construction of the PFAS caps and treatment technologies utilized by the Plant were documented within the Final Phase IV Report which was submitted to MassDEP by HW in January 2023. The goals of remedial action, including performance requirements of the remedial systems, the requirements for achieving a

Permanent or Temporary Solution (whichever is applicable) under 310 CMR 40.1000 and the projected timeframe, based on available information, for achieving such Permanent or Temporary Solution was included in the Final Phase IV Report.

Based upon the evaluation of remediation technologies provided in Phase III, the selected remedy consisted of treatment of groundwater at the Maher Wells and implementation of soil caps. Groundwater monitoring and cap inspections will continue to be conducted bi-annually and documented in future Phase V Status Reports until a Permanent or Temporary Solution can be achieved.

## 6.1 Goals of the Remedy

Soil Caps

The goal of the soil caps is to reduce the infiltration of PFAS from soil into groundwater. The caps were installed in 2020 at the locations indicated on Figure 3. The caps have significantly reduced the concentrations of total PFAS in groundwater in the vicinity of the Deployment Area and ARFF/SRE Area, as indicated on Table 3 and the time plots presented in Appendix C.

Fluctuations in the concentration of PFAS is expected as the groundwater level rises and falls over the next several years and contaminants are flushed from the capillary fringe zone. After flushing is complete, concentrations associated with the Airports PFAS Plume are expected to decline. The effectiveness of the caps will be documented through the collection of groundwater samples until a Permanent or Temporary Solution can be achieved. The caps will be inspected twice annually and maintained as necessary until a Permanent or Temporary Solution can be achieved. Assuming that the future Permanent or Temporary Solution relies on the caps to maintain a level of no significant risk, the caps will be maintained and inspected in the future in accordance with an Activity and Use Limitation (AUL). Any future construction within the estimated extent of PFAS impacted soils indicated on Figure 5 will be conducted under a RAM.

Groundwater Treatment

The goal of the groundwater remedial action is to reduce the concentration of PFAS in groundwater and to provide safe drinking water to the Town of Barnstable. The Town of Barnstable began construction of the Plant in 2019. The Plant was designed by Tata and Howard, Inc. for the treatment of PFAS, 1,4-dioxane, iron, and manganese. The Plant utilizes green sand filtration, advanced oxidation, and GAC.

The plant has a design capacity of 1,500 gallons per minute and removes PFAS with granular GAC filtration; 1,4-Dioxane by advanced oxidation with peroxide and ultraviolet light (UV); and iron and manganese by greensand filtration. The plant was completed in 2020 with the design reviewed and approved by MassDEP. The plant has been providing the Town of Barnstable with drinking water that meets state and federal drinking water requirements as documented in the Annual Water Quality Report from 2022 (Appendix E).

Based on contaminant migration fate and transport mechanisms incorporated into a USGS MODFLOW Model (included in the Final Phase IV dated January 2023) it is expected that groundwater impacts from the Airports PFAS plume in all impacted areas will be less than the

GW-1 standard by 2031. The model also suggests that PFAS impacts at the Maher Wells would not exceed the current GW-1 standard (0.02 ug/l) if the Airports PFAS plume was the only source of PFAS impacting them.

It should be noted that the Maher treatment plant became operational in October 2020. The Airport PFAS plume was not detected in Maher Wells prior to the Plant becoming operational. The Airports PFAS plume was detected in Maher Well 2 in July 2022. The Airports PFAS signature has not been detected in the other two Maher Wells (ME-1 and ME-3) which is consistent with MODFLOW modeling previously documented in the Final Phase IV.

Cap inspection and groundwater monitoring has been reported in IRA status reports. Future reports of the remedial action will be documented in Phase V Status Reports submitted bi- annually. The first Phase V Status Report is included in Section 10.0.

## 7.0 PHASE IV FINAL INSPECTION REPORT

*Pursuant to 310 CMR 40.0878, a final inspection must be conducted by the Licensed Site Professional (LSP) of record to ensure that:*

- The Comprehensive Remedial Action has been constructed in accordance with construction plans under 310 CMR 40.0874(3)(c) of the Phase IV Remedial Implementation Plan or appropriate modification to such plans; and

- Following initial implementation and operation and any modifications or adjustments necessary to optimize the performance of remedial systems, the Comprehensive Remedial Action is meeting projected design standards.

The Comprehensive Remedial Action activities were substantially completed in a manner consistent with the specifications set forth in the Final Phase IV Report dated January 2023 and the Comprehensive Response Actions are meeting projected design standards.

## 8.0 PHASE IV COMPLATION STATEMENT

Pursuant to 310 CMR 40.0879(2), the LSP Opinion, certification of submittal, and indication that the Phase IV is complete and that Phase V activities will be conducted as part of the Comprehensive Response Action is set forth on the Comprehensive Response Action Transmittal Form (BWSC-108) being submitted to the MassDEP concurrently with this report.

## 9.0 PHASE V OPERATION, MAINTENANCE, AND MONITORING

Pursuant to 310 CMR 40.0891(1), the provisions of Phase V shall apply to disposal sites where Phase IV response actions have been completed and operation, maintenance and/or monitoring (OMM) of the Comprehensive Remedial Action is necessary to achieve a Permanent or Temporary Solution under 310 CMR 40.1000.

Phase IV response actions have been completed at the Site and monitoring of the Comprehensive Response Action is required to achieve a Permanent or Temporary Solution. An OMM plan outlining additional monitoring activities to achieve a Permanent or Temporary Solution is set forth below.

### 9.1 Operation, Maintenance, and Monitoring Plan

Soil Caps

The two soil cap areas at the Airport (Figure 3) will be inspected bi-annually. The first Phase V inspection is included in Section 10.2 The cap inspections will include the following:

- Asphalt Cap: The asphalt cap will be inspected by the LSP of Record to document that it is free of any cracks or significant depressions. Crack sealing, if needed, is routinely completed as part of the Airports general asphalt management program. The cap area will also be monitored for any significant depressions. Significant depressions that result or could result in damage to the asphalt cap will be noted and fixed, as necessary. Photographic documentation of the asphalt cap area will be included in Phase V Status Reports.
- Geomembrane: The geomembrane cap will be inspected by the LSP of Record to document that the protective soil cover is free of any depressions or erosion. Significant depressions or erosion that could result in damage to the geomembrane cap will be noted and fixed, as necessary. Photographic documentation of the geomembrane cap area will be included in Phase V Status Reports.

Groundwater Treatment

The groundwater treatment system is managed by the Town of Barnstable/Hyannis Water System consistent with MassDEP requirements. As part of the Plant's compliance testing, samples of the treated groundwater are collected quarterly and submitted to a laboratory for analysis of multiple contaminants including PFAS. The Plant also collects process control samples monthly from multiple locations throughout the plant process including the untreated groundwater, before filtration, after the lead GAC vessel, after the lag GAC vessel and at the treated tap. This information is used to adjust the treatment process as necessary and to determine when GAC replacement is needed. In addition, the Plant has an emergency generator in the event of a power failure. A copy of the 2024 Registration and 2022 water quality report are included in Appendix D and E, respectively.

<u>Groundwater Monitoring</u>

Groundwater monitoring will be conducted bi-annually to monitor the effect of the soil caps on the Airports PFAS Plume. At a minimum, groundwater samples will be collected from the following wells for PFAS analysis:

- HW-I(s)
- HW-I(m)
- H-I(d)
- HW-S (s)
- HW-S (m)
- HW-P(s)
- HW-P(m)
- HW-302
- HW-3
- ME-1 (untreated intake water from Maher Drinking Water Well 1)
- ME-2 (untreated intake water from Maher Drinking Water Well 2)
- ME-3 (untreated intake water from Maher Drinking Water Well 3)

Groundwater sampling will occur in May and November. The next groundwater sampling event will occur in May 2024. Additional wells beyond those described above may be sampled and/or installed at the discretion of the LSP and documented in future monitoring reports.

## 9.2 Inspection and Monitoring Reports

Groundwater monitoring and bi-annual cap inspections will be completed to document the cap effectiveness and track the plume migration as part of Phase V until a Permanent or Temporary Solution can be achieved. The Plant will continue to be operated by the Town of Barnstable/Hyannis Water System consistent with its MassDEP permit requirements.

Pursuant to 310 CMR 40.0892, Phase V Status Reports will be submitted to MassDEP every six months.

## 10.0 PHASE V STATUS REPORT

### 10.1 Groundwater Monitoring

Details concerning field investigations conducted between October 2023 and April 2024 are summarized below.

- On December 5 and December 6, 2023, HW collected groundwater samples from the three Maher Wells (ME-1, ME-2 and ME-3) and monitoring wells HW-I(s), HW-I(m), H-I(d), HW-S (s), HW-S (m), HW-P(s), HW-P(m), HW-302, HW-3 for PFAS analysis.

Analytical results are included on Table 2, and laboratory reports are included in Appendix A. PFAS in groundwater trend graphs for select wells in the vicinity of the caps are included in Appendix C.

HW will continue to sample select wells in the vicinity of the Deployment Area, ARFF/SRE Building and other select locations bi-annually as part of the on-going evaluation of the cap and PFAS plume monitoring.

### 10.2 Bi-Annual Cap Inspection and Cap Performance Monitoring

HW has inspected the two caps bi-annually since the installation was completed. The first Cap inspection was conducted in March 2021. The most recent cap monitoring event was conducted on March 19, 2024. The asphalt cap was free of significant cracks. A slight depression was noted in the central portion of the ARFF/SRE Cap, where mobile refueler trucks are staged (right photograph). This area will be monitored to determine if corrective actions are necessary.

HW inspected the geomembrane cap on March 19, 2024, in the vicinity of the Deployment Area. The sand and loam protective layer over the geomembrane cap were intact with no signs of significant erosion as indicated in the photos below.

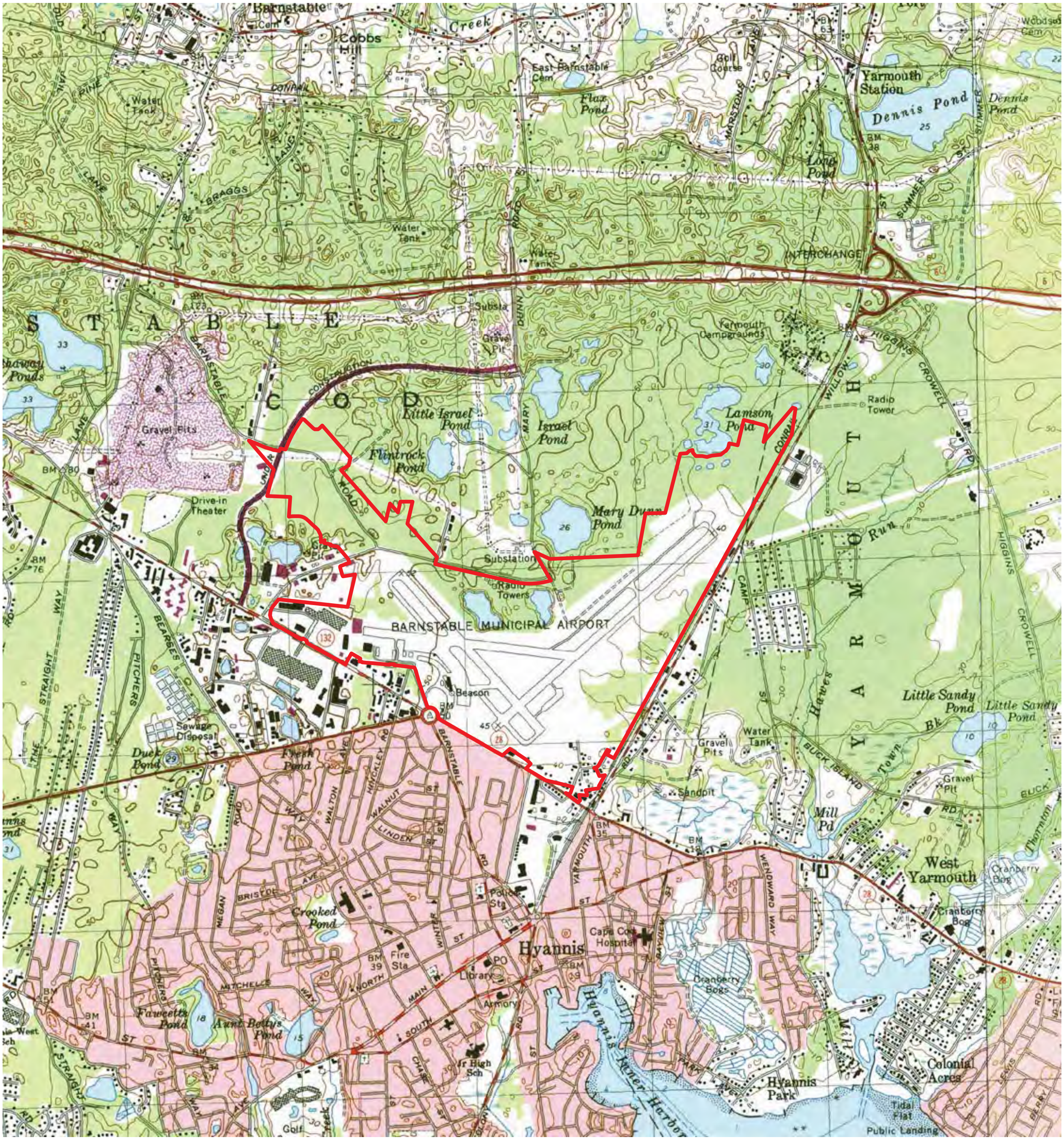
HW will continue to inspect the two cap areas every six months and collect groundwater samples from select existing monitoring wells to document the effectiveness of the caps.  These details will be included in future Phase V Status Reports submitted every six months. The next Phase V Status Report will be submitted in October 2024.

## 11.0 PUBLIC INVOLVEMENT

Considering this is the last phased report until a Permanent or Temporary Solution is submitted, a IRA Status Report 14, DRAFT IRA Completion Statement, and DRAFT Phase IV Completion Report was submitted to MassDEP and notifications were distributed to all persons identified on Table 1, Community Notification List October 11, 2023. The Airport sent a subsequent notification on November 13, 2023 to all persons identified on Table 1, Community Notification List, about an in person meeting on December 18, 2023. After the meeting, the Airport provided an additional 45-day review period for the public and MassDEP to review the PFAS related investigation completed by the Airport. A Phase V Status report has also been included in this Report due to the extended comment period and the required regulatory submittals needed to satisfy the requirements of the Massachusetts Contingency Plan. Questions and Comments received by the public (the Siera Club, Hyannis Park Civic Association and Mr. Thomas Cambareri) are detailed above. Copies of the submitted questions/comments are included in Appendix A.

Pursuant to 310 CMR 40.0880, notification of the Final IRA Status Report 14, IRA Completion Statement, Final Phase IV Completion Report, and Phase V Status Report will be provided to all individuals on Table 1. This includes the Chief Municipal Officer and the Board of Health for both Barnstable and Yarmouth.

FIGURES




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

*Hyannis Topographic Quadrangle

**Legend**

Airport Property Line

N

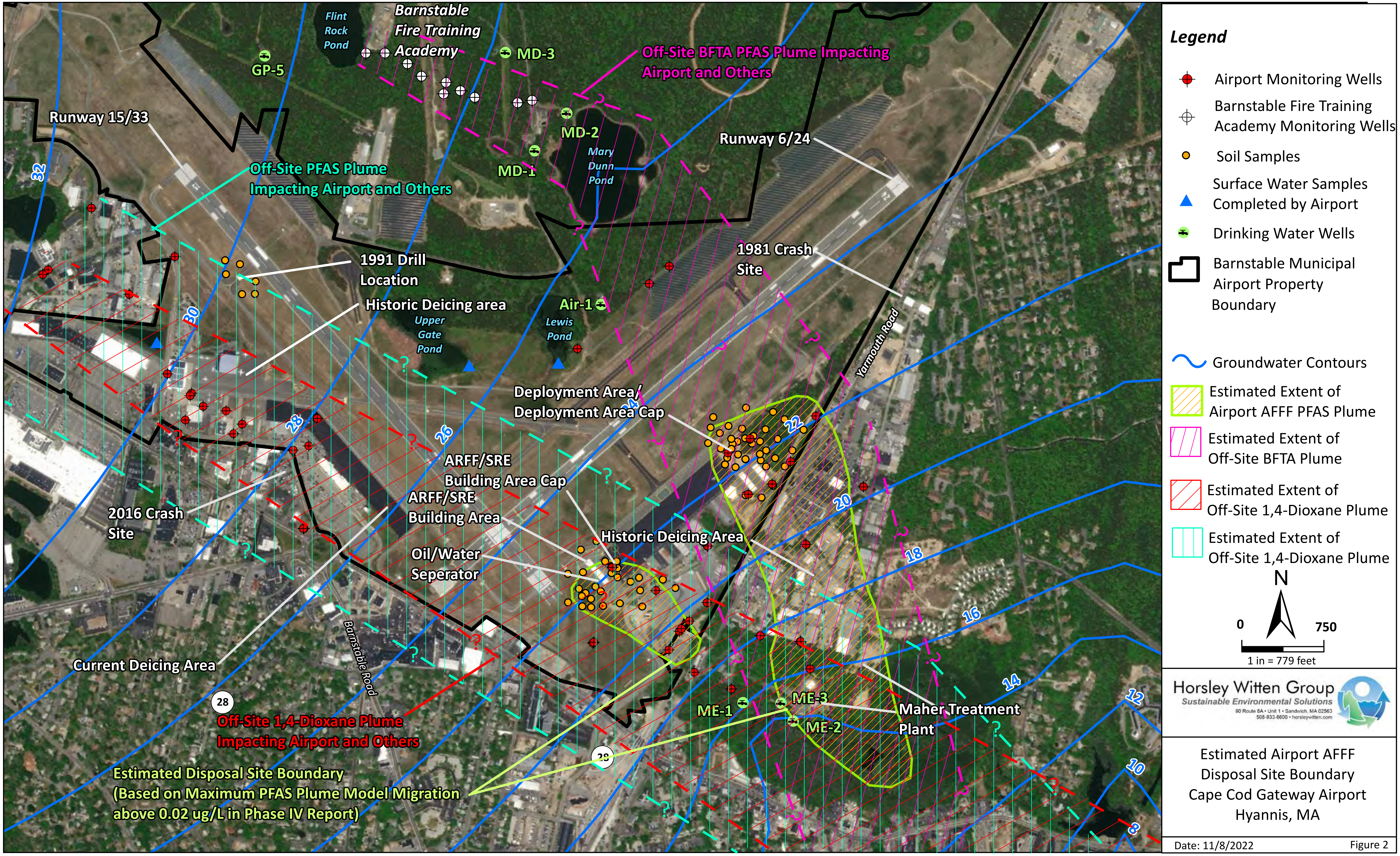
0.5 Miles

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

USGS Locus
Cape Cod Gateway Airport
Hyannis, MA

Date: 4/17/2018

Figure 1




* Cape Cod Commission (CCC) Groundwater Contours

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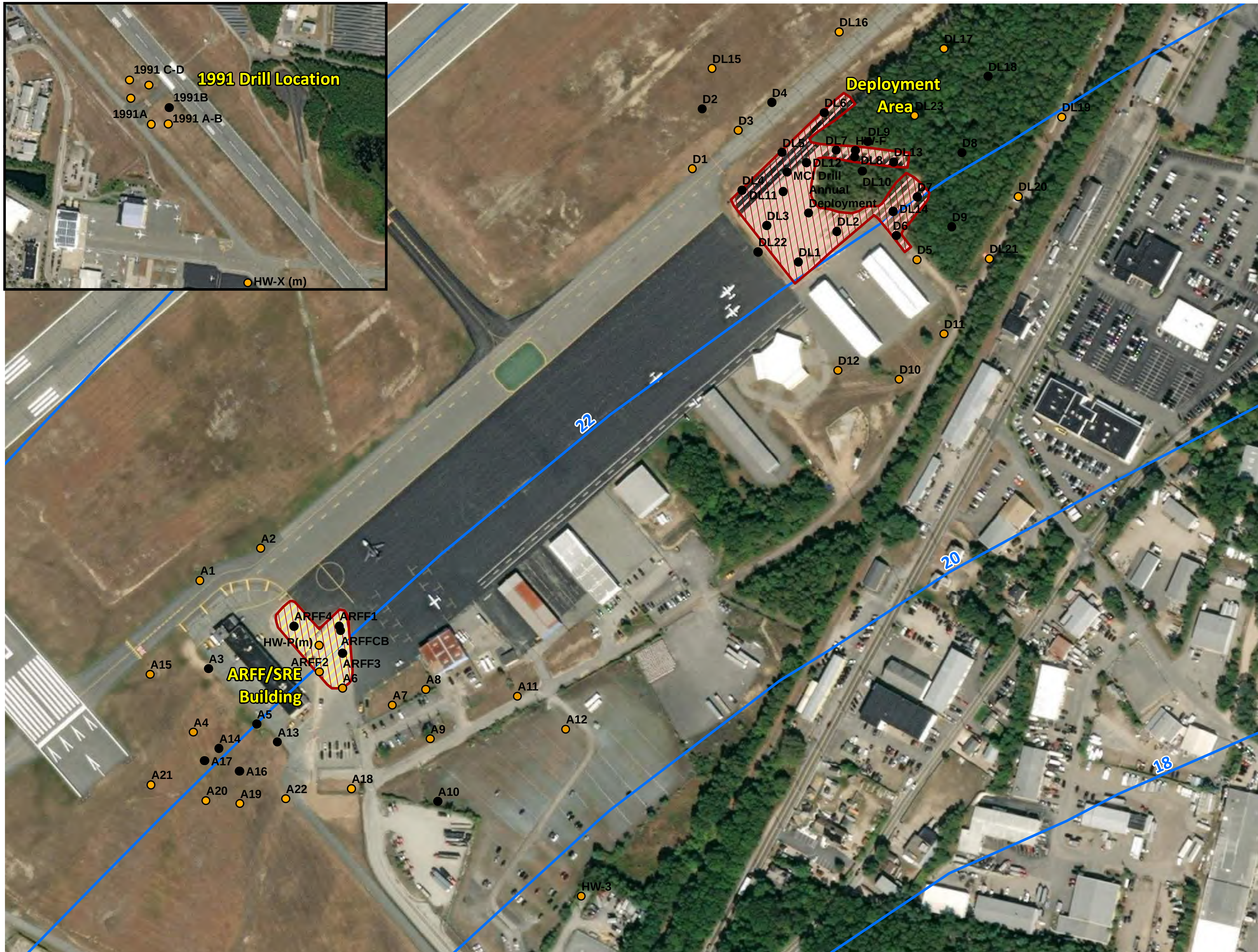


*Cape Cod Commission (CCC) Groundwater Contours

***Legend***

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

Method
PFHpA = 0.5 ug/kg
PFHxS = 0.3 ug/kg
PFOA = 0.72 ug/kg
PFNA = 0.32 ug/kg
PFOS = 2 ug/kg
PFDA = 0.3 ug/kg

Soil Sample Location for TOC

N

0 225

1 in = 225 feet

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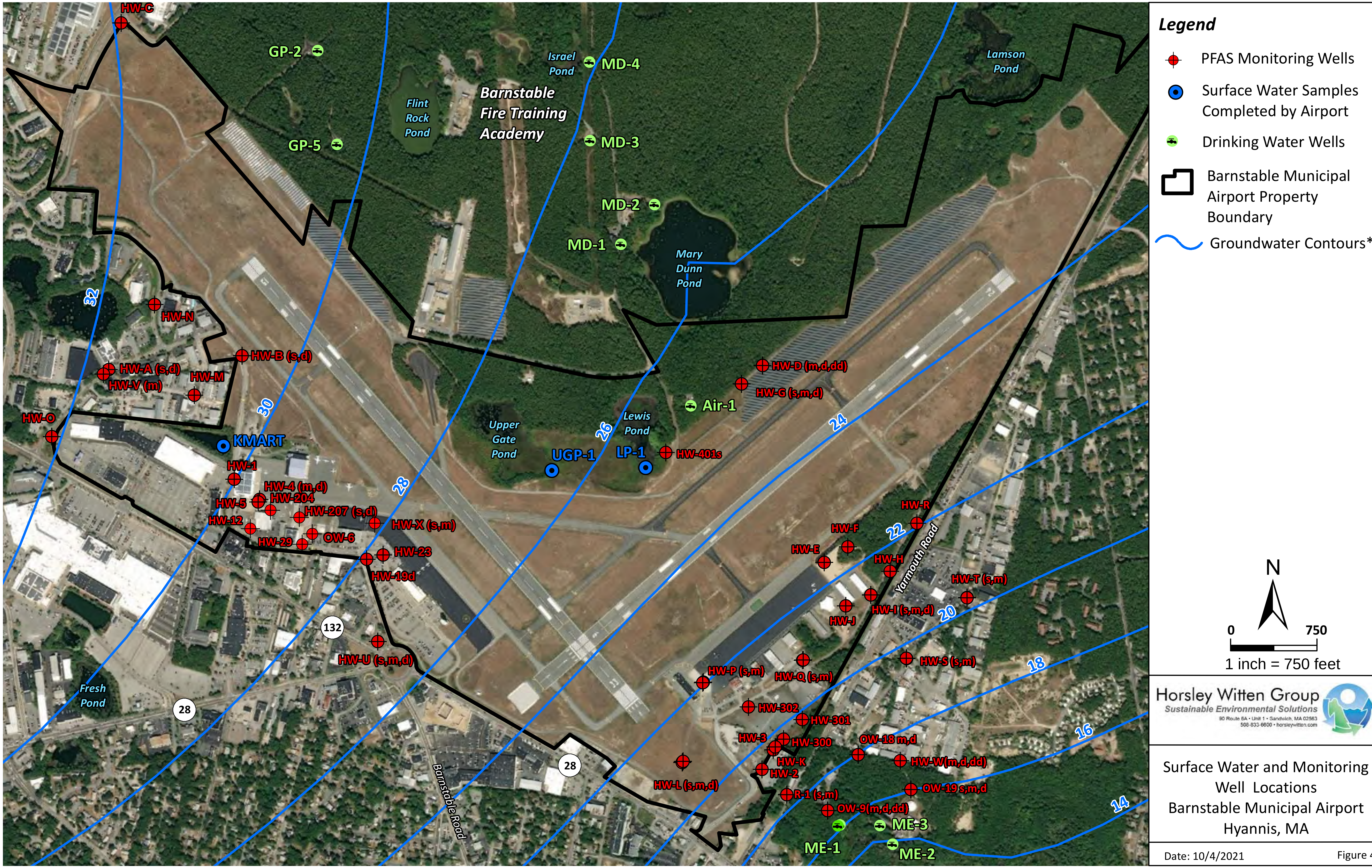
Soil Sample Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 10/4/2021 Figure 3

*Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\Soil Sample Locations.mxd*




Surface Water and Monitoring Well Locations
Barnstable Municipal Airport
Hyannis, MA

Date: 10/4/2021 Figure 4

* Cape Cod Commission (CCC) Groundwater Contours

Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\200408_Well Locations.mxd


*Legend*

Groundwater Contours*

Samples exceeding MassDEP S-1/GW-1 Standard

ARFF Asphalt Cap

Deployment Area Liner Cap

**Maximum Concentration of Total PFAS Detected in Soil (ug/kg)**

- 0 - 0.5
- 0.5 - 1
- 1 - 5
- 5 - 20
- 20 - 100
- 100 - 200
- 200 - 500
- 500 - 1000
- 1000 - 2000
- 2000 - 6000

Notes:
1. Multiple circles indicates samples at different depths. The larger the circle, the deeper the sample.

2. Total PFAS is the sum of all laboratory reported PFAS analytes.

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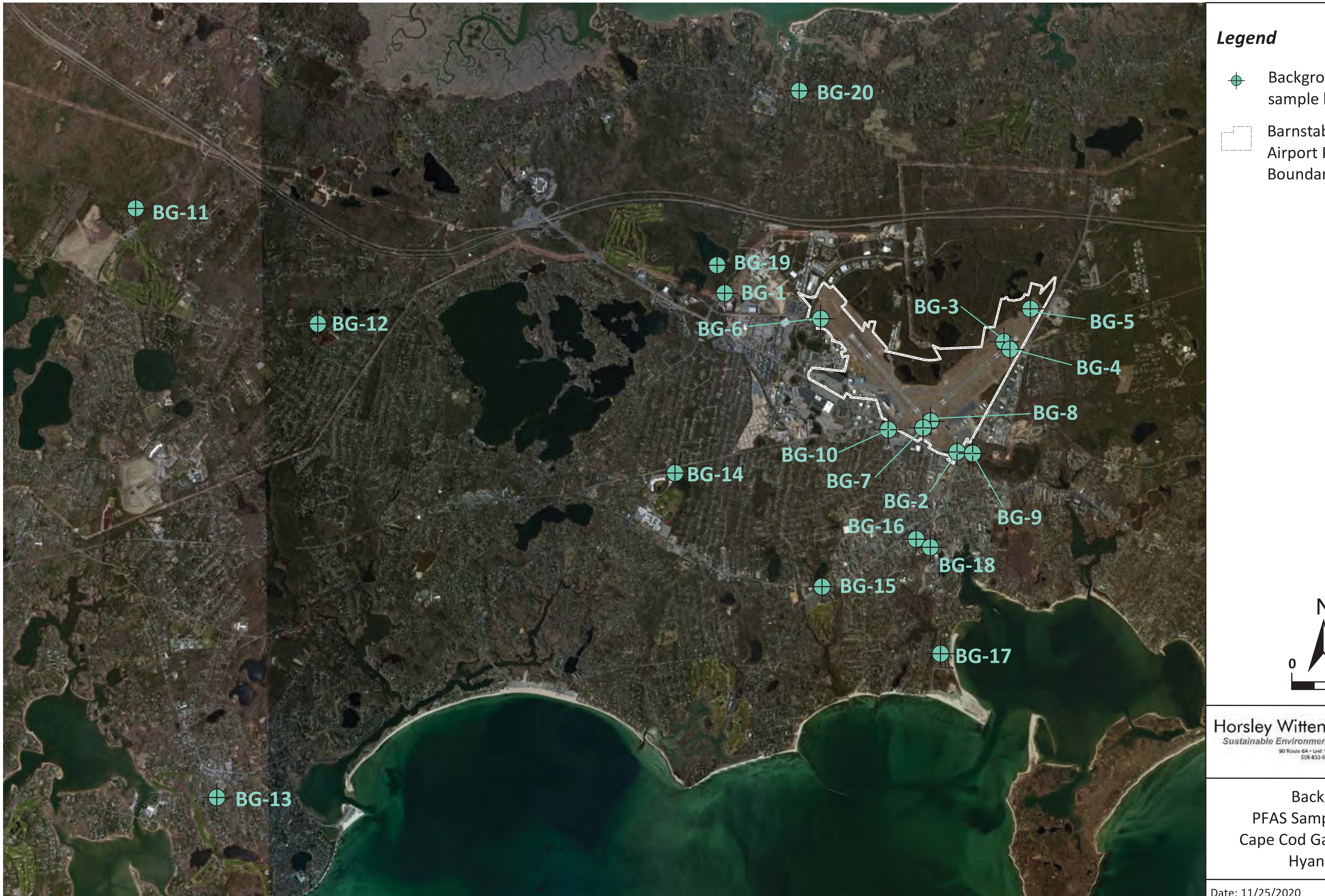
Sum of Six PFAS in Soil
Cape Cod Gateway Airport
Hyannis, MA

Date: 8/11/2021

Figure 5

*Path: H:\Projects\HYA\21084 PFOS Phase III\GIS\Maps\201030_SoilPFASTotalZoom.mxd*

* Cape Cod Commission (CCC) Groundwater Contours




***Legend***

Background PFAS sample locations

Barnstable Municipal Airport Property Boundary

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Background
PFAS Sample Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 11/25/2020 Figure 6

*Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\180110_PFOS_BackgroundSampleLocations.mxd*


*Legend*

- Soil Sample Location 6-24 A Composite (0-1')
- Soil Sample Location 6-24 A Composite (1-2')
- Soil Sample 6-24 B (0-1') Composite Locations
- Soil Sample 6-24 B (1-2') Composite Locations
- Soil Sample 6-24 C (0-1') Composite Locations
- Soil Sample 6-24 C (1-2') Composite Locations
- Barnstable Municipal Airport Property Boundary

N

0 375

1 inch = 375 feet

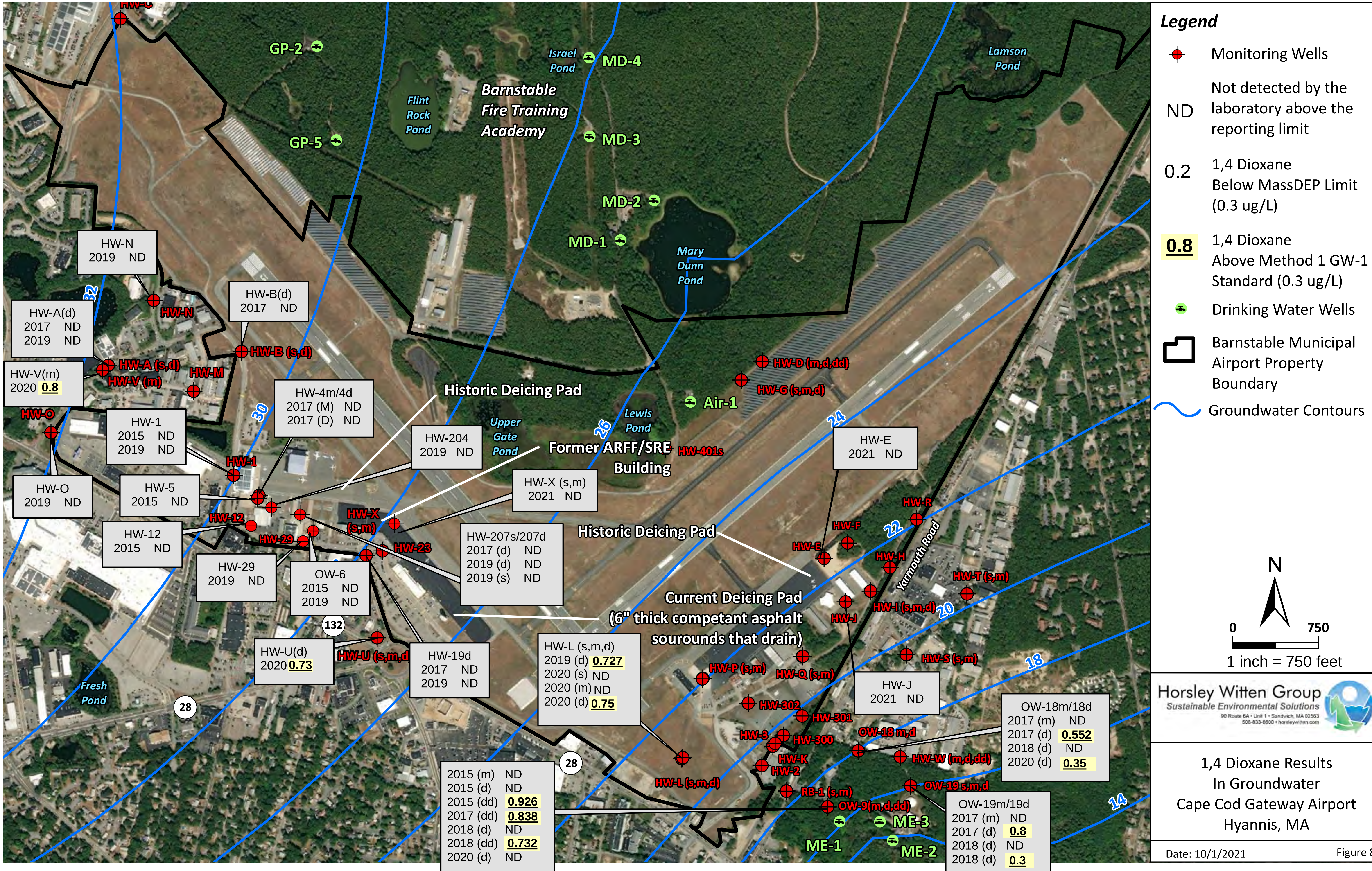
Horsley Witten Group
Sustainable Environmental Solutions

Surficial Soil Sampling
Runway 6/24 Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 3/17/2022 Figure 7

* Cape Cod Commission (CCC) Groundwater Contours

Path: H:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\220302_Surficial Soil Sampling.mxd

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TOC Sample Locations
Cape Cod Gateway Airport
Hyannis, MA

Date: 8/9/2021 Figure 9

* Cape Cod Commission (CCC) Groundwater Contours

Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\TOC Sample Locations.mxd

TABLES

Table 1
Community Notification List
Cape Cod Gateway Airport Public Involvement Plan

| NAME | ADDRESS |
|---|---|
| Brad Schiff | bschiff@pierce-cote.com |
| Bronwen Walsh | bwalsh@barnstablepatriot.com |
| Chanda Beaty | chanda123@yahoo.com |
| David Dow | ddow420@comcast.net |
| Geoff Spillane | gspillane@capecodonline.com |
| Gerard Martin | gerard.martin@mass.gov |
| Gordon Starr | gordon.m.starr@gmail.com |
| Keith Lewison | keith.lewison@gmail.com |
| Lisa Connors | lconnors@pierce-cote.com |
| Paul Neary | nearyprecinct6@gmail.com |
| Steve Seymour | steveseymour@comcast.net |
| Tom Cambareri | tomcambareri@gmail.com |
| Sue Phelan | suephelan@comcast.net |
| Chris Greeley | greeleyc@comcast.net |
| Laurie Ruszala | lruszala@yarmouth.ma.us |
| Paul phalan | phalanpaul@gmail.com> |
| Amanda Rose | 504 Pitchers Way<br>Hyannis, MA 02601 |
| Angela Gallagher | MassDEP Southeast Regional Office<br>Bureau of Waste Site Cleanup<br>20 Riverside Drive<br>Lakeville, MA 02347 |
| Anthony Alva | 184 Mockingbird Lane<br>Marstons Mills, MA 02646 |
| Araceli Alcantara | 67 Coolidge Road<br>West Yarmouth, MA 02673 |
| Arthur Beatty | 699 Cotuit Road<br>Marstons Mills, MA 02648 |
| Bruce Murphy | Health Department<br>Town of Yarmouth<br>1146 Route 28<br>South Yarmouth, MA 02664 |
| Ronald Beaty | 245 Parker Rd.<br>West Barnstable, MA 02668 |
| Rong Jian Liu | 5 Fishing Brook Road<br>Yarmouth, MA 02664 |
| Scott Beaty | 29 Washington Avenue<br>West Yarmouth, MA 02673 |
| Sue Phelan | Green Cape - PO Box 631<br>West Barnstable, MA 02668 |
| Sylvia Laselva | 358 Sea Street<br>Hyannis, MA 02673 |
| Vilson Kote | 106 Betty's Path<br>West Yarmouth, MA 02673 |

| NAME | ADDRESS |
|---|---|
| Charlie Bloom | 29 Oak Street<br>Hyannis, MA 02601 |
| Cheryl Osimo | MBCC<br>PO Box 202<br>Franklin, MA 02038 |
| Christian Cook | 37 Maple Avenue<br>Hyannis, MA 02601 |
| Daniel Knapik | Town Administrator<br>Town of Yarmouth<br>424 Rte. 28<br>West Yarmouth, MA 02673 |
| Daniel Santos | Department of Public Works<br>Town of Barnstable<br>397 Main Street<br>Hyannis, MA 02601 |
| Darcy Karie | Conservation Commission<br>Town of Barnstable<br>397 Main Street<br>Hyannis, MA 02601 |
| David Beaty | 137 Harbor Bluff Road<br>Hyannis, MA 02601 |
| Eric Kristofferson | Hyannis Fire Department<br>95 High School Road Ext.<br>Hyannis, MA 02601 |
| Hans Keijser | Department of Public Works<br>Town of Barnstable<br>397 Main Street |
| Janine Voiles | 67 Coolidge Road<br>West Yarmouth, MA 02673 |
| Jeanny Fichter | 1640 Old Stage Rd.<br>West Barnstable, MA 02668 |
| Karl Von Hone | Yarmouth Natural Resources<br>Town of Yarmouth<br>424 Route 28<br>West Yarmouth, MA 02673 |
| Luiz Gonzaga | 92 High School Rd.<br>Hyannis, MA 02601 |
| M. Curley | 39 Oak Ridge Road<br>Osterville, MA 02655 |
| Thomas McKean | Board of Health<br>Town of Barnstable<br>397 Main Street<br>Hyannis, MA 02601 |
| Maia Fitzstevens | Silent Spring Institute<br>320 Nevada Street, Suite 302<br>Newton, MA 02460 |
| Mainur Kote | 106 Betty's Path<br>West Yarmouth, MA 02673 |
| Mainur Kote | 106 Betty's Path<br>West Yarmouth, MA 02673 |
| Margo Pisacano | 73 Harbor Bluff Road<br>Hyannis, MA 02601 |
| Mark Ells | Town Manager<br>Town of Barnstable<br>397 Main Street<br>Hyannis, MA 02601 |
| Mark Forest | Board of Selectmen<br>c/o Town Administrator's Office<br>1146 Route 28<br>South Yarmouth, MA 02664 |
| Mr. Michael Gorenstein | Department of Public Works<br>Town of Barnstable<br>397 Main Street |
| Nancy Wentzel-Johnson | PO Box 342<br>Hyannis, MA 02601 |
| Peter Burke | Hyannis Fire Department<br>95 High School Road Ext.<br>Hyannis, MA 02602 |
| Richard A. Zoino | 92 High School Road<br>Hyannis, MA 02601 |
| Richard Rougeau | 306 Longbeach Road<br>Centerville, MA 02632 |
| | |

Table 2. Soil Results for PFAS Compounds ug/kg

| Sample Location | | | | ARFF Building | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Method 1 Standard | | UCL | ARFF1 (0-1') | ARFF1 (2') | ARFF1 (4') | ARFF2 (0-1') | ARFF3 (0-1') | ARFF3 (10-12) | ARFF4 (0-1') | ARFFCB (0-1) | A1 (0-1') | A2 (0-1') | A3 (0-1') | A4 (0-1') | A5 (0-1') | A5 (2-4') | A6 (0-1') | A7 (0-1') | A8 (0-1') | A9 (0-1') | A10 (0-1') | A11 (0-1') | A12 (0-1') | A13 (0-1') | A13 (0-1') | A14 (0-1') | A14 (0-1') | A15 (0-1') | A15 (0-1') | A16 (0-1') | A17 (0-1') | A18 (0-1) | A19 (0-1) | A20 (0-1) | A20 (2-4) | A21 (0-1) | A22 (0-1) | HW-P(M) [8-10] | HW-P(M) [18-20] | DL1(0-1') |
| Sample Date | S-1/GW-1 | S-1/GW-3 | | 6/20/2017 | 9/26/2017 | 9/26/2017 | 6/20/2017 | 9/26/2017 | 10/9/2018 | 9/26/2017 | 9/26/2017 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 9/24/2020 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 2/27/2019 | 9/29/2020 | 2/27/2019 | 5/13/2020 | 2/27/2019 | 5/13/2020 | 9/17/2020 | 9/17/2020 | 9/29/2020 | 9/24/2020 | 9/24/2020 | 9/24/2020 | 9/24/2020 | 9/29/2020 | 9/18/2020 | 9/18/2020 | 6/20/2017 |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | 300 | 4,000 | **0.82 J** | **1.8** | **0.66 J** | 0.17 U | **0.60 J** | 0.32 J | **0.75 J** | **0.60 J** | 0.19 U | 0.19 U | 0.38 J | 0.19 U | **1.1** | 0.089 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | **<2.0** | 0.396 J | **<1.9** | **0.51 J** | **<2.0** | 0.21 U | 0.067 J | **1.07** | 0.076 J | 0.101 J | 0.09 U | 0.09 U | 0.045 U | 0.096 J | 0.044 U | 0.043 U | 0.30 J |
| Perfluorohexanesulfonic acid (PFHxS) | 0.3 | 300 | 4,000 | 0.23 U | 0.23 U | 0.23 U | 0.23 U | **0.64 J** | 0.24 U | 0.23 U | 0.23 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.12 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | **<2.0** | 0.058 U | **<1.9** | 0.24 U | **<2.0** | 0.21 U | 0.085 J | 0.058 U | 0.054 U | 0.059 U | 0.121 U | 0.121 U | 0.06 U | 0.055 U | 0.059 U | 0.058 U | 0.23 U |
| Perfluorooctanoic acid (PFOA) | 0.72 | 300 | 4,000 | **0.75 J** | **2.6** | **0.75 J** | 0.26 U | **0.78 J** | **1.9** | **0.97 J** | **0.90 J** | 0.25 U | 0.25 U | 0.37 J | 0.30 J | **1.9** | 0.228 J | 0.25 U | 0.25 U | 0.25 U | 0.34 J | 0.25 U | 0.25 U | 0.25 U | **<2.0** | 0.67 J | **<1.9** | 0.68 J | **<2.0** | 0.14 U | 0.088 J | **0.989** | 0.111 J | 0.129 J | 0.196 J | 0.147 J | 0.042 U | 0.069 J | 0.089 J | 0.046 J | 0.26 U |
| Perfluorononanoic acid (PFNA) | 0.32 | 300 | 4,000 | **2.5** | **5.7** | **1.4** | 0.20 J | **0.91 J** | **3.1** | **2.9** | 0.17 U | 0.22 U | 0.22 U | **0.51 J** | 0.22 U | **0.87 J** | 0.148 U | 0.22 U | 0.22 U | 0.22 U | 0.22 U | 0.22 U | 0.22 U | 0.22 U | **<2.0** | **1.2** | **<1.9** | **0.54 J** | **<2.0** | 0.15 U | 0.119 J | **0.774 J** | 0.281 J | 0.246 J | 0.15 U | 0.15 U | 0.075 U | 0.11 J | 0.073 U | 0.072 U | 0.17 U |
| Perfluorooctane sulfonate (PFOS) | 2 | 300 | 4,000 | **4.5** | **2.7** | 1.1 | 0.29 J | **4.4** | 1.1 | 1.0 | 1.1 | 0.26 U | 0.26 U | 0.29 J | 0.26 U | 0.26 U | 0.257 U | 0.26 U | 0.38 J | 0.26 U | 0.85 J | 0.26 U | 0.26 U | 0.26 U | <2.0 | 1.3 | <1.9 | 0.32 J | <2.0 | 0.29 J | **2.02** | 0.573 J | 1.15 | 0.611 J | 0.259 U | 0.26 U | 0.276 J | 0.559 J | 0.0127 U | 0.0124 U | 0.40 J |
| Perfluorodecanoic Acid (PFDA) | 0.3 | 300 | 4,000 | **4.4** | **1.2** | **0.62 J** | 0.13 U | **1.6** | 0.28 U | **0.85 J** | 0.13 U | 0.28 U | 0.28 U | **0.42 J** | 0.28 U | **1.4** | 0.133 U | 0.28 U | 0.28 U | 0.28 U | 0.28 U | **0.33 J** | 0.28 U | 0.28 U | **<2.0** | **0.34 J** | **<1.9** | **0.95 J** | **<2.0** | 0.15 U | 0.074 J | 0.147 J | 0.146 J | 0.066 U | 0.134 U | 0.134 U | 0.067 U | 0.119 J | 0.065 U | 0.064 U | **0.63 J** |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | NA | 0.93 J | 0.74 J | 1 | 0.23 U | 0.61 J | 4.2 | 0.65 J | 2.2 | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 18 | 0.355 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | <2.0 | 0.173 U | <1.9 | 0.25 U | <2.0 | 0.22 U | 0.17 U | 0.172 U | 0.161 U | 0.175 U | 0.358 U | 0.359 U | 0.179 U | 0.164 U | 0.221 J | 0.172 U | 0.39 J |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | NA | NA | 120.06 | 41.75 | 46.85 | 1.16 | 23.72 | 11.03 | 11.9 | 95.43 | 0 | 0 | 6.2 | 1.14 | 161.07 | 0.613 | 1.5 | 1.35 | 0.48 | 1.92 | 1.1 | 0.43 | 0 | 0.0 | 5.2 | 0 | 13.15 | 0.0 | 0.45 | 3.131 | 11.267 | 2.652 | 1.409 | 0.316 | 0.147 | 0.571 | 1.412 | 0.411 | 0.09 | 11.14 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | NA | NA | 12.97 | 14 | 4.53 | 0.49 | 8.93 | 6.42 | 6.47 | 2.6 | 0 | 0 | 1.97 | 0.3 | 5.27 | 0.228 | 0 | 0.38 | 0 | 1.19 | 0.33 | 0 | 0 | 0 | 3.916 | 0 | 3 | 0 | 0.29 | 2.453 | 3.553 | 1.764 | 1.087 | 0.196 | 0.147 | 0.276 | 0.953 | 0.089 | 0.046 | 1.33 |

| Sample Location | | | | Deployment Area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Method 1 Standard | | UCL | 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') | DL11 (4-6') | DL11 (10-12') | DL11 (14-16') | DL12 (0-1') | DL13 (0-1') | DL14 (0-1') | DL14 (4-6') | DL14 (10-12') | DL14 (14-16') | DL15 (0-1) | DL16 (0-1) | DL17 (0-1) | DL18 (0-1) | DL19 (0-1) | DL20 (0-1) | DL21 (0-1) | DL22 (2-4) | DL22 (6-8) |
| Sample Date | S-1/GW-1 | S-1/GW-3 | | 6/20/2017 | 9/26/2017 | 9/26/2017 | 6/20/2017 | 9/26/2017 | 9/26/2017 | 6/20/2017 | 9/26/2017 | 9/26/2017 | 6/20/2017 | 9/26/2017 | 9/26/2017 | 6/20/2017 | 6/20/2017 | 6/20/2017 | 9/26/2017 | 6/20/2017 | 6/20/2017 | 9/26/2017 | 8/20/2019 | 10/4/2018 | 10/4/2018 | 10/4/2018 | 9/26/2017 | 9/26/2017 | 9/26/2017 | 10/4/2018 | 10/4/2018 | 10/4/2018 | 9/30/2020 | 9/30/2020 | 9/25/2020 | 9/25/2020 | 9/25/2020 | 9/25/2020 | 9/25/2020 | 9/25/2020 | 9/25/2020 |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | 300 | 4,000 | **1.9** | **1.2** | 0.48 J | **0.84 J** | 0.17 U | 0.17 U | 0.31 J | 0.17 U | 0.17 U | **2.5** | 0.40 J | 0.50 J | **5.0** | **2.5 J** | **2.9 J** | **4.7 J** | **0.66 J** | **1.3** | **2.1** | **1.8** | **1.3** | 0.31 J | 0.23 J | **1.2** | **1.6** | **4.9** | 0.36 J | 0.19 U | **1.4** | 0.175 U | 0.138 J | 0.167 U | 0.319 J | 0.145 U | 0.157 U | 0.158 U | 0.109 J | 0.481 J |
| Perfluorohexanesulfonic acid (PFHxS) | 0.3 | 300 | 4,000 | **1.8** | **1.3** | **0.59 J** | **0.34 J** | 0.23 U | 0.23 U | 0.23 U | 0.23 U | 0.23 U | **0.49 J** | **0.49 J** | 0.23 U | 0.23 U | **2.3 U** | **2.3 U** | **2.3 U** | **0.35 J** | **0.94 J** | **0.82 J** | **<0.9** | 0.24 U | 0.24 U | 0.24 U | 0.23 U | 0.23 U | **0.71 J** | 0.24 U | 0.24 U | **0.74 J** | 0.235 U | 0.057 U | 0.224 U | 0.159 J | 0.194 U | 0.21 U | 0.212 U | 0.057 U | 0.07 J |
| Perfluorooctanoic acid (PFOA) | 0.72 | 300 | 4,000 | **1.6** | **4.1** | **0.74 J** | **0.80 J** | 0.26 U | 0.26 U | **0.83 J** | 0.26 U | 0.26 U | **3.7** | **1.6** | 0.26 U | 0.26 U | **4.2 J** | **25** | **22** | 0.68 J | **1.7** | **4.7** | **5.2** | **2.9** | **1.9** | 0.50 J | **4.6** | **2.4** | **23** | 0.58 J | 0.32 J | **2.9** | 0.334 J | 0.223 J | 0.166 J | **0.979 J** | 0.135 U | 0.146 U | 0.159 J | 0.447 J | **1.32** |
| Perfluorononanoic acid (PFNA) | 0.32 | 300 | 4,000 | **0.81 J** | **2.5** | 0.17 U | **0.55 J** | 0.17 U | 0.17 U | **2.7** | 0.17 U | **3.7** | 0.19 J | 0.17 U | 0.17 U | 0.19 J | **9.6 J** | **46** | **1.7 U** | 0.22 J | 0.17 U | **16** | **2.4** | **2.5** | 0.22 U | 0.22 U | **7.3** | **1.5** | **10** | 0.22 U | 0.22 U | **10** | 0.292 U | 0.285 J | 0.277 U | 0.296 J | 0.241 U | 0.261 U | 0.263 U | **5.46** | **2.66** |
| Perfluorooctane sulfonate (PFOS) | 2 | 300 | 4,000 | **12** | 1.5 | 0.21 U | 0.51 J | 0.21 U | 0.21 U | 2.0 | 0.21 U | 0.50 J | 0.21 U | 0.21 U | 0.21 U | 0.21 U | **3.9 J** | **14** | **2.1 U** | 0.38 J | 0.26 J | **29** | 1.5 | 0.26 U | 0.26 U | 0.26 U | **23** | 0.66 J | **7.6** | 0.26 U | 0.26 U | **2.3** | 0.505 U | 0.575 J | 0.481 U | 1.05 J | 0.418 U | 0.452 U | 0.456 U | **20.3** | **8.85** |
| Perfluorodecanoic Acid (PFDA) | 0.3 | 300 | 4,000 | 0.13 U | 0.13 U | 0.13 U | **1.4** | 0.13 U | 0.13 U | **1.3** | 0.13 U | 0.13 U | 0.13 U | 0.13 U | 0.13 U | 0.13 U | **1.3 U** | **1.3 U** | **1.3 U** | 0.13 U | 0.13 U | **1.8** | **8.7** | 0.28 U | 0.28 U | 0.28 U | **0.66 J** | **7.4** | **9.6** | 0.28 U | 0.28 U | 0.28 U | 0.26 U | 0.181 J | 0.248 U | 0.167 J | 0.215 U | 0.233 U | 0.235 U | **0.834 J** | **0.383 J** |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | NA | 0.23 U | 0.23 U | 0.57 J | 3.1 | 1.5 | 1 | 0.24 J | 0.23 U | 1.7 | 0.23 U | 0.23 U | 0.23 U | 2 | 290 | 1600 | 900 | 0.23 U | 0.23 U | 7.8 | 30 | 4.1 | 4.4 | 6.7 | 62 | 320 | 230 | 0.67 J | 0.30 J | 64 | 0.698 U | 0.168 U | 0.664 U | 0.19 U | 0.577 U | 0.625 U | 0.629 U | 7.49 | 11.7 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | NA | | 24.41 | 12.17 | 2.38 | 84.86 | 9.56 | 13.81 | 9.6 | 0.88 | 5.9 | 11.03 | 2.49 | 0.5 | 18.59 | 404.4 | 1727.2 | 949.6 | 6.38 | 9.1 | 85.22 | 91.5 | 11.07 | 6.82 | 7.63 | 108.56 | 521.26 | 598.24 | 50.11 | 21.22 | 116.64 | 4.523 | 2.269 | 0.628 | 4.84 | 0 | 0 | 0.68 | 66.813 | 41.988 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | NA | NA | 18.11 | 10.6 | 1.81 | 4.44 | 0 | 0 | 7.14 | 0 | 4.2 | 6.88 | 2.49 | 0.5 | 5.19 | 20.2 | 87.9 | 26.7 | 2.29 | 4.2 | 54.42 | 19.6 | 6.7 | 2.21 | 0.73 | 36.76 | 13.56 | 55.81 | 0.94 | 0.32 | 17.34 | 0.334 | 1.402 | 0.166 | 2.97 | 0 | 0 | 0.159 | 27.15 | 13.764 |

| Sample Location | | | | **Deployment Area** | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Method 1 Standard | | UCL | DL22 (18-20) | DL23 (0-1) | D1 (0-1') | D2 (0-1') | D3 (0-1') | D4 (0-1') | D5 (0-1') | D6 (0-1') | D7 (0-1') | D8 (0-1') | D9 (0-1') | D10 (0-1') | D11 (0-1') | D12 (0-1') | HW-F (10-12') | HW-F (14-16') | HW-3 (0-1') | MCI Drill (0-1) | Annual Deployment (0-1) | | |
| Sample Date | S-1/GW-1 | S-1/GW-3 | | 9/25/2020 | 9/29/2020 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 8/14/2018 | 10/4/2018 | 10/4/2018 | 10/9/2018 | 12/9/2016 | 12/9/2016 | | |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | 300 | 4,000 | 0.073 J | 0.24 J | 0.19 U | 0.21 J | 0.19 U | **0.95 J** | 0.22 J | 0.25 J | **7.8** | **1.0** | **2.7** | 0.19 U | 0.19 U | 0.19 U | 0.32 J | **1.3** | 0.19 U | **8.4** | **20** | | |
| Perfluorohexanesulfonic acid (PFHxS) | 0.3 | 300 | 4,000 | 0.059 U | 0.134 J | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | **0.31 J** | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.24 U | **0.5 J** | **4 U** | | |
| Perfluorooctanoic acid (PFOA) | 0.72 | 300 | 4,000 | 0.176 J | 0.471 J | 0.25 U | 0.33 J | 0.25 U | **1.1** | 0.25 U | 0.28 J | **14** | **2.2** | **3** | 0.25 U | 0.25 U | 0.25 U | 0.25 U | **1.4** | 0.25 U | **23** | **100** | | |
| Perfluorononanoic acid (PFNA) | 0.32 | 300 | 4,000 | **0.476 J** | 0.176 J | 0.22 U | **0.67 J** | 0.22 U | **0.98 J** | 0.22 U | 0.22 U | **10** | **0.59 J** | **0.83 J** | 0.22 U | 0.22 U | 0.32 J | 0.22 U | 0.22 U | 0.22 U | **14** | **31** | | |
| Perfluorooctane sulfonate (PFOS) | 2 | 300 | 4,000 | 1.18 | 0.725 J | 0.26 U | 0.66 J | 0.38 J | **2.9** | 0.26 U | 0.26 U | **3.4** | **2.1** | 0.67 J | 0.54 J | 0.91 J | 0.44 J | 0.26 U | 0.26 U | 0.26 U | **24** | 1.9 J | | |
| Perfluorodecanoic Acid (PFDA) | 0.3 | 300 | 4,000 | 0.065 U | 0.266 J | 0.28 U | 0.28 U | 0.28 U | **0.40 J** | 0.28 U | **0.66 J** | **8.6** | **1.3** | **1.6** | 0.28 U | 0.28 U | 0.28 U | 0.28 U | 0.28 U | 0.28 U | **20** | **69** | | |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | NA | 2.67 | 0.181 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.78 J | 1.2 | 12 | 0.26 U | 6.6 | 0.26 U | 0.26 U | 0.26 U | 24 | 140 | 0.26 U | 270 | 4300 | | |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | NA | NA | 11.352 | 4.053 | 0.74 | 1.87 | 0.94 | 11.42 | 3.01 | 9.06 | 151.24 | 24.61 | 43.41 | 0.83 | 1.62 | 1.47 | 25.27 | 146.5 | 0 | 1,524 | 5,972.9 | | |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | NA | NA | 1.905 | 2.012 | 0 | 1.87 | 0.38 | 6.33 | 0.22 | 1.19 | 43.8 | 7.5 | 8.8 | 0.54 | 0.91 | 0.76 | 0.32 | 2.7 | 0 | 89.9 | 221.9 | | |

| Sample Location | | | | **1991 Drill Location** | | | | | | **Old ARFF/SRE Building** |
|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Method 1 Standard | | UCL | 1991A (0-1') | 1991B (0-1') | 1991C (0-1') | 1991D (0-1') | 1991A-B (3-4') | 1991C-D (2-3') | HW-X(m) [7-9] |
| 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 | 9/7/2021 |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | 300 | 4,000 | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.19 U | 0.043 U |
| Perfluorohexanesulfonic acid (PFHxS) | 0.3 | 300 | 4,000 | 0.24 U | **0.66 J** | 0.24 U | 0.24 U | 0.24 U | 0.24 U | 0.058 U |
| Perfluorooctanoic acid (PFOA) | 0.72 | 300 | 4,000 | 0.25 U | 0.26 J | 0.25 U | 0.25 U | 0.25 U | 0.25 U | 0.04 U |
| Perfluorononanoic acid (PFNA) | 0.32 | 300 | 4,000 | 0.22 U | 0.22 U | 0.22 U | 0.30 J | 0.22 U | 0.22 U | 0.072 U |
| Perfluorooctane sulfonate (PFOS) | 2 | 300 | 4,000 | 0.49 J | 1.1 | 0.55 J | 0.36 J | 0.30 J | 0.42 J | 0.124 U |
| Perfluorodecanoic Acid (PFDA) | 0.3 | 300 | 4,000 | 0.28 U | 0.28 U | 0.28 U | 0.28 U | 0.28 U | 0.28 U | 0.064 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | NA | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.26 U | 0.171 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | |
| Total PFAS | NA | NA | NA | 0.49 | 3.18 | 0.55 | 0.66 | 0.3 | 0.42 | 0.139 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | NA | NA | 0.49 | 2.02 | 0.55 | 0.66 | 0.3 | 0.42 | 0.124 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 the Method 1 S-1/GW-1 standard.
Total PFAS is the sum of all laboratory detected PFAS analytes including estimated values and does not include non-detects (U or <).
Sum of six includes estimated values and does not include non-detects (U or <).
UCL = Upper Concentration Limit

Table 3. Groundwater Results for PFAS Compounds ug/L

| Sample Location | | North Ramp Area | | | | | | | | | | | | | Lewis Pond Area | Airport Road/Iyannough Road Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-1 | HW-1 | HW-1 | HW-4M | HW-4M | HW-5 | HW-5 | HW-5 | HW-5 | HW-23 | HW-23 | HW-19D | HW-19D | HW-X(s) | HW-X(m) | HW-401S | HW-A(S) | HW-B(S) | HW-B(S) | HW-B(D) | HW-C | HW-M | HW-N | HW-O |
| Sample Date | | 7/1/2016 | 6/20/2017 | 11/1/2018 | 4/5/2017 | 3/25/2022 | 7/1/2016 | 4/7/2017 | 11/1/2018 | 3/25/2022 | 6/20/2017 | 11/1/2018 | 6/20/2017 | 11/7/2018 | 9/10/2021 | 9/10/2021 | 4/7/2017 | 4/7/2017 | 4/7/2017 | 10/26/2018 | 10/26/2018 | 4/7/2017 | 6/24/2019 | 6/24/2019 | 7/2/2019 |
| TOC Elevation | | 51.51 | 51.51 | 51.51 | 54.02 | 54.02 | 54.98 | 54.98 | 54.98 | 54.98 | 50.65 | 50.65 | 49.10 | 49.10 | NA | NA | 41.58 | 55.34 | 51.84 | 51.84 | 51.95 | 69.25 | 53.69 | 49.49 | 43.46 |
| Depth to Groundwater | | 21.63 | 25.00 | 21.83 | 26.20 | 25.00 | 24.94 | 26.75 | 25.27 | 25.31 | 22.70 | 24.01 | 21.29 | 22.19 | 24.74 | 25.21 | 17.95 | 24.62 | 22.26 | 21.59 | 21.66 | 38.50 | 20.32 | 15.48 | 3.62 |
| Groundwater Elevation | | 29.88 | 26.51 | 29.68 | 27.82 | 29.02 | 30.04 | 28.23 | 29.71 | 29.67 | 27.95 | 26.64 | 27.81 | 26.91 | NA | NA | 23.63 | 30.72 | 29.58 | 30.25 | 30.29 | 30.75 | 33.37 | 34.01 | 39.84 |
| Total Well Depth | | 30.84 | 30.84 | 30.84 | 32.32 | 32.32 | 27.80 | 27.80 | 27.80 | 27.80 | 28.11 | 28.11 | 41.30 | 41.30 | 29.24 | 36.82 | 23.60 | 32.00 | 30.23 | 30.23 | 57.20 | 42.15 | 26.92 | 22.33 | 14.10 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.01 | 0.0042 J | 0.013 J | 0.007 J | 0.003 | 0.0041 | 0.0084 J | 0.0074 U | 0.0048 | 0.0045J | 0.0098 J | 0.0052 J | 0.0080 J | 0.0061 | 0.0034 | 0.0043 J | 0.0048 J | 0.049 | 0.012 J | 0.0074 U | 0.0033 U | 0.007 | 0.0034 | <0.002 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.018 | 0.065 | 0.018 J | 0.02 | 0.011 | 0.011 | 0.018 J | 0.0056 U | 0.013 | 0.021 | 0.023 | 0.046 | 0.045 | 0.047 | 0.0021 | 0.011 J | 0.0079 J | 0.044 | 0.047 | 0.0056 U | 0.0034 U | 0.016 | 0.033 | 0.0043 |
| Perfluorononanoic acid (PFNA) | 100,000 | <0.002 | 0.0057 J | 0.0087 U | 0.0046 U | 0.0018 U | <0.002 | 0.0046 U | 0.0088 J | 0.0018 U | 0.0038 U | 0.0087 U | 0.0065 J | 0.0087 U | 0.00049 J | 0.002 | 0.0046 U | 0.0046 U | 0.0046 U | 0.0087 U | 0.0087 U | 0.0046 U | <0.002 | <0.002 | <0.002 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.033 | 0.022 | 0.031 | 0.011 J | 0.013 | 0.031 | 0.020 J | 0.011 J | 0.023 | 0.0046 U | 0.011 J | 0.017 J | 0.014 J | 0.013 | 0.0062 | 0.0046 U | 0.0026 U | 0.0094 J | 0.020 J | 0.012 J | 0.0026 U | 0.027 | 0.0088 | 0.0039 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.017 | 0.24 | 0.028 | 0.043 | 0.025 | 0.12 | 0.052 | 0.12 | 0.048 | 0.0079 J | 0.015 J | 0.061 | 0.069 | 0.068 | 0.034 | 0.012 J | 0.0026 U | 0.026 | 0.019 J | 0.010 J | 0.0026 U | 0.0074 | 0.004 | 0.017 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | NA | 0.0040 U | 0.0061 U | 0.0040 U | 0.0018 U | NA | 0.0040 U | 0.0061 U | 0.0018 U | 0.0040 U | 0.0061 U | 0.0040 U | 0.0061 U | 0.00050 U | 0.0042 | 0.0040 U | 0.0040 U | 0.0040 U | 0.0061 U | 0.0061 U | 0.0040 U | <0.002 | <0.002 | 0.0021 |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | 0.0032 U | 0.0066 U | 0.0038 J | 0.0018 U | NA | 0.0037 J | 0.0066 U | 0.0018 U | 0.0032 U | 0.0066 U | 0.0032 U | 0.0066 U | 0.002 J | 0.00035 U | 0.004 J | 0.0032 U | 0.0032 U | 0.0066 U | 0.0066 U | 0.0034 J | <0.002 | <0.002 | 0.002 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.078 | 0.4247 | 0.15 | 0.1162 | 0.0679 | 0.1661 | 3.0021 | 0.1507 | 0.1045 | 0.0745 | 0.0858 | 0.1758 | 0.16 | 0.18221 | 0.10025 | 0.0313 | 0.0779 | 0.4561 | 0.186 | 0.0465 | 0.0034 | 0.0927 | 0.0727 | 0.0585 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.078** | **0.3369** | **0.09** | **0.081** | **0.052** | **0.1661** | **0.0984** | **0.1398** | **0.0888** | **0.0334** | **0.0588** | **0.1357** | **0.136** | **0.13459** | **0.0519** | **0.0273** | 0.0127 | **0.1284** | **0.098** | **0.022** | <0.0046 | **0.0574** | **0.0492** | **0.0273** |

| Sample Location | | Deployment Area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (s) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (m) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-I (d) | HW-J | HW-J | HW-J | HW-J |
| Sample Date | | 11/7/2018 | 5/8/2020 | 3/17/2021 | 9/8/2021 | 3/18/2022 | 8/2/2022 | 10/31/2022 | 2/2/2023 | 6/7/2023 | 12/5/2023 | 6/24/2019 | 5/8/2020 | 3/17/2021 | 9/8/2021 | 3/18/2022 | 8/2/2022 | 10/31/2022 | 6/7/2023 | 12/5/2023 | 6/24/2019 | 5/8/2020 | 3/17/2021 | 9/11/2021 | 3/18/2022 | 8/2/2022 | 10/31/2022 | 6/7/2023 | 12/5/2023 | 11/7/2018 | 3/17/2021 | 9/10/2021 | 3/16/2022 |
| TOC Elevation | | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.08 | 36.27 | 36.27 | 36.27 | 36.27 | 36.27 | 36.27 | 36.27 | 36.27 | 36.27 | 36.02 | 36.02 | 36.02 | 36.02 | 36.02 | 36.02 | 36.02 | 36.02 | 36.02 | 37.10 | 37.10 | 37.10 | 37.10 |
| Depth to Groundwater | | 18.35 | 15.39 | 18.42 | 19.94 | 17.72 | 19.81 | 20.44 | 17.55 | 19.19 | 24.00 | 16.33 | 15.61 | 18.66 | 20.17 | 18.07 | 20.03 | 20.70 | 18.98 | 20.19 | 16.20 | 15.49 | 18.52 | 20.04 | 17.95 | 19.90 | 20.55 | 18.85 | 20.07 | 19.18 | 19.34 | 20.60 | 18.75 |
| Groundwater Elevation | | 17.73 | 20.69 | 17.66 | 16.14 | 18.36 | 16.27 | 15.64 | 18.53 | 16.89 | 12.08 | 19.94 | 20.66 | 17.61 | 16.10 | 18.20 | 16.24 | 15.57 | 17.29 | 16.08 | 19.82 | 20.53 | 17.50 | 15.98 | 18.07 | 16.12 | 15.47 | 17.17 | 15.95 | 17.92 | 17.76 | 16.50 | 18.35 |
| Total Well Depth | | 25.10 | 25.10 | 25.10 | 25.10 | 25.15 | 25.18 | 25.14 | 25.15 | 25.60 | 25.60 | 34.80 | 34.80 | 34.80 | 34.80 | 34.80 | 34.80 | 34.80 | 34.79 | 34.80 | 41.67 | 41.67 | 41.67 | 41.67 | 41.67 | 41.70 | 41.70 | 41.70 | 41.70 | 24.30 | 24.30 | 24.30 | 24.28 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.2 | 0.54 | 0.032 | 0.097 | 0.098 | 0.2 | 0.065 | 0.021 | 0.106 | 0.1 | 0.0032 | 0.0012 | 0.00086 J | 0.0014 J | 0.0024 | 0.0017 U | 0.00067 J | 0.00116 J | 0.0018 J | 0.0053 | 0.0046 | 0.0065 | 0.0083 | 0.0079 | 0.012 | 0.0093 | 0.0108 | 0.023 | 0.025 | 0.044 | 0.02 | 0.13 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.18 | 0.22 | 0.021 | 0.036 | 0.06 | 0.11 | 0.026 | 0.011 | 0.0692 | 0.04 | 0.019 | 0.0091 | 0.0052 | 0.0078 | 0.0052 | 0.0032 | 0.0042 | 0.00592 | 0.0072 | 0.057 | 0.018 | 0.031 | 0.05 | 0.039 | 0.063 | 0.045 | 0.028 | 0.023 | 0.0056 U | 0.088 | 0.01 | 0.15 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.16 | 0.082 | 0.065 | 0.033 | 0.21 | 0.12 | 0.04 | 0.028 | 0.235 | 0.15 | <0.002 | 0.00078 | 0.00048 U | 0.00046 J | 0.00061 J | 0.0017 U | 0.00061 U | 0.000518 J | 0.00088 U | <0.002 | 0.00063 U | 0.00075 J | 0.00084 J | 0.00077 J | 0.0018 U | 0.0011 J | 0.00117 J | 0.0014 J | 0.028 | 0.035 J | 0.015 | 0.062 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.26 | 0.29 | 0.05 | 0.063 | 0.11 | 0.17 | 0.067 | 0.016 | 0.172 | 0.14 | 0.0061 | 0.0018 | 0.0014 J | 0.0016 J | 0.0016 J | 0.0017 U | 0.00076 J | 0.000977 J | 0.0013 U | 0.0047 | 0.0028 | 0.0043 | 0.0053 | 0.0074 | 0.013 U | 0.0096 | 0.0101 | 0.019 | 0.026 | 0.061 | 0.0091 | 0.13 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.066 | 0.04 | 0.028 | 0.02 | 0.52 | 0.43 | 0.036 | 0.024 | 0.708 | 0.14 | 0.014 | 0.014 | 0.013 | 0.016 | 0.011 | 0.005 | 0.0043 | 0.00676 | 0.0081 | 0.012 | 0.02 | 0.038 | 0.039 | 0.047 | 0.083 | 0.063 | 0.0719 | 0.094 | 0.13 | 0.25 | 0.08 | 0.15 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.012 U | 0.00062 U | 0.0038 U | 0.00047 U | 0.00043 U | 0.0018 U | 0.00065 U | 0.0018 U | 0.02 U | 0.00072 U | <0.002 | 0.00062 U | 0.00038 U | 0.00050 U | 0.00043 U | 0.0017 U | 0.00065 U | 0.00174 U | 0.00079 U | <0.002 | 0.00062 U | 0.00038 U | 0.00048 U | 0.00043 U | 0.0018 U | 0.00065 U | 0.000296 JF | 0.00075 U | 0.0061 U | 0.0076 U | 0.00050 U | 0.00044 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 11 | 13 | 1.7 | 2.1 | 1.3 | 4.6 | 0.0013 U | 0.48 | 1.53 | 0.001 U | <0.002 | 0.00039 U | 0.0011 U | 0.00037 U | 0.00032 U | 0.0017 U | 0.0013 U | 0.00174 U | 0.0012 U | <0.002 | 0.0016 | 0.0011 U | 0.00054 | 0.00086 | 0.0018 U | 0.0013 U | 0.00174 U | 0.0011 U | 0.68 | 0.44 | 0.13 | 1.6 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 13.346 | 15.5383 | 2.082 | 2.73304 | 2.66512 | 6.1201 | 0.5101 | 0.69229 | 3.12648 | 0.9408 | 0.0718 | 0.03308 | 0.02516 | 0.03254 | 0.02985 | 0.0082 | 0.00993 | 0.018057 | 0.0223 | 0.1367 | 0.08985 | 0.15585 | 0.16687 | 0.15181 | 0.23 | 0.1844 | 0.196726 | 0.4114 | 1.074 | 1.217 | 0.511 | 2.826 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.866** | **1.172** | **0.196** | **0.249** | **0.998** | **1.03** | **0.234** | **0.1** | **1.2902** | **0.57** | **0.0423** | **0.02688** | **0.02046** | **0.02726** | **0.02081** | 0.0082 | 0.00993 | 0.015335 | **0.0171** | **0.079** | **0.0454** | **0.08055** | **0.10344** | **0.10207** | **0.158** | **0.128** | **0.122266** | **0.1604** | **0.209** | **0.478** | **0.1341** | **0.622** |

| Sample Location | | Yarmouth Road Area | | | | | | | | | | | | | Solar Field Area | | | | | | | | Steamship Parking Lot Area | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-T (s) | HW-T (s) | HW-T (m) | HW-T (m) | RB-1 (s) | RB-1 (s) | RB-1 (s) | RB-1 (s) | RB-1 (m) | RB-1 (m) | RB-1 (m) | RB-1 (m) | HW-D (m) | HW-D (m) | HW-D (d) | HW-D (d) | HW-D (dd) | HW-D (dd) | HW-G(S) | HW-G(M) | HW-G(D) | HW-2 | HW-2 | HW-2 | HW-2 |
| Sample Date | | 10/1/2020 | 5/18/2022 | 10/1/2020 | 5/18/2022 | 11/5/2020 | 3/18/2021 | 9/5/2021 | 3/31/2022 | 11/5/2020 | 3/18/2021 | 9/5/2021 | 3/31/2022 | 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 | 7/1/2016 | 5/5/2020 | 9/1/2021 | 3/25/2022 |
| TOC Elevation | | 28.97 | 28.97 | 29.11 | 29.11 | NA | NA | NA | NA | NA | NA | NA | NA | 45.20 | 45.20 | 45.08 | 45.08 | 45.05 | 45.05 | 44.99 | 45.11 | 44.93 | 40.41 | 40.41 | 40.41 | 40.41 |
| Depth to Groundwater | | 13.41 | 12.07 | 13.58 | 12.24 | 17.87 | 16.91 | 18.64 | 16.65 | 17.79 | 16.85 | 18.57 | 16.59 | 18.83 | 18.34 | 18.99 | 18.23 | 20.60 | 19.97 | 20.69 | 20.75 | 20.71 | 27.48 | 25.33 | 30.20 | 27.72 |
| Groundwater Elevation | | 15.56 | 16.90 | 15.53 | 16.87 | NA | NA | NA | NA | NA | NA | NA | NA | 26.37 | 26.86 | 26.09 | 26.85 | 24.45 | 25.08 | 24.30 | 24.36 | 24.22 | 12.93 | 15.08 | 10.21 | 12.69 |
| Total Well Depth | | 18.54 | 18.60 | 28.96 | 28.96 | 27.80 | 27.80 | 27.80 | 27.81 | 49.85 | 49.85 | 48.85 | 48.82 | 30.32 | 30.32 | 44.94 | 44.94 | 65.05 | 65.05 | 28.45 | 38.25 | 48.28 | 32.80 | 32.80 | 32.80 | 32.35 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.0039 | 0.0073 | 0.022 | 0.02 | 0.0042 | 0.0054 | 0.0077 | 0.0051 | 0.011 | 0.013 J | 0.0073 | 0.0073 | 0.0033 U | 0.00053 U | 0.021 | 0.017 | <0.002 | 0.00053 U | 0.0074 U | 0.0074 U | 0.0074 U | 0.0071 | 0.035 | 0.046 | 0.011 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.17 | 0.029 | 0.019 | 0.046 | 0.0084 | 0.03 | 0.0051 | 0.022 | 0.01 | 0.017 J | 0.0099 | 0.016 | 0.0089 J | 0.00077 U | 0.062 | 0.039 | 0.0092 | 0.008 | 0.0056 U | 0.012 J | 0.0056 U | 0.0035 | 0.0066 | 0.0056 J | 0.009 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.00074 | 0.0013 | 0.0032 | 0.00031 U | 0.0047 | 0.0025 | 0.0026 | 0.0029 | 0.0068 | 0.0072 J | 0.0044 | 0.0062 | 0.0046 U | 0.00063 U | 0.015 | 0.019 | 0.0041 | 0.0029 | 0.0087 U | 0.011 J | 0.0087 U | <0.002 | 0.016 | 0.004 J | 0.0052 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0067 | 0.01 | 0.011 | 0.0035 | 0.007 | 0.0087 | 0.0093 | 0.0092 | 0.013 | 0.013 J | 0.012 | 0.01 | 0.0046 U | 0.00071 U | 0.0088 | 0.0076 | <0.002 | 0.00071 U | 0.0033 U | 0.0033 U | 0.0033 U | 0.0063 | 0.039 | 0.012 | 0.01 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.21 | 0.035 | 0.025 | 0.0059 | 0.038 | 0.04 | 0.01 | 0.0045 | 0.049 | 0.075 | 0.055 | 0.054 | 0.022 | 0.0011 | 0.095 | 0.12 | 0.013 | 0.013 | 0.0060 U | 0.036 | 0.0060 U | 0.012 | 0.053 | 0.026 | 0.024 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00062 U | 0.00047 | 0.0014 | 0.00054 | 0.00062 U | 0.00038 U | 0.00045 U | 0.0019 U | 0.00075 | 0.0038 U | 0.0033 | 0.0028 | 0.0040 U | 0.00062 U | <0.002 | 0.00062 U | <0.002 | 0.00062 U | 0.0061 U | 0.0061 U | 0.0061 U | NA | 0.00062 U | 0.0025 U | 0.0018 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.00039 U | 0.00032 U | 0.00039 U | 0.00033 U | 0.00039 U | 0.0011 U | 0.00034 U | 0.0019 U | 0.038 | 0.055 | 0.013 | 0.02 | 0.0032 U | 0.00039 U | 0.0022 | 0.00039 U | 0.002 U | 0.00039 U | 0.0066 U | 0.0066 U | 0.0066 U | NA | 0.15 | 0.071 | 0.052 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.44114 | 0.1295 | 0.3254 | 0.33614 | 0.08008 | 0.1175 | 0.06755 | 0.0713 | 0.2015 | 0.2642 | 0.1561 | 0.1733 | 0.0309 | 0.0011 | 0.2768 | 0.24993 | 0.0263 | 0.02444 | 0.0087 U | 0.059 | 0.0087 U | 0.0289 | 0.42678 | 0.4136 | 0.1563 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.39134** | **0.08307** | **0.0816** | **0.07594** | **0.0623** | **0.0866** | **0.0347** | **0.0437** | **0.09055** | **0.1252** | **0.0919** | **0.0963** | **0.0309** | 0.0011 | **0.2018** | **0.2026** | **0.0263** | **0.0239** | 0.0087 U | **0.059** | 0.0087 U | **0.0289** | **0.1496** | **0.0936** | **0.0592** |

| Sample Location | | Maher Well Area | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | ME-1* | MW-1* | ME-1* | ME-1* | ME-1* | ME-1* | ME-2** | ME-2** | ME-2** | ME-2** | ME-2** | ME-2** | ME-3*** | ME-3*** | ME-3*** | ME-3*** | ME-3*** | ME-3*** | OW-18S | OW-18S | OW-18S | OW-18M | OW-18M | OW-18M | OW-18D | OW-18D Duplicate | OW-18D | OW-18D | OW-18D |
| Sample Date | | 9/17/2020 | 7/29/2022 | 11/2/2022 | 2/2/2023 | 5/26/2023 | 12/6/2023 | 9/17/2020 | 7/29/2022 | 11/2/2022 | 2/2/2023 | 5/26/2023 | 12/6/2023 | 9/17/2020 | 7/29/2022 | 11/2/2022 | 2/2/2023 | 5/26/2023 | 12/6/2023 | 7/5/2016 | 12/7/2018 | 5/8/2020 | 7/5/2016 | 12/7/2018 | 5/8/2020 | 7/5/2016 | 7/5/2016 | 4/11/2017 | 12/7/2018 | 5/13/2020 |
| TOC Elevation | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 39.03 | 39.03 | 39.03 | 39.30 | 39.30 | 39.30 | 38.84 | 38.84 | 38.84 | 38.84 | 38.84 |
| Depth to Groundwater | | 3.60 | NA | NA | NA | NA | NA | 6.50 | NA | NA | NA | NA | NA | 6.00 | NA | NA | NA | NA | NA | 24.40 | 24.29 | 23.45 | 25.82 | 24.72 | 23.93 | 25.95 | 25.95 | 25.55 | 24.28 | 23.47 |
| Groundwater Elevation | | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 14.63 | 14.74 | 15.58 | 13.48 | 14.58 | 15.37 | 12.89 | 12.89 | 13.29 | 14.56 | 15.37 |
| Total Well Depth | | 81.20 | NA | NA | NA | NA | NA | 54.20 | NA | NA | NA | NA | NA | 50.30 | NA | NA | NA | NA | NA | 31.23 | 31.23 | 31.23 | 74.44 | 74.44 | 74.44 | 123.36 | 123.36 | 123.36 | 123.36 | 123.36 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.011 | 0.025 | 0.017 | 0.015 | 0.018 | 0.015 | 0.0055 | 0.016 | 0.036 | 0.027 | 0.017 | 0.017 | 0.0036 | 0.0065 | 0.0082 | 0.0087 | 0.0086 | 0.012 | 0.0071 | 0.0074 U | 0.0039 | 0.0029 | 0.0074 U | 0.0074 | 0.0071 | 0.0063 | 0.015J | 0.014 J | 0.012 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.03 | 0.058 | 0.04 | 0.027 | 0.029 | 0.038 | 0.04 | 0.035 | 0.071 | 0.065 | 0.044 | 0.046 | 0.018 | 0.029 | 0.032 | 0.032 | 0.034 | 0.038 | 0.0068 | 0.0056 U | 0.0085 | 0.016 | 0.073 | 0.07 | 0.01 | 0.011 | 0.13 | 0.13 | 0.03 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.017 | 0.021 | 0.015 | 0.0098 | 0.011 | 0.012 | 0.003 | 0.0089 | 0.023 | 0.014 | 0.0067 | 0.011 | 0.004 | 0.0054 | 0.007 | 0.0063 | 0.0061 | 0.0087 | <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 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.016 | 0.029 | 0.021 | 0.015 | 0.018 | 0.019 | 0.0077 | 0.017 | 0.032 | 0.02 | 0.017 | 0.016 | 0.012 | 0.012 | 0.014 | 0.011 | 0.014 | 0.016 | 0.018 | 0.012 J | 0.01 | 0.0058 | 0.0060 J | 0.0096 | 0.0059 | 0.0059 | 0.025 | 0.019 J | 0.0095 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.11 | 0.12 | 0.087 | 0.069 | 0.069 | 0.075 | 0.095 | 0.051 | 0.093 | 0.077 | 0.065 | 0.07 | 0.072 | 0.07 | 0.086 | 0.072 | 0.083 | 0.094 | 0.0083 | 0.028 | 0.016 | 0.044 | 0.24 | 0.18 | 0.018 | 0.019 | 0.22 | 0.32 | 0.041 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00062 U | 0.0017 U | 0.001 | 0.0018 U | 0.00083 | 0.00086 J | 0.00062 U | 0.0017 U | 0.0014 J | 0.00086 J | 0.00079 U | 0.00086 J | 0.00062 U | 0.0017 U | 0.00064 | 0.0018 U | 0.00074 | 0.00083 U | NA | 0.0061 U | 0.00062 U | NA | 0.0061 U | 0.00062 U | NA | NA | 0.0040 U | 0.0061 U | 0.00062 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.034 | 0.046 | 0.026 | 0.026 | 0.043 | 0.022 | 0.00039 U | 0.043 | 0.25 | 0.31 | 0.045 | 0.07 | 0.0071 | 0.0054 | 0.0035 | 0.004 | 0.0027 | 0.014 | NA | 0.0066 U | 0.00039 U | NA | 0.0066 U | 0.00039 U | NA | NA | 0.0032 U | 0.0066 U | 0.00039 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.2873 | 0.4769 | 0.3426 | 0.2712 | 0.31403 | 0.15986 | 0.2009 | 0.2702 | 0.73928 | 0.70216 | 0.3223 | 0.35446 | 0.14005 | 0.1796 | 0.221 | 0.2012 | 0.21741 | 0.27988 | 0.0402 | 0.0573 | 0.05953 | 0.0763 | 0.3891 | 0.4357 | 0.0475 | NA | 0.506 | 0.5504 | 0.1832 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.184** | **0.253** | **0.181** | **0.1358** | **0.14583** | **0.15986** | **0.1512** | **0.1279** | **0.2564** | **0.20386** | **0.1497** | **0.16086** | **0.1096** | **0.1229** | **0.1478** | **0.13** | **0.1464** | **0.1687** | **0.0402** | **0.04** | **0.0416** | **0.0763** | **0.319** | **0.2697** | **0.0475** | **0.048** | **0.39** | **0.483** | **0.0953** |

Notes:

UCL = Upper Concentration Limit

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

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

Results in ug/L, micrograms per liter.

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

**Bold results above Method 1 GW-1 standard (0.02 ug/L).**

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

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

NA = Not Applicable.

* = ME-1 is screened from 37 to 47 and 70 to 80 feet below grade.

** = ME-2 is screened from 44 to 54 feet below grade.

*** = ME-3 is screened from 40 to 50 feet below grade.

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

1. Well elevation increased due to soil cap.

Table 3. Groundwater Results for PFAS Compounds ug/L

| Sample Location | | Airport Road/Iyannough Road Area | | | | | | | | | | | | | ARFF Building Area | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-U(s) | HW-U(s) | HW-U(s) | HW-U(m) | HW-U(m) | HW-U(m) | HW-U(d) | HW-U(d) | HW-U(d) | HW-V(m) | HW-L (s) | HW-L (m) | HW-L (d) | HW-L (d) | HW-P (s) | HW-P (s) | HW-P (s) | HW-P (s) | HW-P (s) | HW-P (s) | HW-P (s) | HW-P (s) |
| Sample Date | | 4/19/2021 | 9/5/2021 | 3/15/2022 | 4/19/2021 | 9/5/2021 | 3/15/2022 | 10/2/2020 | 9/5/2021 | 3/15/2022 | 10/2/2020 | 10/7/2020 | 10/7/2020 | 6/19/2019 | 10/7/2020 | 10/1/2020 | 3/18/2021 | 9/8/2021 | 3/18/2022 | 11/2/2022 | 2/2/2023 | 6/8/2023 | 12/5/2023 |
| TOC Elevation | | NA | NA | NA | NA | NA | NA | 48.80 | 48.80 | 48.80 | 53.83 | 39.07 | 38.98 | 39.15 | 39.15 | 40.51 | 40.51 | 40.51 | 40.51 | 40.51 | 40.51 | 40.51 | 40.51 |
| Depth to Groundwater | | 23.59 | 24.53 | 22.89 | 23.50 | 24.49 | 22.80 | 24.66 | 25.24 | 23.52 | 22.90 | 21.96 | 21.88 | 19.40 | 22.22 | 22.69 | 22.09 | 23.54 | 21.61 | 23.96 | 21.42 | 22.23 | 23.47 |
| Groundwater Elevation | | NA | NA | NA | NA | NA | NA | 24.14 | 23.56 | 25.28 | 30.93 | 17.11 | 17.10 | 19.75 | 16.93 | 17.82 | 18.42 | 16.97 | 18.90 | 16.55 | 19.09 | 18.28 | 17.04 |
| Total Well Depth | | 28.83 | 28.83 | 29.15 | 38.93 | 38.93 | 39.65 | 62.30 | 62.30 | 63.65 | 36.15 | 27.33 | 37.33 | 70.55 | 70.55 | 27.60 | 27.60 | 27.60 | 27.61 | 27.61 | 27.62 | 27.60 | 27.60 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.002 J | 0.004 | 0.0027 | 0.0018 J | 0.0049 | 0.004 | 0.01 | 0.01 | 0.01 | 0.0033 | 0.00053 U | 0.0064 | 0.0078 | 0.0065 | 0.026 | 0.0067 | 0.004 | 0.01 | 0.0044 | 0.012 | 0.00698 | 0.0076 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.01 | 0.0034 | 0.0039 | 0.0043 | 0.011 | 0.0098 | 0.018 | 0.022 | 0.017 | 0.0032 | 0.0013 | 0.023 | 0.033 | 0.015 | 0.0018 | 0.00074 J | 0.00056 J | 0.0012 J | 0.00054 U | 0.0022 | 0.000798 JF | 0.0018 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0013 J | 0.0017 J | 0.0013 J | 0.00083 J | 0.0011 J | 0.0021 | 0.0016 | 0.005 | 0.0025 | 0.0017 | 0.00063 U | 0.0025 | 0.0033 | 0.0022 | 0.0061 | 0.002 | 0.0013 J | 0.0039 | 0.0016 J | 0.015 | 0.0151 | 0.013 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0075 | 0.0047 | 0.0052 | 0.0055 | 0.0094 | 0.018 | 0.01 | 0.013 | 0.013 | 0.0063 | 0.00071 U | 0.01 | 0.025 | 0.018 | 0.0084 | 0.0042 | 0.0017 J | 0.012 | 0.0037 | 0.014 | 0.0145 | 0.0034 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.06 | 0.029 | 0.012 | 0.0093 | 0.027 | 0.029 | 0.023 | 0.051 | 0.043 | 0.0059 | 0.0014 | 0.07 | 0.049 | 0.039 | 0.00097 | 0.00049 J | 0.00054 U | 0.00098 J | 0.00048 J | 0.0037 | 0.00138 JF | 0.0024 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00064 J | 0.0011 J | 0.0006 J | 0.00038 U | 0.001 U | 0.00055 J | 0.00062 U | 0.0025 U | 0.00047 J | 0.00062 U | 0.00062 U | 0.00062 U | <0.002 | 0.0019 | 0.00085 | 0.0004 J | 0.00048 U | 0.00043 U | 0.00066 U | 0.0018 U | 0.000464 J | 0.00083 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.0011 U | 0.00034 U | 0.00032 U | 0.0011 U | 0.00075 | 0.00033 U | 0.0012 | 0.04 | 0.00032 U | 0.00039 U | 0.00039 U | 0.022 | 0.0021 | 0.00078 | 0.011 | 0.0034 | 0.0014 | 0.0083 | 0.0016 J | 0.019 | 0.00441 | 0.0016 J |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.09704 | 0.06596 | 0.04424 | 0.03622 | 0.0839 | 0.10395 | 0.0889 | 0.1775 | 0.12378 | 0.0543 | 0.0027 | 0.18375 | 0.1823 | 0.12348 | 0.2478 | 0.06294 | 0.05055 | 0.08508 | 0.03898 | 0.1232 | 0.100275 | 0.1088 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.08144** | **0.0439** | **0.0257** | **0.02173** | **0.0534** | **0.06345** | **0.0588** | **0.0987** | **0.08167** | **0.0204** | 0.0027 | **0.1119** | **0.1181** | **0.0826** | **0.04412** | 0.01453 | 0.00756 | **0.02808** | **0.01018** | **0.0469** | **0.039222** | **0.0282** |

| Sample Location | | Deployment Area | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-E | HW-E | HW-E | HW-E | HW-E[1] | HW-E[1] | HW-E[1] | HW-F | HW-F | HW-F | HW-F | HW-F | HW-F | HW-H | HW-H | HW-H | HW-H† | HW-R(s) | HW-R(s) | HW-R(s) | HW-R(s) | HW-R† |
| Sample Date | | 4/5/2017 | 11/7/2018 | 8/19/2019 | 5/5/2020 | 3/17/2021 | 9/8/2021 | 3/16/2022 | 4/5/2017 | 11/7/2018 | 5/5/2020 | 3/17/2021 | 9/8/2021 | 3/16/2022 | 11/7/2018 | 5/8/2020 | 5/18/2022 | 6/1/2023 | 10/1/2020 | 3/17/2021 | 9/8/2021 | 3/16/2022 | 6/1/2023 |
| TOC Elevation | | 38.45 | 38.45 | 38.45 | 38.45 | 42.40 | 42.40 | 42.40 | 36.32 | 36.32 | 36.32 | 36.32 | 36.32 | 36.32 | 38.47 | 38.47 | 38.47 | NA | 35.72 | 35.72 | 35.72 | 35.72 | NA |
| Depth to Groundwater | | 19.05 | 19.38 | 17.82 | 16.16 | 23.35 | 25.02 | 22.67 | 19.60 | 20.08 | 16.82 | 20.01 | 21.72 | 19.34 | 20.39 | 17.37 | 20.07 | 23.10 | 18.33 | 17.37 | 19.00 | 16.69 | 18.44 |
| Groundwater Elevation | | 19.40 | 19.07 | 20.63 | 22.29 | 19.05 | 17.38 | 19.73 | 16.72 | 16.24 | 19.50 | 16.31 | 14.60 | 16.98 | 18.08 | 21.10 | 18.40 | NA | 17.39 | 18.35 | 16.72 | 19.03 | NA |
| Total Well Depth | | 26.22 | 26.22 | 26.22 | 26.22 | 30.26 | 30.26 | 30.26 | 26.89 | 26.89 | 26.89 | 26.89 | 26.89 | 26.83 | 27.09 | 27.09 | 27.07 | 28.03 | 23.56 | 23.67 | 23.67 | 23.66 | 23.25 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.15 | 0.0074 U | 0.0053 | 0.044 | 0.014 | 0.0018 J | 0.023 | 0.34 | 0.0074 U | 0.23 | 0.39 | 0.0051 | 0.36 | 0.077 | 0.28 | 0.015 | 0.00076 U | 0.021 | 0.005 | 0.021 | 0.03 | 0.0099 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.042 | 0.0056 U | 0.0021 | 0.011 | 0.0015 J | 0.00088 J | 0.0028 | 0.019J | 0.0056 U | 0.005 | 0.012 U | 0.00037 U | 0.0097 | 0.0056 U | 0.0031 | 0.0021 | 0.00099 J | 0.02 | 0.01 | 0.0046 | 0.0019 | 0.0012 J |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0087 J | 0.0087 U | <0.002 | 0.0052 | 0.00048 U | 0.00037 U | 0.0023 | 0.0046 U | 0.0087 U | 0.00081 | 0.0097 U | 0.00037 U | 0.0025 | 0.0087 U | 0.00063 U | 0.0003 U | 0.00083 U | 0.0031 | 0.001 J | 0.00034 U | 0.00031 U | 0.00081 U |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.053 | 0.0033 U | 0.0047 | 0.027 | 0.00095 J | 0.00094 J | 0.029 J | 0.075 | 0.0033 U | 0.02 | 0.052 | 0.00074 U | 0.052 | 0.0050 J | 0.002 | 0.0006 U | 0.0012 U | 0.014 | 0.004 | 0.004 | 0.0014 J | 0.0012 U |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.047 | 0.0060 U | <0.002 | 0.0037 | 0.00082 J | 0.00064 U | 0.0013 J | 0.0026 U | 0.0060 U | 0.00086 | 0.0076 U | 0.00065 U | 0.0037 | 0.0060 U | 0.00068 U | 0.00053 U | 0.00077 U | 0.016 | 0.0023 | 0.0053 | 0.001 J | 0.00074 U |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.0040 U | 0.0061 U | <0.002 | 0.00062 U | 0.00038 U | 0.00052 U | 0.00043 U | 0.0040 U | 0.0061 U | 0.00062 U | 0.0076 U | 0.00053 U | 0.00043 U | 0.0061 U | 0.00062 U | 0.00043 U | 0.00075 U | 0.00062 U | 0.00038 U | 0.00049 U | 0.00044 U | 0.00073 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 2 | 0.0066 U | 0.069 | 0.86 | 0.0035 | 0.00039 U | 0.83 | 5.7 | 0.0066 U | 1.5 | 4.8 | 0.0049 | 8.2 | 1.5 | 0.13 | 0.00032 U | 0.0011 U | 0.037 | 0.0048 | 0.003 | 0.0053 | 0.0011 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 3.2257 | 0.0087 U | 0.14 | 1.04526 | 0.04812 | 0.01342 | 0.9169 | 12.96 | 0.084 | 2.65637 | 8.422 | 0.159 | 12.18373 | 4.452 | 1.26666 | 0.165 | 0.021 | 0.2171 | 0.04878 | 0.2549 | 0.30126 | 0.0873 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.3007** | 0.0087 U | 0.0121 | **0.0909** | 0.01727 | 0.00362 | **0.0584** | **0.434** | 0.0087 U | **0.25667** | **0.442** | 0.0051 | **0.4279** | **0.082** | **0.2851** | 0.0171 | 0.00099 | **0.0741** | **0.0223** | **0.0349** | **0.0343** | **0.0111** |

| Sample Location | | Steamship Parking Lot Area | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-3 | HW-3 | HW-3 | HW-3 | HW-3 | HW-3 | HW-3 | HW-3 | HW-3 | HW-300 | HW-300 | HW-300 | HW-300 | HW-301 | HW-302 | HW-302 | HW-302 | HW-302 | HW-302 | HW-302 |
| Sample Date | | 7/1/2016 | 4/5/2017 | 10/26/2018 | 5/5/2020 | 3/17/2021 | 9/1/2021 | 3/25/2022 | 10/31/2022 | 12/6/2023 | 7/1/2016 | 3/17/2021 | 9/2/2021 | 3/31/2022 | 7/1/2016 | 7/1/2016 | 12/3/2018 | 3/17/2021 | 9/1/2021 | 3/25/2022 | 12/6/2023 |
| TOC Elevation | | 38.74 | 38.74 | 38.74 | 38.74 | 38.74 | 38.74 | 38.74 | 38.74 | 38.74 | 36.09 | 36.09 | 36.09 | 36.09 | 39.46 | 41.17 | 41.17 | 41.17 | 41.17 | 41.17 | 41.17 |
| Depth to Groundwater | | 25.81 | 25.70 | 26.06 | 23.64 | 26.19 | 28.35 | 26.03 | 27.63 | 27.43 | 22.52 | 22.86 | 23.02 | 22.53 | 25.05 | 23.52 | 22.65 | 24.04 | 26.15 | 23.70 | 25.59 |
| Groundwater Elevation | | 12.93 | 13.04 | 12.68 | 15.10 | 12.55 | 10.39 | 12.71 | 11.11 | 11.31 | 13.57 | 13.23 | 13.07 | 13.56 | 14.41 | 17.65 | 18.52 | 17.13 | 15.02 | 17.47 | 15.58 |
| Total Well Depth | | 33.08 | 33.08 | 33.08 | 33.08 | 33.12 | 33.11 | 33.70 | 33.00 | 32.99 | 30.33 | 30.30 | 30.34 | 30.40 | 30.42 | 30.45 | 30.45 | 30.44 | 30.40 | 30.42 | 30.40 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.016 | 0.1 | 0.10 | 0.1 | 0.084 | 0.035 | 0.02 | 0.054 | 0.018 | 0.0096 | 0.0028 | 0.0029 | 0.0019 U | 0.002 | 0.019 | 0.015 J | 0.0066 | 0.0062 | 0.0092 | 0.012 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.0043 | 0.020 J | 0.012 J | 0.0087 | 0.0064 J | 0.0057 J | 0.013 | 0.024 | 0.03 | 0.012 | 0.0099 | 0.00066 J | 0.006 | 0.038 | 0.0063 | 0.016 J | 0.0022 | 0.004 | 0.013 | 0.0084 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0063 | 0.027 | 0.023 | 0.021 | 0.019 J | 0.014 J | 0.0039 | 0.0097 | 0.0092 | <0.002 | 0.00099 J | 0.0028 | 0.0019 U | <0.002 | 0.054 | 0.0097 J | 0.0066 | 0.005 | 0.02 | 0.033 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0091 | 0.065 | 0.057 | 0.054 | 0.064 | 0.016 J | 0.0069 | 0.022 | 0.015 | 0.0052 | 0.0044 | 0.0044 | 0.0033 | 0.0037 | 0.033 | 0.03 | 0.005 | 0.0065 | 0.017 | 0.011 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.084 | 0.15 | 0.053 | 0.1 | 0.056 | 0.044 | 0.024 | 0.028 | 0.044 | 0.017 | 0.015 | 0.017 | 0.012 | 0.011 | 0.014 | 0.031 | 0.0041 | 0.015 | 0.0095 | 0.021 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | NA | 0.0040 U | 0.0061 U | 0.0014 | 0.0038 U | 0.0052 U | 0.0019 U | 0.00069 U | 0.00079 U | NA | 0.00038 U | 0.0006 J | 0.0019 U | NA | NA | 0.0061 U | 0.00086 J | 0.001 J | 0.0019 U | 0.0016 |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | 0.47 | 0.12 | 0.13 | 0.47 | 0.2 | 0.14 | 0.0014 U | 0.13 | NA | 0.0011 U | 0.00034 U | 0.0019 U | NA | NA | 0.13 | 0.012 | 0.0062 | 0.072 | 0.026 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.1197 | 1.603 | 0.952 | 0.96981 | 1.1394 | 0.6867 | 0.4359 | 0.73178 | 0.4776 | 0.0438 | 0.05509 | 0.03812 | 0.0369 | 0.0547 | 0.1263 | 0.3427 | 0.08304 | 0.09793 | 0.2149 | 0.20946 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.1197** | **0.362** | **0.245** | **0.2851** | **0.2294** | **0.1147** | **0.0678** | **0.1377** | **0.1162** | **0.0438** | **0.03309** | **0.02836** | **0.0213** | **0.0547** | **0.1263** | **0.1017** | **0.02536** | **0.0377** | **0.0687** | **0.087** |

| Sample Location | | Maher Well Area | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | OW-19(S) | OW-19(S) | OW-19(S) | OW-19(S) | OW-19(M) | OW-19(M) | OW-19(M) | OW-19(M) | OW-19D | OW-19D | OW-19D | OW-19D | OW-19D | HW-W(m) | HW-W(m) | HW-W(m) | HW-W(m) | HW-W(d) | HW-W(d) | HW-W(d) |
| Sample Date | | 11/6/2020 | 3/18/2021 | 9/2/2021 | 3/16/2022 | 11/6/2020 | 3/19/2021 | 9/3/2021 | 3/18/2022 | 4/11/2017 | 5/13/2020 | 3/19/2021 | 9/11/2021 | 3/18/2022 | 4/19/2021 | 9/5/2021 | 3/16/2022 | 10/31/2022 | 4/19/2021 | 9/5/2021 | 3/16/2022 |
| TOC Elevation | | NA | NA | NA | NA | NA | NA | NA | NA | 39.06 | 39.06 | 39.06 | 39.06 | 39.06 | NA | NA | NA | NA | NA | NA | NA |
| Depth to Groundwater | | 27.38 | 26.27 | 28.47 | 27.42 | 27.57 | 27.15 | 28.65 | 27.59 | 26.73 | 25.64 | 27.52 | 28.90 | 27.95 | 28.96 | 30.17 | 29.12 | 29.59 | 28.73 | 29.93 | 28.92 |
| Groundwater Elevation | | NA | NA | NA | NA | NA | NA | NA | NA | 12.33 | 13.42 | 11.54 | 10.16 | 11.11 | NA | NA | NA | NA | NA | NA | NA |
| Total Well Depth | | 34.56 | 34.65 | 34.67 | 35.20 | 76.28 | 76.24 | 76.25 | 78.05 | 110.42 | 110.42 | 110.33 | 110.34 | 112.70 | 52.04 | 58.02 | 53.10 | 52.09 | 61.78 | 61.78 | 63.02 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.0042 | 0.0044 | 0.0056 | 0.0062 | 0.03 | 0.044 | 0.014 | 0.0038 | 0.0051 J | 0.011 | 0.018 | 0.022 | 0.018 | 0.01 | 0.0034 | 0.0041 | 0.013 | 0.0021 | 0.01 | 0.01 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.0031 | 0.0064 | 0.0027 | 0.0044 | 0.027 | 0.014 J | 0.015 | 0.013 | 0.029 | 0.12 | 0.026 | 0.028 | 0.029 | 0.012 | 0.015 | 0.014 | 0.025 | 0.0088 | 0.0064 | 0.022 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0024 | 0.0012 J | 0.0025 | 0.0012 J | 0.002 | 0.0048 U | 0.0021 | 0.0022 | 0.006 J | 0.0017 | 0.0029 | 0.00088 J | 0.00042 J | 0.00077 J | 0.001 J | 0.00055 J | 0.002 | 0.0013 J | 0.0025 | 0.0023 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.011 | 0.007 | 0.0066 | 0.0085 | 0.011 | 0.0094 J | 0.0037 | 0.0045 | 0.0046 U | 0.023 | 0.0097 | 0.007 | 0.0078 | 0.0041 | 0.0024 | 0.0032 | 0.0071 | 0.0029 | 0.0094 | 0.0097 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.025 | 0.015 | 0.031 | 0.0071 | 0.047 | 0.027 | 0.029 | 0.012 | 0.029 | 0.31 | 0.047 | 0.053 | 0.041 | 0.075 | 0.042 | 0.068 | 0.13 | 0.012 | 0.017 | 0.034 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.0027 | 0.001 J | 0.00048 U | 0.00046 U | 0.00062 U | 0.0038 U | 0.00046 U | 0.00043 U | 0.0040 U | 0.00062 U | 0.00038 U | 0.00048 U | 0.00046 U | 0.00038 U | 0.00046 U | 0.00044 U | 0.00063 U | 0.00038 U | 0.00046 U | 0.00043 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.00039 U | 0.0011 U | 0.00036 U | 0.00034 U | 0.00095 | 0.011 U | 0.00035 U | 0.00032 U | 0.0032 U | 0.00039 U | 0.0011 U | 0.00036 U | 0.00034 U | 0.0011 U | 0.0029 | 0.0034 | 0.0072 | 0.0011 U | 0.00042 | 0.00059 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.0707 | 0.0634 | 0.07307 | 0.05705 | 0.37335 | 0.3974 | 0.16133 | 0.0571 | 0.0936 | 0.5463 | 0.3127 | 0.31489 | 0.28111 | 0.17849 | 0.17264 | 0.20725 | 0.3989 | 0.04339 | 0.08666 | 0.13162 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.0484** | **0.035** | **0.0484** | **0.0274** | **0.117** | **0.0944** | **0.0638** | **0.0355** | **0.0691** | **0.4657** | **0.1036** | **0.11088** | **0.09622** | **0.09707** | **0.06380** | **0.08985** | **0.1771** | **0.0271** | **0.0453** | **0.078** |

Notes:

UCL = Upper Concentration Limit

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

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

Results in ug/L, micrograms per liter.

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

**Bold results above Method 1 GW-1 standard (0.02 ug/L).**

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

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

NA = Not Applicable.

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

1. Well elevation increased due to soil cap.

Table 3. Groundwater Results for PFAS Compounds ug/L

| Sample Location | | ARFF Building Area | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-P (m) | HW-P (m) | HW-P (m) | HW-P (m) | HW-P (m) | HW-P (m) | HW-P (m) | HW-Q (s) | HW-Q (s) | HW-Q (m) |
| Sample Date | | 10/1/2020 | 3/18/2021 | 9/8/2021 | 3/18/2022 | 11/2/2022 | 6/8/2023 | 12/5/2023 | 10/1/2020 | 11/6/2020 | 10/1/2020 |
| TOC Elevation | | 40.64 | 40.64 | 40.64 | 40.64 | 40.64 | 40.64 | 40.64 | 37.89 | 37.89 | 37.90 |
| Depth to Groundwater | | 22.80 | 22.20 | 23.67 | 21.73 | 24.08 | 22.39 | 23.55 | 21.45 | 22.04 | 21.41 |
| Groundwater Elevation | | 17.84 | 18.44 | 16.97 | 18.91 | 16.56 | 18.25 | 17.09 | 16.44 | 15.85 | 16.49 |
| Total Well Depth | | 38.30 | 38.30 | 38.30 | 38.28 | 38.30 | 30.25 | 38.26 | 26.60 | 26.60 | 36.79 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.003 | 0.017 | 0.016 | 0.009 | 0.0083 | 0.00451 | 0.0052 | 0.0018 J | 0.0021 | 0.00053 U |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.00085 | 0.0015 J | 0.0013 J | 0.002 | 0.0011 J | 0.0034 | 0.021 | 0.013 | 0.0087 | 0.0019 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0011 | 0.006 | 0.0099 | 0.009 | 0.0095 | 0.00746 | 0.0073 | 0.00063 U | 0.00063 U | 0.00075 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0018 | 0.0096 | 0.01 | 0.0081 | 0.008 | 0.00378 | 0.0055 | 0.0049 | 0.0062 | 0.00095 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.0011 | 0.0035 | 0.003 | 0.0026 | 0.0022 | 0.00275 | 0.04 | 0.0041 | 0.0075 | 0.0049 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00062 U | 0.00038 U | 0.00048 U | 0.00043 U | 0.00065 U | 0.00174 U | 0.00078 U | 0.00062 U | 0.00062 U | 0.00062 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.00092 | 0.0011 U | 0.00036 U | 0.00033 U | 0.0013 U | 0.00174 U | 0.0011 U | 0.00039 U | 0.00039 U | 0.00039 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | |
| Total PFAS | NA | 0.02967 | 0.17311 | 0.15362 | 0.08697 | 0.0705 | 0.051382 | 0.1076 | 0.0307 | 0.0346 | 0.00944 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | 0.00785 | **0.0376** | **0.0402** | **0.0307** | **0.0291** | **0.0219** | **0.079** | **0.0238** | **0.0245** | 0.0085 |

| Sample Location | | Yarmouth Road Area | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-S (s) | HW-S (s) | HW-S (s) | HW-S (s) | HW-S(s) | HW-S(s) | HW-S(s) | HW-S (m) | HW-S (m) | HW-S (m) | HW-S (m) | HW-S(m) | HW-S(m) | HW-S(m) |
| Sample Date | | 10/1/2020 | 3/18/2021 | 9/3/2021 | 3/31/2022 | 8/8/2022 | 6/9/2023 | 12/6/2023 | 10/1/2020 | 3/18/2021 | 9/3/2021 | 3/25/2022 | 8/8/2022 | 6/9/2023 | 12/6/2023 |
| TOC Elevation | | 31.60 | 31.60 | 31.60 | 31.60 | 31.60 | 31.60 | 31.60 | 31.59 | 31.59 | 31.59 | 31.59 | 31.59 | 31.59 | 31.59 |
| Depth to Groundwater | | 16.88 | 16.29 | 17.30 | 15.70 | 16.43 | 17.59 | 17.59 | 17.01 | 16.35 | 17.37 | 15.48 | 17.94 | 16.76 | 17.70 |
| Groundwater Elevation | | 14.72 | 15.31 | 14.30 | 15.90 | 15.17 | 14.01 | 14.01 | 14.58 | 15.24 | 14.22 | 16.11 | 13.65 | 14.83 | 13.89 |
| Total Well Depth | | 22.10 | 22.10 | 22.10 | 22.20 | 22.15 | 22.05 | 22.05 | 32.04 | 32.04 | 32.04 | 32.05 | 32.11 | 32.10 | 32.11 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.11 | 0.14 | 0.11 | 0.061 | 0.16 | 0.0467 | 0.09 | 0.00096 | 0.0011 J | 0.0012 J | 0.0018 U | 0.0065 | 0.0257 | 0.0013 J |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.055 | 0.083 | 0.064 | 0.041 | 0.12 | 0.03 | 0.067 | 0.0064 | 0.0073 | 0.0053 | 0.0026 | 0.0074 | 0.0216 | 0.005 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.1 | 0.024 | 0.1 | 0.043 | 0.16 | 0.0442 | 0.18 | 0.00063 U | 0.00057 J | 0.00055 J | 0.0018 U | 0.0017 U | 0.0262 | 0.0019 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.062 | 0.078 | 0.13 | 0.05 | 0.23 | 0.0521 | 0.12 | 0.0013 | 0.0018 J | 0.0014 J | 0.0019 | 0.0049 | 0.0297 | 0.0014 J |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.1 | 0.03 | 0.048 | 0.048 | 0.16 | 0.185 | 0.15 | 0.0058 | 0.006 | 0.0094 | 0.0052 | 0.0096 | 0.255 | 0.017 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00062 U | 0.0038 U | 0.012 U | 0.0019 U | 0.0017 U | 0.01 U | 0.00082 | 0.00062 U | 0.00038 U | 0.00047 U | 0.0018 U | 0.0017 U | 0.00177 U | 0.00077 |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 3.7 | 3.1 | 5.2 | 0.0019 U | 0.0017 U | 1.15 | 2.4 | 0.0065 | 0.0067 | 0.0036 | 0.023 | 0.0017 U | 0.198 | 0.011 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | |
| Total PFAS | NA | 4.8958 | 4.3105 | 6.1418 | 0.5956 | 1.5581 | 1.7573 | 3.4027 | 0.02471 | 0.03263 | 0.02873 | 0.043 | 0.0564 | 0.635542 | 0.0464 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.427** | **0.355** | **0.452** | **0.243** | **0.83** | **0.358** | 0.607 | 0.01446 | 0.01677 | 0.01785 | 0.0097 | **0.0284** | **0.3582** | **0.02737** |

| Sample Location | | Steamship Parking Lot Area | | | | |
|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-K | HW-K | HW-K | HW-K | HW-K |
| Sample Date | | 6/19/2019 | 5/21/2020 | 3/18/2021 | 9/2/2021 | 3/25/2022 |
| TOC Elevation | | 37.70 | 37.70 | 37.70 | 37.70 | 37.70 |
| Depth to Groundwater | | 20.88 | 20.56 | 22.87 | 24.24 | 22.93 |
| Groundwater Elevation | | 16.82 | 17.14 | 14.83 | 13.46 | 14.77 |
| Total Well Depth | | 44.18 | 44.18 | 44.17 | 44.18 | 44.17 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.0051 | 0.0028 | 0.0044 | 0.0086 | 0.017 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | <0.002 | 0.001 | 0.00066 J | 0.0015 J | 0.0019 |
| Perfluorononanoic acid (PFNA) | 100,000 | <0.002 | 0.0012 | 0.0037 | 0.003 | 0.0087 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0041 | 0.0019 | 0.0036 | 0.0038 | 0.012 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | <0.002 | 0.0016 | 0.0015 J | 0.0019 | 0.0037 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | <0.002 | 0.00062 U | 0.00038 U | 0.00046 U | 0.0019 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | <0.002 | 0.00039 U | 0.0011 U | 0.00034 U | 0.0019 U |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | |
| Total PFAS | NA | 0.0348 | 0.0275 | 0.04486 | 0.09217 | 0.1864 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | 0.0092 | 0.0085 | 0.01386 | 0.0188 | **0.0433** |

| Sample Location | | Maher Well Area | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | UCL | HW-W(dd) | HW-W(dd) | HW-W(dd) | OW-9S | OW-9S | OW-9S | OW-9M | OW-9M | OW-9D | OW-9D | OW-9D | OW-9DD | OW-9DD | OW-9DD |
| Sample Date | | 4/19/2021 | 9/5/2021 | 3/16/2022 | 7/5/2016 | 12/3/2018 | 5/8/2020 | 12/3/2018 | 5/8/2020 | 7/5/2016 | 12/3/2018 | 5/5/2020 | 4/11/2017 | 12/3/2018 | 10/2/2020 |
| TOC Elevation | | NA | NA | NA | 23.25 | 23.25 | 23.25 | 23.53 | 23.53 | 23.22 | 23.22 | 23.22 | 23.81 | 23.81 | 23.81 |
| Depth to Groundwater | | 28.67 | 29.89 | 28.85 | 12.23 | 10.80 | 10.14 | 11.11 | 10.45 | 12.48 | 10.82 | 10.15 | 12.10 | 11.30 | 13.04 |
| Groundwater Elevation | | NA | NA | NA | 11.02 | 12.45 | 13.11 | 12.42 | 13.08 | 10.74 | 12.40 | 13.07 | 11.71 | 12.51 | 10.77 |
| Total Well Depth | | 72.10 | 72.09 | 73.61 | 21.35 | 21.35 | 21.35 | 56.20 | 56.20 | 68.63 | 68.63 | 68.63 | 86.75 | 86.75 | 86.75 |
| Perfluoroheptanoic acid (PFHpA) | 100,000 | 0.0091 | 0.0073 | 0.0077 | 0.014 | 0.048 | 0.0064 | 0.11 | 0.0061 | 0.0028 | 0.033 | 0.044 | 0.034 | 0.015 J | 0.0085 |
| Perfluorohexanesulfonic acid (PFHxS) | 5,000 | 0.0086 | 0.0048 | 0.02 | <0.003 | 0.023 | 0.011 | 0.0056 U | 0.0033 | 0.012 | 0.12 | 0.18 | 0.12 | 0.042 | 0.019 |
| Perfluorononanoic acid (PFNA) | 100,000 | 0.0014 J | 0.002 | 0.0015 J | 0.0077 | 0.0087 U | 0.0033 | 0.044 | 0.0037 | 0.0036 | 0.1 | 0.15 | 0.059 | 0.038 | 0.018 |
| Perfluorooctanoic acid (PFOA) | 100,000 | 0.0046 | 0.0069 | 0.0059 | 0.007 | 0.032 | 0.0043 | 0.052 | 0.0035 | 0.0052 | 0.057 | 0.088 | 0.055 | 0.020 J | 0.01 |
| Perfluorooctane sulfonate (PFOS) | 5,000 | 0.015 | 0.0081 | 0.035 | 0.0074 | 0.024 | 0.0058 | 0.0081 J | 0.01 | 0.041 | 0.52 | 0.72 | 0.5 | 0.14 | 0.049 |
| Perfluorodecanoic Acid (PFDA) | 100,000 | 0.00038 U | 0.00049 U | 0.00045 U | NA | 0.0061 U | 0.00062 U | 0.0061 U | 0.00062 U | NA | 0.0061 U | 0.00062 U | 0.0040 U | 0.0061 U | 0.00062 U |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | 0.0011 U | 0.00036 U | 0.0033 U | NA | 0.0066 U | 0.00039 U | 0.64 | 0.0049 | NA | 0.19 | 0.23 | 0.13 | 0.062 | 0.02 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | | | | | | | |
| Total PFAS | NA | 0.10469 | 0.0563 | 0.11378 | 0.0361 | 0.618 | 0.06678 | 1.7141 | 0.0816 | 0.0646 | 1.217 | 1.5845 | 1.02 | 0.39 | 0.169 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | **0.0387** | **0.0291** | **0.0701** | **0.0361** | **0.127** | **0.0308** | **0.2141** | **0.0266** | **0.0646** | **0.83** | **1.182** | **0.768** | **0.255** | **0.1045** |

Notes:

UCL = Upper Concentration Limit

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

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

Results in ug/L, micrograms per liter.

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

**Bold results above Method 1 GW-1 standard (0.02 ug/L).**

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

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

NA = Not Applicable.

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

| Sample Location | North Ramp | | | | | | | | | | | | | | | | | Airport Road/Iyannough Road Area | | | | | | | 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-X(s) | HW-X(m) | HW-A(D) | HW-A(D) | HW-B(D) | HW-N | HW-O | HW-U(d) | HW-V(m) | HW-L(s) | HW-L(m) | HW-L(d) | HW-L(d) |
| Sample Date | 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 | 9/10/2021 | 9/10/2021 | 4/5/2017 | 8/5/2019 | 4/5/2017 | 8/5/2019 | 8/5/2019 | 10/2/2020 | 10/2/2020 | 10/7/2020 | 10/7/2020 | 7/2/2019 | 5/13/2020 |
| 1,4-Dioxane | <0.152 | <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 | <0.19 | <0.22 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | **0.73** | **0.8** | <0.2 | <0.2 | **0.727** | **0.75** |

| **Sample Location** | Maher Well Field | | | | | | | | | | | | | | | Deployment Area | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 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 | HW-E | HW-J |
| 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 | 9/10/2021 | 9/10/2021 |
| 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** | <0.20 | <0.20 |

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

Table 5. ARFF Concentrate Analytical Results ug/L

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

Notes:

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

Table 6. SPLP Results ug/L

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

Notes:

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

Table 7: Background PFAS Levels in Soil and Soil Stockpile Samples

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

Notes:

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

Results in ug/kg, micrograms per kilogram.

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

Bold results above the proposed Method 1 S-1/GW-1 standard.

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

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

Table 8. Surface Water Results for PFAS ug/L

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

Notes:

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

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

Results in ug/L, micrograms per liter.

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

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

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

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

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

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

Table 9: Ratio of Stable Isotopes Oxygen-18 and Hydrogen-2 Laboratory Results

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

Table 10. Fire Truck Spray Water PFAS Results ug/L

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

Notes:

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

Results in ug/L, micrograms per liter.

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

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

Table 11: Total Organic Carbon Levels (mg/kg)

| Total Organic Carbon Concentration | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID | HW-W dd 3-5 ft | HW-W dd 8-10 ft | HW-W dd 18-20 ft | HW-W dd 23-25 ft | HW-W dd 28-30 ft | HW-W dd 33-35 ft | HW-W dd 38-40 ft | HW-W dd 43-45 ft | HW-W dd 48-50 ft | HW-W dd 58-60 ft | HW-W dd 63-65 ft | S1 0-2ft | S1 2-4ft | S1 4-6ft | S2 0-2ft | S2 2-4ft | S2 4-6ft |
| Sample Date | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 04/06/2021 | 4/19/2021 | 4/19/2021 | 4/19/2021 | 4/19/2021 | 4/19/2021 | 4/19/2021 |
| Sample Depth (ft below grade) | 3-5 | 8-10 | 18-20 | 23-25 | 28-30 | 33-35 | 38-40 | 43-45 | 48-50 | 58-60 | 63-65 | 0-2 | 2-4 | 4-6 | 0-2 | 2-4 | 4-6 |
| Sample Location | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Water Department Property | Deployment Area | Deployment Area | Deployment Area | Deployment Area | Deployment Area | Deployment Area |
| Total Organic Carbon | 94.8 U | 94.3 U | 96.5 U | 93.9 U | 95.7 U | 93.5 U | 96.9 U | 95.7 U | 95.7 U | 95.7 U | 95.7 U | 28,900 | 1,150 | 180 | 1,550 | 95.1 U | 3,500 |

Notes:
Results in mg/kg, milligrams per kilogram.
U= Not detected by the Laboratory above the method detection limit. Method detection limit shown.

Table 12.Runway 6/24 Surface Soil Results ug/kg

| Sample Location | | | | Surface Soils | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Sample ID | Method 1 Standard | | UCL | 6-24 A (0-1) | 6-24 A (1-2) | 6-24 B (0-1) | 6-24 B (1-2) | 6-24 C (0-1) | 6-24 C (1-2) |
| Sample Date | S-1/GW-1 | S-1/GW-3 | | 3/2/2022 | 3/2/2022 | 3/2/2022 | 3/2/2022 | 3/4/2022 | 3/4/2022 |
| Perfluoroheptanoic acid (PFHpA) | 0.5 | 300 | 4,000 | <0.051 | <0.046 | 0.068 J | <0.049 | <0.055 | 0.079 J |
| Perfluorohexanesulfonic acid (PFHxS) | 0.3 | 300 | 4,000 | <0.068 | <0.062 | <0.064 | <0.066 | <0.074 | <0.069 |
| Perfluorooctanoic acid (PFOA) | 0.72 | 300 | 4,000 | <0.047 | 0.115 J | 0.136 J | 0.106 J | 0.058 J | 0.156 J |
| Perfluorononanoic acid (PFNA) | 0.32 | 300 | 4,000 | <0.085 | <0.077 | 0.115 J | <0.082 | <0.091 | <0.085 |
| Perfluorooctane sulfonate (PFOS) | 2 | 300 | 4,000 | 0.318 | 0.361 | 0.471 | 0.196 J | 0.654 | 0.297 |
| Perfluorodecanoic Acid (PFDA) | 0.3 | 300 | 4,000 | <0.076 | <0.069 | <0.071 | <0.073 | <0.082 | <0.076 |
| 6:2 Fluorotelomer sulfonate (6:2 FTS) | NA | NA | NA | <0.203 | <0.184 | <0.19 | <0.197 | <0.219 | <0.203 |
| Sum of Laboratory Reported PFAS (Total PFAS) and Sum of Six | | | | | | | | | |
| Total PFAS | NA | NA | NA | 0.457 | 0.731 | 1.312 | 0.55 | 1.123 | 0.85 |
| Sum of Six (PFHpA,PFHxS,PFOA, PFOS, PFNA, and PFDA) | NA | NA | NA | 0.318 | 0.476 | 0.79 | 0.302 | 0.712 | 0.532 |

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

# APPENDIX A

## PIP COMMENTS/QUESTIONS

# APPENDIX B

# LABORATORY REPORTS

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

January 2, 2024

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

Project Location: Hyannis
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 23L1211

Enclosed are results of analyses for samples as received by the laboratory on December 8, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

# Table of Contents

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: 1/2/2024

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 23L1211

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

PROJECT LOCATION: Hyannis

| FIELD SAMPLE # | LAB ID: | MATRIX | SAMPLE DESCRIPTION | TEST | SUB LAB |
|---|---|---|---|---|---|
| HW-I(S) | 23L1211-01 | Ground Water | | SOP-454 PFAS | |
| HW-I(M) | 23L1211-02 | Ground Water | | SOP-454 PFAS | |
| HW-I(D) | 23L1211-03 | Ground Water | | SOP-454 PFAS | |
| HW-P(S) | 23L1211-04 | Ground Water | | SOP-454 PFAS | |
| HW-P(M) | 23L1211-05 | Ground Water | | SOP-454 PFAS | |
| HW-3 | 23L1211-06 | Ground Water | | SOP-454 PFAS | |
| HW-302 | 23L1211-07 | Ground Water | | SOP-454 PFAS | |
| HW--S(S) | 23L1211-08 | Ground Water | | SOP-454 PFAS | |
| HW--S(M) | 23L1211-09 | Ground Water | | SOP-454 PFAS | |
| ME-1 | 23L1211-10 | Ground Water | | SOP-454 PFAS | |
| ME-2 | 23L1211-11 | Ground Water | | SOP-454 PFAS | |
| ME-3 | 23L1211-12 | Ground Water | | SOP-454 PFAS | |

**CASE NARRATIVE SUMMARY**

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

**SOP-454 PFAS**

**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:**

**N-EtFOSAA (NEtFOSAA)**
B361067-BSD1

**Perfluorononanesulfonic acid (PFNS)**
B361067-BSD1

**L-02**

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

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

**N-MeFOSAA (NMeFOSAA)**
B361067-BS1, B361067-BSD1

**PF-17**

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

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

**D3-NMeFOSAA**
23L1211-08[HW--S(S)]

**D5-NEtFOSAA**
23L1211-08[HW--S(S)]

**M2-6:2FTS**
23L1211-01[HW-I(S)], 23L1211-02[HW-I(M)], 23L1211-08[HW--S(S)]

**PF-19**

Sample re-analyzed at a dilution that was re-fortified with internal standard.

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

**6:2 Fluorotelomersulfonic acid (6:2FTS A)**
23L1211-08RE2[HW--S(S)]

**Perfluorooctanesulfonic acid (PFOS)**
23L1211-08RE1[HW--S(S)]

**Perfluoropentanoic acid (PFPeA)**
23L1211-08RE1[HW--S(S)]

**S-29**

Extracted Internal Standard is outside of control limits.

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

**D3-NMeFOSAA**
23L1211-03[HW-I(D)], 23L1211-07[HW-302], 23L1211-09[HW--S(M)], 23L1211-10[ME-1]

**D5-NEtFOSAA**
23L1211-03[HW-I(D)], 23L1211-07[HW-302], 23L1211-09[HW--S(M)], 23L1211-10[ME-1]

**M2-4:2FTS**
23L1211-01[HW-I(S)], 23L1211-02[HW-I(M)], 23L1211-03[HW-I(D)], 23L1211-04[HW-P(S)], 23L1211-05[HW-P(M)], 23L1211-06[HW-3], 23L1211-07[HW-302], 23L1211-08[HW--S(S)], 23L1211-09[HW--S(M)], 23L1211-10[ME-1], 23L1211-11[ME-2], 23L1211-12[ME-3], B361067-BS1, B361067-BSD1

**M2-6:2FTS**
23L1211-03[HW-I(D)], 23L1211-07[HW-302], 23L1211-09[HW--S(M)], 23L1211-10[ME-1]

**M2-8:2FTS**
23L1211-07[HW-302], 23L1211-10[ME-1], 23L1211-12[ME-3]

**M2PFTA**
23L1211-07[HW-302], 23L1211-08[HW--S(S)]

**M7PFUnA**
23L1211-07[HW-302], 23L1211-10[ME-1]

**MPFDoA**
23L1211-07[HW-302], 23L1211-10[ME-1]

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

The results of analyses reported only relate to samples submitted to Con-Test, a Pace 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: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-I(S)** | Sampled: 12/5/2023 10:10

**Sample ID: 23L1211-01**

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) | 47 | 1.7 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.3 | 1.7 | 0.64 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoropentanoic acid (PFPeA) | 160 | 1.7 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorohexanoic acid (PFHxA) | 110 | 1.7 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.7 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.7 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.7 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.7 | 0.51 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 7.0 | 1.7 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.7 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.7 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.7 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 28 | 1.7 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.7 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.7 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.7 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.7 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.7 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.7 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.7 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.7 | 0.89 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 14 | 1.7 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.4 | 1.7 | 0.68 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 40 | 1.7 | 0.62 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.7 | 0.62 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.7 | 0.56 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.7 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.1 | 1.7 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.7 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.7 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 100 | 1.7 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorooctanoic acid (PFOA) | 140 | 1.7 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 140 | 1.7 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |
| Perfluorononanoic acid (PFNA) | 150 | 1.7 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:23 | QNW |

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-I(M)** Sampled: 12/5/2023 12:00

**Sample ID: 23L1211-02**

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 | 1.9 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoropentanoic acid (PFPeA) | 1.9 | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorohexanoic acid (PFHxA) | 1.7 | 1.9 | 0.78 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | 0.56 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.9 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 7.2 | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | 0.62 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.9 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | 0.82 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 1.8 | 1.9 | 0.81 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorooctanoic acid (PFOA) | ND | 1.9 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 8.1 | 1.9 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |
| Perfluorononanoic acid (PFNA) | ND | 1.9 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 14:31 | QNW |

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-I(D)** | Sampled: 12/5/2023 11:15

**Sample ID: 23L1211-03**

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) | 42 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.2 | 1.8 | 0.67 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoropentanoic acid (PFPeA) | 120 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorohexanoic acid (PFHxA) | 85 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 1.4 | 1.8 | 0.74 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 23 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 1.4 | 1.8 | 0.69 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 23 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorooctanoic acid (PFOA) | 19 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 94 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |
| Perfluorononanoic acid (PFNA) | 1.4 | 1.8 | 0.84 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:07 | QNW |

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-P(S)** | Sampled: 12/5/2023 13:15

**Sample ID: 23L1211-04**

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) | 16 | 2.0 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 2.0 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoropentanoic acid (PFPeA) | 43 | 2.0 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorohexanoic acid (PFHxA) | 19 | 2.0 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 2.0 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 2.0 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 2.0 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 1.0 | 2.0 | 0.95 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 2.0 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 2.0 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 2.0 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 2.0 | 0.82 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 2.0 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 2.0 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 2.0 | 0.82 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 2.0 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 2.0 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 1.8 | 2.0 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 2.0 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 2.0 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 1.6 | 2.0 | 1.2 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 2.0 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 2.0 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 2.0 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 7.6 | 2.0 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorooctanoic acid (PFOA) | 3.4 | 2.0 | 1.4 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 2.4 | 2.0 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |
| Perfluorononanoic acid (PFNA) | 13 | 2.0 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:14 | QNW |

Project Location: Hyannis    Sample Description:    Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-P(M)**    Sampled: 12/5/2023 15:55

**Sample ID: 23L1211-05**

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) | 4.8 | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.9 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoropentanoic acid (PFPeA) | 13 | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorohexanoic acid (PFHxA) | 7.6 | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | 0.55 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.9 | 0.89 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 1.8 | 1.9 | 0.77 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | 0.89 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 21 | 1.9 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | 0.61 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.9 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 1.4 | 1.9 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 5.2 | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorooctanoic acid (PFOA) | 5.5 | 1.9 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 40 | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |
| Perfluorononanoic acid (PFNA) | 7.3 | 1.9 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:22 | QNW |

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-3** | Sampled: 12/6/2023 10:30

**Sample ID: 23L1211-06**

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) | 29 | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.3 | 1.9 | 0.70 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoropentanoic acid (PFPeA) | 110 | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorohexanoic acid (PFHxA) | 77 | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | 0.56 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 5.4 | 1.9 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 4.1 | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 30 | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | 0.62 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 130 | 1.9 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.1 | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoroundecanoic acid (PFUnA) | 2.5 | 1.9 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 18 | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorooctanoic acid (PFOA) | 15 | 1.9 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 44 | 1.9 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |
| Perfluorononanoic acid (PFNA) | 9.2 | 1.9 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:29 | QNW |

**con-test** A Pace Analytical® Laboratory

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW-302** | Sampled: 12/6/2023 10:55

**Sample ID: 23L1211-07**

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) | 15 | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoropentanoic acid (PFPeA) | 47 | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorohexanoic acid (PFHxA) | 24 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.54 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 3.7 | 1.8 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorodecanoic acid (PFDA) | 1.6 | 1.8 | 0.76 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorododecanoic acid (PFDoA) | 0.87 | 1.8 | 0.85 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 0.79 | 1.8 | 0.75 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorooctanesulfonamide (FOSA) | 1.3 | 1.8 | 0.93 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 8.4 | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.60 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 26 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoroundecanoic acid (PFUnA) | 3.8 | 1.8 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 12 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorooctanoic acid (PFOA) | 11 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 21 | 1.8 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |
| Perfluorononanoic acid (PFNA) | 33 | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:36 | QNW |

Project Location: Hyannis    Sample Description:    Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW--S(S)**    Sampled: 12/6/2023 11:30

**Sample ID: 23L1211-08**

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) | 50 | 2.0 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.8 | 2.0 | 0.73 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoropentanoic acid (PFPeA) | 180 | 20 | 7.8 | ng/L | 10 | PF-19 | SOP-454 PFAS | 12/19/23 | 12/21/23 13:45 | QNW |
| Perfluorohexanoic acid (PFHxA) | 140 | 2.0 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 2.0 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 2.0 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 2.0 | 0.58 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 2.0 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 2.0 | 0.82 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 2.0 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 2.0 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 15 | 2.0 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 2.0 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 2.0 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 2.0 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 2.0 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 3.9 | 2.0 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.4 | 2.0 | 0.77 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 67 | 2.0 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 2.0 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 2.0 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 2400 | 98 | 59 | ng/L | 50 | PF-19 | SOP-454 PFAS | 12/19/23 | 12/21/23 14:44 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 3.6 | 2.0 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 2.0 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 2.0 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 90 | 2.0 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorooctanoic acid (PFOA) | 120 | 2.0 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 150 | 20 | 8.3 | ng/L | 10 | PF-19 | SOP-454 PFAS | 12/19/23 | 12/21/23 13:45 | QNW |
| Perfluorononanoic acid (PFNA) | 180 | 2.0 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:43 | QNW |

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: HW--S(M)** | Sampled: 12/6/2023 11:55

**Sample ID: 23L1211-09**

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) | 1.7 | 1.8 | 0.69 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoropentanoic acid (PFPeA) | 4.5 | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorohexanoic acid (PFHxA) | 2.6 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.54 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 5.0 | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.60 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 11 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 1.3 | 1.8 | 0.78 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorooctanoic acid (PFOA) | 1.4 | 1.8 | 1.3 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 17 | 1.8 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |
| Perfluorononanoic acid (PFNA) | 1.9 | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:51 | QNW |

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: ME-1** | Sampled: 12/6/2023 14:17

**Sample ID: 23L1211-10**

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) | 18 | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 2.8 | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoropentanoic acid (PFPeA) | 53 | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorohexanoic acid (PFHxA) | 33 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.54 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.88 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorodecanoic acid (PFDA) | 0.86 | 1.8 | 0.76 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.1 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.1 | 1.8 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 38 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.60 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 22 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.4 | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 15 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorooctanoic acid (PFOA) | 19 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 75 | 1.8 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |
| Perfluorononanoic acid (PFNA) | 12 | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 15:58 | QNW |

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: ME-2** | Sampled: 12/6/2023 14:05

**Sample ID: 23L1211-11**

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) | 15 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 4.7 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoropentanoic acid (PFPeA) | 52 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorohexanoic acid (PFHxA) | 37 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 7.4 | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorodecanoic acid (PFDA) | 0.86 | 1.8 | 0.75 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.4 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.5 | 1.8 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 46 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 70 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 3.6 | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 17 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorooctanoic acid (PFOA) | 16 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 70 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |
| Perfluorononanoic acid (PFNA) | 11 | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 12/19/23 | 12/20/23 16:05 | QNW |

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

Project Location: Hyannis | Sample Description: | Work Order: 23L1211

Date Received: 12/8/2023

**Field Sample #: ME-3** | Sampled: 12/6/2023 14:10

**Sample ID: 23L1211-12**

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) | 12 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 3.0 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoropentanoic acid (PFPeA) | 36 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorohexanoic acid (PFHxA) | 27 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.1 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorooctanesulfonamide (FOSA) | 9.9 | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 2.1 | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.5 | 1.8 | 0.70 | ng/L | 1 | J | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 38 | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 14 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.6 | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoroundecanoic acid (PFUnA) | 0.98 | 1.8 | 0.77 | ng/L | 1 | J | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 12 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorooctanoic acid (PFOA) | 16 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 94 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |
| Perfluorononanoic acid (PFNA) | 8.7 | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 12/27/23 | 1/2/24 12:08 | QNW |

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

## Sample Extraction Data

**Prep Method:SOP 454-PFAAS** **Analytical Method:SOP-454 PFAS**

| Lab Number [Field ID] | Batch | Initial [mL] | Final [mL] | Date |
|---|---|---|---|---|
| 23L1211-01 [HW-I(S)] | B361025 | 289 | 1.00 | 12/19/23 |
| 23L1211-02 [HW-I(M)] | B361025 | 262 | 1.00 | 12/19/23 |
| 23L1211-03 [HW-I(D)] | B361025 | 276 | 1.00 | 12/19/23 |
| 23L1211-04 [HW-P(S)] | B361025 | 251 | 1.00 | 12/19/23 |
| 23L1211-05 [HW-P(M)] | B361025 | 268 | 1.00 | 12/19/23 |
| 23L1211-06 [HW-3] | B361025 | 263 | 1.00 | 12/19/23 |
| 23L1211-07 [HW-302] | B361025 | 273 | 1.00 | 12/19/23 |
| 23L1211-08 [HW--S(S)] | B361025 | 255 | 1.00 | 12/19/23 |
| 23L1211-08RE1 [HW--S(S)] | B361025 | 255 | 1.00 | 12/19/23 |
| 23L1211-08RE2 [HW--S(S)] | B361025 | 255 | 1.00 | 12/19/23 |
| 23L1211-09 [HW--S(M)] | B361025 | 271 | 1.00 | 12/19/23 |
| 23L1211-10 [ME-1] | B361025 | 273 | 1.00 | 12/19/23 |
| 23L1211-11 [ME-2] | B361025 | 276 | 1.00 | 12/19/23 |

**Prep Method:SOP 454-PFAAS** **Analytical Method:SOP-454 PFAS**

| Lab Number [Field ID] | Batch | Initial [mL] | Final [mL] | Date |
|---|---|---|---|---|
| 23L1211-12 [ME-3] | B361067 | 277 | 1.00 | 12/27/23 |

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 B361025 - SOP 454-PFAAS** | | | | | | | | | | |
| **Blank (B361025-BLK1)** | | | | Prepared: 12/19/23 Analyzed: 12/20/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanoic acid (PFPeA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanoic acid (PFHxA) | ND | 1.9 | ng/L | | | | | | | |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | ng/L | | | | | | | |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | ng/L | | | | | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | ng/L | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | ng/L | | | | | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.9 | ng/L | | | | | | | |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | ng/L | | | | | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanesulfonic acid (PFHxS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | ng/L | | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | ng/L | | | | | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanoic acid (PFHpA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanoic acid (PFOA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonic acid (PFOS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanoic acid (PFNA) | ND | 1.9 | ng/L | | | | | | | |
| **LCS (B361025-BS1)** | | | | Prepared: 12/19/23 Analyzed: 12/20/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | 8.84 | 1.9 | ng/L | 9.51 | | 92.9 | 73-129 | | | |
| Perfluorobutanesulfonic acid (PFBS) | 7.64 | 1.9 | ng/L | 8.42 | | 90.8 | 72-130 | | | |
| Perfluoropentanoic acid (PFPeA) | 8.72 | 1.9 | ng/L | 9.51 | | 91.7 | 72-129 | | | |
| Perfluorohexanoic acid (PFHxA) | 8.79 | 1.9 | ng/L | 9.51 | | 92.4 | 72-129 | | | |
| 11Cl-PF3OUdS (F53B Major) | 8.69 | 1.9 | ng/L | 8.96 | | 96.9 | 43.3-138 | | | |
| 9Cl-PF3ONS (F53B Minor) | 9.27 | 1.9 | ng/L | 8.87 | | 105 | 52-140 | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 8.14 | 1.9 | ng/L | 8.96 | | 90.8 | 53.7-152 | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 7.65 | 1.9 | ng/L | 9.51 | | 80.4 | 42.1-145 | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 8.40 | 1.9 | ng/L | 9.13 | | 91.9 | 67-138 | | | |
| Perfluorodecanoic acid (PFDA) | 9.70 | 1.9 | ng/L | 9.51 | | 102 | 71-129 | | | |
| Perfluorododecanoic acid (PFDoA) | 9.73 | 1.9 | ng/L | 9.51 | | 102 | 72-134 | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 9.79 | 1.9 | ng/L | 8.47 | | 116 | 52.7-147 | | | |

**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 B361025 - SOP 454-PFAAS** | | | | | | | | | | |
| **LCS (B361025-BS1)** | | | | Prepared: 12/19/23 Analyzed: 12/20/23 | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 8.79 | 1.9 | ng/L | 9.08 | | 96.7 | 69-134 | | | |
| N-EtFOSAA (NEtFOSAA) | 10.0 | 1.9 | ng/L | 9.51 | | 106 | 61-135 | | | |
| N-MeFOSAA (NMeFOSAA) | 10.0 | 1.9 | ng/L | 9.51 | | 105 | 65-136 | | | |
| Perfluorotetradecanoic acid (PFTA) | 9.40 | 1.9 | ng/L | 9.51 | | 98.8 | 71-132 | | | |
| Perfluorotridecanoic acid (PFTrDA) | 9.19 | 1.9 | ng/L | 9.51 | | 96.6 | 65-144 | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 7.93 | 1.9 | ng/L | 8.89 | | 89.1 | 63-143 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 7.47 | 1.9 | ng/L | 9.18 | | 81.4 | 53-142 | | | |
| Perfluorooctanesulfonamide (FOSA) | 9.20 | 1.9 | ng/L | 9.51 | | 96.7 | 67-137 | | | |
| Perfluorononanesulfonic acid (PFNS) | 7.89 | 1.9 | ng/L | 9.13 | | 86.4 | 69-127 | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 6.84 | 1.9 | ng/L | 9.51 | | 71.9 | 50-150 | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | 7.06 | 1.9 | ng/L | 9.51 | | 74.3 | 50-150 | | | |
| Perfluorohexanesulfonic acid (PFHxS) | 8.18 | 1.9 | ng/L | 8.70 | | 93.9 | 68-131 | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 9.61 | 1.9 | ng/L | 9.51 | | 101 | 53.8-150 | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 10.0 | 1.9 | ng/L | 9.51 | | 105 | 54.5-152 | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 9.06 | 1.9 | ng/L | 9.04 | | 100 | 64-140 | | | |
| Perfluoropentanesulfonic acid (PFPeS) | 7.84 | 1.9 | ng/L | 8.94 | | 87.6 | 71-127 | | | |
| Perfluoroundecanoic acid (PFUnA) | 9.30 | 1.9 | ng/L | 9.51 | | 97.7 | 69-133 | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 8.07 | 1.9 | ng/L | 9.51 | | 84.9 | 50.5-159 | | | |
| Perfluoroheptanoic acid (PFHpA) | 8.96 | 1.9 | ng/L | 9.51 | | 94.2 | 72-130 | | | |
| Perfluorooctanoic acid (PFOA) | 8.97 | 1.9 | ng/L | 9.51 | | 94.3 | 71-133 | | | |
| Perfluorooctanesulfonic acid (PFOS) | 8.47 | 1.9 | ng/L | 8.80 | | 96.2 | 65-140 | | | |
| Perfluorononanoic acid (PFNA) | 9.25 | 1.9 | ng/L | 9.51 | | 97.2 | 69-130 | | | |
| **LCS Dup (B361025-BSD1)** | | | | Prepared: 12/19/23 Analyzed: 12/20/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | 8.18 | 1.9 | ng/L | 9.67 | | 84.6 | 73-129 | 7.65 | 30 | |
| Perfluorobutanesulfonic acid (PFBS) | 6.97 | 1.9 | ng/L | 8.56 | | 81.4 | 72-130 | 9.17 | 30 | |
| Perfluoropentanoic acid (PFPeA) | 8.31 | 1.9 | ng/L | 9.67 | | 85.9 | 72-129 | 4.79 | 30 | |
| Perfluorohexanoic acid (PFHxA) | 7.97 | 1.9 | ng/L | 9.67 | | 82.4 | 72-129 | 9.83 | 30 | |
| 11Cl-PF3OUdS (F53B Major) | 7.62 | 1.9 | ng/L | 9.11 | | 83.6 | 43.3-138 | 13.1 | 30 | |
| 9Cl-PF3ONS (F53B Minor) | 8.22 | 1.9 | ng/L | 9.02 | | 91.2 | 52-140 | 11.9 | 30 | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 7.38 | 1.9 | ng/L | 9.11 | | 81.0 | 53.7-152 | 9.80 | 30 | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 8.47 | 1.9 | ng/L | 9.67 | | 87.6 | 42.1-145 | 10.3 | 30 | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 8.00 | 1.9 | ng/L | 9.29 | | 86.2 | 67-138 | 4.82 | 30 | |
| Perfluorodecanoic acid (PFDA) | 9.02 | 1.9 | ng/L | 9.67 | | 93.2 | 71-129 | 7.31 | 30 | |
| Perfluorododecanoic acid (PFDoA) | 8.99 | 1.9 | ng/L | 9.67 | | 92.9 | 72-134 | 7.92 | 30 | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 9.09 | 1.9 | ng/L | 8.61 | | 106 | 52.7-147 | 7.37 | 30 | |
| Perfluoroheptanesulfonic acid (PFHpS) | 8.18 | 1.9 | ng/L | 9.24 | | 88.6 | 69-134 | 7.12 | 30 | |
| N-EtFOSAA (NEtFOSAA) | 8.92 | 1.9 | ng/L | 9.67 | | 92.2 | 61-135 | 11.9 | 30 | |
| N-MeFOSAA (NMeFOSAA) | 9.54 | 1.9 | ng/L | 9.67 | | 98.6 | 65-136 | 4.76 | 30 | |
| Perfluorotetradecanoic acid (PFTA) | 8.52 | 1.9 | ng/L | 9.67 | | 88.1 | 71-132 | 9.84 | 30 | |
| Perfluorotridecanoic acid (PFTrDA) | 8.60 | 1.9 | ng/L | 9.67 | | 88.9 | 65-144 | 6.63 | 30 | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 7.39 | 1.9 | ng/L | 9.05 | | 81.7 | 63-143 | 7.07 | 30 | |
| Perfluorodecanesulfonic acid (PFDS) | 7.09 | 1.9 | ng/L | 9.34 | | 75.9 | 53-142 | 5.24 | 30 | |
| Perfluorooctanesulfonamide (FOSA) | 8.41 | 1.9 | ng/L | 9.67 | | 86.9 | 67-137 | 9.02 | 30 | |
| Perfluorononanesulfonic acid (PFNS) | 7.17 | 1.9 | ng/L | 9.29 | | 77.2 | 69-127 | 9.66 | 30 | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 5.85 | 1.9 | ng/L | 9.67 | | 60.5 | 50-150 | 15.6 | 30 | |
| Perfluoro-1-butanesulfonamide (FBSA) | 6.09 | 1.9 | ng/L | 9.67 | | 63.0 | 50-150 | 14.8 | 30 | |
| Perfluorohexanesulfonic acid (PFHxS) | 7.70 | 1.9 | ng/L | 8.85 | | 87.0 | 68-131 | 5.95 | 30 | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 9.01 | 1.9 | ng/L | 9.67 | | 93.2 | 53.8-150 | 6.38 | 30 | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 9.42 | 1.9 | ng/L | 9.67 | | 97.4 | 54.5-152 | 6.14 | 30 | |

**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 B361025 - SOP 454-PFAAS** | | | | | | | | | | |
| **LCS Dup (B361025-BSD1)** | | | | Prepared: 12/19/23 Analyzed: 12/20/23 | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 8.57 | 1.9 | ng/L | 9.19 | | 93.3 | 64-140 | 5.51 | 30 | |
| Perfluoropentanesulfonic acid (PFPeS) | 7.32 | 1.9 | ng/L | 9.09 | | 80.5 | 71-127 | 6.76 | 30 | |
| Perfluoroundecanoic acid (PFUnA) | 8.57 | 1.9 | ng/L | 9.67 | | 88.5 | 69-133 | 8.19 | 30 | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 7.33 | 1.9 | ng/L | 9.67 | | 75.8 | 50.5-159 | 9.65 | 30 | |
| Perfluoroheptanoic acid (PFHpA) | 8.35 | 1.9 | ng/L | 9.67 | | 86.3 | 72-130 | 7.04 | 30 | |
| Perfluorooctanoic acid (PFOA) | 8.21 | 1.9 | ng/L | 9.67 | | 84.9 | 71-133 | 8.82 | 30 | |
| Perfluorooctanesulfonic acid (PFOS) | 7.45 | 1.9 | ng/L | 8.95 | | 83.3 | 65-140 | 12.7 | 30 | |
| Perfluorononanoic acid (PFNA) | 8.35 | 1.9 | ng/L | 9.67 | | 86.3 | 69-130 | 10.2 | 30 | |
| **Batch B361067 - SOP 454-PFAAS** | | | | | | | | | | |
| **Blank (B361067-BLK1)** | | | | Prepared: 12/27/23 Analyzed: 12/28/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanoic acid (PFPeA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanoic acid (PFHxA) | ND | 1.9 | ng/L | | | | | | | |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | ng/L | | | | | | | |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | ng/L | | | | | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | ng/L | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | ng/L | | | | | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.9 | ng/L | | | | | | | |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | ng/L | | | | | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanesulfonic acid (PFHxS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | ng/L | | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | ng/L | | | | | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanoic acid (PFHpA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanoic acid (PFOA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonic acid (PFOS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanoic acid (PFNA) | ND | 1.9 | ng/L | | | | | | | |

**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 B361067 - SOP 454-PFAAS** | | | | | | | | | | | |
| **LCS (B361067-BS1)** | | | | Prepared: 12/27/23 Analyzed: 12/28/23 | | | | | | | |
| Perfluorobutanoic acid (PFBA) | 11.2 | 1.9 | ng/L | 9.26 | | 121 | | 73-129 | | | |
| Perfluorobutanesulfonic acid (PFBS) | 9.50 | 1.9 | ng/L | 8.19 | | 116 | | 72-130 | | | |
| Perfluoropentanoic acid (PFPeA) | 11.2 | 1.9 | ng/L | 9.26 | | 121 | | 72-129 | | | |
| Perfluorohexanoic acid (PFHxA) | 11.2 | 1.9 | ng/L | 9.26 | | 121 | | 72-129 | | | |
| 11Cl-PF3OUdS (F53B Major) | 8.67 | 1.9 | ng/L | 8.72 | | 99.4 | | 43.3-138 | | | |
| 9Cl-PF3ONS (F53B Minor) | 9.00 | 1.9 | ng/L | 8.63 | | 104 | | 52-140 | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 8.97 | 1.9 | ng/L | 8.72 | | 103 | | 53.7-152 | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 10.9 | 1.9 | ng/L | 9.26 | | 117 | | 42.1-145 | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 11.1 | 1.9 | ng/L | 8.89 | | 125 | | 67-138 | | | |
| Perfluorodecanoic acid (PFDA) | 10.9 | 1.9 | ng/L | 9.26 | | 118 | | 71-129 | | | |
| Perfluorododecanoic acid (PFDoA) | 10.7 | 1.9 | ng/L | 9.26 | | 115 | | 72-134 | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 10.5 | 1.9 | ng/L | 8.24 | | 127 | | 52.7-147 | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 10.7 | 1.9 | ng/L | 8.84 | | 122 | | 69-134 | | | |
| N-EtFOSAA (NEtFOSAA) | 11.3 | 1.9 | ng/L | 9.26 | | 122 | | 61-135 | | | |
| **N-MeFOSAA (NMeFOSAA)** | 13.5 | 1.9 | ng/L | 9.26 | | **146** | * | 65-136 | | | L-02 |
| Perfluorotetradecanoic acid (PFTA) | 10.0 | 1.9 | ng/L | 9.26 | | 108 | | 71-132 | | | |
| Perfluorotridecanoic acid (PFTrDA) | 10.3 | 1.9 | ng/L | 9.26 | | 112 | | 65-144 | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 10.2 | 1.9 | ng/L | 8.65 | | 117 | | 63-143 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 9.17 | 1.9 | ng/L | 8.93 | | 103 | | 53-142 | | | |
| Perfluorooctanesulfonamide (FOSA) | 11.3 | 1.9 | ng/L | 9.26 | | 122 | | 67-137 | | | |
| Perfluorononanesulfonic acid (PFNS) | 8.77 | 1.9 | ng/L | 8.89 | | 98.7 | | 69-127 | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 10.1 | 1.9 | ng/L | 9.26 | | 109 | | 50-150 | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | 10.3 | 1.9 | ng/L | 9.26 | | 111 | | 50-150 | | | |
| Perfluorohexanesulfonic acid (PFHxS) | 9.64 | 1.9 | ng/L | 8.47 | | 114 | | 68-131 | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 10.4 | 1.9 | ng/L | 9.26 | | 112 | | 53.8-150 | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 11.0 | 1.9 | ng/L | 9.26 | | 119 | | 54.5-152 | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 11.8 | 1.9 | ng/L | 8.79 | | 134 | | 64-140 | | | |
| Perfluoropentanesulfonic acid (PFPeS) | 10.8 | 1.9 | ng/L | 8.70 | | 124 | | 71-127 | | | |
| Perfluoroundecanoic acid (PFUnA) | 11.2 | 1.9 | ng/L | 9.26 | | 122 | | 69-133 | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 9.62 | 1.9 | ng/L | 9.26 | | 104 | | 50.5-159 | | | |
| Perfluoroheptanoic acid (PFHpA) | 10.4 | 1.9 | ng/L | 9.26 | | 112 | | 72-130 | | | |
| Perfluorooctanoic acid (PFOA) | 11.2 | 1.9 | ng/L | 9.26 | | 121 | | 71-133 | | | |
| Perfluorooctanesulfonic acid (PFOS) | 10.4 | 1.9 | ng/L | 8.56 | | 122 | | 65-140 | | | |
| Perfluorononanoic acid (PFNA) | 11.3 | 1.9 | ng/L | 9.26 | | 123 | | 69-130 | | | |
| **LCS Dup (B361067-BSD1)** | | | | Prepared: 12/27/23 Analyzed: 12/28/23 | | | | | | | |
| Perfluorobutanoic acid (PFBA) | 11.3 | 1.8 | ng/L | 9.12 | | 123 | | 73-129 | 0.751 | 30 | |
| Perfluorobutanesulfonic acid (PFBS) | 9.95 | 1.8 | ng/L | 8.07 | | 123 | | 72-130 | 4.62 | 30 | |
| Perfluoropentanoic acid (PFPeA) | 11.5 | 1.8 | ng/L | 9.12 | | 126 | | 72-129 | 2.72 | 30 | |
| Perfluorohexanoic acid (PFHxA) | 11.8 | 1.8 | ng/L | 9.12 | | 129 | | 72-129 | 5.58 | 30 | |
| 11Cl-PF3OUdS (F53B Major) | 10.1 | 1.8 | ng/L | 8.59 | | 118 | | 43.3-138 | 15.4 | 30 | |
| 9Cl-PF3ONS (F53B Minor) | 10.4 | 1.8 | ng/L | 8.50 | | 123 | | 52-140 | 14.9 | 30 | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 8.57 | 1.8 | ng/L | 8.59 | | 99.8 | | 53.7-152 | 4.54 | 30 | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 9.68 | 1.8 | ng/L | 9.12 | | 106 | | 42.1-145 | 11.4 | 30 | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 11.7 | 1.8 | ng/L | 8.76 | | 133 | | 67-138 | 5.04 | 30 | |
| Perfluorodecanoic acid (PFDA) | 11.6 | 1.8 | ng/L | 9.12 | | 127 | | 71-129 | 6.05 | 30 | |
| Perfluorododecanoic acid (PFDoA) | 11.2 | 1.8 | ng/L | 9.12 | | 122 | | 72-134 | 4.36 | 30 | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 10.7 | 1.8 | ng/L | 8.12 | | 131 | | 52.7-147 | 1.47 | 30 | |

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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 B361067 - SOP 454-PFAAS** | | | | | | | | | | | |
| **LCS Dup (B361067-BSD1)** | | | | Prepared: 12/27/23 Analyzed: 12/28/23 | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 11.6 | 1.8 | ng/L | 8.71 | | 133 | | 69-134 | 7.28 | 30 | |
| **N-EtFOSAA (NEtFOSAA)** | 13.3 | 1.8 | ng/L | 9.12 | | **146** | * | 61-135 | 16.5 | 30 | L-01 |
| **N-MeFOSAA (NMeFOSAA)** | 13.7 | 1.8 | ng/L | 9.12 | | **150** | * | 65-136 | 1.33 | 30 | L-02 |
| Perfluorotetradecanoic acid (PFTA) | 10.3 | 1.8 | ng/L | 9.12 | | 113 | | 71-132 | 2.55 | 30 | |
| Perfluorotridecanoic acid (PFTrDA) | 10.8 | 1.8 | ng/L | 9.12 | | 119 | | 65-144 | 4.64 | 30 | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 10.5 | 1.8 | ng/L | 8.53 | | 123 | | 63-143 | 3.20 | 30 | |
| Perfluorodecanesulfonic acid (PFDS) | 9.87 | 1.8 | ng/L | 8.80 | | 112 | | 53-142 | 7.34 | 30 | |
| Perfluorooctanesulfonamide (FOSA) | 10.8 | 1.8 | ng/L | 9.12 | | 118 | | 67-137 | 4.06 | 30 | |
| **Perfluorononanesulfonic acid (PFNS)** | 11.7 | 1.8 | ng/L | 8.76 | | **133** | * | 69-127 | 28.3 | 30 | L-01 |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 10.1 | 1.8 | ng/L | 9.12 | | 111 | | 50-150 | 0.539 | 30 | |
| Perfluoro-1-butanesulfonamide (FBSA) | 10.7 | 1.8 | ng/L | 9.12 | | 117 | | 50-150 | 3.39 | 30 | |
| Perfluorohexanesulfonic acid (PFHxS) | 10.2 | 1.8 | ng/L | 8.34 | | 122 | | 68-131 | 5.58 | 30 | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 10.6 | 1.8 | ng/L | 9.12 | | 116 | | 53.8-150 | 2.59 | 30 | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 11.1 | 1.8 | ng/L | 9.12 | | 122 | | 54.5-152 | 0.592 | 30 | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 11.9 | 1.8 | ng/L | 8.66 | | 137 | | 64-140 | 0.348 | 30 | |
| Perfluoropentanesulfonic acid (PFPeS) | 10.8 | 1.8 | ng/L | 8.57 | | 126 | | 71-127 | 0.180 | 30 | |
| Perfluoroundecanoic acid (PFUnA) | 11.3 | 1.8 | ng/L | 9.12 | | 124 | | 69-133 | 0.793 | 30 | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 10.1 | 1.8 | ng/L | 9.12 | | 110 | | 50.5-159 | 4.48 | 30 | |
| Perfluoroheptanoic acid (PFHpA) | 10.5 | 1.8 | ng/L | 9.12 | | 115 | | 72-130 | 0.460 | 30 | |
| Perfluorooctanoic acid (PFOA) | 12.1 | 1.8 | ng/L | 9.12 | | 132 | | 71-133 | 7.33 | 30 | |
| Perfluorooctanesulfonic acid (PFOS) | 10.9 | 1.8 | ng/L | 8.44 | | 129 | | 65-140 | 4.36 | 30 | |
| Perfluorononanoic acid (PFNA) | 11.1 | 1.8 | ng/L | 9.12 | | 122 | | 69-130 | 2.13 | 30 | |

**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-02 | Laboratory fortified blank/laboratory control sample recovery and duplicate recoveries outside of control limits. Data validation is not affected since all results are "not detected" for associated samples in this batch and bias is on the high side. |
| PF-17 | Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side. |
| PF-19 | Sample re-analyzed at a dilution that was re-fortified with internal standard. |
| S-29 | Extracted Internal Standard is outside of control limits. |

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## INTERNAL STANDARD AREA AND RT SUMMARY

## SOP-454 PFAS

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-I(S) (23L1211-01 )** | | | Lab File ID: 23L1211-01.d | | | Analyzed: 12/20/23 14:23 | | | |
| M8FOSA | 463270.2 | 3.9566 | 821,977.00 | 3.9566 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 62904.53 | 2.4804 | 228,021.00 | 2.496817 | 28 | 50 - 150 | -0.0164 | +/-0.50 | * |
| M2PFTA | 1326524 | 4.321567 | 2,190,084.00 | 4.329683 | 61 | 50 - 150 | -0.0081 | +/-0.50 | |
| M2-8:2FTS | 291426.9 | 3.786867 | 426,189.00 | 3.794833 | 68 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 536763.8 | 1.075083 | 866,915.00 | 1.075083 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 185366.1 | 2.81475 | 218,004.00 | 2.8393 | 85 | 50 - 150 | -0.0246 | +/-0.50 | |
| M6PFDA | 1275743 | 3.79535 | 1,844,299.00 | 3.79535 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 257195.2 | 1.878383 | 329,840.00 | 1.894967 | 78 | 50 - 150 | -0.0166 | +/-0.50 | |
| M7PFUnA | 1113566 | 3.93805 | 1,701,532.00 | 3.946033 | 65 | 50 - 150 | -0.0080 | +/-0.50 | |
| M2-6:2FTS | 991021.9 | 3.429317 | 170,229.00 | 3.429317 | 582 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 532536.8 | 1.7231 | 770,284.00 | 1.7231 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 953714.5 | 2.564133 | 1,324,533.00 | 2.58055 | 72 | 50 - 150 | -0.0164 | +/-0.50 | |
| M3PFHxS | 150736.7 | 3.193817 | 192,516.00 | 3.193817 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 948504.4 | 3.1627 | 1,285,304.00 | 3.1627 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 962814.5 | 3.437833 | 1,450,100.00 | 3.445833 | 66 | 50 - 150 | -0.0080 | +/-0.50 | |
| M8PFOS | 168148.9 | 3.636183 | 228,157.00 | 3.636183 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 997513.9 | 3.637217 | 1,403,264.00 | 3.637217 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 905054.6 | 4.08065 | 1,494,566.00 | 4.08065 | 61 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 189473.8 | 3.945517 | 339,024.00 | 3.945517 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 210223.7 | 3.873767 | 419,564.00 | 3.873767 | 50 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-I(M) (23L1211-02 )** | | | Lab File ID: 23L1211-02.d | | | Analyzed: 12/20/23 14:31 | | | |
| M8FOSA | 464249.3 | 3.9566 | 821,977.00 | 3.9566 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 62173.49 | 2.4804 | 228,021.00 | 2.496817 | 27 | 50 - 150 | -0.0164 | +/-0.50 | * |
| M2PFTA | 1251582 | 4.32155 | 2,190,084.00 | 4.329683 | 57 | 50 - 150 | -0.0081 | +/-0.50 | |
| M2-8:2FTS | 281420.1 | 3.786867 | 426,189.00 | 3.794833 | 66 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 519207.3 | 1.075083 | 866,915.00 | 1.075083 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 165138.8 | 2.81475 | 218,004.00 | 2.8393 | 76 | 50 - 150 | -0.0246 | +/-0.50 | |
| M6PFDA | 1190799 | 3.787383 | 1,844,299.00 | 3.79535 | 65 | 50 - 150 | -0.0080 | +/-0.50 | |
| M3PFBS | 229097.9 | 1.878383 | 329,840.00 | 1.894967 | 69 | 50 - 150 | -0.0166 | +/-0.50 | |
| M7PFUnA | 1129378 | 3.93805 | 1,701,532.00 | 3.946033 | 66 | 50 - 150 | -0.0080 | +/-0.50 | |
| M2-6:2FTS | 72206.48 | 3.4293 | 170,229.00 | 3.429317 | 42 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 514616.3 | 1.714833 | 770,284.00 | 1.7231 | 67 | 50 - 150 | -0.0083 | +/-0.50 | |
| M5PFHxA | 890184.9 | 2.555917 | 1,324,533.00 | 2.58055 | 67 | 50 - 150 | -0.0246 | +/-0.50 | |
| M3PFHxS | 139954.4 | 3.185733 | 192,516.00 | 3.193817 | 73 | 50 - 150 | -0.0081 | +/-0.50 | |
| M4PFHpA | 886071.4 | 3.154633 | 1,285,304.00 | 3.1627 | 69 | 50 - 150 | -0.0081 | +/-0.50 | |
| M8PFOA | 1018299 | 3.437833 | 1,450,100.00 | 3.445833 | 70 | 50 - 150 | -0.0080 | +/-0.50 | |
| M8PFOS | 154740.4 | 3.6282 | 228,157.00 | 3.636183 | 68 | 50 - 150 | -0.0080 | +/-0.50 | |
| M9PFNA | 993050.7 | 3.629233 | 1,403,264.00 | 3.637217 | 71 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFDoA | 893333.9 | 4.08065 | 1,494,566.00 | 4.08065 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 187411.1 | 3.937517 | 339,024.00 | 3.945517 | 55 | 50 - 150 | -0.0080 | +/-0.50 | |
| D3-NMeFOSAA | 221842.7 | 3.865617 | 419,564.00 | 3.873767 | 53 | 50 - 150 | -0.0082 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-I(D) (23L1211-03 )** | | | Lab File ID: 23L1211-03.d | | | Analyzed: 12/20/23 15:07 | | | |
| M8FOSA | 462277.7 | 3.9566 | 821,977.00 | 3.9566 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 60904.13 | 2.496817 | 228,021.00 | 2.4886 | 27 | 50 - 150 | 0.0082 | +/-0.50 | * |
| M2PFTA | 1188155 | 4.32155 | 2,190,084.00 | 4.32155 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 228856.4 | 3.786867 | 426,189.00 | 3.786867 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 517497.3 | 1.075083 | 866,915.00 | 1.075083 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 189752.8 | 2.831117 | 218,004.00 | 2.822933 | 87 | 50 - 150 | 0.0082 | +/-0.50 | |
| M6PFDA | 1225098 | 3.79535 | 1,844,299.00 | 3.79535 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 255724.9 | 1.894967 | 329,840.00 | 1.886683 | 78 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 891763 | 3.938033 | 1,701,532.00 | 3.93805 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 77468.52 | 3.4293 | 170,229.00 | 3.4293 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 551952.7 | 1.731383 | 770,284.00 | 1.7231 | 72 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 966177.1 | 2.58055 | 1,324,533.00 | 2.572333 | 73 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 150190.8 | 3.193817 | 192,516.00 | 3.193817 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 967674.6 | 3.1627 | 1,285,304.00 | 3.1627 | 75 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1104364 | 3.445833 | 1,450,100.00 | 3.437833 | 76 | 50 - 150 | 0.0080 | +/-0.50 | |
| M8PFOS | 169840.1 | 3.636183 | 228,157.00 | 3.636183 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1033511 | 3.637217 | 1,403,264.00 | 3.637217 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 855756.1 | 4.08065 | 1,494,566.00 | 4.08065 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 150711.5 | 3.945517 | 339,024.00 | 3.945517 | 44 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D3-NMeFOSAA | 201933.6 | 3.865617 | 419,564.00 | 3.865617 | 48 | 50 - 150 | 0.0000 | +/-0.50 | * |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-P(S) (23L1211-04 )** | | | Lab File ID: 23L1211-04.d | | | Analyzed: 12/20/23 15:14 | | | |
| M8FOSA | 509573.8 | 3.9566 | 821,977.00 | 3.9566 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 66231.33 | 2.4886 | 228,021.00 | 2.4886 | 29 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1342759 | 4.32155 | 2,190,084.00 | 4.32155 | 61 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 314348 | 3.78685 | 426,189.00 | 3.786867 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 575390.1 | 1.075083 | 866,915.00 | 1.075083 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 167277.5 | 2.831117 | 218,004.00 | 2.822933 | 77 | 50 - 150 | 0.0082 | +/-0.50 | |
| M6PFDA | 1403788 | 3.79535 | 1,844,299.00 | 3.79535 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 263766.9 | 1.886667 | 329,840.00 | 1.886683 | 80 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1062980 | 3.938033 | 1,701,532.00 | 3.93805 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 85348.72 | 3.4293 | 170,229.00 | 3.4293 | 50 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 568175.6 | 1.7231 | 770,284.00 | 1.7231 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 976009.8 | 2.572333 | 1,324,533.00 | 2.572333 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 155146.5 | 3.193817 | 192,516.00 | 3.193817 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 981997.8 | 3.1627 | 1,285,304.00 | 3.1627 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1115158 | 3.445833 | 1,450,100.00 | 3.437833 | 77 | 50 - 150 | 0.0080 | +/-0.50 | |
| M8PFOS | 179229.1 | 3.636183 | 228,157.00 | 3.636183 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1078889 | 3.637217 | 1,403,264.00 | 3.637217 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 924448.1 | 4.08065 | 1,494,566.00 | 4.08065 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 203626.7 | 3.945517 | 339,024.00 | 3.945517 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 273685.7 | 3.865617 | 419,564.00 | 3.865617 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |

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## INTERNAL STANDARD AREA AND RT SUMMARY

## SOP-454 PFAS

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-P(M) (23L1211-05 )** | | | Lab File ID: 23L1211-05.d | | | Analyzed: 12/20/23 15:22 | | | |
| M8FOSA | 411943.3 | 3.9566 | 821,977.00 | 3.9566 | 50 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 67788.56 | 2.4886 | 228,021.00 | 2.4886 | 30 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1240170 | 4.32155 | 2,190,084.00 | 4.32155 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 287215.1 | 3.786867 | 426,189.00 | 3.786867 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 519686.1 | 1.075083 | 866,915.00 | 1.075083 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 194448.2 | 2.822933 | 218,004.00 | 2.822933 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 1282929 | 3.787383 | 1,844,299.00 | 3.79535 | 70 | 50 - 150 | -0.0080 | +/-0.50 | |
| M3PFBS | 250397 | 1.886683 | 329,840.00 | 1.886683 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1221857 | 3.938033 | 1,701,532.00 | 3.93805 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 100662.7 | 3.429317 | 170,229.00 | 3.4293 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 547576.1 | 1.7231 | 770,284.00 | 1.7231 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 946278.3 | 2.572333 | 1,324,533.00 | 2.572333 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 142625.1 | 3.193817 | 192,516.00 | 3.193817 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 937358.5 | 3.1627 | 1,285,304.00 | 3.1627 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1099577 | 3.437833 | 1,450,100.00 | 3.437833 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 175072.7 | 3.636183 | 228,157.00 | 3.636183 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1072001 | 3.637217 | 1,403,264.00 | 3.637217 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 882426.8 | 4.08065 | 1,494,566.00 | 4.08065 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 182447.8 | 3.945517 | 339,024.00 | 3.945517 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 239943.2 | 3.865617 | 419,564.00 | 3.865617 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-3 (23L1211-06 )** | | | Lab File ID: 23L1211-06.d | | | Analyzed: 12/20/23 15:29 | | | |
| M8FOSA | 472977.6 | 3.9566 | 821,977.00 | 3.9566 | 58 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 75876.34 | 2.4886 | 228,021.00 | 2.4886 | 33 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1204922 | 4.32155 | 2,190,084.00 | 4.32155 | 55 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 267703.3 | 3.786867 | 426,189.00 | 3.786867 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 453977.4 | 1.075083 | 866,915.00 | 1.075083 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 181011 | 2.822933 | 218,004.00 | 2.822933 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 1255178 | 3.79535 | 1,844,299.00 | 3.79535 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 250711.2 | 1.886683 | 329,840.00 | 1.886683 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 996653.7 | 3.93805 | 1,701,532.00 | 3.93805 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 124645.5 | 3.429317 | 170,229.00 | 3.4293 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 530864.4 | 1.7231 | 770,284.00 | 1.7231 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 931596.9 | 2.572333 | 1,324,533.00 | 2.572333 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 145464.4 | 3.193817 | 192,516.00 | 3.193817 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 935062.1 | 3.1627 | 1,285,304.00 | 3.1627 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1053201 | 3.437833 | 1,450,100.00 | 3.437833 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 171706.3 | 3.636183 | 228,157.00 | 3.636183 | 75 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1001043 | 3.637217 | 1,403,264.00 | 3.637217 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 858206.8 | 4.08065 | 1,494,566.00 | 4.08065 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 192552.1 | 3.945517 | 339,024.00 | 3.945517 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 246428.8 | 3.865617 | 419,564.00 | 3.865617 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-302 (23L1211-07 )** | | | Lab File ID: 23L1211-07.d | | | Analyzed: 12/20/23 15:36 | | | |
| M8FOSA | 449284.4 | 3.9566 | 821,977.00 | 3.9566 | 55 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 54681.99 | 2.496817 | 228,021.00 | 2.4886 | 24 | 50 - 150 | 0.0082 | +/-0.50 | * |
| M2PFTA | 1061947 | 4.32155 | 2,190,084.00 | 4.32155 | 48 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-8:2FTS | 198172.1 | 3.786867 | 426,189.00 | 3.786867 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| MPFBA | 583669.1 | 1.075083 | 866,915.00 | 1.075083 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 178422.5 | 2.831117 | 218,004.00 | 2.822933 | 82 | 50 - 150 | 0.0082 | +/-0.50 | |
| M6PFDA | 1151847 | 3.79535 | 1,844,299.00 | 3.79535 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 254547.7 | 1.886667 | 329,840.00 | 1.886683 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 800728.9 | 3.938033 | 1,701,532.00 | 3.93805 | 47 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-6:2FTS | 74254.66 | 3.4293 | 170,229.00 | 3.4293 | 44 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 562580.6 | 1.7231 | 770,284.00 | 1.7231 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 965793.8 | 2.58055 | 1,324,533.00 | 2.572333 | 73 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 153697.5 | 3.193817 | 192,516.00 | 3.193817 | 80 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 974684.1 | 3.1627 | 1,285,304.00 | 3.1627 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1076678 | 3.445833 | 1,450,100.00 | 3.437833 | 74 | 50 - 150 | 0.0080 | +/-0.50 | |
| M8PFOS | 157981.7 | 3.636183 | 228,157.00 | 3.636183 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1002055 | 3.637217 | 1,403,264.00 | 3.637217 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 655959.2 | 4.08065 | 1,494,566.00 | 4.08065 | 44 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D5-NEtFOSAA | 122594 | 3.945517 | 339,024.00 | 3.945517 | 36 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D3-NMeFOSAA | 167463.5 | 3.865617 | 419,564.00 | 3.865617 | 40 | 50 - 150 | 0.0000 | +/-0.50 | * |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW--S(S) (23L1211-08 )** | | | Lab File ID: 23L1211-08.d | | | Analyzed: 12/20/23 15:43 | | | |
| M8FOSA | 420042.5 | 3.9566 | 821,977.00 | 3.9566 | 51 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 54832.82 | 2.496817 | 228,021.00 | 2.4886 | 24 | 50 - 150 | 0.0082 | +/-0.50 | * |
| M2PFTA | 1064026 | 4.32155 | 2,190,084.00 | 4.32155 | 49 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-8:2FTS | 217749.7 | 3.786867 | 426,189.00 | 3.786867 | 51 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 511187.4 | 1.075083 | 866,915.00 | 1.075083 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 184491.7 | 2.822933 | 218,004.00 | 2.822933 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 1194872 | 3.787383 | 1,844,299.00 | 3.79535 | 65 | 50 - 150 | -0.0080 | +/-0.50 | |
| M3PFBS | 253028.1 | 1.886683 | 329,840.00 | 1.886683 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 957013.4 | 3.93805 | 1,701,532.00 | 3.93805 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 718948.9 | 3.429317 | 170,229.00 | 3.4293 | 422 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 523406.1 | 1.7231 | 770,284.00 | 1.7231 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 926596.9 | 2.572333 | 1,324,533.00 | 2.572333 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 145386.7 | 3.193817 | 192,516.00 | 3.193817 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 915287.3 | 3.1627 | 1,285,304.00 | 3.1627 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 949649.6 | 3.437833 | 1,450,100.00 | 3.437833 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 158663.3 | 3.636183 | 228,157.00 | 3.636183 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 931227.8 | 3.637217 | 1,403,264.00 | 3.637217 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 805107.4 | 4.08065 | 1,494,566.00 | 4.08065 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 131276.1 | 3.945517 | 339,024.00 | 3.945517 | 39 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D3-NMeFOSAA | 157168.3 | 3.865617 | 419,564.00 | 3.865617 | 37 | 50 - 150 | 0.0000 | +/-0.50 | * |
| **HW--S(S) (23L1211-08RE1 )** | | | Lab File ID: 23L1211-08RE1.d | | | Analyzed: 12/21/23 13:45 | | | |
| M5PFPeA | 655666.7 | 1.757717 | 851,514.00 | 1.757717 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 225406.1 | 3.636183 | 295,085.00 | 3.636183 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| **HW--S(S) (23L1211-08RE2 )** | | | Lab File ID: 23L1211-08RE2.d | | | Analyzed: 12/21/23 14:44 | | | |
| M2-6:2FTS | 121604.8 | 3.445283 | 155,055.00 | 3.445283 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW--S(M) (23L1211-09 )** | | | Lab File ID: 23L1211-09.d | | | Analyzed: 12/20/23 15:51 | | | |
| M8FOSA | 433014.2 | 3.9566 | 821,977.00 | 3.9566 | 53 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 63356.71 | 2.4886 | 228,021.00 | 2.4886 | 28 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1117269 | 4.32155 | 2,190,084.00 | 4.32155 | 51 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 235288.6 | 3.78685 | 426,189.00 | 3.786867 | 55 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 542559.1 | 1.075083 | 866,915.00 | 1.075083 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 182660 | 2.822933 | 218,004.00 | 2.822933 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 1140514 | 3.79535 | 1,844,299.00 | 3.79535 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 219247.7 | 1.886667 | 329,840.00 | 1.886683 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 998922.2 | 3.938033 | 1,701,532.00 | 3.93805 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 72610.51 | 3.4293 | 170,229.00 | 3.4293 | 43 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 522252.4 | 1.7231 | 770,284.00 | 1.7231 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 861863.6 | 2.572333 | 1,324,533.00 | 2.572333 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 124475.7 | 3.193817 | 192,516.00 | 3.193817 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 851350.1 | 3.1627 | 1,285,304.00 | 3.1627 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 941892.6 | 3.437833 | 1,450,100.00 | 3.437833 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 146634.2 | 3.636183 | 228,157.00 | 3.636183 | 64 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 860693.1 | 3.637217 | 1,403,264.00 | 3.637217 | 61 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 822533.6 | 4.08065 | 1,494,566.00 | 4.08065 | 55 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 154953.4 | 3.945517 | 339,024.00 | 3.945517 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D3-NMeFOSAA | 179618.4 | 3.873767 | 419,564.00 | 3.865617 | 43 | 50 - 150 | 0.0082 | +/-0.50 | * |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-1 (23L1211-10 )** | | | Lab File ID: 23L1211-10.d | | | Analyzed: 12/20/23 15:58 | | | |
| M8FOSA | 427133.9 | 3.9566 | 821,977.00 | 3.9566 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 54895.25 | 2.4886 | 228,021.00 | 2.4886 | 24 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1137290 | 4.32155 | 2,190,084.00 | 4.32155 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 206108.3 | 3.786867 | 426,189.00 | 3.786867 | 48 | 50 - 150 | 0.0000 | +/-0.50 | * |
| MPFBA | 544624.4 | 1.075083 | 866,915.00 | 1.075083 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 212588.5 | 2.831117 | 218,004.00 | 2.822933 | 98 | 50 - 150 | 0.0082 | +/-0.50 | |
| M6PFDA | 1209469 | 3.79535 | 1,844,299.00 | 3.79535 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 267435.5 | 1.886667 | 329,840.00 | 1.886683 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 816585.1 | 3.93805 | 1,701,532.00 | 3.93805 | 48 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-6:2FTS | 78333.41 | 3.429317 | 170,229.00 | 3.4293 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 559957.8 | 1.7231 | 770,284.00 | 1.7231 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 993301.9 | 2.58055 | 1,324,533.00 | 2.572333 | 75 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 153331.2 | 3.193817 | 192,516.00 | 3.193817 | 80 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 994327.5 | 3.1627 | 1,285,304.00 | 3.1627 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1171672 | 3.445833 | 1,450,100.00 | 3.437833 | 81 | 50 - 150 | 0.0080 | +/-0.50 | |
| M8PFOS | 161827.5 | 3.636183 | 228,157.00 | 3.636183 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1034256 | 3.637217 | 1,403,264.00 | 3.637217 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 688761.8 | 4.08065 | 1,494,566.00 | 4.08065 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D5-NEtFOSAA | 143512.7 | 3.945517 | 339,024.00 | 3.945517 | 42 | 50 - 150 | 0.0000 | +/-0.50 | * |
| D3-NMeFOSAA | 186319.1 | 3.865617 | 419,564.00 | 3.865617 | 44 | 50 - 150 | 0.0000 | +/-0.50 | * |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-2 (23L1211-11 )** | | | Lab File ID: 23L1211-11.d | | | Analyzed: 12/20/23 16:05 | | | |
| M8FOSA | 490380 | 3.9566 | 821,977.00 | 3.9566 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 56782.08 | 2.4886 | 228,021.00 | 2.4886 | 25 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1355333 | 4.32155 | 2,190,084.00 | 4.32155 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 227222 | 3.786867 | 426,189.00 | 3.786867 | 53 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 560998.1 | 1.075083 | 866,915.00 | 1.075083 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 190025.4 | 2.831117 | 218,004.00 | 2.822933 | 87 | 50 - 150 | 0.0082 | +/-0.50 | |
| M6PFDA | 1418127 | 3.79535 | 1,844,299.00 | 3.79535 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 272403.2 | 1.886667 | 329,840.00 | 1.886683 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1024300 | 3.93805 | 1,701,532.00 | 3.93805 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 90094.32 | 3.429317 | 170,229.00 | 3.4293 | 53 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 582025.6 | 1.7231 | 770,284.00 | 1.7231 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 1024335 | 2.58055 | 1,324,533.00 | 2.572333 | 77 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 156808.8 | 3.193817 | 192,516.00 | 3.193817 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 1008153 | 3.1627 | 1,285,304.00 | 3.1627 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1196874 | 3.445833 | 1,450,100.00 | 3.437833 | 83 | 50 - 150 | 0.0080 | +/-0.50 | |
| M8PFOS | 174874.8 | 3.636183 | 228,157.00 | 3.636183 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1073064 | 3.637217 | 1,403,264.00 | 3.637217 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 862743.3 | 4.08065 | 1,494,566.00 | 4.08065 | 58 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 200490.3 | 3.945517 | 339,024.00 | 3.945517 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 264670.4 | 3.865617 | 419,564.00 | 3.865617 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-3 (23L1211-12 )** | | | Lab File ID: 23L1211-12.d | | | Analyzed: 01/02/24 12:08 | | | |
| M8FOSA | 450414.8 | 4.00455 | 766,294.00 | 3.99655 | 59 | 50 - 150 | 0.0080 | +/-0.50 | |
| M2-4:2FTS | 92028.63 | 2.644867 | 256,494.00 | 2.644867 | 36 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1185256 | 4.362167 | 2,101,978.00 | 4.362167 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 95473.79 | 3.82705 | 209,493.00 | 3.82705 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| MPFBA | 518848.9 | 1.100017 | 884,750.00 | 1.0917 | 59 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 210075.3 | 2.937833 | 276,915.00 | 2.937833 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 901650.9 | 3.82755 | 1,372,130.00 | 3.82755 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 262579.8 | 2.011067 | 372,281.00 | 2.011067 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 989501.6 | 3.978 | 1,689,139.00 | 3.978 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 119701.5 | 3.469383 | 174,608.00 | 3.477367 | 69 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 538465.1 | 1.824517 | 803,514.00 | 1.816233 | 67 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 975605.3 | 2.730867 | 1,443,773.00 | 2.730867 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 166842.1 | 3.250667 | 231,194.00 | 3.250667 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 1000295 | 3.227617 | 1,481,981.00 | 3.227617 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1099237 | 3.485883 | 1,525,826.00 | 3.485883 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 164137.2 | 3.668117 | 243,805.00 | 3.668117 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 998280.8 | 3.66915 | 1,341,664.00 | 3.66915 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 968659.9 | 4.120767 | 1,700,937.00 | 4.120767 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 231634.1 | 3.985467 | 413,957.00 | 3.985467 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 255231.5 | 3.9059 | 494,834.00 | 3.9059 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Blank (B361025-BLK1 )** | | | Lab File ID: B361025-BLK1.d | | | Analyzed: 12/20/23 13:33 | | | |
| M8FOSA | 628576.7 | 3.964583 | 821,977.00 | 3.9566 | 76 | 50 - 150 | 0.0080 | +/-0.50 | |
| M2-4:2FTS | 190048.4 | 2.505033 | 228,021.00 | 2.496817 | 83 | 50 - 150 | 0.0082 | +/-0.50 | |
| M2PFTA | 1611991 | 4.329683 | 2,190,084.00 | 4.329683 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 457246 | 3.794833 | 426,189.00 | 3.794833 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 674140.7 | 1.075083 | 866,915.00 | 1.075083 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 202862.1 | 2.831117 | 218,004.00 | 2.8393 | 93 | 50 - 150 | -0.0082 | +/-0.50 | |
| M6PFDA | 1519480 | 3.79535 | 1,844,299.00 | 3.79535 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 274348.3 | 1.894967 | 329,840.00 | 1.894967 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1279714 | 3.946033 | 1,701,532.00 | 3.946033 | 75 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 157058.5 | 3.4373 | 170,229.00 | 3.429317 | 92 | 50 - 150 | 0.0080 | +/-0.50 | |
| M5PFPeA | 624570.2 | 1.731383 | 770,284.00 | 1.7231 | 81 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 1088003 | 2.588767 | 1,324,533.00 | 2.58055 | 82 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 169760 | 3.201883 | 192,516.00 | 3.193817 | 88 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 1113443 | 3.170783 | 1,285,304.00 | 3.1627 | 87 | 50 - 150 | 0.0081 | +/-0.50 | |
| M8PFOA | 1315735 | 3.445833 | 1,450,100.00 | 3.445833 | 91 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 190868.2 | 3.636183 | 228,157.00 | 3.636183 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1264270 | 3.637217 | 1,403,264.00 | 3.637217 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 1109098 | 4.08865 | 1,494,566.00 | 4.08065 | 74 | 50 - 150 | 0.0080 | +/-0.50 | |
| D5-NEtFOSAA | 260160.9 | 3.9535 | 339,024.00 | 3.945517 | 77 | 50 - 150 | 0.0080 | +/-0.50 | |
| D3-NMeFOSAA | 358518.7 | 3.873767 | 419,564.00 | 3.873767 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS (B361025-BS1 )** | | | Lab File ID: B361025-BS1.d | | | Analyzed: 12/20/23 13:18 | | | |
| M8FOSA | 639083.4 | 3.9566 | 821,977.00 | 3.9566 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 205118.6 | 2.496817 | 228,021.00 | 2.496817 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 1651785 | 4.32155 | 2,190,084.00 | 4.329683 | 75 | 50 - 150 | -0.0081 | +/-0.50 | |
| M2-8:2FTS | 536812.2 | 3.794833 | 426,189.00 | 3.794833 | 126 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 725384.1 | 1.075083 | 866,915.00 | 1.075083 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 247274.2 | 2.831117 | 218,004.00 | 2.8393 | 113 | 50 - 150 | -0.0082 | +/-0.50 | |
| M6PFDA | 1596528 | 3.79535 | 1,844,299.00 | 3.79535 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 293228.3 | 1.886667 | 329,840.00 | 1.894967 | 89 | 50 - 150 | -0.0083 | +/-0.50 | |
| M7PFUnA | 1325192 | 3.93805 | 1,701,532.00 | 3.946033 | 78 | 50 - 150 | -0.0080 | +/-0.50 | |
| M2-6:2FTS | 165660.4 | 3.4293 | 170,229.00 | 3.429317 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 668087.1 | 1.7231 | 770,284.00 | 1.7231 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 1153284 | 2.58055 | 1,324,533.00 | 2.58055 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 179742.9 | 3.193817 | 192,516.00 | 3.193817 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 1160738 | 3.1627 | 1,285,304.00 | 3.1627 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1348348 | 3.445833 | 1,450,100.00 | 3.445833 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 196466.4 | 3.636183 | 228,157.00 | 3.636183 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1280663 | 3.637217 | 1,403,264.00 | 3.637217 | 91 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 1128930 | 4.08065 | 1,494,566.00 | 4.08065 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 280918.9 | 3.945517 | 339,024.00 | 3.945517 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 368520.5 | 3.865617 | 419,564.00 | 3.873767 | 88 | 50 - 150 | -0.0082 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS Dup (B361025-BSD1 )** | | | Lab File ID: B361025-BSD1.d | | | Analyzed: 12/20/23 13:26 | | | |
| M8FOSA | 665667.1 | 3.964583 | 821,977.00 | 3.9566 | 81 | 50 - 150 | 0.0080 | +/-0.50 | |
| M2-4:2FTS | 229504.7 | 2.505033 | 228,021.00 | 2.496817 | 101 | 50 - 150 | 0.0082 | +/-0.50 | |
| M2PFTA | 1873515 | 4.329683 | 2,190,084.00 | 4.329683 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 573174.6 | 3.794833 | 426,189.00 | 3.794833 | 134 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 758255.4 | 1.075083 | 866,915.00 | 1.075083 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 237271.7 | 2.8393 | 218,004.00 | 2.8393 | 109 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 1762897 | 3.79535 | 1,844,299.00 | 3.79535 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 329697.9 | 1.894967 | 329,840.00 | 1.894967 | 100 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1531161 | 3.946033 | 1,701,532.00 | 3.946033 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 188275.3 | 3.4373 | 170,229.00 | 3.429317 | 111 | 50 - 150 | 0.0080 | +/-0.50 | |
| M5PFPeA | 706437.5 | 1.731383 | 770,284.00 | 1.7231 | 92 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 1251322 | 2.588767 | 1,324,533.00 | 2.58055 | 94 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 197890.1 | 3.201883 | 192,516.00 | 3.193817 | 103 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 1283716 | 3.170783 | 1,285,304.00 | 3.1627 | 100 | 50 - 150 | 0.0081 | +/-0.50 | |
| M8PFOA | 1506973 | 3.445833 | 1,450,100.00 | 3.445833 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 219852.4 | 3.636183 | 228,157.00 | 3.636183 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1500780 | 3.637217 | 1,403,264.00 | 3.637217 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 1226190 | 4.08865 | 1,494,566.00 | 4.08065 | 82 | 50 - 150 | 0.0080 | +/-0.50 | |
| D5-NEtFOSAA | 311707.4 | 3.9535 | 339,024.00 | 3.945517 | 92 | 50 - 150 | 0.0080 | +/-0.50 | |
| D3-NMeFOSAA | 390538.3 | 3.873767 | 419,564.00 | 3.873767 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Blank (B361067-BLK1 )** | | | Lab File ID: B361067-BLK1.d | | | Analyzed: 12/28/23 21:47 | | | |
| M8FOSA | 581097.6 | 4.036533 | 917,199.00 | 4.036533 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 186744.7 | 2.62 | 344,794.00 | 2.62 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 1202198 | 4.35405 | 1,825,146.00 | 4.35405 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 243284.5 | 3.835017 | 325,660.00 | 3.835017 | 75 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 677262 | 1.0917 | 973,516.00 | 1.0917 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 230914.5 | 2.929717 | 303,808.00 | 2.921133 | 76 | 50 - 150 | 0.0086 | +/-0.50 | |
| M6PFDA | 1165586 | 3.8355 | 1,678,611.00 | 3.82755 | 69 | 50 - 150 | 0.0080 | +/-0.50 | |
| M3PFBS | 294337.2 | 1.986217 | 421,258.00 | 1.986217 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1103658 | 3.978017 | 1,844,773.00 | 3.978017 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 193335.1 | 3.48535 | 246,266.00 | 3.48535 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 624963.4 | 1.799667 | 846,062.00 | 1.799667 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 1114600 | 2.706317 | 1,533,051.00 | 2.706317 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 170427.4 | 3.266833 | 245,975.00 | 3.25875 | 69 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 1151061 | 3.2357 | 1,550,063.00 | 3.2357 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1330943 | 3.493867 | 1,635,755.00 | 3.493867 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 174737.5 | 3.676117 | 258,464.00 | 3.676117 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 1081554 | 3.67715 | 1,495,942.00 | 3.67715 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 1005416 | 4.112633 | 1,727,274.00 | 4.112633 | 58 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 275236.6 | 3.985483 | 450,264.00 | 3.985483 | 61 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 345813 | 3.9059 | 520,003.00 | 3.9059 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS (B361067-BS1 )** | | | Lab File ID: B361067-BS1.d | | | Analyzed: 12/28/23 21:33 | | | |
| M8FOSA | 462877.2 | 4.036533 | 917,199.00 | 4.036533 | 50 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 157811.2 | 2.62 | 344,794.00 | 2.62 | 46 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1033471 | 4.35405 | 1,825,146.00 | 4.35405 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 184635.3 | 3.835017 | 325,660.00 | 3.835017 | 57 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 576188.5 | 1.100017 | 973,516.00 | 1.0917 | 59 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 196347.1 | 2.929717 | 303,808.00 | 2.921133 | 65 | 50 - 150 | 0.0086 | +/-0.50 | |
| M6PFDA | 984374.8 | 3.8355 | 1,678,611.00 | 3.82755 | 59 | 50 - 150 | 0.0080 | +/-0.50 | |
| M3PFBS | 254455.5 | 1.986217 | 421,258.00 | 1.986217 | 60 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 928224.9 | 3.978017 | 1,844,773.00 | 3.978017 | 50 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 158132.4 | 3.48535 | 246,266.00 | 3.48535 | 64 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 533464.2 | 1.799667 | 846,062.00 | 1.799667 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 954248.5 | 2.7145 | 1,533,051.00 | 2.706317 | 62 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 140507.4 | 3.266833 | 245,975.00 | 3.25875 | 57 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 954176.6 | 3.2357 | 1,550,063.00 | 3.2357 | 62 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1084792 | 3.493867 | 1,635,755.00 | 3.493867 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 151940.6 | 3.676117 | 258,464.00 | 3.676117 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 913978.8 | 3.67715 | 1,495,942.00 | 3.67715 | 61 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 875322.9 | 4.112633 | 1,727,274.00 | 4.112633 | 51 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 249789.2 | 3.985483 | 450,264.00 | 3.985483 | 55 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 282457.7 | 3.9059 | 520,003.00 | 3.9059 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS Dup (B361067-BSD1 )** | | | Lab File ID: B361067-BSD1.d | | | Analyzed: 12/28/23 21:40 | | | |
| M8FOSA | 514454.5 | 4.036533 | 917,199.00 | 4.036533 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 170160.5 | 2.62 | 344,794.00 | 2.62 | 49 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2PFTA | 1141424 | 4.345933 | 1,825,146.00 | 4.35405 | 63 | 50 - 150 | -0.0081 | +/-0.50 | |
| M2-8:2FTS | 207282.5 | 3.835017 | 325,660.00 | 3.835017 | 64 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 615521.4 | 1.0917 | 973,516.00 | 1.0917 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 211255.3 | 2.929717 | 303,808.00 | 2.921133 | 70 | 50 - 150 | 0.0086 | +/-0.50 | |
| M6PFDA | 1045449 | 3.8355 | 1,678,611.00 | 3.82755 | 62 | 50 - 150 | 0.0080 | +/-0.50 | |
| M3PFBS | 264352.8 | 1.986217 | 421,258.00 | 1.986217 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 1096342 | 3.978017 | 1,844,773.00 | 3.978017 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 177137.7 | 3.48535 | 246,266.00 | 3.48535 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 568139.6 | 1.799667 | 846,062.00 | 1.799667 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 990086.8 | 2.706317 | 1,533,051.00 | 2.706317 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 152599.2 | 3.266833 | 245,975.00 | 3.25875 | 62 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 1032255 | 3.2357 | 1,550,063.00 | 3.2357 | 67 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 1126134 | 3.493867 | 1,635,755.00 | 3.493867 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 143775.2 | 3.676117 | 258,464.00 | 3.676117 | 56 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 973770.9 | 3.67715 | 1,495,942.00 | 3.67715 | 65 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 939403.9 | 4.112633 | 1,727,274.00 | 4.112633 | 54 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 262717.8 | 3.985483 | 450,264.00 | 3.985483 | 58 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 326695.5 | 3.9059 | 520,003.00 | 3.9059 | 63 | 50 - 150 | 0.0000 | +/-0.50 | |

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## INTERNAL STANDARD AREA AND RT SUMMARY

### SOP-454 PFAS

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Resolution Check (S098170-RES1 )** | | | Lab File ID: BIC1_ID_122123.d | | | Analyzed: 12/21/23 13:12 | | | |
| M8FOSA | | | | 3.972583 | | 50 - 150 | -3.9726 | +/-0.50 | * |
| M2-4:2FTS | | | | 2.562517 | | 50 - 150 | -2.5625 | +/-0.50 | * |
| M2PFTA | | | | 4.329683 | | 50 - 150 | -4.3297 | +/-0.50 | * |
| M2-8:2FTS | | | | 3.8028 | | 50 - 150 | -3.8028 | +/-0.50 | * |
| MPFBA | | | | 1.058467 | | 50 - 150 | -1.0585 | +/-0.50 | * |
| M3HFPO-DA | | | | 2.872033 | | 50 - 150 | -2.8720 | +/-0.50 | * |
| M6PFDA | | | | 3.79535 | | 50 - 150 | -3.7954 | +/-0.50 | * |
| M3PFBS | | | | 1.9364 | | 50 - 150 | -1.9364 | +/-0.50 | * |
| M7PFUnA | | | | 3.946033 | | 50 - 150 | -3.9460 | +/-0.50 | * |
| M2-6:2FTS | | | | 3.445283 | | 50 - 150 | -3.4453 | +/-0.50 | * |
| M5PFPeA | | | | 1.757717 | | 50 - 150 | -1.7577 | +/-0.50 | * |
| M5PFHxA | | | | 2.646767 | | 50 - 150 | -2.6468 | +/-0.50 | * |
| M3PFHxS | | | | 3.218333 | | 50 - 150 | -3.2183 | +/-0.50 | * |
| M4PFHpA | | | | 3.186933 | | 50 - 150 | -3.1869 | +/-0.50 | * |
| M8PFOA | | | | 3.453817 | | 50 - 150 | -3.4538 | +/-0.50 | * |
| M8PFOS | | | | 3.636183 | | 50 - 150 | -3.6362 | +/-0.50 | * |
| M9PFNA | | | | 3.6452 | | 50 - 150 | -3.6452 | +/-0.50 | * |
| MPFDoA | | | | 4.08865 | | 50 - 150 | -4.0887 | +/-0.50 | * |
| D5-NEtFOSAA | 1658.416 | 3.905533 | | 3.9535 | | 50 - 150 | -0.0480 | +/-0.50 | * |
| D3-NMeFOSAA | 161.3761 | 3.897717 | | 3.873767 | | 50 - 150 | 0.0240 | +/-0.50 | * |

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## CERTIFICATIONS

**Certified Analyses included in this Report**

| Analyte | Certifications |
|---|---|
| ***SOP-454 PFAS in Water*** | |
| Perfluorobutanoic acid (PFBA) | NH-P,PA,NY |
| Perfluorobutanesulfonic acid (PFBS) | NH-P,PA,NY |
| Perfluoropentanoic acid (PFPeA) | NH-P,PA,NY |
| Perfluorohexanoic acid (PFHxA) | NH-P,PA,NY |
| 11Cl-PF3OUdS (F53B Major) | NH-P,PA,NY |
| 9Cl-PF3ONS (F53B Minor) | NH-P,PA |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NH-P,PA,NY |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | NH-P,PA,NY |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | NH-P,PA |
| Perfluorodecanoic acid (PFDA) | NH-P,PA,NY |
| Perfluorododecanoic acid (PFDoA) | NH-P,PA,NY |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | NH-P,PA,NY |
| Perfluoroheptanesulfonic acid (PFHpS) | NH-P,PA,NY |
| N-EtFOSAA (NEtFOSAA) | NH-P,PA,NY |
| N-MeFOSAA (NMeFOSAA) | NH-P,PA,NY |
| Perfluorotetradecanoic acid (PFTA) | NH-P,PA,NY |
| Perfluorotridecanoic acid (PFTrDA) | NH-P,PA,NY |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | NH-P,PA,NY |
| Perfluorodecanesulfonic acid (PFDS) | NH-P,PA |
| Perfluorooctanesulfonamide (FOSA) | NH-P,PA |
| Perfluorononanesulfonic acid (PFNS) | NH-P,PA |
| Perfluoro-1-hexanesulfonamide (FHxSA) | NH-P,PA |
| Perfluoro-1-butanesulfonamide (FBSA) | NH-P,PA |
| Perfluorohexanesulfonic acid (PFHxS) | NH-P,PA,NY |
| Perfluoro-4-oxapentanoic acid (PFMPA) | NH-P,PA,NY |
| Perfluoro-5-oxahexanoic acid (PFMBA) | NH-P,PA,NY |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | NH-P,PA,NY |
| Perfluoropentanesulfonic acid (PFPeS) | NH-P,PA,NY |
| Perfluoroundecanoic acid (PFUnA) | NH-P,PA,NY |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | NH-P,PA |
| Perfluoroheptanoic acid (PFHpA) | NH-P,PA,NY |
| Perfluorooctanoic acid (PFOA) | NH-P,PA,NY |
| Perfluorooctanesulfonic acid (PFOS) | NH-P,PA,NY |
| Perfluorononanoic acid (PFNA) | NH-P,PA,NY |
| ***SOP-466 PFAS in Soil*** | |
| Perfluorobutanoic acid (PFBA) | NH-P,PA,NY |
| Perfluorobutanesulfonic acid (PFBS) | NH-P,PA |
| Perfluoropentanoic acid (PFPeA) | NH-P,PA,NY |
| Perfluorohexanoic acid (PFHxA) | NH-P,PA,NY |
| 11Cl-PF3OUdS (F53B Major) | NH-P,PA |
| 9Cl-PF3ONS (F53B Minor) | NH-P,PA |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NH-P,PA |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | NH-P,PA |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | NH-P,PA,NY |
| Perfluorodecanoic acid (PFDA) | NH-P,PA,NY |
| Perfluorododecanoic acid (PFDoA) | NH-P,PA,NY |

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

## CERTIFICATIONS

**Certified Analyses included in this Report**

| Analyte | Certifications |
|---|---|
| ***SOP-466 PFAS in Soil*** | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | NH-P,PA |
| Perfluoroheptanesulfonic acid (PFHpS) | NH-P,PA |
| N-EtFOSAA (NEtFOSAA) | NH-P,PA,NY |
| N-MeFOSAA (NMeFOSAA) | NH-P,PA |
| Perfluorotetradecanoic acid (PFTA) | NH-P,PA,NY |
| Perfluorotridecanoic acid (PFTrDA) | NH-P,PA,NY |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | NH-P,PA |
| Perfluorodecanesulfonic acid (PFDS) | NH-P,PA |
| Perfluorooctanesulfonamide (FOSA) | NH-P,PA |
| Perfluorononanesulfonic acid (PFNS) | NH-P,PA |
| Perfluoro-1-hexanesulfonamide (FHxSA) | NH-P,PA |
| Perfluoro-1-butanesulfonamide (FBSA) | NH-P,PA |
| Perfluorohexanesulfonic acid (PFHxS) | NH-P,PA |
| Perfluoro-4-oxapentanoic acid (PFMPA) | NH-P,PA |
| Perfluoro-5-oxahexanoic acid (PFMBA) | NH-P,PA |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | NH-P,PA |
| Perfluoropentanesulfonic acid (PFPeS) | NH-P,PA |
| Perfluoroundecanoic acid (PFUnA) | NH-P,PA,NY |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | NH-P,PA |
| Perfluoroheptanoic acid (PFHpA) | NH-P,PA,NY |
| Perfluorooctanoic acid (PFOA) | NH-P,PA,NY |
| Perfluorooctanesulfonic acid (PFOS) | NH-P,PA,NY |
| Perfluorononanoic acid (PFNA) | NH-P,PA,NY |

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

| Code | Description | Number | Expires |
|---|---|---|---|
| NY | New York State Department of Health | 10899 NELAP | 04/1/2024 |
| NH-P | New Hampshire Environmental Lab | 2557 NELAP | 09/6/2024 |
| PA | Commonwealth of Pennsylvania DEP | 68-05812 | 06/30/2024 |

23L1211

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CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev S_07/13/2021



Company Name: Horsley Witten Group
Address: 90 Route 6A, Sandwich, MA
Phone: 508-833-6600
Project Name: HYA-Cape Cod Gateway
Project Location: Hyannis
Project Number: 23070
Project Manager: Mark Nelson / Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: Caroline Armstrong

**Requested Turnaround Time**
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☒ Due Date:

**Rush-Approval Required**
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

**Data Delivery**
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To:
Fax To #:

**Dissolved Metals Samples**
○ Field Filtered
○ Lab to Filter

**Orthophosphate Samples**
○ Field Filtered
○ Lab to Filter

**PCB ONLY**
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

| Pace Work Order# | Client Sample ID / Description | Beginning Date/Time | Ending Date/Time | COMP/GRAB | ¹Matrix Code | Conc Code | VIALS | GLASS | PLASTIC | BACTERIA | ENCORE | PFAS (isotope dilution) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | HW-I(S) | 12/5/23 | 1010 | G | GW | | | | 2 | | | X |
| 2 | HW-I(M) | ↓ | 1200 | ↓ | ↓ | | | | ↓ | | | X |
| 3 | HW-I(D) | ↓ | 1115 | ↓ | ↓ | | | | ↓ | | | X |
| 4 | HW-P(S) | ↓ | 1315 | ↓ | ↓ | | | | ↓ | | | X |
| 5 | HW-P(M) | ↓ | 1555 | ↓ | ↓ | | | | ↓ | | | X |
| 6 | HW-3 | 12/6/23 | 1030 | ↓ | ↓ | | | | ↓ | | | X |
| 7 | HW-302 | ↓ | 1055 | ↓ | ↓ | | | | ↓ | | | X |
| 8 | ~~HW-D~~ HW-S(S) | ↓ | 1130 | ↓ | ↓ | | | | ↓ | | | X |
| 9 | HW-S(M) | ↓ | 1355 | ↓ | ↓ | | | | ↓ | | | X |

² Preservation Code

Courier Use Only
Total Number Of:
VIALS____
GLASS____
PLASTIC____
BACTERIA____
ENCORE____

Glassware in the fridge? Y / (N)
Glassware in freezer? Y / (N)
Prepackaged Cooler? (Y) / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

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)

| Relinquished / Received | Date/Time |
|---|---|
| Relinquished by: (signature) [signature] | 12/8 1040 |
| Received by: (signature) [signature] | 12/8/23 1040 |
| Relinquished by: (signature) [signature] | 12/8 1735 |
| Received by: (signature) [signature] 3.1 | 12/8/23 1735 |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |

Client Comments: MCP-GW-1

**Detection Limit Requirements**
MA: GW-1
CT:
Other:

**Special Requirements**
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Federal ☐ City ☐
Municipality ☐ 21 J ☐ Brownfield ☐
MWRA ☐ School ☐ MBTA ☐
WRTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

**Disclaimer:** Pace Analytical 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 what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

d3L1211

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East Longmeadow, MA D1D28

CHAIN OF CUSTODY RECORD

Doc # 381 Rev 5_D7/13/2021



Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich, MA
Phone: 508-833-6600
Project Name: HYA-Capecod Gateway
Project Location: 23070
Project Number: Hyannis
Project Manager: Mark Nelson / Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: Caroline Armstrong

**Requested Turnaround Time:** 7-Day ☐ 1D-Day ☐ PFAS 10-Day (std) ☒ Due Date:

**Rush-Approval Required:** 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☐

**Data Delivery:** Format: PDF ☒ EXCEL ☒ Other: CLP Like Data Pkg Required: ☐ Email To: Fax To #:

**Dissolved Metals Samples:** ○ Field Filtered ○ Lab to Filter

**Orthophosphate Samples:** ○ Field Filtered ○ Lab to Filter

**PCB ONLY:** SOXHLET ☐ NON SOXHLET ☐

ANALYSIS REQUESTED

| Pace Work Order# | Client Sample ID / Description | Beginning Date/Time | Ending Date/Time | COMP/GRAB | ¹Matrix Code | Conc Code | VIALS | GLASS | PLASTIC | BACTERIA | ENCORE | PFAS (isotope dilution) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 10 | ME-1 | 12/6/23 | 1417 | G | GW | | | | 2 | | | X |
| 11 | ME-2 | ↓ | 1405 | G | GW | | | | 2 | | | X |
| 12 | ME-3 | ↓ | 1410 | G | GW | | | | 2 | | | X |

² Preservation Code

Courier Use Only
Total Number Of:
VIALS____
GLASS____
PLASTIC____
BACTERIA____
ENCORE____

Glassware in the fridge? Y / (N)
Glassware in freezer? Y / (N)
Prepackaged Cooler? (Y) / N
*Pace Analytical is not responsible for missing samples from prepacked coolers

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)

| Relinquished/Received | Signature | Date/Time |
|---|---|---|
| Relinquished by: (signature) | [signature] | 12/8 1040 |
| Received by: (signature) | [signature] | 12/8/23 1040 |
| Relinquished by: (signature) | [signature] | 12/8 1735 |
| Received by: (signature) | [signature] 3.1 | 12/8/23 1735 |
| Relinquished by: (signature) | | |
| Received by: (signature) | | |
| Relinquished by: (signature) | | |
| Received by: (signature) | | |

Client Comments: MCP GW-1

**Detection Limit Requirements**
MA: GW-1
CT:
Other:

**Special Requirements**
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Federal ☐ City ☐
Municipality ☐ 21 J ☐ Brownfield ☐
MWRA ☐ School ☐ MBTA ☐
WRTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

**Disclaimer:** Pace Analytical 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 what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

| Pace Analytical Services | DC#_Title: ENV-FRM-ELON-0001 v07_Sample Receiving Checklist |
|---|---|
| | Effective Date: 07/13/2023 |

# Log In Back-Sheet

Client Horsley Witten

Project HYA

MCP/RCP Required MA MCP

Deliverable Package Requirement GW-1

Location MA

PWSID# (When Applicable) N/A

Arrival Method:

Courier ☑ Fed Ex ☐ Walk In ☐ Other ☐

Received By / Date / Time 9n 12/8/23 1735

Back-Sheet By / Date / Time 9n 12/8/23 2117

Temperature Method gun # 5

Temp < 6° C Actual Temperature 3.1

Rush Samples: Yes / (No) Notify

Short Hold: Yes / (No) Notify

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

| | True | False |
|---|---|---|
| Received on Ice | ☑ | ☐ |
| Received in Cooler | ☑ | ☐ |
| Custody Seal: DATE TIME | ☐ | ☑ |
| COC Relinquished | ☑ | ☐ |
| COC/Samples Labels Agree | ☑ | ☐ |
| All Samples in Good Condition | ☑ | ☐ |
| Samples Received within Holding Time | ☑ | ☐ |
| Is there enough Volume | ☑ | ☐ |
| Proper Media/Container Used | ☑ | ☐ |
| Splitting Samples Required | ☐ | ☑ |
| MS/MSD | ☐ | ☑ |
| Trip Blanks | ☐ | ☑ |
| Lab to Filters | ☐ | ☑ |
| COC Legible | ☑ | ☐ |

COC Included: (Check all included)

Client ☑ Analysis ☑ Sampler Name ☑

Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper pH: (N/A) ☐ ☐

**Notes regarding Samples/COC outside of SOP:**

**Additional Container Notes**

*Note: West Virginia requires all samples to have their temperature taken. Note any outliers.*

| Container | Size | Sample | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Soils Jars (Circle Amb/Clear) | | 16oz Amb/Clear | | | | | | | | | | | | | | | | | | | | |
| | | 8oz Amb/Clear | | | | | | | | | | | | | | | | | | | | |
| | | 4oz Amb/Clear | | | | | | | | | | | | | | | | | | | | |
| | | 2oz Amb/Clear | | | | | | | | | | | | | | | | | | | | |
| Ambers | 1 Liter | Unpreserved | | | | | | | | | | | | | | | | | | | | |
| | | HCL | | | | | | | | | | | | | | | | | | | | |
| | | Sulfuric | | | | | | | | | | | | | | | | | | | | |
| | 250mL | Sulfuric | | | | | | | | | | | | | | | | | | | | |
| | | Phosphoric | | | | | | | | | | | | | | | | | | | | |
| | | HCl | | | | | | | | | | | | | | | | | | | | |
| | 100mL | Unpreserved | | | | | | | | | | | | | | | | | | | | |
| Plastics | 1 Liter | Unpreserved | | | | | | | | | | | | | | | | | | | | |
| | | Sulfuric | | | | | | | | | | | | | | | | | | | | |
| | 500mL | Unpreserved | | | | | | | | | | | | | | | | | | | | |
| | | Sulfuric | | | | | | | | | | | | | | | | | | | | |
| | 250mL | Unpreserved | 2 | | | | | | | | | | | | | | | | | | | |
| | | Trizma | | | | | | | | | | | | | | | | | | | | |
| | | Sulfuric | | | | | | | | | | | | | | | | | | | | |
| | | Nitric | | | | | | | | | | | | | | | | | | | | |
| | | NaOH | | | | | | | | | | | | | | | | | | | | |
| | | Ammonium Acetate | | | | | | | | | | | | | | | | | | | | |
| | | NaOH/Zinc | | | | | | | | | | | | | | | | | | | | |
| VOA Vials | | Unpreserved | | | | | | | | | | | | | | | | | | | | |
| | | HCl | | | | | | | | | | | | | | | | | | | | |
| | | MeOH | | | | | | | | | | | | | | | | | | | | |
| | | D.I. Water | | | | | | | | | | | | | | | | | | | | |
| | | BiSulfate | | | | | | | | | | | | | | | | | | | | |
| Other / Fill in | | Col/Bact | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |

ANALYTICAL REPORT

| | |
|---|---|
| Lab Number: | L2332762 |
| Client: | Horseley & Witten, Inc.<br>Sextant Hill Office Park<br>90 Route 6A<br>Sandwich, MA 02563 |
| ATTN: | Brian Massa |
| Phone: | (508) 833-6600 |
| Project Name: | CAPECOD GATEWAY AIRPORT |
| Project Number: | 23070 |
| Report Date: | 06/30/23 |



Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0825), DoD (L2474), FL (E87814), IL (200081), IN (C-MA-04), KY (KY98046), LA (85084), ME (MA00030), MD (350), MI (99110) , NJ (MA015), NY (11627), NC (685), OH (CL106), OR (MA-0262), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #525-23-107-88708), 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:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070

**Lab Number:** L2332762
**Report Date:** 06/30/23

| Alpha Sample ID | Client ID | Matrix | Sample Location | Collection Date/Time | Receive Date |
|---|---|---|---|---|---|
| L2332762-01 | HW-I (S) | WATER | HYANIS, MA | 06/07/23 10:10 | 06/09/23 |
| L2332762-02 | HW-I (M) | WATER | HYANIS, MA | 06/07/23 12:15 | 06/09/23 |
| L2332762-03 | HW-I (D) | WATER | HYANIS, MA | 06/07/23 11:15 | 06/09/23 |
| L2332762-04 | HW-P (S) | WATER | HYANIS, MA | 06/08/23 10:25 | 06/09/23 |
| L2332762-05 | HW-P (M) | WATER | HYANIS, MA | 06/08/23 11:48 | 06/09/23 |
| L2332762-06 | HW-S (S) | WATER | HYANIS, MA | 06/09/23 10:08 | 06/09/23 |
| L2332762-07 | HW-S (M) | WATER | HYANIS, MA | 06/09/23 12:25 | 06/09/23 |

| | | | |
|---|---|---|---|
| **Project Name:** | CAPECOD GATEWAY AIRPORT | **Lab Number:** | L2332762 |
| **Project Number:** | 23070 | **Report Date:** | 06/30/23 |

## 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.

**Case Narrative (continued)**

Report Submission

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

Perfluorinated Alkyl Acids by Isotope Dilution

L2332762-01 and -06: The sample has elevated detection limits due to the limited sample volume utilized during extraction, as required by the high concentrations in the screen results.

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: Darian Dailey

Title: Technical Director/Representative Date: 06/30/23

# ORGANICS

# SEMIVOLATILES

**Project Name:** CAPECOD GATEWAY AIRPORT
**Lab Number:** L2332762
**Project Number:** 23070
**Report Date:** 06/30/23

**SAMPLE RESULTS**

Lab ID: L2332762-01
Client ID: HW-I (S)
Sample Location: HYANIS, MA
Date Collected: 06/07/23 10:10
Date Received: 06/09/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 06/29/23 18:05
Analyst: AC
Extraction Method: ALPHA 23528
Extraction Date: 06/28/23 16:55

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 43.0 | | ng/l | 20.0 | 4.08 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 166 | | ng/l | 20.0 | 3.96 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | ND | | ng/l | 20.0 | 2.38 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 20.0 | 4.52 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 87.4 | | ng/l | 20.0 | 3.28 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | ND | | ng/l | 20.0 | 2.45 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 106 | | ng/l | 20.0 | 2.25 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 69.2 | | ng/l | 20.0 | 3.76 | 1 |
| Perfluorooctanoic Acid (PFOA) | 172 | | ng/l | 20.0 | 2.36 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 1530 | | ng/l | 20.0 | 13.3 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 9.88 | J | ng/l | 20.0 | 6.88 | 1 |
| Perfluorononanoic Acid (PFNA) | 235 | | ng/l | 20.0 | 3.12 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 708 | | ng/l | 20.0 | 5.04 | 1 |
| Perfluorodecanoic Acid (PFDA) | ND | | ng/l | 20.0 | 3.04 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 20.0 | 12.1 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 20.0 | 11.2 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 20.0 | 6.48 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 20.0 | 2.60 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 20.0 | 9.80 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 20.0 | 5.80 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 20.0 | 8.04 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 20.0 | 3.72 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 20.0 | 3.27 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 20.0 | 2.48 | 1 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-01
Client ID: HW-I (S)
Sample Location: HYANIS, MA
Date Collected: 06/07/23 10:10
Date Received: 06/09/23
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) | 100 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 109 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 105 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 97 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 98 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 97 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 99 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 100 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 119 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 97 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 101 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 99 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 111 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 112 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 100 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 17 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 113 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 96 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 93 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-02
Client ID: HW-I (M)
Sample Location: HYANIS, MA

Date Collected: 06/07/23 12:15
Date Received: 06/09/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 06/29/23 18:21
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 06/28/23 16:55

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 0.553 | J | ng/l | 1.74 | 0.354 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 0.987 | J | ng/l | 1.74 | 0.344 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | ND | | ng/l | 1.74 | 0.207 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 1.74 | 0.393 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 0.963 | J | ng/l | 1.74 | 0.285 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | 0.219 | JF | ng/l | 1.74 | 0.213 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 1.16 | J | ng/l | 1.74 | 0.196 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 5.92 | | ng/l | 1.74 | 0.327 | 1 |
| Perfluorooctanoic Acid (PFOA) | 0.977 | J | ng/l | 1.74 | 0.205 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | ND | | ng/l | 1.74 | 1.16 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | | ng/l | 1.74 | 0.598 | 1 |
| Perfluorononanoic Acid (PFNA) | 0.518 | J | ng/l | 1.74 | 0.271 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 6.76 | | ng/l | 1.74 | 0.438 | 1 |
| Perfluorodecanoic Acid (PFDA) | ND | | ng/l | 1.74 | 0.264 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 1.74 | 1.05 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 1.74 | 0.973 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 1.74 | 0.563 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 1.74 | 0.226 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 1.74 | 0.852 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 1.74 | 0.504 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 1.74 | 0.698 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 1.74 | 0.323 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 1.74 | 0.284 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 1.74 | 0.215 | 1 |

| | | | |
|---|---|---|---|
| **Project Name:** | CAPECOD GATEWAY AIRPORT | **Lab Number:** | L2332762 |
| **Project Number:** | 23070 | **Report Date:** | 06/30/23 |

**SAMPLE RESULTS**

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-02 | Date Collected: | 06/07/23 12:15 |
| Client ID: | HW-I (M) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | 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) | 82 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 90 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 113 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 115 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 79 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 79 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 105 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 89 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 109 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 90 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 106 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 95 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 108 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 97 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 96 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 13 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 97 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 95 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 76 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT | **Lab Number:** L2332762
**Project Number:** 23070 | **Report Date:** 06/30/23

## SAMPLE RESULTS

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-03 | Date Collected: | 06/07/23 11:15 |
| Client ID: | HW-I (D) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | Field Prep: | Not Specified |
| Sample Depth: | | | |
| Matrix: | Water | Extraction Method: | ALPHA 23528 |
| Analytical Method: | 134,LCMSMS-ID | Extraction Date: | 06/28/23 16:55 |
| Analytical Date: | 06/29/23 18:38 | | |
| Analyst: | AC | | |

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 10.2 | | ng/l | 1.74 | 0.356 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 33.4 | | ng/l | 1.74 | 0.345 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | 1.15 | J | ng/l | 1.74 | 0.208 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 1.74 | 0.394 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 25.8 | | ng/l | 1.74 | 0.286 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | 1.48 | J | ng/l | 1.74 | 0.214 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 10.8 | | ng/l | 1.74 | 0.196 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 28.0 | | ng/l | 1.74 | 0.328 | 1 |
| Perfluorooctanoic Acid (PFOA) | 10.1 | | ng/l | 1.74 | 0.206 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | ND | | ng/l | 1.74 | 1.16 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 2.43 | | ng/l | 1.74 | 0.600 | 1 |
| Perfluorononanoic Acid (PFNA) | 1.17 | J | ng/l | 1.74 | 0.272 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 71.9 | | ng/l | 1.74 | 0.440 | 1 |
| Perfluorodecanoic Acid (PFDA) | 0.296 | JF | ng/l | 1.74 | 0.265 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 1.74 | 1.06 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 1.74 | 0.977 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 1.74 | 0.565 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 1.74 | 0.227 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 1.74 | 0.855 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 1.74 | 0.506 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 1.74 | 0.701 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 1.74 | 0.324 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 1.74 | 0.285 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 1.74 | 0.216 | 1 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-03 Date Collected: 06/07/23 11:15
Client ID: HW-I (D) Date Received: 06/09/23
Sample Location: HYANIS, MA 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) | 81 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 91 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 106 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 112 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 76 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 79 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 104 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 85 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 105 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 79 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 80 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 70 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 77 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 80 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 70 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 5 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 78 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 63 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 57 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-04
Client ID: HW-P (S)
Sample Location: HYANIS, MA

Date Collected: 06/08/23 10:25
Date Received: 06/09/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 06/29/23 18:54
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 06/28/23 16:55

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 12.3 | | ng/l | 1.76 | 0.359 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 28.6 | | ng/l | 1.76 | 0.348 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | ND | | ng/l | 1.76 | 0.209 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 1.76 | 0.397 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 15.5 | | ng/l | 1.76 | 0.288 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | ND | | ng/l | 1.76 | 0.216 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 6.98 | | ng/l | 1.76 | 0.198 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 0.798 | JF | ng/l | 1.76 | 0.330 | 1 |
| Perfluorooctanoic Acid (PFOA) | 14.5 | | ng/l | 1.76 | 0.207 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 4.41 | | ng/l | 1.76 | 1.17 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | | ng/l | 1.76 | 0.605 | 1 |
| Perfluorononanoic Acid (PFNA) | 15.1 | | ng/l | 1.76 | 0.274 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 1.38 | JF | ng/l | 1.76 | 0.443 | 1 |
| Perfluorodecanoic Acid (PFDA) | 0.464 | J | ng/l | 1.76 | 0.267 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 1.76 | 1.06 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 1.76 | 0.985 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 1.76 | 0.570 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | 0.243 | JF | ng/l | 1.76 | 0.228 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 1.76 | 0.862 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 1.76 | 0.510 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 1.76 | 0.707 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 1.76 | 0.327 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 1.76 | 0.288 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 1.76 | 0.218 | 1 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-04
Client ID: HW-P (S)
Sample Location: HYANIS, MA
Date Collected: 06/08/23 10:25
Date Received: 06/09/23
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) | 72 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 79 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 105 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 116 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 66 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 67 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 101 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 70 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 109 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 67 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 97 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 72 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 104 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 78 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 76 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 6 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 75 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 74 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 73 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762

**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-05 | Date Collected: | 06/08/23 11:48 |
| Client ID: | HW-P (M) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | Field Prep: | Not Specified |
| Sample Depth: | | | |
| Matrix: | Water | Extraction Method: | ALPHA 23528 |
| Analytical Method: | 134,LCMSMS-ID | Extraction Date: | 06/28/23 16:55 |
| Analytical Date: | 06/29/23 19:11 | | |
| Analyst: | AC | | |

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 6.07 | | ng/l | 1.74 | 0.354 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 14.9 | | ng/l | 1.74 | 0.344 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | 0.278 | J | ng/l | 1.74 | 0.207 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 1.74 | 0.392 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 7.88 | | ng/l | 1.74 | 0.285 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | 0.354 | J | ng/l | 1.74 | 0.213 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 4.51 | | ng/l | 1.74 | 0.196 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 3.40 | | ng/l | 1.74 | 0.326 | 1 |
| Perfluorooctanoic Acid (PFOA) | 3.78 | | ng/l | 1.74 | 0.205 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | ND | | ng/l | 1.74 | 1.16 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | | ng/l | 1.74 | 0.598 | 1 |
| Perfluorononanoic Acid (PFNA) | 7.46 | | ng/l | 1.74 | 0.271 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 2.75 | | ng/l | 1.74 | 0.438 | 1 |
| Perfluorodecanoic Acid (PFDA) | ND | | ng/l | 1.74 | 0.264 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 1.74 | 1.05 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 1.74 | 0.973 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 1.74 | 0.563 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 1.74 | 0.226 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 1.74 | 0.851 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 1.74 | 0.504 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 1.74 | 0.698 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 1.74 | 0.323 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 1.74 | 0.284 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 1.74 | 0.215 | 1 |

| | | | |
|---|---|---|---|
| **Project Name:** | CAPECOD GATEWAY AIRPORT | **Lab Number:** | L2332762 |
| **Project Number:** | 23070 | **Report Date:** | 06/30/23 |

## SAMPLE RESULTS

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-05 | Date Collected: | 06/08/23 11:48 |
| Client ID: | HW-P (M) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | 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) | 79 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 88 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 105 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 94 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 74 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 73 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 104 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 79 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 103 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 80 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 98 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 82 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 96 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 94 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 87 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 17 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 87 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 83 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 85 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-06 | Date Collected: | 06/09/23 10:08 |
| Client ID: | HW-S (S) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | Field Prep: | Not Specified |
| Sample Depth: | | | |
| Matrix: | Water | Extraction Method: | ALPHA 23528 |
| Analytical Method: | 134,LCMSMS-ID | Extraction Date: | 06/28/23 16:55 |
| Analytical Date: | 06/29/23 19:28 | | |
| Analyst: | AC | | |

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 32.3 | | ng/l | 10.0 | 2.04 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 135 | | ng/l | 10.0 | 1.98 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | 1.74 | J | ng/l | 10.0 | 1.19 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 10.0 | 2.26 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 77.0 | | ng/l | 10.0 | 1.64 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | 3.26 | J | ng/l | 10.0 | 1.23 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 46.7 | | ng/l | 10.0 | 1.13 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 30.0 | | ng/l | 10.0 | 1.88 | 1 |
| Perfluorooctanoic Acid (PFOA) | 52.1 | | ng/l | 10.0 | 1.18 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 1150 | | ng/l | 10.0 | 6.66 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | | ng/l | 10.0 | 3.44 | 1 |
| Perfluorononanoic Acid (PFNA) | 44.2 | | ng/l | 10.0 | 1.56 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 185 | | ng/l | 10.0 | 2.52 | 1 |
| Perfluorodecanoic Acid (PFDA) | ND | | ng/l | 10.0 | 1.52 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | ND | | ng/l | 10.0 | 6.06 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 10.0 | 5.60 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 10.0 | 3.24 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 10.0 | 1.30 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 10.0 | 4.90 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 10.0 | 2.90 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 10.0 | 4.02 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 10.0 | 1.86 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 10.0 | 1.64 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 10.0 | 1.24 | 1 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

**SAMPLE RESULTS**

| | | | |
|---|---|---|---|
| Lab ID: | L2332762-06 | Date Collected: | 06/09/23 10:08 |
| Client ID: | HW-S (S) | Date Received: | 06/09/23 |
| Sample Location: | HYANIS, MA | 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) | 74 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 84 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 105 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 94 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 73 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 74 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 101 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 83 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 126 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 88 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 101 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 95 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 106 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 107 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 101 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 20 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 99 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 98 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 88 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-07
Client ID: HW-S (M)
Sample Location: HYANIS, MA
Date Collected: 06/09/23 12:25
Date Received: 06/09/23
Field Prep: Not Specified

Sample Depth:
Matrix: Water
Analytical Method: 134,LCMSMS-ID
Analytical Date: 06/29/23 19:44
Analyst: AC
Extraction Method: ALPHA 23528
Extraction Date: 06/28/23 16:55

| Parameter | Result | Qualifier | Units | RL | MDL | Dilution Factor |
|---|---|---|---|---|---|---|
| **Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab** | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 10.8 | | ng/l | 1.77 | 0.360 | 1 |
| Perfluoropentanoic Acid (PFPeA) | 38.0 | | ng/l | 1.77 | 0.350 | 1 |
| Perfluorobutanesulfonic Acid (PFBS) | 0.533 | J | ng/l | 1.77 | 0.210 | 1 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | | ng/l | 1.77 | 0.399 | 1 |
| Perfluorohexanoic Acid (PFHxA) | 24.1 | | ng/l | 1.77 | 0.290 | 1 |
| Perfluoropentanesulfonic Acid (PFPeS) | 0.749 | J | ng/l | 1.77 | 0.216 | 1 |
| Perfluoroheptanoic Acid (PFHpA) | 25.7 | | ng/l | 1.77 | 0.199 | 1 |
| Perfluorohexanesulfonic Acid (PFHxS) | 21.6 | | ng/l | 1.77 | 0.332 | 1 |
| Perfluorooctanoic Acid (PFOA) | 29.7 | | ng/l | 1.77 | 0.208 | 1 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 198 | | ng/l | 1.77 | 1.18 | 1 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 1.93 | | ng/l | 1.77 | 0.608 | 1 |
| Perfluorononanoic Acid (PFNA) | 26.2 | | ng/l | 1.77 | 0.276 | 1 |
| Perfluorooctanesulfonic Acid (PFOS) | 255 | | ng/l | 1.77 | 0.445 | 1 |
| Perfluorodecanoic Acid (PFDA) | ND | | ng/l | 1.77 | 0.268 | 1 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | 3.23 | | ng/l | 1.77 | 1.07 | 1 |
| Perfluorononanesulfonic Acid (PFNS) | ND | | ng/l | 1.77 | 0.989 | 1 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | | ng/l | 1.77 | 0.572 | 1 |
| Perfluoroundecanoic Acid (PFUnA) | ND | | ng/l | 1.77 | 0.230 | 1 |
| Perfluorodecanesulfonic Acid (PFDS) | ND | | ng/l | 1.77 | 0.865 | 1 |
| Perfluorooctanesulfonamide (FOSA) | ND | | ng/l | 1.77 | 0.512 | 1 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | | ng/l | 1.77 | 0.710 | 1 |
| Perfluorododecanoic Acid (PFDoA) | ND | | ng/l | 1.77 | 0.328 | 1 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | | ng/l | 1.77 | 0.289 | 1 |
| Perfluorotetradecanoic Acid (PFTA) | ND | | ng/l | 1.77 | 0.219 | 1 |

**Project Name:** CAPECOD GATEWAY AIRPORT **Lab Number:** L2332762
**Project Number:** 23070 **Report Date:** 06/30/23

## SAMPLE RESULTS

Lab ID: L2332762-07
Client ID: HW-S (M)
Sample Location: HYANIS, MA
Date Collected: 06/09/23 12:25
Date Received: 06/09/23
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) | 85 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 95 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 112 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 114 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 84 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 85 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 113 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 91 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 144 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 92 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 101 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 96 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 116 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 101 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 100 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 20 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 103 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 95 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 89 | | 22-136 |

**Project Name:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070

**Lab Number:** L2332762
**Report Date:** 06/30/23

# Method Blank Analysis
## Batch Quality Control

Analytical Method: 134,LCMSMS-ID
Analytical Date: 06/29/23 12:39
Analyst: AC

Extraction Method: ALPHA 23528
Extraction Date: 06/28/23 16:55

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-07 Batch: WG1797335-1 | | | | | |
| 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) | ND | | 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:** | CAPECOD GATEWAY AIRPORT | **Lab Number:** | L2332762 |
| **Project Number:** | 23070 | **Report Date:** | 06/30/23 |

# Method Blank Analysis
## Batch Quality Control

| | | | |
|---|---|---|---|
| Analytical Method: | 134,LCMSMS-ID | Extraction Method: | ALPHA 23528 |
| Analytical Date: | 06/29/23 12:39 | Extraction Date: | 06/28/23 16:55 |
| Analyst: | AC | | |

| Parameter | Result | Qualifier | Units | RL | MDL |
|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab for sample(s): 01-07 Batch: WG1797335-1 | | | | | |

| Surrogate (Extracted Internal Standard) | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|
| Perfluoro[13C4]Butanoic Acid (MPFBA) | 101 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 108 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 102 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 102 | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 103 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 100 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 96 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 105 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 108 | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 101 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 98 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 96 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 121 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 94 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 104 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 35 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 97 | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 96 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 91 | | 22-136 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070
**Lab Number:** L2332762
**Report Date:** 06/30/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-07 Batch: WG1797335-2 | | | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 99 | | - | | 67-148 | - | | 30 |
| Perfluoropentanoic Acid (PFPeA) | 100 | | - | | 63-161 | - | | 30 |
| Perfluorobutanesulfonic Acid (PFBS) | 94 | | - | | 65-157 | - | | 30 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | 99 | | - | | 37-219 | - | | 30 |
| Perfluorohexanoic Acid (PFHxA) | 99 | | - | | 69-168 | - | | 30 |
| Perfluoropentanesulfonic Acid (PFPeS) | 101 | | - | | 52-156 | - | | 30 |
| Perfluoroheptanoic Acid (PFHpA) | 100 | | - | | 58-159 | - | | 30 |
| Perfluorohexanesulfonic Acid (PFHxS) | 96 | | - | | 69-177 | - | | 30 |
| Perfluorooctanoic Acid (PFOA) | 98 | | - | | 63-159 | - | | 30 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 96 | | - | | 49-187 | - | | 30 |
| Perfluoroheptanesulfonic Acid (PFHpS) | 98 | | - | | 61-179 | - | | 30 |
| Perfluorononanoic Acid (PFNA) | 102 | | - | | 68-171 | - | | 30 |
| Perfluorooctanesulfonic Acid (PFOS) | 93 | | - | | 52-151 | - | | 30 |
| Perfluorodecanoic Acid (PFDA) | 101 | | - | | 63-171 | - | | 30 |
| 1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS) | 105 | | - | | 56-173 | - | | 30 |
| Perfluorononanesulfonic Acid (PFNS) | 100 | | - | | 48-150 | - | | 30 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | 103 | | - | | 60-166 | - | | 30 |
| Perfluoroundecanoic Acid (PFUnA) | 102 | | - | | 60-153 | - | | 30 |
| Perfluorodecanesulfonic Acid (PFDS) | 104 | | - | | 38-156 | - | | 30 |
| Perfluorooctanesulfonamide (FOSA) | 103 | | - | | 46-170 | - | | 30 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | 92 | | - | | 45-170 | - | | 30 |
| Perfluorododecanoic Acid (PFDoA) | 95 | | - | | 67-153 | - | | 30 |

# Lab Control Sample Analysis
## Batch Quality Control

**Project Name:** CAPECOD GATEWAY AIRPORT
**Lab Number:** L2332762
**Project Number:** 23070
**Report Date:** 06/30/23

| Parameter | LCS %Recovery | Qual | LCSD %Recovery | Qual | %Recovery Limits | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-07 Batch: WG1797335-2 | | | | | | | | |
| Perfluorotridecanoic Acid (PFTrDA) | 113 | | - | | 48-158 | - | | 30 |
| Perfluorotetradecanoic Acid (PFTA) | 100 | | - | | 59-182 | - | | 30 |

| *Surrogate (Extracted Internal Standard)* | LCS %Recovery | Qual | LCSD %Recovery | Qual | Acceptance Criteria |
|---|---|---|---|---|---|
| Perfluoro[13C4]Butanoic Acid (MPFBA) | 104 | | | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 112 | | | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 101 | | | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | 107 | | | | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 101 | | | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 99 | | | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 96 | | | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 103 | | | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | 112 | | | | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 100 | | | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 102 | | | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 102 | | | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 121 | | | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 103 | | | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 107 | | | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 31 | | | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 109 | | | | 27-126 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 109 | | | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 103 | | | | 22-136 |

# Matrix Spike Analysis
### Batch Quality Control

**Project Name:** CAPECOD GATEWAY AIRPORT

**Project Number:** 23070

**Lab Number:** L2332762

**Report Date:** 06/30/23

| 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): 01-07 QC Batch ID: WG1797335-3 QC Sample: L2332157-01 Client ID: MS Sample | | | | | | | | | | | | |
| Perfluorobutanesulfonic Acid (PFBS) | 1.07J | 35 | 33.4 | 92 | | - | - | | 65-157 | - | | 30 |
| Perfluorohexanoic Acid (PFHxA) | 3.71 | 39.4 | 41.4 | 96 | | - | - | | 69-168 | - | | 30 |
| Perfluoropentanesulfonic Acid (PFPeS) | 0.335J | 37.1 | 36.0 | 96 | | - | - | | 52-156 | - | | 30 |
| Perfluoroheptanoic Acid (PFHpA) | 2.33 | 39.4 | 40.3 | 96 | | - | - | | 58-159 | - | | 30 |
| Perfluorohexanesulfonic Acid (PFHxS) | 1.81J | 36 | 36.8 | 97 | | - | - | | 69-177 | - | | 30 |
| Perfluorooctanoic Acid (PFOA) | 5.04 | 39.4 | 42.7 | 96 | | - | - | | 63-159 | - | | 30 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | 37.6 | 37.7 | 100 | | - | - | | 61-179 | - | | 30 |
| Perfluorononanoic Acid (PFNA) | 0.390J | 39.4 | 40.8 | 103 | | - | - | | 68-171 | - | | 30 |
| Perfluorooctanesulfonic Acid (PFOS) | 3.28F | 36.5 | 38.3 | 96 | | - | - | | 52-151 | - | | 30 |
| Perfluorodecanoic Acid (PFDA) | ND | 39.4 | 39.8 | 101 | | - | - | | 63-171 | - | | 30 |
| N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeFOSAA) | ND | 39.4 | 38.0 | 96 | | - | - | | 60-166 | - | | 30 |
| Perfluoroundecanoic Acid (PFUnA) | ND | 39.4 | 39.2 | 100 | | - | - | | 60-153 | - | | 30 |
| N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOSAA) | ND | 39.4 | 36.3 | 92 | | - | - | | 45-170 | - | | 30 |
| Perfluorododecanoic Acid (PFDoA) | ND | 39.4 | 38.5 | 98 | | - | - | | 67-153 | - | | 30 |
| Perfluorotridecanoic Acid (PFTrDA) | ND | 39.4 | 42.7 | 108 | | - | - | | 48-158 | - | | 30 |
| Perfluorotetradecanoic Acid (PFTA) | ND | 39.4 | 38.4 | 98 | | - | - | | 59-182 | - | | 30 |
| 2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid (HFPO-DA) | ND | 384 | 378 | 98 | | - | - | | 57-162 | - | | 30 |
| 4,8-Dioxa-3h-Perfluorononanoic Acid (ADONA) | ND | 37.2 | 32.0 | 86 | | - | - | | 69-143 | - | | 30 |
| 9-Chlorohexadecafluoro-3-Oxanone-1-Sulfonic Acid (9Cl-PF3ONS) | ND | 36.8 | 34.4 | 94 | | - | - | | 55-158 | - | | 30 |
| 11-Chloroeicosafluoro-3-Oxaundecane-1-Sulfonic Acid (11Cl-PF3OUdS) | ND | 37.2 | 35.9 | 97 | | - | - | | 52-156 | - | | 30 |

# Matrix Spike Analysis

*Batch Quality Control*

**Project Name:** CAPECOD GATEWAY AIRPORT

**Project Number:** 23070

**Lab Number:** L2332762

**Report Date:** 06/30/23

| 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): 01-07 QC Batch ID: WG1797335-3 QC Sample: L2332157-01 Client ID: MS Sample | | | | | | | | | | | | |

| Surrogate (Extracted Internal Standard) | MS % Recovery | MS Qualifier | MSD % Recovery | MSD Qualifier | Acceptance Criteria |
|---|---|---|---|---|---|
| 2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA) | 71 | | | | 10-165 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 95 | | | | 27-126 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 95 | | | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 85 | | | | 55-137 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 78 | | | | 62-124 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 75 | | | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 76 | | | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 99 | | | | 71-134 |
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 87 | | | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 86 | | | | 22-136 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 90 | | | | 69-131 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 80 | | | | 62-129 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 78 | | | | 59-139 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 104 | | | | 70-131 |

**Project Name:** CAPECOD GATEWAY AIRPORT

**Project Number:** 23070

# Lab Duplicate Analysis
## Batch Quality Control

**Lab Number:** L2332762

**Report Date:** 06/30/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1797335-4 QC Sample: L2332728-01 Client ID: DUP Sample | | | | | | |
| Perfluorobutanoic Acid (PFBA) | 14.1 | 13.7 | ng/l | 3 | | 30 |
| Perfluoropentanoic Acid (PFPeA) | 10.9 | 10.0 | ng/l | 9 | | 30 |
| Perfluorobutanesulfonic Acid (PFBS) | 1.37J | 1.41J | ng/l | NC | | 30 |
| 1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS) | ND | ND | ng/l | NC | | 30 |
| Perfluorohexanoic Acid (PFHxA) | 9.19 | 8.84 | ng/l | 4 | | 30 |
| Perfluoropentanesulfonic Acid (PFPeS) | 0.793J | 0.630J | ng/l | NC | | 30 |
| Perfluoroheptanoic Acid (PFHpA) | 9.92 | 9.43 | ng/l | 5 | | 30 |
| Perfluorohexanesulfonic Acid (PFHxS) | 4.92 | 4.87 | ng/l | 1 | | 30 |
| Perfluorooctanoic Acid (PFOA) | 62.1 | 59.2 | ng/l | 5 | | 30 |
| 1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS) | 2.13 | 1.73J | ng/l | NC | | 30 |
| Perfluoroheptanesulfonic Acid (PFHpS) | ND | ND | ng/l | NC | | 30 |
| Perfluorononanoic Acid (PFNA) | 2.13 | 2.08 | ng/l | 2 | | 30 |
| Perfluorooctanesulfonic Acid (PFOS) | 23.0 | 22.6 | ng/l | 2 | | 30 |
| Perfluorodecanoic Acid (PFDA) | 0.337JF | 0.295J | 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:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070

**Lab Number:** L2332762
**Report Date:** 06/30/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1797335-4 QC Sample: L2332728-01 Client ID: DUP Sample | | | | | | |
| 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 |
| 2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-Propanoic Acid (HFPO-DA) | 29.4 | 23.9 | ng/l | 21 | | 30 |

| Surrogate (Extracted Internal Standard) | %Recovery | Qualifier | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|---|---|
| Perfluoro[13C4]Butanoic Acid (MPFBA) | 89 | | 83 | | 58-132 |
| Perfluoro[13C5]Pentanoic Acid (M5PFPEA) | 89 | | 84 | | 62-163 |
| Perfluoro[2,3,4-13C3]Butanesulfonic Acid (M3PFBS) | 89 | | 84 | | 70-131 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Hexanesulfonic Acid (M2-4:2FTS) | **158** | Q | **153** | Q | 12-142 |
| Perfluoro[1,2,3,4,6-13C5]Hexanoic Acid (M5PFHxA) | 73 | | 68 | | 57-129 |
| Perfluoro[1,2,3,4-13C4]Heptanoic Acid (M4PFHpA) | 80 | | 75 | | 60-129 |
| Perfluoro[1,2,3-13C3]Hexanesulfonic Acid (M3PFHxS) | 91 | | 84 | | 71-134 |
| Perfluoro[13C8]Octanoic Acid (M8PFOA) | 85 | | 80 | | 62-129 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Octanesulfonic Acid (M2-6:2FTS) | **169** | Q | **152** | Q | 14-147 |
| Perfluoro[13C9]Nonanoic Acid (M9PFNA) | 80 | | 77 | | 59-139 |
| Perfluoro[13C8]Octanesulfonic Acid (M8PFOS) | 76 | | 71 | | 69-131 |
| Perfluoro[1,2,3,4,5,6-13C6]Decanoic Acid (M6PFDA) | 75 | | 67 | | 62-124 |
| 1H,1H,2H,2H-Perfluoro[1,2-13C2]Decanesulfonic Acid (M2-8:2FTS) | 155 | | 136 | | 10-162 |
| N-Deuteriomethylperfluoro-1-octanesulfonamidoacetic Acid (d3-NMeFOSAA) | 108 | | 84 | | 24-116 |
| Perfluoro[1,2,3,4,5,6,7-13C7]Undecanoic Acid (M7-PFUDA) | 75 | | 65 | | 55-137 |
| Perfluoro[13C8]Octanesulfonamide (M8FOSA) | 26 | | 11 | | 5-112 |
| N-Deuterioethylperfluoro-1-octanesulfonamidoacetic Acid (d5-NEtFOSAA) | 121 | | 103 | | 27-126 |

# Lab Duplicate Analysis
**Batch Quality Control**

**Project Name:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070

**Lab Number:** L2332762
**Report Date:** 06/30/23

| Parameter | Native Sample | Duplicate Sample | Units | RPD | Qual | RPD Limits |
|---|---|---|---|---|---|---|
| Perfluorinated Alkyl Acids by Isotope Dilution - Mansfield Lab Associated sample(s): 01-07 QC Batch ID: WG1797335-4 QC Sample: L2332728-01 Client ID: DUP Sample | | | | | | |

| Surrogate (Extracted Internal Standard) | %Recovery | Qualifier | %Recovery | Qualifier | Acceptance Criteria |
|---|---|---|---|---|---|
| Perfluoro[1,2-13C2]Dodecanoic Acid (MPFDOA) | 71 | | 61 | | 48-131 |
| Perfluoro[1,2-13C2]Tetradecanoic Acid (M2PFTEDA) | 64 | | 60 | | 22-136 |
| 2,3,3,3-Tetrafluoro-2-[1,1,2,2,3,3,3-Heptafluoropropoxy]-13C3-Propanoic Acid (M3HFPO-DA) | 75 | | 71 | | 10-165 |

**Project Name:** CAPECOD GATEWAY AIRPORT
**Project Number:** 23070

**Lab Number:** L2332762
**Report Date:** 06/30/23

### *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(*)* |
|---|---|---|---|---|---|---|---|---|---|
| L2332762-01A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-01B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-02A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-02B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-03A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-03B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-04A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-04B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-05A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-05B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-06A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-06B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-07A | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |
| L2332762-07B | Plastic 250ml unpreserved | A | NA | | 2.9 | Y | Absent | | A2-537-ISOTOPE(28) |

*Values in parentheses indicate holding time in days

## 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/PFTeDA | 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/PFDoS | 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 |
| Perfluoropropanesulfonic Acid | PFPrS | 423-41-6 |
| 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/PFOSA | 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 | PFEESA | 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 |

## PFAS PARAMETER SUMMARY

| Parameter | Acronym | CAS Number |
|---|---|---|
| FLUOROTELOMER CARBOXYLIC ACIDS (FTCAs) | | |
| 3-Perfluoroheptyl Propanoic Acid | 7:3FTCA | 812-70-4 |
| 2H,2H,3H,3H-Perfluorooctanoic Acid | 5:3FTCA | 914637-49-3 |
| 3-Perfluoropropyl Propanoic Acid | 3:3FTCA | 356-02-5 |

# 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.)<br><br>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. |
| NR | - No Results: Term is utilized when 'No Target Compounds Requested' is reported for the analysis of Volatile or Semivolatile Organic TIC only requests. |
| 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. |

*Report Format:* *DU Report with 'J' Qualifiers*

### *Footnotes*

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.

Chlordane: 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.)

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'.

Gasoline Range Organics (GRO): Gasoline Range Organics (GRO) results include all chromatographic peaks eluting from Methyl tert butyl ether through Naphthalene, with the exception of GRO analysis in support of State of Ohio programs, which includes all chromatographic peaks eluting from Hexane through Dodecane.

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, Dibenz(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. In addition, the 'PFAS, Total (6)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA, PFDA and PFOS. For MassDEP DW compliance analysis only, the 'PFAS, Total (6)' result is defined as the summation of results at or above the RL. Note: If a 'Total' result is requested, the results of its individual components will also be reported.

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

***Data Qualifiers***

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.

**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.

**V** - The surrogate associated with this target analyte has a recovery outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

**Z** - The batch matrix spike and/or duplicate associated with this target analyte has a recovery/RPD outside the QC acceptance limits. (Applicable to MassDEP DW Compliance samples only.)

## REFERENCES

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.

# Certification Information

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

**Westborough Facility**
**EPA 624.1:** m/p-xylene, o-xylene, Naphthalene
**EPA 625.1:** alpha-Terpineol
**EPA 8260D:** NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
**EPA 8270E:** NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine, alpha-Terpineol; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
**SM4500**: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

**Mansfield Facility**
**SM 2540D:** TSS.
**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.
**Biological Tissue Matrix:** EPA 3050B

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

**Westborough Facility:**

***Drinking Water***
**EPA 300.0**: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
**EPA 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).
**Microbiology**: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603, SM9222D.**

**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, EPA 537.1.**

***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.

ALPHA ANALYTICAL

# CHAIN OF CUSTODY

PAGE 1 OF 1

Date Rec'd in Lab: 6/9/23

ALPHA Job #: L2332762

8 Walkup Drive
Westboro, MA 01581
Tel: 508-898-9220

320 Forbes Blvd
Mansfield, MA 02048
Tel: 508-822-9300

## Project Information

Project Name: CAPE COD GATEWAY AIRPORT
Project Location: HYANNIS, MA
Project #: 23070
Project Manager: BRYAN MASSA
ALPHA Quote #:

## Report Information - Data Deliverables

☐ ADEx ☒ EMAIL

## Billing Information

☐ Same as Client info PO #:

## Client Information

Client: HORSLEY WITTEN GROUP
Address: 90 ROUTE 6A
SANDWICH, MA 02563
Phone: 508-833-6600
Email: jgustavesen@horsleywitten.com

## Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods
☐ Yes ☒ No CT RCP Analytical Methods
☐ Yes ☒ No Matrix Spike Required on this SDG? (Required for MCP Inorganics)
☒ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets)
☐ Yes ☒ No NPDES RGP
☐ Other State /Fed Program ______ Criteria ______

## Turn-Around Time

☒ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

ANALYSIS: VOC: ☐ 8260 ☐ 624 ☐ 524.2; SVOC: ☐ ABN ☐ PAH; METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; EPH: ☐ Ranges & Targets ☐ Ranges Only; VPH: ☐ Ranges & Targets ☐ Ranges Only; ☐ PCB ☐ PEST; TPH: ☐ Quant Only ☐ Fingerprint; PFAS

SAMPLE INFO — Filtration: ☐ Field ☐ Lab to do; Preservation: ☐ Lab to do

| ALPHA Lab ID (Lab Use Only) | Sample ID | Collection Date | Collection Time | Sample Matrix | Sampler Initials | PFAS | Sample Comments | TOTAL # BOTTLES |
|---|---|---|---|---|---|---|---|---|
| 32762-01 | HW-I(S) | 6/7/23 | 1010 | GW | JG | X | | 2 |
| -02 | HW-I(M) | 6/7/23 | 1215 | ↓ | ↓ | ↓ | | ↓ |
| -03 | HW-I(D) | 6/7/23 | 1115 | ↓ | ↓ | ↓ | | ↓ |
| -04 | HW-P(S) | 6/8/23 | 1025 | ↓ | ↓ | ↓ | | ↓ |
| -05 | HW-P(M) | 6/8/23 | 1148 | ↓ | ↓ | ↓ | | ↓ |
| -06 | HW-S(S) | 6/9/23 | 1008 | ↓ | ↓ | ↓ | | ↓ |
| -07 | HW-S(M) | 6/9/23 | 1225 | ↓ | ↓ | X | | X |

| | PFAS |
|---|---|
| Container Type | P |
| Preservative | A |

Container Type: P= Plastic, A= Amber glass, V= Vial, G= Glass, B= Bacteria cup, C= Cube, O= Other, E= Encore, D= BOD Bottle

Preservative: A= None, B= HCl, C= $HNO_3$, D= $H_2SO_4$, E= NaOH, F= MeOH, G= $NaHSO_4$, H = $Na_2S_2O_3$, I= Ascorbic Acid, J = $NH_4Cl$, K= Zn Acetate, O= Other

| Relinquished By: | Date/Time | Received By: | Date/Time |
|---|---|---|---|
| [signature] | 6/9/23 1337 | HW FRIDGE | 6/9/23 1337 |
| HW FRIDGE | 6/9 16:00 | [signature] AAL | 6/9 16:00 |
| [signature] AAL | 6/9 17:45 | [signature] | 6/9 1745 |
| [signature] 06/09/23-1930 | | [signature] AAL | 6/9/23 1930 |



FORM NO: 01-01 (rev. 12-Mar-2012)

2130 6/9/23 [signature] AAL 6/9/23 2130 [signature] AAL

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

June 12, 2023

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

Project Location: Barnstable, MA
Client Job Number:
Project Number: [none]
Laboratory Work Order Number: 23F0282

Enclosed are results of analyses for samples as received by the laboratory on June 2, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

# Table of Contents

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: 6/12/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: [none]

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 23F0282

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

PROJECT LOCATION: Barnstable, MA

| FIELD SAMPLE # | LAB ID: | MATRIX | SAMPLE DESCRIPTION | TEST | SUB LAB |
|---|---|---|---|---|---|
| HW-R | 23F0282-01 | Ground Water | | SOP-454 PFAS | |
| HW-H | 23F0282-02 | Ground Water | | SOP-454 PFAS | |

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

**CASE NARRATIVE SUMMARY**

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

**SOP-454 PFAS**

**Qualifications:**

**PF-17**

Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side.

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

**M2-6:2FTS**
23F0282-01[HW-R]

**S-29**

Extracted Internal Standard is outside of control limits.

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

**M2-8:2FTS**
S088826-CCV1

**V-05**

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

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

**Perfluoro-1-hexanesulfonamide (FHxSA)**
23F0282-01[HW-R], 23F0282-02[HW-H], S088826-CCV2, S088826-CCV3

**V-20**

Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound.

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

**Perfluorononanesulfonic acid (PFNS)**
S088826-CCV1

The results of analyses reported only relate to samples submitted to Con-Test, a Pace 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.

Meghan E. Kelley
Reporting Specialist

con-test® A Pace Analytical® Laboratory

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

Project Location: Barnstable, MA | Sample Description: | Work Order: 23F0282

Date Received: 6/2/2023

**Field Sample #: HW-R** | Sampled: 6/1/2023 10:25

**Sample ID: 23F0282-01**

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) | 11 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.2 | 1.8 | 0.65 | ng/L | 1 | J | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoropentanoic acid (PFPeA) | 40 | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorohexanoic acid (PFHxA) | 24 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.52 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.89 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.92 | ng/L | 1 | V-05 | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 1.2 | 1.8 | 0.63 | ng/L | 1 | J | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.63 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.57 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 9.9 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorooctanoic acid (PFOA) | ND | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |
| Perfluorononanoic acid (PFNA) | ND | 1.8 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:32 | QNW |

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Project Location: Barnstable, MA Sample Description: Work Order: 23F0282

Date Received: 6/2/2023

**Field Sample #: HW-H** Sampled: 6/1/2023 11:15

**Sample ID: 23F0282-02**

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) | 3.4 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoropentanoic acid (PFPeA) | 8.7 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorohexanoic acid (PFHxA) | 7.8 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.95 | ng/L | 1 | V-05 | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 0.99 | 1.8 | 0.64 | ng/L | 1 | J | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluoroheptanoic acid (PFHpA) | ND | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorooctanoic acid (PFOA) | ND | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |
| Perfluorononanoic acid (PFNA) | ND | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/6/23 | 6/8/23 16:39 | QNW |

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## Sample Extraction Data

**Prep Method:SOP 454-PFAAS** **Analytical Method:SOP-454 PFAS**

| Lab Number [Field ID] | Batch | Initial [mL] | Final [mL] | Date |
|---|---|---|---|---|
| 23F0282-01 [HW-R] | B342148 | 285 | 1.00 | 06/06/23 |
| 23F0282-02 [HW-H] | B342148 | 277 | 1.00 | 06/06/23 |

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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 B342148 - SOP 454-PFAAS** | | | | | | | | | | |
| **Blank (B342148-BLK1)** | | | | Prepared: 06/06/23 Analyzed: 06/08/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanoic acid (PFPeA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanoic acid (PFHxA) | ND | 1.9 | ng/L | | | | | | | |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | ng/L | | | | | | | |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | ng/L | | | | | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | ng/L | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | ng/L | | | | | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 1.9 | ng/L | | | | | | | |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | ng/L | | | | | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorohexanesulfonic acid (PFHxS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | ng/L | | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | ng/L | | | | | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluoroheptanoic acid (PFHpA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanoic acid (PFOA) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorooctanesulfonic acid (PFOS) | ND | 1.9 | ng/L | | | | | | | |
| Perfluorononanoic acid (PFNA) | ND | 1.9 | ng/L | | | | | | | |
| **LCS (B342148-BS1)** | | | | Prepared: 06/06/23 Analyzed: 06/08/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | 8.65 | 1.9 | ng/L | 9.69 | | 89.2 | 73-129 | | | |
| Perfluorobutanesulfonic acid (PFBS) | 7.63 | 1.9 | ng/L | 8.58 | | 89.0 | 72-130 | | | |
| Perfluoropentanoic acid (PFPeA) | 8.25 | 1.9 | ng/L | 9.69 | | 85.2 | 72-129 | | | |
| Perfluorohexanoic acid (PFHxA) | 8.47 | 1.9 | ng/L | 9.69 | | 87.4 | 72-129 | | | |
| 11Cl-PF3OUdS (F53B Major) | 7.82 | 1.9 | ng/L | 9.13 | | 85.6 | 55.1-141 | | | |
| 9Cl-PF3ONS (F53B Minor) | 7.64 | 1.9 | ng/L | 9.03 | | 84.6 | 59.6-146 | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 7.70 | 1.9 | ng/L | 9.13 | | 84.3 | 60.3-131 | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 6.38 | 1.9 | ng/L | 9.69 | | 65.9 | 37.6-167 | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 9.08 | 1.9 | ng/L | 9.30 | | 97.6 | 67-138 | | | |
| Perfluorodecanoic acid (PFDA) | 8.65 | 1.9 | ng/L | 9.69 | | 89.2 | 71-129 | | | |
| Perfluorododecanoic acid (PFDoA) | 8.69 | 1.9 | ng/L | 9.69 | | 89.7 | 72-134 | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 7.44 | 1.9 | ng/L | 8.62 | | 86.2 | 49.4-154 | | | |

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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 B342148 - SOP 454-PFAAS** | | | | | | | | | | |
| **LCS (B342148-BS1)** | | | | Prepared: 06/06/23 Analyzed: 06/08/23 | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 8.52 | 1.9 | ng/L | 9.25 | | 92.1 | 69-134 | | | |
| N-EtFOSAA (NEtFOSAA) | 8.19 | 1.9 | ng/L | 9.69 | | 84.5 | 61-135 | | | |
| N-MeFOSAA (NMeFOSAA) | 9.28 | 1.9 | ng/L | 9.69 | | 95.8 | 65-136 | | | |
| Perfluorotetradecanoic acid (PFTA) | 7.93 | 1.9 | ng/L | 9.69 | | 81.8 | 71-132 | | | |
| Perfluorotridecanoic acid (PFTrDA) | 9.53 | 1.9 | ng/L | 9.69 | | 98.3 | 65-144 | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 8.02 | 1.9 | ng/L | 9.06 | | 88.5 | 63-143 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 7.74 | 1.9 | ng/L | 9.35 | | 82.8 | 53-142 | | | |
| Perfluorooctanesulfonamide (FOSA) | 8.90 | 1.9 | ng/L | 9.69 | | 91.8 | 67-137 | | | |
| Perfluorononanesulfonic acid (PFNS) | 8.23 | 1.9 | ng/L | 9.30 | | 88.5 | 69-127 | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 6.33 | 1.9 | ng/L | 9.69 | | 65.3 | 61.7-156 | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | 7.08 | 1.9 | ng/L | 9.69 | | 73.1 | 61.3-145 | | | |
| Perfluorohexanesulfonic acid (PFHxS) | 7.43 | 1.9 | ng/L | 8.87 | | 83.8 | 68-131 | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 8.24 | 1.9 | ng/L | 9.69 | | 85.0 | 59.8-147 | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 8.39 | 1.9 | ng/L | 9.69 | | 86.5 | 59.5-146 | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 6.87 | 1.9 | ng/L | 9.21 | | 74.6 | 64-140 | | | |
| Perfluoropentanesulfonic acid (PFPeS) | 7.65 | 1.9 | ng/L | 9.11 | | 83.9 | 71-127 | | | |
| Perfluoroundecanoic acid (PFUnA) | 8.84 | 1.9 | ng/L | 9.69 | | 91.2 | 69-133 | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 7.93 | 1.9 | ng/L | 9.69 | | 81.9 | 58.5-143 | | | |
| Perfluoroheptanoic acid (PFHpA) | 8.81 | 1.9 | ng/L | 9.69 | | 90.9 | 72-130 | | | |
| Perfluorooctanoic acid (PFOA) | 8.75 | 1.9 | ng/L | 9.69 | | 90.3 | 71-133 | | | |
| Perfluorooctanesulfonic acid (PFOS) | 8.58 | 1.9 | ng/L | 8.96 | | 95.7 | 65-140 | | | |
| Perfluorononanoic acid (PFNA) | 6.96 | 1.9 | ng/L | 9.69 | | 71.8 | 69-130 | | | |

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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-17 | Extracted Internal Standard recovery is outside of control limits. Data is not significantly affected since associated analyte is not detected and bias is on the high side. |
| S-29 | Extracted Internal Standard is outside of control limits. |
| V-05 | Continuing calibration verification (CCV) did not meet method specifications and was biased on the low side for this compound. |
| V-20 | Continuing calibration verification (CCV) did not meet method specifications and was biased on the high side. Data validation is not affected since sample result was "not detected" for this compound. |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-R (23F0282-01 )** | | | Lab File ID: 23F0282-01.d | | | Analyzed: 06/08/23 16:32 | | | |
| M8FOSA | 211001.6 | 3.9486 | 268,784.00 | 3.9486 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 51181.51 | 2.4228 | 35,452.00 | 2.431017 | 144 | 50 - 150 | -0.0082 | +/-0.50 | |
| M2PFTA | 323478.5 | 4.248767 | 469,922.00 | 4.248767 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 85345.59 | 3.731083 | 77,186.00 | 3.731083 | 111 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 144999.8 | 1.033533 | 277,346.00 | 1.033533 | 52 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 120862.5 | 2.76565 | 130,159.00 | 2.773833 | 93 | 50 - 150 | -0.0082 | +/-0.50 | |
| M6PFDA | 446925.3 | 3.739567 | 574,846.00 | 3.739567 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 118083.4 | 1.83695 | 127,381.00 | 1.83695 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 404686.3 | 3.873917 | 481,877.00 | 3.8819 | 84 | 50 - 150 | -0.0080 | +/-0.50 | |
| M2-6:2FTS | 49683.5 | 3.3883 | 28,494.00 | 3.3883 | 174 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 228695.3 | 1.6652 | 278,521.00 | 1.6652 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 418491.7 | 2.506633 | 467,599.00 | 2.51485 | 89 | 50 - 150 | -0.0082 | +/-0.50 | |
| M3PFHxS | 77013.32 | 3.153433 | 82,162.00 | 3.153433 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 434091.8 | 3.113417 | 483,204.00 | 3.122333 | 90 | 50 - 150 | -0.0089 | +/-0.50 | |
| M8PFOA | 477298.3 | 3.397017 | 521,324.00 | 3.397017 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 74349.38 | 3.588267 | 77,713.00 | 3.588267 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 455007.4 | 3.589317 | 532,218.00 | 3.589317 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 322093.3 | 4.0087 | 390,006.00 | 4.0167 | 83 | 50 - 150 | -0.0080 | +/-0.50 | |
| D5-NEtFOSAA | 83401.87 | 3.881417 | 132,373.00 | 3.8894 | 63 | 50 - 150 | -0.0080 | +/-0.50 | |
| D3-NMeFOSAA | 93401.98 | 3.809467 | 140,897.00 | 3.809467 | 66 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **HW-H (23F0282-02 )** | | | Lab File ID: 23F0282-02.d | | | Analyzed: 06/08/23 16:39 | | | |
| M8FOSA | 191588.9 | 3.9486 | 268,784.00 | 3.9486 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 41657.39 | 2.4228 | 35,452.00 | 2.431017 | 118 | 50 - 150 | -0.0082 | +/-0.50 | |
| M2PFTA | 359161.1 | 4.248767 | 469,922.00 | 4.248767 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 52997.11 | 3.731083 | 77,186.00 | 3.731083 | 69 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 162831.8 | 1.033533 | 277,346.00 | 1.033533 | 59 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 113603.7 | 2.76565 | 130,159.00 | 2.773833 | 87 | 50 - 150 | -0.0082 | +/-0.50 | |
| M6PFDA | 395469.9 | 3.7316 | 574,846.00 | 3.739567 | 69 | 50 - 150 | -0.0080 | +/-0.50 | |
| M3PFBS | 110653.7 | 1.828667 | 127,381.00 | 1.83695 | 87 | 50 - 150 | -0.0083 | +/-0.50 | |
| M7PFUnA | 386337.7 | 3.873917 | 481,877.00 | 3.8819 | 80 | 50 - 150 | -0.0080 | +/-0.50 | |
| M2-6:2FTS | 37707.73 | 3.380233 | 28,494.00 | 3.3883 | 132 | 50 - 150 | -0.0081 | +/-0.50 | |
| M5PFPeA | 213186.3 | 1.6652 | 278,521.00 | 1.6652 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 380034.9 | 2.506633 | 467,599.00 | 2.51485 | 81 | 50 - 150 | -0.0082 | +/-0.50 | |
| M3PFHxS | 69730.17 | 3.153433 | 82,162.00 | 3.153433 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 396611.2 | 3.113417 | 483,204.00 | 3.122333 | 82 | 50 - 150 | -0.0089 | +/-0.50 | |
| M8PFOA | 449884.9 | 3.397017 | 521,324.00 | 3.397017 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 65539.32 | 3.588267 | 77,713.00 | 3.588267 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 439632.2 | 3.581317 | 532,218.00 | 3.589317 | 83 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFDoA | 307125.2 | 4.0087 | 390,006.00 | 4.0167 | 79 | 50 - 150 | -0.0080 | +/-0.50 | |
| D5-NEtFOSAA | 91506.02 | 3.881417 | 132,373.00 | 3.8894 | 69 | 50 - 150 | -0.0080 | +/-0.50 | |
| D3-NMeFOSAA | 95647.33 | 3.809467 | 140,897.00 | 3.809467 | 68 | 50 - 150 | 0.0000 | +/-0.50 | |

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

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Blank (B342148-BLK1 )** | | | Lab File ID: B342148-BLK1.d | | | Analyzed: 06/08/23 14:21 | | | |
| M8FOSA | 256694.9 | 3.9486 | 268,784.00 | 3.9486 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 41506.67 | 2.439333 | 35,452.00 | 2.431017 | 117 | 50 - 150 | 0.0083 | +/-0.50 | |
| M2PFTA | 423753.3 | 4.256834 | 469,922.00 | 4.256834 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 87081.41 | 3.73905 | 77,186.00 | 3.73905 | 113 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 287826 | 1.04185 | 277,346.00 | 1.033533 | 104 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 129662.1 | 2.782017 | 130,159.00 | 2.782017 | 100 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 523699.6 | 3.739567 | 574,846.00 | 3.739567 | 91 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 136324.6 | 1.845233 | 127,381.00 | 1.845233 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 443994.6 | 3.8819 | 481,877.00 | 3.8819 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 34461.97 | 3.3883 | 28,494.00 | 3.3883 | 121 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 299746.4 | 1.681733 | 278,521.00 | 1.673467 | 108 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 503753.3 | 2.523067 | 467,599.00 | 2.523067 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 83166.31 | 3.1615 | 82,162.00 | 3.153433 | 101 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 514162.8 | 3.122317 | 483,204.00 | 3.122317 | 106 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 581790.5 | 3.405067 | 521,324.00 | 3.405067 | 112 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 71865.37 | 3.588267 | 77,713.00 | 3.588267 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 565916 | 3.5893 | 532,218.00 | 3.589317 | 106 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 361185.8 | 4.0167 | 390,006.00 | 4.0167 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 118862.9 | 3.8894 | 132,373.00 | 3.8894 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 130121.6 | 3.817433 | 140,897.00 | 3.809467 | 92 | 50 - 150 | 0.0080 | +/-0.50 | |

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

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS (B342148-BS1 )** | | | Lab File ID: B342148-BS1.d | | | Analyzed: 06/08/23 14:13 | | | |
| M8FOSA | 255406.9 | 3.9486 | 268,784.00 | 3.9486 | 95 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 40160.35 | 2.439333 | 35,452.00 | 2.431017 | 113 | 50 - 150 | 0.0083 | +/-0.50 | |
| M2PFTA | 458516.6 | 4.256834 | 469,922.00 | 4.256834 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 78121.29 | 3.73905 | 77,186.00 | 3.73905 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFBA | 279092.3 | 1.04185 | 277,346.00 | 1.033533 | 101 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 135231.3 | 2.782017 | 130,159.00 | 2.782017 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 569540.6 | 3.739567 | 574,846.00 | 3.739567 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 132695.9 | 1.845233 | 127,381.00 | 1.845233 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 460832.9 | 3.8819 | 481,877.00 | 3.8819 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 35179.05 | 3.3883 | 28,494.00 | 3.3883 | 123 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFPeA | 286399.5 | 1.681733 | 278,521.00 | 1.673467 | 103 | 50 - 150 | 0.0083 | +/-0.50 | |
| M5PFHxA | 486166.7 | 2.523067 | 467,599.00 | 2.523067 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 83622.95 | 3.1615 | 82,162.00 | 3.153433 | 102 | 50 - 150 | 0.0081 | +/-0.50 | |
| M4PFHpA | 503771.8 | 3.122317 | 483,204.00 | 3.122317 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 555438.6 | 3.405067 | 521,324.00 | 3.405067 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 75263.58 | 3.588267 | 77,713.00 | 3.588267 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 560333.3 | 3.589317 | 532,218.00 | 3.589317 | 105 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 391526.1 | 4.0167 | 390,006.00 | 4.0167 | 100 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 124139.9 | 3.8894 | 132,373.00 | 3.8894 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 135218.1 | 3.817433 | 140,897.00 | 3.809467 | 96 | 50 - 150 | 0.0080 | +/-0.50 | |

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

## CERTIFICATIONS

**Certified Analyses included in this Report**

| Analyte | Certifications |
|---|---|
| ***SOP-454 PFAS in Water*** | |
| Perfluorobutanoic acid (PFBA) | NH-P |
| Perfluorobutanesulfonic acid (PFBS) | NH-P |
| Perfluoropentanoic acid (PFPeA) | NH-P |
| Perfluorohexanoic acid (PFHxA) | NH-P |
| 11Cl-PF3OUdS (F53B Major) | NH-P |
| 9Cl-PF3ONS (F53B Minor) | NH-P |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NH-P |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | NH-P |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | NH-P |
| Perfluorodecanoic acid (PFDA) | NH-P |
| Perfluorododecanoic acid (PFDoA) | NH-P |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | NH-P |
| Perfluoroheptanesulfonic acid (PFHpS) | NH-P |
| N-EtFOSAA (NEtFOSAA) | NH-P |
| N-MeFOSAA (NMeFOSAA) | NH-P |
| Perfluorotetradecanoic acid (PFTA) | NH-P |
| Perfluorotridecanoic acid (PFTrDA) | NH-P |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | NH-P |
| Perfluorodecanesulfonic acid (PFDS) | NH-P |
| Perfluorooctanesulfonamide (FOSA) | NH-P |
| Perfluorononanesulfonic acid (PFNS) | NH-P |
| Perfluoro-1-hexanesulfonamide (FHxSA) | NH-P |
| Perfluoro-1-butanesulfonamide (FBSA) | NH-P |
| Perfluorohexanesulfonic acid (PFHxS) | NH-P |
| Perfluoro-4-oxapentanoic acid (PFMPA) | NH-P |
| Perfluoro-5-oxahexanoic acid (PFMBA) | NH-P |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | NH-P |
| Perfluoropentanesulfonic acid (PFPeS) | NH-P |
| Perfluoroundecanoic acid (PFUnA) | NH-P |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | NH-P |
| Perfluoroheptanoic acid (PFHpA) | NH-P |
| Perfluorooctanoic acid (PFOA) | NH-P |
| Perfluorooctanesulfonic acid (PFOS) | NH-P |
| Perfluorononanoic acid (PFNA) | NH-P |

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

| Code | Description | Number | Expires |
|---|---|---|---|
| NH-P | New Hampshire Environmental Lab | 2557 NELAP | 09/6/2023 |

23F0282 KAF

Pace Analytical

Phone: 413-525-2332
Fax: 413-525-6405
Access COC's and Support Requests

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021



Company Name: Horsley Witten Group
Address: c/o Route 6A Sandwich, MA
Phone: 508-833-6600
Project Name: HYA
Project Location: Hyannis
Project Number:
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient:
Sampled By: Caroline Armstrong

**Requested Turnaround Time**: 7-Day ☐ 10-Day ☐ PFAS 10-Day (std) ☒ Due Date:

**Rush-Approval Required**: 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☐

**Data Delivery**: Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To: bmassa@horsley witten.com
Fax To #:

**Dissolved Metals Samples**: ○ Field Filtered ○ Lab to Filter

**Orthophosphate Samples**: ○ Field Filtered ○ Lab to Filter

**PCB ONLY**: SOXHLET ☐ NON SOXHLET ☐

**ANALYSIS REQUESTED**: PFAS (isotope dilution)

| Pace Work Order# | Client Sample ID / Description | Beginning Date/Time | Ending Date/Time | COMP/GRAB | ¹Matrix Code | Conc Code | VIALS | GLASS | PLASTIC | BACTERIA | ENCORE | PFAS (isotope dilution) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | HW-R | 6/1/23 | 10:25 | g | gw | | | | 2 | | | |
| 2 | HW-H | 6/1/23 | 11:15 | g | gw | | | | 2 | | | |

² Preservation Code

Courier Use Only
Total Number Of:
VIALS____
GLASS____
PLASTIC____
BACTERIA____
ENCORE____

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

| Relinquished / Received | Date/Time |
|---|---|
| Relinquished by: (signature) [signature] | 6/2/23 10:30 |
| Received by: (signature) [signature] | 6/2/23 1030 |
| Relinquished by: (signature) [signature] | 6/2/23 1800 |
| Received by: (signature) [signature] 23 | 6/2 1806 |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |

Client Comments: MCP GW-1

**Detection Limit Requirements**
MA: GW-1
CT:
Other:

**Special Requirements**
☒ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

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)

Comments:

East Longmeadow, MA. 01028
P: 413-525-2332
F:413-525-6405
www.pacelabs.com

# Log In Back-Sheet

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

Pace PEOPLE ADVANCING SCIEN

Client Horsley Witten
Project HYA PFAS Monitoring
MCP/RCP Required MA-MCP
Deliverable Package Req. GW-1
Location Hyannis, MA
PWSID# (When Applicable) n/a

Arrival Method:
Courier ☑ Fed Ex ☐ Walk In ☐ Other ☐

Received By / Date / Time Mcm 1/2/23 1806
Back-Sheet By / Date / Time Mcm 1/2/23 1821
Temperature Method Gun # 5
Temp ☑ < 6° C Actual Temperature 2.3
Rush Samples: Yes / No Notify No
Short Hold: Yes / No Notify No

**Notes regarding Samples/COC outside of SOP:**

| | True | False |
|---|---|---|
| Received on Ice | ☑ | ☐ |
| Received in Cooler | ☑ | ☐ |
| Custody Seal: DATE TIME | ☐ | ☑ |
| COC Relinquished | ☑ | ☐ |
| COC/Samples Labels Agree | ☑ | ☐ |
| All Samples in Good Condition | ☑ | ☐ |
| Samples Received within Holding Time | ☑ | ☐ |
| Is there enough Volume | ☑ | ☐ |
| Proper Media/Container Used | ☑ | ☐ |
| Splitting Samples Required | ☐ | ☑ |
| MS/MSD | ☐ | ☑ |
| Trip Blanks | ☐ | ☑ |
| Lab to Filters | ☐ | ☑ |
| COC Legible | ☑ | ☐ |

COC Included: (Check all included)
Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper pH: (N/A) ☐ ☐

| Container (Circle when applicable) | UnP | HCl | HNO3 | H2SO4 | NaOH | Trizma | NaS2O3 | Other Preservative |
|---|---|---|---|---|---|---|---|---|
| 1L Amber Plastic | | | | | | | | |
| 500 mL Amber Plastic | | | | | | | | |
| 250 mL Amber (Plastic) | 4 | | | | | | | |
| Other Amber Clear Plastic | | | | | | | | |
| 16oz Amber Clear | | | | | | | | |
| 8oz Amber Clear | | | | | | | | |
| 4oz Amber Clear | | | | | | | | |
| 2oz Amber Clear | | | | | | | | |
| Col/Bacteria | | | | | | | | |
| Flashpoint | | | | | | | | |
| Plastic Bag | | | | | | | | |
| SOC Kit | | | | | | | | |
| Perchlorate | | | | | | | | |
| Encore | | | | | | | | |
| Frozen | | | | | | | | |

| | Proper Headspace | UnP | HCl | MeOH | Bisulfate | DI | Thiosulfate | Sulfuric | Other |
|---|---|---|---|---|---|---|---|---|---|
| Vials | | | | | | | | | |

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

June 20, 2023

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

Project Location: Hyannis, MA
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 23E3794

Enclosed are results of analyses for samples as received by the laboratory on May 30, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

# Table of Contents

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: 6/20/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 23E3794

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

PROJECT LOCATION: Hyannis, MA

| FIELD SAMPLE # | LAB ID: | MATRIX | SAMPLE DESCRIPTION | TEST | SUB LAB |
|---|---|---|---|---|---|
| ME-1 | 23E3794-01 | Ground Water | | SOP-454 PFAS | |
| ME-2 | 23E3794-02 | Ground Water | | SOP-454 PFAS | |
| ME-3 | 23E3794-03 | Ground Water | | SOP-454 PFAS | |

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

**CASE NARRATIVE SUMMARY**

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

**SOP-454 PFAS**

**Qualifications:**

**L-07**

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

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

**Perfluoroheptanesulfonic acid (PFHpS)**
23E3794-01RE1[ME-1], 23E3794-02RE1[ME-2], 23E3794-03RE1[ME-3], B342713-BSD1

**S-29**

Extracted Internal Standard is outside of control limits.

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

**M2-6:2FTS**
23E3794-01RE1[ME-1]

**M2-8:2FTS**
S088753-CCV1

**M8FOSA**
23E3794-02RE1[ME-2]

The results of analyses reported only relate to samples submitted to Con-Test, a Pace 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.

Meghan E. Kelley
Reporting Specialist

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

Project Location: Hyannis, MA    Sample Description:    Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-1**    Sampled: 5/26/2023 08:45

**Sample ID: 23E3794-01**

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) | 19 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 2.5 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoropentanoic acid (PFPeA) | 60 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorohexanoic acid (PFHxA) | 38 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorodecanoic acid (PFDA) | 0.83 | 1.8 | 0.75 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.0 | 1.8 | 0.74 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.3 | 1.8 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 29 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 43 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.4 | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 18 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanoic acid (PFOA) | 18 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 69 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorononanoic acid (PFNA) | 11 | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |

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

Project Location: Hyannis, MA | Sample Description: | Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-2** | Sampled: 5/26/2023 08:55

**Sample ID: 23E3794-02**

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) | 16 | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 4.2 | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoropentanoic acid (PFPeA) | 54 | 1.9 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorohexanoic acid (PFHxA) | 40 | 1.9 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | 0.56 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 5.7 | 1.9 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.4 | 1.9 | 0.77 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.7 | 1.9 | 0.74 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 44 | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | 0.61 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 45 | 1.9 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 3.6 | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 17 | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanoic acid (PFOA) | 17 | 1.9 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 65 | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorononanoic acid (PFNA) | 6.7 | 1.9 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |

Project Location: Hyannis, MA
Sample Description:
Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-3**
Sampled: 5/26/2023 08:50

**Sample ID: 23E3794-03**

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) | 8.2 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.7 | 1.8 | 0.66 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoropentanoic acid (PFPeA) | 23 | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorohexanoic acid (PFHxA) | 18 | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.2 | 1.8 | 0.73 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanesulfonamide (FOSA) | 11 | 1.8 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 1.9 | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 0.91 | 1.8 | 0.70 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 34 | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.58 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 2.7 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.1 | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 8.6 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanoic acid (PFOA) | 14 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 83 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorononanoic acid (PFNA) | 6.1 | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |

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

## Sample Extraction Data

**Prep Method:SOP 454-PFAAS** **Analytical Method:SOP-454 PFAS**

| Lab Number [Field ID] | Batch | Initial [mL] | Final [mL] | Date |
|---|---|---|---|---|
| 23E3794-01RE1 [ME-1] | B342713 | 276 | 1.00 | 06/13/23 |
| 23E3794-02RE1 [ME-2] | B342713 | 264 | 1.00 | 06/13/23 |
| 23E3794-03RE1 [ME-3] | B342713 | 279 | 1.00 | 06/13/23 |

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 B342713 - SOP 454-PFAAS** | | | | | | | | | | |
| **Blank (B342713-BLK1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoropentanoic acid (PFPeA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorohexanoic acid (PFHxA) | ND | 2.1 | ng/L | | | | | | | |
| 11Cl-PF3OUdS (F53B Major) | ND | 2.1 | ng/L | | | | | | | |
| 9Cl-PF3ONS (F53B Minor) | ND | 2.1 | ng/L | | | | | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 2.1 | ng/L | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 2.1 | ng/L | | | | | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorodecanoic acid (PFDA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorododecanoic acid (PFDoA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 2.1 | ng/L | | | | | | | |
| N-EtFOSAA (NEtFOSAA) | ND | 2.1 | ng/L | | | | | | | |
| N-MeFOSAA (NMeFOSAA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorotetradecanoic acid (PFTA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorotridecanoic acid (PFTrDA) | ND | 2.1 | ng/L | | | | | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorodecanesulfonic acid (PFDS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanesulfonamide (FOSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorononanesulfonic acid (PFNS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorohexanesulfonic acid (PFHxS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 2.1 | ng/L | | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroundecanoic acid (PFUnA) | ND | 2.1 | ng/L | | | | | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroheptanoic acid (PFHpA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanoic acid (PFOA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanesulfonic acid (PFOS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorononanoic acid (PFNA) | ND | 2.1 | ng/L | | | | | | | |
| **LCS (B342713-BS1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | 10.3 | 2.0 | ng/L | 10.2 | | 102 | 73-129 | | | |
| Perfluorobutanesulfonic acid (PFBS) | 9.03 | 2.0 | ng/L | 8.99 | | 100 | 72-130 | | | |
| Perfluoropentanoic acid (PFPeA) | 10.3 | 2.0 | ng/L | 10.2 | | 101 | 72-129 | | | |
| Perfluorohexanoic acid (PFHxA) | 10.5 | 2.0 | ng/L | 10.2 | | 103 | 72-129 | | | |
| 11Cl-PF3OUdS (F53B Major) | 9.20 | 2.0 | ng/L | 9.57 | | 96.1 | 55.1-141 | | | |
| 9Cl-PF3ONS (F53B Minor) | 8.88 | 2.0 | ng/L | 9.47 | | 93.7 | 59.6-146 | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 9.47 | 2.0 | ng/L | 9.57 | | 99.0 | 60.3-131 | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 9.74 | 2.0 | ng/L | 10.2 | | 95.9 | 37.6-167 | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 9.64 | 2.0 | ng/L | 9.75 | | 98.8 | 67-138 | | | |
| Perfluorodecanoic acid (PFDA) | 10.6 | 2.0 | ng/L | 10.2 | | 104 | 71-129 | | | |
| Perfluorododecanoic acid (PFDoA) | 11.9 | 2.0 | ng/L | 10.2 | | 117 | 72-134 | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 8.89 | 2.0 | ng/L | 9.04 | | 98.4 | 49.4-154 | | | |

**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 B342713 - SOP 454-PFAAS** | | | | | | | | | | | |
| **LCS (B342713-BS1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 10.5 | 2.0 | ng/L | 9.70 | | 108 | | 69-134 | | | |
| N-EtFOSAA (NEtFOSAA) | 11.4 | 2.0 | ng/L | 10.2 | | 112 | | 61-135 | | | |
| N-MeFOSAA (NMeFOSAA) | 11.9 | 2.0 | ng/L | 10.2 | | 117 | | 65-136 | | | |
| Perfluorotetradecanoic acid (PFTA) | 10.7 | 2.0 | ng/L | 10.2 | | 105 | | 71-132 | | | |
| Perfluorotridecanoic acid (PFTrDA) | 11.7 | 2.0 | ng/L | 10.2 | | 115 | | 65-144 | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 9.63 | 2.0 | ng/L | 9.50 | | 101 | | 63-143 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 7.82 | 2.0 | ng/L | 9.80 | | 79.7 | | 53-142 | | | |
| Perfluorooctanesulfonamide (FOSA) | 10.8 | 2.0 | ng/L | 10.2 | | 107 | | 67-137 | | | |
| Perfluorononanesulfonic acid (PFNS) | 8.87 | 2.0 | ng/L | 9.75 | | 90.9 | | 69-127 | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 9.25 | 2.0 | ng/L | 10.2 | | 91.1 | | 61.7-156 | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | 9.18 | 2.0 | ng/L | 10.2 | | 90.4 | | 61.3-145 | | | |
| Perfluorohexanesulfonic acid (PFHxS) | 8.78 | 2.0 | ng/L | 9.30 | | 94.4 | | 68-131 | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 10.4 | 2.0 | ng/L | 10.2 | | 103 | | 59.8-147 | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 10.0 | 2.0 | ng/L | 10.2 | | 98.8 | | 59.5-146 | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 10.6 | 2.0 | ng/L | 9.65 | | 110 | | 64-140 | | | |
| Perfluoropentanesulfonic acid (PFPeS) | 9.72 | 2.0 | ng/L | 9.55 | | 102 | | 71-127 | | | |
| Perfluoroundecanoic acid (PFUnA) | 10.2 | 2.0 | ng/L | 10.2 | | 100 | | 69-133 | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 11.3 | 2.0 | ng/L | 10.2 | | 111 | | 58.5-143 | | | |
| Perfluoroheptanoic acid (PFHpA) | 10.4 | 2.0 | ng/L | 10.2 | | 103 | | 72-130 | | | |
| Perfluorooctanoic acid (PFOA) | 10.7 | 2.0 | ng/L | 10.2 | | 105 | | 71-133 | | | |
| Perfluorooctanesulfonic acid (PFOS) | 9.66 | 2.0 | ng/L | 9.40 | | 103 | | 65-140 | | | |
| Perfluorononanoic acid (PFNA) | 10.1 | 2.0 | ng/L | 10.2 | | 99.7 | | 69-130 | | | |
| **LCS Dup (B342713-BSD1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | | |
| Perfluorobutanoic acid (PFBA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | | 73-129 | 9.93 | 30 | |
| Perfluorobutanesulfonic acid (PFBS) | 10.2 | 2.1 | ng/L | 9.26 | | 110 | | 72-130 | 12.3 | 30 | |
| Perfluoropentanoic acid (PFPeA) | 11.5 | 2.1 | ng/L | 10.5 | | 109 | | 72-129 | 10.8 | 30 | |
| Perfluorohexanoic acid (PFHxA) | 11.5 | 2.1 | ng/L | 10.5 | | 110 | | 72-129 | 9.29 | 30 | |
| 11Cl-PF3OUdS (F53B Major) | 9.22 | 2.1 | ng/L | 9.86 | | 93.5 | | 55.1-141 | 0.252 | 30 | |
| 9Cl-PF3ONS (F53B Minor) | 10.2 | 2.1 | ng/L | 9.76 | | 105 | | 59.6-146 | 13.9 | 30 | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 10.5 | 2.1 | ng/L | 9.86 | | 107 | | 60.3-131 | 10.5 | 30 | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 9.16 | 2.1 | ng/L | 10.5 | | 87.6 | | 37.6-167 | 6.15 | 30 | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 12.6 | 2.1 | ng/L | 10.0 | | 125 | | 67-138 | 26.6 | 30 | |
| Perfluorodecanoic acid (PFDA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | | 71-129 | 6.41 | 30 | |
| Perfluorododecanoic acid (PFDoA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | | 72-134 | 3.79 | 30 | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 10.1 | 2.1 | ng/L | 9.32 | | 108 | | 49.4-154 | 12.3 | 30 | |
| **Perfluoroheptanesulfonic acid (PFHpS)** | 13.6 | 2.1 | ng/L | 10.0 | | **137** | * | 69-134 | 26.4 | 30 | L-07 |
| N-EtFOSAA (NEtFOSAA) | 12.3 | 2.1 | ng/L | 10.5 | | 118 | | 61-135 | 7.96 | 30 | |
| N-MeFOSAA (NMeFOSAA) | 12.9 | 2.1 | ng/L | 10.5 | | 123 | | 65-136 | 7.82 | 30 | |
| Perfluorotetradecanoic acid (PFTA) | 11.6 | 2.1 | ng/L | 10.5 | | 111 | | 71-132 | 8.45 | 30 | |
| Perfluorotridecanoic acid (PFTrDA) | 11.5 | 2.1 | ng/L | 10.5 | | 110 | | 65-144 | 1.59 | 30 | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 10.3 | 2.1 | ng/L | 9.79 | | 106 | | 63-143 | 7.08 | 30 | |
| Perfluorodecanesulfonic acid (PFDS) | 8.99 | 2.1 | ng/L | 10.1 | | 89.0 | | 53-142 | 14.0 | 30 | |
| Perfluorooctanesulfonamide (FOSA) | 11.6 | 2.1 | ng/L | 10.5 | | 111 | | 67-137 | 6.57 | 30 | |
| Perfluorononanesulfonic acid (PFNS) | 11.5 | 2.1 | ng/L | 10.0 | | 115 | | 69-127 | 25.9 | 30 | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 10.6 | 2.1 | ng/L | 10.5 | | 101 | | 61.7-156 | 13.3 | 30 | |
| Perfluoro-1-butanesulfonamide (FBSA) | 10.7 | 2.1 | ng/L | 10.5 | | 102 | | 61.3-145 | 15.0 | 30 | |
| Perfluorohexanesulfonic acid (PFHxS) | 10.5 | 2.1 | ng/L | 9.58 | | 109 | | 68-131 | 17.6 | 30 | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 11.7 | 2.1 | ng/L | 10.5 | | 111 | | 59.8-147 | 11.2 | 30 | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | | 59.5-146 | 12.3 | 30 | |

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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 B342713 - SOP 454-PFAAS** | | | | | | | | | | |
| **LCS Dup (B342713-BSD1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 9.81 | 2.1 | ng/L | 9.94 | | 98.6 | 64-140 | 8.13 | 30 | |
| Perfluoropentanesulfonic acid (PFPeS) | 11.0 | 2.1 | ng/L | 9.84 | | 112 | 71-127 | 12.7 | 30 | |
| Perfluoroundecanoic acid (PFUnA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | 69-133 | 11.4 | 30 | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 12.4 | 2.1 | ng/L | 10.5 | | 119 | 58.5-143 | 9.68 | 30 | |
| Perfluoroheptanoic acid (PFHpA) | 11.1 | 2.1 | ng/L | 10.5 | | 106 | 72-130 | 5.87 | 30 | |
| Perfluorooctanoic acid (PFOA) | 11.2 | 2.1 | ng/L | 10.5 | | 107 | 71-133 | 4.69 | 30 | |
| Perfluorooctanesulfonic acid (PFOS) | 11.1 | 2.1 | ng/L | 9.68 | | 114 | 65-140 | 13.7 | 30 | |
| Perfluorononanoic acid (PFNA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | 69-130 | 11.0 | 30 | |

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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). |
| L-07 | Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria. |
| S-29 | Extracted Internal Standard is outside of control limits. |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-1 (23E3794-01RE1 )** | | | Lab File ID: 23E3794-01RE1.d | | | Analyzed: 06/15/23 16:52 | | | |
| M8FOSA | 213334.6 | 3.980567 | 227,522.00 | 3.980567 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 28486.3 | 2.562517 | 27,028.00 | 2.562517 | 105 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 355459 | 4.329667 | 479,880.00 | 4.329667 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 37332.14 | 3.794817 | 33,212.00 | 3.802783 | 112 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 231042 | 1.066783 | 256,957.00 | 1.058467 | 90 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 102523.9 | 2.880217 | 114,902.00 | 2.880217 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 449810.7 | 3.795333 | 445,919.00 | 3.795333 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 110999.1 | 1.944683 | 104,197.00 | 1.9364 | 107 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 450689.3 | 3.946033 | 453,308.00 | 3.946017 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 43785.91 | 3.445283 | 27,565.00 | 3.445283 | 159 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 271434.3 | 1.757717 | 276,869.00 | 1.757717 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 467718.8 | 2.655 | 458,596.00 | 2.646767 | 102 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 77050.47 | 3.218333 | 68,806.00 | 3.218333 | 112 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 500292.4 | 3.186933 | 461,168.00 | 3.186933 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 548914.8 | 3.453817 | 508,809.00 | 3.453817 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 76850.11 | 3.636183 | 76,995.00 | 3.636183 | 100 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 512879.3 | 3.637217 | 526,406.00 | 3.637217 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 361032.2 | 4.088634 | 386,713.00 | 4.088634 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 91828.38 | 3.9535 | 101,789.00 | 3.9535 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 107819.7 | 3.873767 | 116,586.00 | 3.873767 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-2 (23E3794-02RE1 )** | | | Lab File ID: 23E3794-02RE1.d | | | Analyzed: 06/15/23 16:59 | | | |
| M8FOSA | 63430.73 | 3.980567 | 227,522.00 | 3.980567 | 28 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-4:2FTS | 24893.35 | 2.562517 | 27,028.00 | 2.562517 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 364628.1 | 4.329667 | 479,880.00 | 4.329667 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 31018.9 | 3.794817 | 33,212.00 | 3.802783 | 93 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 216959.8 | 1.058467 | 256,957.00 | 1.058467 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 98515.74 | 2.880217 | 114,902.00 | 2.880217 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 380677.3 | 3.795333 | 445,919.00 | 3.795333 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 99833.68 | 1.9364 | 104,197.00 | 1.9364 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 358386.6 | 3.946033 | 453,308.00 | 3.946017 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 37812.95 | 3.437283 | 27,565.00 | 3.445283 | 137 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 250487.6 | 1.757717 | 276,869.00 | 1.757717 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 423755.1 | 2.655 | 458,596.00 | 2.646767 | 92 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 69592.15 | 3.218333 | 68,806.00 | 3.218333 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 456410.2 | 3.186933 | 461,168.00 | 3.186933 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 478276.5 | 3.453817 | 508,809.00 | 3.453817 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 68816.74 | 3.636183 | 76,995.00 | 3.636183 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 474013.9 | 3.637217 | 526,406.00 | 3.637217 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 295467.7 | 4.088634 | 386,713.00 | 4.088634 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 71346.97 | 3.9535 | 101,789.00 | 3.9535 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 82685.68 | 3.873767 | 116,586.00 | 3.873767 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-3 (23E3794-03RE1 )** | | | Lab File ID: 23E3794-03RE1.d | | | Analyzed: 06/15/23 17:06 | | | |
| M8FOSA | 166835.3 | 3.980567 | 227,522.00 | 3.980567 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 24394.43 | 2.562517 | 27,028.00 | 2.562517 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 343507.3 | 4.329667 | 479,880.00 | 4.329667 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 29683.95 | 3.794817 | 33,212.00 | 3.802783 | 89 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 199579.7 | 1.066783 | 256,957.00 | 1.058467 | 78 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 95104.96 | 2.880217 | 114,902.00 | 2.880217 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 375022.2 | 3.795333 | 445,919.00 | 3.795333 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 92953.21 | 1.9364 | 104,197.00 | 1.9364 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 351270.3 | 3.946033 | 453,308.00 | 3.946017 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 31350.92 | 3.437283 | 27,565.00 | 3.445283 | 114 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 231561.3 | 1.757717 | 276,869.00 | 1.757717 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 392931.2 | 2.646767 | 458,596.00 | 2.646767 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 64172.11 | 3.218333 | 68,806.00 | 3.218333 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 411807.9 | 3.186933 | 461,168.00 | 3.186933 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 450823.7 | 3.453817 | 508,809.00 | 3.453817 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 64565.88 | 3.636183 | 76,995.00 | 3.636183 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 438212.4 | 3.637217 | 526,406.00 | 3.637217 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 287448.7 | 4.088634 | 386,713.00 | 4.088634 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 80767.51 | 3.9535 | 101,789.00 | 3.9535 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 82407.26 | 3.873767 | 116,586.00 | 3.873767 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Blank (B342713-BLK1 )** | | | Lab File ID: B342713-BLK1.d | | | Analyzed: 06/15/23 16:01 | | | |
| M8FOSA | 196862.9 | 3.980567 | 227,522.00 | 3.980567 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 26152.61 | 2.562517 | 27,028.00 | 2.562517 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 427562.6 | 4.337783 | 479,880.00 | 4.329667 | 89 | 50 - 150 | 0.0081 | +/-0.50 | |
| M2-8:2FTS | 29892 | 3.794817 | 33,212.00 | 3.802783 | 90 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 249440.2 | 1.058467 | 256,957.00 | 1.058467 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 94002.9 | 2.880217 | 114,902.00 | 2.880217 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 409812.8 | 3.795333 | 445,919.00 | 3.795333 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 105955.5 | 1.944683 | 104,197.00 | 1.9364 | 102 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 426348.8 | 3.946017 | 453,308.00 | 3.946017 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 26142.75 | 3.437283 | 27,565.00 | 3.445283 | 95 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 274971.8 | 1.757717 | 276,869.00 | 1.757717 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 449201.1 | 2.655 | 458,596.00 | 2.646767 | 98 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 65679.15 | 3.218333 | 68,806.00 | 3.218333 | 95 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 468079.8 | 3.186933 | 461,168.00 | 3.186933 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 511877 | 3.453817 | 508,809.00 | 3.453817 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 68250.95 | 3.636183 | 76,995.00 | 3.636183 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 486195.3 | 3.637217 | 526,406.00 | 3.637217 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 361203.5 | 4.088634 | 386,713.00 | 4.088634 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 91567.28 | 3.9535 | 101,789.00 | 3.9535 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 109350.9 | 3.873767 | 116,586.00 | 3.873767 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS (B342713-BS1 )** | | | Lab File ID: B342713-BS1.d | | | Analyzed: 06/15/23 15:47 | | | |
| M8FOSA | 177957.5 | 3.980567 | 227,522.00 | 3.980567 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 29196.96 | 2.562517 | 27,028.00 | 2.562517 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 408424.1 | 4.329667 | 479,880.00 | 4.329667 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 28086.29 | 3.794817 | 33,212.00 | 3.802783 | 85 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 252572.1 | 1.058467 | 256,957.00 | 1.058467 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 97688.41 | 2.880217 | 114,902.00 | 2.880217 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 395000.1 | 3.795333 | 445,919.00 | 3.795333 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 107557.4 | 1.944683 | 104,197.00 | 1.9364 | 103 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 394744.1 | 3.946033 | 453,308.00 | 3.946017 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 28605.05 | 3.437283 | 27,565.00 | 3.445283 | 104 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 274098.7 | 1.757717 | 276,869.00 | 1.757717 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 460367.3 | 2.655 | 458,596.00 | 2.646767 | 100 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 71050.67 | 3.218333 | 68,806.00 | 3.218333 | 103 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 467747.6 | 3.186933 | 461,168.00 | 3.186933 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 513461.1 | 3.453817 | 508,809.00 | 3.453817 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 69476.79 | 3.636183 | 76,995.00 | 3.636183 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 496207.2 | 3.637217 | 526,406.00 | 3.637217 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 315758.9 | 4.088634 | 386,713.00 | 4.088634 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 89045.16 | 3.9535 | 101,789.00 | 3.9535 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 94363.59 | 3.873767 | 116,586.00 | 3.873767 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS Dup (B342713-BSD1 )** | | | Lab File ID: B342713-BSD1.d | | | Analyzed: 06/15/23 15:54 | | | |
| M8FOSA | 220138.8 | 3.980567 | 227,522.00 | 3.980567 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 32367.33 | 2.562517 | 27,028.00 | 2.562517 | 120 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 441651.6 | 4.329667 | 479,880.00 | 4.329667 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 31301.99 | 3.794817 | 33,212.00 | 3.802783 | 94 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 272321.5 | 1.058467 | 256,957.00 | 1.058467 | 106 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 118835 | 2.880217 | 114,902.00 | 2.880217 | 103 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 437059.7 | 3.795333 | 445,919.00 | 3.795333 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 114906.1 | 1.944683 | 104,197.00 | 1.9364 | 110 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 421543.8 | 3.946033 | 453,308.00 | 3.946017 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 32375.59 | 3.437283 | 27,565.00 | 3.445283 | 117 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 296427 | 1.757717 | 276,869.00 | 1.757717 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 497145.6 | 2.655 | 458,596.00 | 2.646767 | 108 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 73935.12 | 3.218333 | 68,806.00 | 3.218333 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 510817.8 | 3.186933 | 461,168.00 | 3.186933 | 111 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 559667.8 | 3.453817 | 508,809.00 | 3.453817 | 110 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 74508.68 | 3.636183 | 76,995.00 | 3.636183 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 545909.5 | 3.637217 | 526,406.00 | 3.637217 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 347648.5 | 4.088634 | 386,713.00 | 4.088634 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 93566.37 | 3.9535 | 101,789.00 | 3.9535 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 109406.2 | 3.873767 | 116,586.00 | 3.873767 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |

con-test A Pace Analytical® Laboratory

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## CERTIFICATIONS

**Certified Analyses included in this Report**

| Analyte | Certifications |
|---|---|
| ***SOP-454 PFAS in Water*** | |
| Perfluorobutanoic acid (PFBA) | NH-P,PA |
| Perfluorobutanesulfonic acid (PFBS) | NH-P,PA |
| Perfluoropentanoic acid (PFPeA) | NH-P,PA |
| Perfluorohexanoic acid (PFHxA) | NH-P,PA |
| 11Cl-PF3OUdS (F53B Major) | NH-P,PA |
| 9Cl-PF3ONS (F53B Minor) | NH-P,PA |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NH-P,PA |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | NH-P,PA |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | NH-P,PA |
| Perfluorodecanoic acid (PFDA) | NH-P,PA |
| Perfluorododecanoic acid (PFDoA) | NH-P,PA |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | NH-P,PA |
| Perfluoroheptanesulfonic acid (PFHpS) | NH-P,PA |
| N-EtFOSAA (NEtFOSAA) | NH-P,PA |
| N-MeFOSAA (NMeFOSAA) | NH-P,PA |
| Perfluorotetradecanoic acid (PFTA) | NH-P,PA |
| Perfluorotridecanoic acid (PFTrDA) | NH-P,PA |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | NH-P,PA |
| Perfluorodecanesulfonic acid (PFDS) | NH-P,PA |
| Perfluorooctanesulfonamide (FOSA) | NH-P,PA |
| Perfluorononanesulfonic acid (PFNS) | NH-P,PA |
| Perfluoro-1-hexanesulfonamide (FHxSA) | NH-P,PA |
| Perfluoro-1-butanesulfonamide (FBSA) | NH-P,PA |
| Perfluorohexanesulfonic acid (PFHxS) | NH-P,PA |
| Perfluoro-4-oxapentanoic acid (PFMPA) | NH-P,PA |
| Perfluoro-5-oxahexanoic acid (PFMBA) | NH-P,PA |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | NH-P,PA |
| Perfluoropentanesulfonic acid (PFPeS) | NH-P,PA |
| Perfluoroundecanoic acid (PFUnA) | NH-P,PA |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | NH-P,PA |
| Perfluoroheptanoic acid (PFHpA) | NH-P,PA |
| Perfluorooctanoic acid (PFOA) | NH-P,PA |
| Perfluorooctanesulfonic acid (PFOS) | NH-P,PA |
| Perfluorononanoic acid (PFNA) | NH-P,PA |

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

| Code | Description | Number | Expires |
|---|---|---|---|
| NH-P | New Hampshire Environmental Lab | 2557 NELAP | 09/6/2023 |
| PA | Commonwealth of Pennsylvania DEP | 68-05812 | 06/30/2024 |

23E3794 KAF

Pace Analytical®

Phone: 413-525-2332
Fax: 413-525-6405
Access COC's and Support Requests
http://www.pacelabs.com
39 Spruce Street
East Longmeadow, MA 01028

CHAIN OF CUSTODY RECORD

Doc # 381 Rev 5_07/13/2021



Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich, MA
Phone: 508-833-6600
Project Name: HYA
Project Location: Hyannis, MA
Project Number:
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient: bmassa@horsleywitten.com
Sampled By: Caroline Armstrong

**Requested Turnaround Time**
7-Day ☐ 10-Day ☐
PFAS 10-Day (std) ☒ Due Date:

**Rush-Approval Required**
1-Day ☐ 3-Day ☐
2-Day ☐ 4-Day ☐

**Data Delivery**
Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To:
Fax To #:

**Dissolved Metals Samples**
○ Field Filtered
○ Lab to Filter

**Orthophosphate Samples**
○ Field Filtered
○ Lab to Filter

**PCB ONLY**
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

| Pace Work Order# | Client Sample ID / Description | Beginning Date/Time | Ending Date/Time | COMP/GRAB | [1]Matrix Code | Conc Code | VIALS | GLASS | PLASTIC | BACTERIA | ENCORE | PFAS (isotope dilution) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ME-1 | 5/26/23 | 845 | g | W | | | | 2 | | | X |
| 2 | ME-2 | ↓ | 855 | g | W | | | | 2 | | | X |
| 3 | ME-3 | | 850 | g | W | | | | 2 | | | X |

| Relinquished by: (signature) | Date/Time: |
|---|---|
| Caroline Armstrong | 5/30/23 1143 |
| Received by: (signature) Pace | 5/30/23 1143 |
| Relinquished by: (signature) Pace | 5/30/23 1606 |
| Received by: (signature) [illegible] 2.4 | 5/30/23 1606 |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |
| Relinquished by: (signature) | Date/Time: |
| Received by: (signature) | Date/Time: |

Client Comments:

**Detection Limit Requirements**
MA: GW-1
CT:
Other:

**Special Requirements**
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Municipality ☐ MWRA ☐ WRTA ☐
Federal ☐ 21 J ☐ School ☐
City ☐ Brownfield ☐ MBTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS
GLASS
PLASTIC
BACTERIA
ENCORE

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[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)

Lab Comments:

**Disclaimer:** Pace Analytical 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 what analyses the laboratory will perform. Any missing information is not the laboratory's responsibility. Pace Analytical values your partnership on each project and will try to assist with missing information, but will not be held accountable.

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F:413-525-6405
www.pacelabs.com

ENV-FRM-ELON-0001 V05__Sample Receiving Checklist

# Log In Back-Sheet

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

Pace® PEOPLE ADVANCING SCIENCE

Client: Horsley Witten Group
Project: HYA
MCP/RCP Required: MA MCP
Deliverable Package Requirement: GW-1
Location: Hyannis, MA
PWSID# (When Applicable): N/A
Arrival Method:
Courier ☑ Fed Ex ☐ Walk In ☐ Other ☐
Received By / Date / Time: [initials] 5/30/23 1606
Back-Sheet By / Date / Time: [initials] 5/30/23 1857
Temperature Method: gun # 2
Temp ☑ < 6° C Actual Temperature: 2.4
Rush Samples: Yes / (No) Notify
Short Hold: Yes / (No) Notify

| | True | False |
|---|---|---|
| Received on Ice | ☑ | ☐ |
| Received in Cooler | ☑ | ☐ |
| Custody Seal: DATE TIME | ☐ | ☑ |
| COC Relinquished | ☑ | ☐ |
| COC/Samples Labels Agree | ☑ | ☐ |
| All Samples in Good Condition | ☑ | ☐ |
| Samples Received within Holding Time | ☑ | ☐ |
| Is there enough Volume | ☑ | ☐ |
| Proper Media/Container Used | ☑ | ☐ |
| Splitting Samples Required | ☐ | ☑ |
| MS/MSD | ☐ | ☑ |
| Trip Blanks | ☐ | ☑ |
| Lab to Filters | ☐ | ☑ |
| COC Legible | ☑ | ☐ |

COC Included: (Check all included)
Client ☐ Analysis ☐ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper pH: (N/A) ☐ ☐

## Notes regarding Samples/COC outside of SOP:

## Additional Container Notes

| Sample | Soils Jars (Circle Amb/Clear) | | | | Ambers | | | | | | | Plastics | | | | | | | | | | VOA Vials | | | | | Other / Fill in | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 Liter | | | 250mL | | | 100mL | 1 Liter | | 500mL | | 250mL | | | | | | | | | | | | | | | | |
| | 16oz Amb/Clear | 8oz Amb/Clear | 4oz Amb/Clear | 2oz Amb/Clear | Unpreserved | HCL | Sulfuric | Sulfuric | Phosphoric | HCl | Unpreserved | Unpreserved | Sulfuric | Unpreserved | Sulfuric | Unpreserved | Trizma | Sulfuric | Nitric | NaOH | NaOH/Zinc | Unpreserved | HCl | MeOH | D.I. Water | BiSulfate | Col/Bact | | | | | |
| 1 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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A Pace Analytical® Laboratory
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

June 20, 2023

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

Project Location: Hyannis, MA
Client Job Number:
Project Number: 22071
Laboratory Work Order Number: 23E3794

Enclosed are results of analyses for samples as received by the laboratory on May 30, 2023. If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Kaitlyn A. Feliciano
Project Manager

# Table of Contents

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: 6/20/2023

PURCHASE ORDER NUMBER:

PROJECT NUMBER: 22071

**ANALYTICAL SUMMARY**

WORK ORDER NUMBER: 23E3794

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

PROJECT LOCATION: Hyannis, MA

| FIELD SAMPLE # | LAB ID: | MATRIX | SAMPLE DESCRIPTION | TEST | SUB LAB |
|---|---|---|---|---|---|
| ME-1 | 23E3794-01 | Ground Water | | SOP-454 PFAS | |
| ME-2 | 23E3794-02 | Ground Water | | SOP-454 PFAS | |
| ME-3 | 23E3794-03 | Ground Water | | SOP-454 PFAS | |

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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-454 PFAS

**Qualifications:**

**L-07**

Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria.

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

**Perfluoroheptanesulfonic acid (PFHpS)**
23E3794-01RE1[ME-1], 23E3794-02RE1[ME-2], 23E3794-03RE1[ME-3], B342713-BSD1

**S-29**

Extracted Internal Standard is outside of control limits.

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

**M2-6:2FTS**
23E3794-01RE1[ME-1]

**M2-8:2FTS**
S088753-CCV1

**M8FOSA**
23E3794-02RE1[ME-2]

The results of analyses reported only relate to samples submitted to Con-Test, a Pace 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.

Meghan E. Kelley
Reporting Specialist

con-test
A Pace Analytical® Laboratory

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

Project Location: Hyannis, MA | Sample Description: | Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-1** | Sampled: 5/26/2023 08:45

**Sample ID: 23E3794-01**

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) | 19 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 2.5 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoropentanoic acid (PFPeA) | 60 | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorohexanoic acid (PFHxA) | 38 | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorodecanoic acid (PFDA) | 0.83 | 1.8 | 0.75 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.0 | 1.8 | 0.74 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.8 | 0.95 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.3 | 1.8 | 0.71 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 29 | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.65 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.59 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 43 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.4 | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 18 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanoic acid (PFOA) | 18 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 69 | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |
| Perfluorononanoic acid (PFNA) | 11 | 1.8 | 0.84 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:52 | QNW |

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

Project Location: Hyannis, MA    Sample Description:    Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-2**    Sampled: 5/26/2023 08:55

**Sample ID: 23E3794-02**

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) | 16 | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 4.2 | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoropentanoic acid (PFPeA) | 54 | 1.9 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorohexanoic acid (PFHxA) | 40 | 1.9 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.9 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.9 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.9 | 0.56 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 5.7 | 1.9 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.9 | 0.79 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.9 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.9 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.4 | 1.9 | 0.77 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.9 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.9 | 0.99 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.9 | 0.90 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.9 | 0.78 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.9 | 0.98 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanesulfonamide (FOSA) | ND | 1.9 | 0.96 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.9 | 0.97 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 1.9 | 1.0 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 1.7 | 1.9 | 0.74 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 44 | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.9 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.9 | 0.61 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 45 | 1.9 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 3.6 | 1.9 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.9 | 0.81 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.9 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 17 | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanoic acid (PFOA) | 17 | 1.9 | 1.3 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 65 | 1.9 | 0.80 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |
| Perfluorononanoic acid (PFNA) | 6.7 | 1.9 | 0.87 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 16:59 | QNW |

Project Location: Hyannis, MA		Sample Description:		Work Order: 23E3794

Date Received: 5/30/2023

**Field Sample #: ME-3**		Sampled: 5/26/2023 08:50

**Sample ID: 23E3794-03**

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) | 8.2 | 1.8 | 0.67 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorobutanesulfonic acid (PFBS) | 1.7 | 1.8 | 0.66 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoropentanoic acid (PFPeA) | 23 | 1.8 | 0.71 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorohexanoic acid (PFHxA) | 18 | 1.8 | 0.73 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 11Cl-PF3OUdS (F53B Major) | ND | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 9Cl-PF3ONS (F53B Minor) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 1.8 | 0.53 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 1.8 | 0.86 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorodecanoic acid (PFDA) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorododecanoic acid (PFDoA) | ND | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 1.8 | 0.66 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroheptanesulfonic acid (PFHpS) | 2.2 | 1.8 | 0.73 | ng/L | 1 | L-07 | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| N-EtFOSAA (NEtFOSAA) | ND | 1.8 | 0.72 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| N-MeFOSAA (NMeFOSAA) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorotetradecanoic acid (PFTA) | ND | 1.8 | 0.85 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorotridecanoic acid (PFTrDA) | ND | 1.8 | 0.74 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 1.8 | 0.69 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorodecanesulfonic acid (PFDS) | ND | 1.8 | 0.93 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanesulfonamide (FOSA) | 11 | 1.8 | 0.91 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorononanesulfonic acid (PFNS) | ND | 1.8 | 0.92 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 1.9 | 1.8 | 0.94 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-1-butanesulfonamide (FBSA) | 0.91 | 1.8 | 0.70 | ng/L | 1 | J | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorohexanesulfonic acid (PFHxS) | 34 | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 1.8 | 0.64 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 1.8 | 0.58 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 2.7 | 1.8 | 1.1 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoropentanesulfonic acid (PFPeS) | 2.1 | 1.8 | 0.68 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroundecanoic acid (PFUnA) | ND | 1.8 | 0.77 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 1.8 | 0.70 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluoroheptanoic acid (PFHpA) | 8.6 | 1.8 | 0.75 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanoic acid (PFOA) | 14 | 1.8 | 1.2 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorooctanesulfonic acid (PFOS) | 83 | 1.8 | 0.76 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |
| Perfluorononanoic acid (PFNA) | 6.1 | 1.8 | 0.83 | ng/L | 1 | | SOP-454 PFAS | 6/13/23 | 6/15/23 17:06 | QNW |

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

## Sample Extraction Data

**Prep Method:SOP 454-PFAAS** **Analytical Method:SOP-454 PFAS**

| Lab Number [Field ID] | Batch | Initial [mL] | Final [mL] | Date |
|---|---|---|---|---|
| 23E3794-01RE1 [ME-1] | B342713 | 276 | 1.00 | 06/13/23 |
| 23E3794-02RE1 [ME-2] | B342713 | 264 | 1.00 | 06/13/23 |
| 23E3794-03RE1 [ME-3] | B342713 | 279 | 1.00 | 06/13/23 |

**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 B342713 - SOP 454-PFAAS** | | | | | | | | | | |
| **Blank (B342713-BLK1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorobutanesulfonic acid (PFBS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoropentanoic acid (PFPeA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorohexanoic acid (PFHxA) | ND | 2.1 | ng/L | | | | | | | |
| 11Cl-PF3OUdS (F53B Major) | ND | 2.1 | ng/L | | | | | | | |
| 9Cl-PF3ONS (F53B Minor) | ND | 2.1 | ng/L | | | | | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | ND | 2.1 | ng/L | | | | | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | ND | 2.1 | ng/L | | | | | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorodecanoic acid (PFDA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorododecanoic acid (PFDoA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | ND | 2.1 | ng/L | | | | | | | |
| N-EtFOSAA (NEtFOSAA) | ND | 2.1 | ng/L | | | | | | | |
| N-MeFOSAA (NMeFOSAA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorotetradecanoic acid (PFTA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorotridecanoic acid (PFTrDA) | ND | 2.1 | ng/L | | | | | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorodecanesulfonic acid (PFDS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanesulfonamide (FOSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorononanesulfonic acid (PFNS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorohexanesulfonic acid (PFHxS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | ND | 2.1 | ng/L | | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoropentanesulfonic acid (PFPeS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroundecanoic acid (PFUnA) | ND | 2.1 | ng/L | | | | | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluoroheptanoic acid (PFHpA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanoic acid (PFOA) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorooctanesulfonic acid (PFOS) | ND | 2.1 | ng/L | | | | | | | |
| Perfluorononanoic acid (PFNA) | ND | 2.1 | ng/L | | | | | | | |
| **LCS (B342713-BS1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| Perfluorobutanoic acid (PFBA) | 10.3 | 2.0 | ng/L | 10.2 | | 102 | 73-129 | | | |
| Perfluorobutanesulfonic acid (PFBS) | 9.03 | 2.0 | ng/L | 8.99 | | 100 | 72-130 | | | |
| Perfluoropentanoic acid (PFPeA) | 10.3 | 2.0 | ng/L | 10.2 | | 101 | 72-129 | | | |
| Perfluorohexanoic acid (PFHxA) | 10.5 | 2.0 | ng/L | 10.2 | | 103 | 72-129 | | | |
| 11Cl-PF3OUdS (F53B Major) | 9.20 | 2.0 | ng/L | 9.57 | | 96.1 | 55.1-141 | | | |
| 9Cl-PF3ONS (F53B Minor) | 8.88 | 2.0 | ng/L | 9.47 | | 93.7 | 59.6-146 | | | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 9.47 | 2.0 | ng/L | 9.57 | | 99.0 | 60.3-131 | | | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 9.74 | 2.0 | ng/L | 10.2 | | 95.9 | 37.6-167 | | | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 9.64 | 2.0 | ng/L | 9.75 | | 98.8 | 67-138 | | | |
| Perfluorodecanoic acid (PFDA) | 10.6 | 2.0 | ng/L | 10.2 | | 104 | 71-129 | | | |
| Perfluorododecanoic acid (PFDoA) | 11.9 | 2.0 | ng/L | 10.2 | | 117 | 72-134 | | | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 8.89 | 2.0 | ng/L | 9.04 | | 98.4 | 49.4-154 | | | |

**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 B342713 - SOP 454-PFAAS** | | | | | | | | | | | |
| **LCS (B342713-BS1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | | |
| Perfluoroheptanesulfonic acid (PFHpS) | 10.5 | 2.0 | ng/L | 9.70 | | 108 | | 69-134 | | | |
| N-EtFOSAA (NEtFOSAA) | 11.4 | 2.0 | ng/L | 10.2 | | 112 | | 61-135 | | | |
| N-MeFOSAA (NMeFOSAA) | 11.9 | 2.0 | ng/L | 10.2 | | 117 | | 65-136 | | | |
| Perfluorotetradecanoic acid (PFTA) | 10.7 | 2.0 | ng/L | 10.2 | | 105 | | 71-132 | | | |
| Perfluorotridecanoic acid (PFTrDA) | 11.7 | 2.0 | ng/L | 10.2 | | 115 | | 65-144 | | | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 9.63 | 2.0 | ng/L | 9.50 | | 101 | | 63-143 | | | |
| Perfluorodecanesulfonic acid (PFDS) | 7.82 | 2.0 | ng/L | 9.80 | | 79.7 | | 53-142 | | | |
| Perfluorooctanesulfonamide (FOSA) | 10.8 | 2.0 | ng/L | 10.2 | | 107 | | 67-137 | | | |
| Perfluorononanesulfonic acid (PFNS) | 8.87 | 2.0 | ng/L | 9.75 | | 90.9 | | 69-127 | | | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 9.25 | 2.0 | ng/L | 10.2 | | 91.1 | | 61.7-156 | | | |
| Perfluoro-1-butanesulfonamide (FBSA) | 9.18 | 2.0 | ng/L | 10.2 | | 90.4 | | 61.3-145 | | | |
| Perfluorohexanesulfonic acid (PFHxS) | 8.78 | 2.0 | ng/L | 9.30 | | 94.4 | | 68-131 | | | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 10.4 | 2.0 | ng/L | 10.2 | | 103 | | 59.8-147 | | | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 10.0 | 2.0 | ng/L | 10.2 | | 98.8 | | 59.5-146 | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 10.6 | 2.0 | ng/L | 9.65 | | 110 | | 64-140 | | | |
| Perfluoropentanesulfonic acid (PFPeS) | 9.72 | 2.0 | ng/L | 9.55 | | 102 | | 71-127 | | | |
| Perfluoroundecanoic acid (PFUnA) | 10.2 | 2.0 | ng/L | 10.2 | | 100 | | 69-133 | | | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 11.3 | 2.0 | ng/L | 10.2 | | 111 | | 58.5-143 | | | |
| Perfluoroheptanoic acid (PFHpA) | 10.4 | 2.0 | ng/L | 10.2 | | 103 | | 72-130 | | | |
| Perfluorooctanoic acid (PFOA) | 10.7 | 2.0 | ng/L | 10.2 | | 105 | | 71-133 | | | |
| Perfluorooctanesulfonic acid (PFOS) | 9.66 | 2.0 | ng/L | 9.40 | | 103 | | 65-140 | | | |
| Perfluorononanoic acid (PFNA) | 10.1 | 2.0 | ng/L | 10.2 | | 99.7 | | 69-130 | | | |
| **LCS Dup (B342713-BSD1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | | |
| Perfluorobutanoic acid (PFBA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | | 73-129 | 9.93 | 30 | |
| Perfluorobutanesulfonic acid (PFBS) | 10.2 | 2.1 | ng/L | 9.26 | | 110 | | 72-130 | 12.3 | 30 | |
| Perfluoropentanoic acid (PFPeA) | 11.5 | 2.1 | ng/L | 10.5 | | 109 | | 72-129 | 10.8 | 30 | |
| Perfluorohexanoic acid (PFHxA) | 11.5 | 2.1 | ng/L | 10.5 | | 110 | | 72-129 | 9.29 | 30 | |
| 11Cl-PF3OUdS (F53B Major) | 9.22 | 2.1 | ng/L | 9.86 | | 93.5 | | 55.1-141 | 0.252 | 30 | |
| 9Cl-PF3ONS (F53B Minor) | 10.2 | 2.1 | ng/L | 9.76 | | 105 | | 59.6-146 | 13.9 | 30 | |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | 10.5 | 2.1 | ng/L | 9.86 | | 107 | | 60.3-131 | 10.5 | 30 | |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | 9.16 | 2.1 | ng/L | 10.5 | | 87.6 | | 37.6-167 | 6.15 | 30 | |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | 12.6 | 2.1 | ng/L | 10.0 | | 125 | | 67-138 | 26.6 | 30 | |
| Perfluorodecanoic acid (PFDA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | | 71-129 | 6.41 | 30 | |
| Perfluorododecanoic acid (PFDoA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | | 72-134 | 3.79 | 30 | |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | 10.1 | 2.1 | ng/L | 9.32 | | 108 | | 49.4-154 | 12.3 | 30 | |
| **Perfluoroheptanesulfonic acid (PFHpS)** | 13.6 | 2.1 | ng/L | 10.0 | | **137** | * | 69-134 | 26.4 | 30 | L-07 |
| N-EtFOSAA (NEtFOSAA) | 12.3 | 2.1 | ng/L | 10.5 | | 118 | | 61-135 | 7.96 | 30 | |
| N-MeFOSAA (NMeFOSAA) | 12.9 | 2.1 | ng/L | 10.5 | | 123 | | 65-136 | 7.82 | 30 | |
| Perfluorotetradecanoic acid (PFTA) | 11.6 | 2.1 | ng/L | 10.5 | | 111 | | 71-132 | 8.45 | 30 | |
| Perfluorotridecanoic acid (PFTrDA) | 11.5 | 2.1 | ng/L | 10.5 | | 110 | | 65-144 | 1.59 | 30 | |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | 10.3 | 2.1 | ng/L | 9.79 | | 106 | | 63-143 | 7.08 | 30 | |
| Perfluorodecanesulfonic acid (PFDS) | 8.99 | 2.1 | ng/L | 10.1 | | 89.0 | | 53-142 | 14.0 | 30 | |
| Perfluorooctanesulfonamide (FOSA) | 11.6 | 2.1 | ng/L | 10.5 | | 111 | | 67-137 | 6.57 | 30 | |
| Perfluorononanesulfonic acid (PFNS) | 11.5 | 2.1 | ng/L | 10.0 | | 115 | | 69-127 | 25.9 | 30 | |
| Perfluoro-1-hexanesulfonamide (FHxSA) | 10.6 | 2.1 | ng/L | 10.5 | | 101 | | 61.7-156 | 13.3 | 30 | |
| Perfluoro-1-butanesulfonamide (FBSA) | 10.7 | 2.1 | ng/L | 10.5 | | 102 | | 61.3-145 | 15.0 | 30 | |
| Perfluorohexanesulfonic acid (PFHxS) | 10.5 | 2.1 | ng/L | 9.58 | | 109 | | 68-131 | 17.6 | 30 | |
| Perfluoro-4-oxapentanoic acid (PFMPA) | 11.7 | 2.1 | ng/L | 10.5 | | 111 | | 59.8-147 | 11.2 | 30 | |
| Perfluoro-5-oxahexanoic acid (PFMBA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | | 59.5-146 | 12.3 | 30 | |

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 B342713 - SOP 454-PFAAS** | | | | | | | | | | |
| **LCS Dup (B342713-BSD1)** | | | | Prepared: 06/13/23 Analyzed: 06/15/23 | | | | | | |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | 9.81 | 2.1 | ng/L | 9.94 | | 98.6 | 64-140 | 8.13 | 30 | |
| Perfluoropentanesulfonic acid (PFPeS) | 11.0 | 2.1 | ng/L | 9.84 | | 112 | 71-127 | 12.7 | 30 | |
| Perfluoroundecanoic acid (PFUnA) | 11.4 | 2.1 | ng/L | 10.5 | | 109 | 69-133 | 11.4 | 30 | |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | 12.4 | 2.1 | ng/L | 10.5 | | 119 | 58.5-143 | 9.68 | 30 | |
| Perfluoroheptanoic acid (PFHpA) | 11.1 | 2.1 | ng/L | 10.5 | | 106 | 72-130 | 5.87 | 30 | |
| Perfluorooctanoic acid (PFOA) | 11.2 | 2.1 | ng/L | 10.5 | | 107 | 71-133 | 4.69 | 30 | |
| Perfluorooctanesulfonic acid (PFOS) | 11.1 | 2.1 | ng/L | 9.68 | | 114 | 65-140 | 13.7 | 30 | |
| Perfluorononanoic acid (PFNA) | 11.3 | 2.1 | ng/L | 10.5 | | 108 | 69-130 | 11.0 | 30 | |

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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). |
| L-07 | Either laboratory fortified blank/laboratory control sample or duplicate recovery is outside of control limits, but the other is within limits. RPD between the two LFB/LCS results is within method specified criteria. |
| S-29 | Extracted Internal Standard is outside of control limits. |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-1 (23E3794-01RE1 )** | | | Lab File ID: 23E3794-01RE1.d | | | Analyzed: 06/15/23 16:52 | | | |
| M8FOSA | 213334.6 | 3.980567 | 227,522.00 | 3.980567 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 28486.3 | 2.562517 | 27,028.00 | 2.562517 | 105 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 355459 | 4.329667 | 479,880.00 | 4.329667 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 37332.14 | 3.794817 | 33,212.00 | 3.802783 | 112 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 231042 | 1.066783 | 256,957.00 | 1.058467 | 90 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 102523.9 | 2.880217 | 114,902.00 | 2.880217 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 449810.7 | 3.795333 | 445,919.00 | 3.795333 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 110999.1 | 1.944683 | 104,197.00 | 1.9364 | 107 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 450689.3 | 3.946033 | 453,308.00 | 3.946017 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 43785.91 | 3.445283 | 27,565.00 | 3.445283 | 159 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M5PFPeA | 271434.3 | 1.757717 | 276,869.00 | 1.757717 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 467718.8 | 2.655 | 458,596.00 | 2.646767 | 102 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 77050.47 | 3.218333 | 68,806.00 | 3.218333 | 112 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 500292.4 | 3.186933 | 461,168.00 | 3.186933 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 548914.8 | 3.453817 | 508,809.00 | 3.453817 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 76850.11 | 3.636183 | 76,995.00 | 3.636183 | 100 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 512879.3 | 3.637217 | 526,406.00 | 3.637217 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 361032.2 | 4.088634 | 386,713.00 | 4.088634 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 91828.38 | 3.9535 | 101,789.00 | 3.9535 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 107819.7 | 3.873767 | 116,586.00 | 3.873767 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-2 (23E3794-02RE1 )** | | | Lab File ID: 23E3794-02RE1.d | | | Analyzed: 06/15/23 16:59 | | | |
| M8FOSA | 63430.73 | 3.980567 | 227,522.00 | 3.980567 | 28 | 50 - 150 | 0.0000 | +/-0.50 | * |
| M2-4:2FTS | 24893.35 | 2.562517 | 27,028.00 | 2.562517 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 364628.1 | 4.329667 | 479,880.00 | 4.329667 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 31018.9 | 3.794817 | 33,212.00 | 3.802783 | 93 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 216959.8 | 1.058467 | 256,957.00 | 1.058467 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 98515.74 | 2.880217 | 114,902.00 | 2.880217 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 380677.3 | 3.795333 | 445,919.00 | 3.795333 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 99833.68 | 1.9364 | 104,197.00 | 1.9364 | 96 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 358386.6 | 3.946033 | 453,308.00 | 3.946017 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 37812.95 | 3.437283 | 27,565.00 | 3.445283 | 137 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 250487.6 | 1.757717 | 276,869.00 | 1.757717 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 423755.1 | 2.655 | 458,596.00 | 2.646767 | 92 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 69592.15 | 3.218333 | 68,806.00 | 3.218333 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 456410.2 | 3.186933 | 461,168.00 | 3.186933 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 478276.5 | 3.453817 | 508,809.00 | 3.453817 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 68816.74 | 3.636183 | 76,995.00 | 3.636183 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 474013.9 | 3.637217 | 526,406.00 | 3.637217 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 295467.7 | 4.088634 | 386,713.00 | 4.088634 | 76 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 71346.97 | 3.9535 | 101,789.00 | 3.9535 | 70 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 82685.68 | 3.873767 | 116,586.00 | 3.873767 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **ME-3 (23E3794-03RE1 )** | | | Lab File ID: 23E3794-03RE1.d | | | Analyzed: 06/15/23 17:06 | | | |
| M8FOSA | 166835.3 | 3.980567 | 227,522.00 | 3.980567 | 73 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 24394.43 | 2.562517 | 27,028.00 | 2.562517 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 343507.3 | 4.329667 | 479,880.00 | 4.329667 | 72 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 29683.95 | 3.794817 | 33,212.00 | 3.802783 | 89 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 199579.7 | 1.066783 | 256,957.00 | 1.058467 | 78 | 50 - 150 | 0.0083 | +/-0.50 | |
| M3HFPO-DA | 95104.96 | 2.880217 | 114,902.00 | 2.880217 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 375022.2 | 3.795333 | 445,919.00 | 3.795333 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 92953.21 | 1.9364 | 104,197.00 | 1.9364 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M7PFUnA | 351270.3 | 3.946033 | 453,308.00 | 3.946017 | 77 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 31350.92 | 3.437283 | 27,565.00 | 3.445283 | 114 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 231561.3 | 1.757717 | 276,869.00 | 1.757717 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 392931.2 | 2.646767 | 458,596.00 | 2.646767 | 86 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFHxS | 64172.11 | 3.218333 | 68,806.00 | 3.218333 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 411807.9 | 3.186933 | 461,168.00 | 3.186933 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 450823.7 | 3.453817 | 508,809.00 | 3.453817 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 64565.88 | 3.636183 | 76,995.00 | 3.636183 | 84 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 438212.4 | 3.637217 | 526,406.00 | 3.637217 | 83 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 287448.7 | 4.088634 | 386,713.00 | 4.088634 | 74 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 80767.51 | 3.9535 | 101,789.00 | 3.9535 | 79 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 82407.26 | 3.873767 | 116,586.00 | 3.873767 | 71 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **Blank (B342713-BLK1 )** | | | Lab File ID: B342713-BLK1.d | | | Analyzed: 06/15/23 16:01 | | | |
| M8FOSA | 196862.9 | 3.980567 | 227,522.00 | 3.980567 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 26152.61 | 2.562517 | 27,028.00 | 2.562517 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 427562.6 | 4.337783 | 479,880.00 | 4.329667 | 89 | 50 - 150 | 0.0081 | +/-0.50 | |
| M2-8:2FTS | 29892 | 3.794817 | 33,212.00 | 3.802783 | 90 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 249440.2 | 1.058467 | 256,957.00 | 1.058467 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 94002.9 | 2.880217 | 114,902.00 | 2.880217 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 409812.8 | 3.795333 | 445,919.00 | 3.795333 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 105955.5 | 1.944683 | 104,197.00 | 1.9364 | 102 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 426348.8 | 3.946017 | 453,308.00 | 3.946017 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 26142.75 | 3.437283 | 27,565.00 | 3.445283 | 95 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 274971.8 | 1.757717 | 276,869.00 | 1.757717 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 449201.1 | 2.655 | 458,596.00 | 2.646767 | 98 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 65679.15 | 3.218333 | 68,806.00 | 3.218333 | 95 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 468079.8 | 3.186933 | 461,168.00 | 3.186933 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 511877 | 3.453817 | 508,809.00 | 3.453817 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 68250.95 | 3.636183 | 76,995.00 | 3.636183 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 486195.3 | 3.637217 | 526,406.00 | 3.637217 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 361203.5 | 4.088634 | 386,713.00 | 4.088634 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 91567.28 | 3.9535 | 101,789.00 | 3.9535 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 109350.9 | 3.873767 | 116,586.00 | 3.873767 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |

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**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS (B342713-BS1 )** | | | Lab File ID: B342713-BS1.d | | | Analyzed: 06/15/23 15:47 | | | |
| M8FOSA | 177957.5 | 3.980567 | 227,522.00 | 3.980567 | 78 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 29196.96 | 2.562517 | 27,028.00 | 2.562517 | 108 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 408424.1 | 4.329667 | 479,880.00 | 4.329667 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 28086.29 | 3.794817 | 33,212.00 | 3.802783 | 85 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 252572.1 | 1.058467 | 256,957.00 | 1.058467 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 97688.41 | 2.880217 | 114,902.00 | 2.880217 | 85 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 395000.1 | 3.795333 | 445,919.00 | 3.795333 | 89 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 107557.4 | 1.944683 | 104,197.00 | 1.9364 | 103 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 394744.1 | 3.946033 | 453,308.00 | 3.946017 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 28605.05 | 3.437283 | 27,565.00 | 3.445283 | 104 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 274098.7 | 1.757717 | 276,869.00 | 1.757717 | 99 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 460367.3 | 2.655 | 458,596.00 | 2.646767 | 100 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 71050.67 | 3.218333 | 68,806.00 | 3.218333 | 103 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 467747.6 | 3.186933 | 461,168.00 | 3.186933 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 513461.1 | 3.453817 | 508,809.00 | 3.453817 | 101 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 69476.79 | 3.636183 | 76,995.00 | 3.636183 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 496207.2 | 3.637217 | 526,406.00 | 3.637217 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 315758.9 | 4.088634 | 386,713.00 | 4.088634 | 82 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 89045.16 | 3.9535 | 101,789.00 | 3.9535 | 87 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 94363.59 | 3.873767 | 116,586.00 | 3.873767 | 81 | 50 - 150 | 0.0000 | +/-0.50 | |

con-test
A Pace Analytical® Laboratory
39 Spruce Street * East Longmeadow, MA 01028 * FAX 413/525-6405 * TEL. 413/525-2332

**INTERNAL STANDARD AREA AND RT SUMMARY**

**SOP-454 PFAS**

| Internal Standard | Response | RT | Reference Response | Reference RT | Area % | Area % Limits | RT Diff | RT Diff Limit | Q |
|---|---|---|---|---|---|---|---|---|---|
| **LCS Dup (B342713-BSD1 )** | | | Lab File ID: B342713-BSD1.d | | | Analyzed: 06/15/23 15:54 | | | |
| M8FOSA | 220138.8 | 3.980567 | 227,522.00 | 3.980567 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-4:2FTS | 32367.33 | 2.562517 | 27,028.00 | 2.562517 | 120 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2PFTA | 441651.6 | 4.329667 | 479,880.00 | 4.329667 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-8:2FTS | 31301.99 | 3.794817 | 33,212.00 | 3.802783 | 94 | 50 - 150 | -0.0080 | +/-0.50 | |
| MPFBA | 272321.5 | 1.058467 | 256,957.00 | 1.058467 | 106 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3HFPO-DA | 118835 | 2.880217 | 114,902.00 | 2.880217 | 103 | 50 - 150 | 0.0000 | +/-0.50 | |
| M6PFDA | 437059.7 | 3.795333 | 445,919.00 | 3.795333 | 98 | 50 - 150 | 0.0000 | +/-0.50 | |
| M3PFBS | 114906.1 | 1.944683 | 104,197.00 | 1.9364 | 110 | 50 - 150 | 0.0083 | +/-0.50 | |
| M7PFUnA | 421543.8 | 3.946033 | 453,308.00 | 3.946017 | 93 | 50 - 150 | 0.0000 | +/-0.50 | |
| M2-6:2FTS | 32375.59 | 3.437283 | 27,565.00 | 3.445283 | 117 | 50 - 150 | -0.0080 | +/-0.50 | |
| M5PFPeA | 296427 | 1.757717 | 276,869.00 | 1.757717 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M5PFHxA | 497145.6 | 2.655 | 458,596.00 | 2.646767 | 108 | 50 - 150 | 0.0082 | +/-0.50 | |
| M3PFHxS | 73935.12 | 3.218333 | 68,806.00 | 3.218333 | 107 | 50 - 150 | 0.0000 | +/-0.50 | |
| M4PFHpA | 510817.8 | 3.186933 | 461,168.00 | 3.186933 | 111 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOA | 559667.8 | 3.453817 | 508,809.00 | 3.453817 | 110 | 50 - 150 | 0.0000 | +/-0.50 | |
| M8PFOS | 74508.68 | 3.636183 | 76,995.00 | 3.636183 | 97 | 50 - 150 | 0.0000 | +/-0.50 | |
| M9PFNA | 545909.5 | 3.637217 | 526,406.00 | 3.637217 | 104 | 50 - 150 | 0.0000 | +/-0.50 | |
| MPFDoA | 347648.5 | 4.088634 | 386,713.00 | 4.088634 | 90 | 50 - 150 | 0.0000 | +/-0.50 | |
| D5-NEtFOSAA | 93566.37 | 3.9535 | 101,789.00 | 3.9535 | 92 | 50 - 150 | 0.0000 | +/-0.50 | |
| D3-NMeFOSAA | 109406.2 | 3.873767 | 116,586.00 | 3.873767 | 94 | 50 - 150 | 0.0000 | +/-0.50 | |

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

## CERTIFICATIONS

**Certified Analyses included in this Report**

| Analyte | Certifications |
|---|---|
| ***SOP-454 PFAS in Water*** | |
| Perfluorobutanoic acid (PFBA) | NH-P,PA |
| Perfluorobutanesulfonic acid (PFBS) | NH-P,PA |
| Perfluoropentanoic acid (PFPeA) | NH-P,PA |
| Perfluorohexanoic acid (PFHxA) | NH-P,PA |
| 11Cl-PF3OUdS (F53B Major) | NH-P,PA |
| 9Cl-PF3ONS (F53B Minor) | NH-P,PA |
| 4,8-Dioxa-3H-perfluorononanoic acid (ADONA) | NH-P,PA |
| Hexafluoropropylene oxide dimer acid (HFPO-DA) | NH-P,PA |
| 8:2 Fluorotelomersulfonic acid (8:2FTS A) | NH-P,PA |
| Perfluorodecanoic acid (PFDA) | NH-P,PA |
| Perfluorododecanoic acid (PFDoA) | NH-P,PA |
| Perfluoro(2-ethoxyethane)sulfonic acid (PFEESA) | NH-P,PA |
| Perfluoroheptanesulfonic acid (PFHpS) | NH-P,PA |
| N-EtFOSAA (NEtFOSAA) | NH-P,PA |
| N-MeFOSAA (NMeFOSAA) | NH-P,PA |
| Perfluorotetradecanoic acid (PFTA) | NH-P,PA |
| Perfluorotridecanoic acid (PFTrDA) | NH-P,PA |
| 4:2 Fluorotelomersulfonic acid (4:2FTS A) | NH-P,PA |
| Perfluorodecanesulfonic acid (PFDS) | NH-P,PA |
| Perfluorooctanesulfonamide (FOSA) | NH-P,PA |
| Perfluorononanesulfonic acid (PFNS) | NH-P,PA |
| Perfluoro-1-hexanesulfonamide (FHxSA) | NH-P,PA |
| Perfluoro-1-butanesulfonamide (FBSA) | NH-P,PA |
| Perfluorohexanesulfonic acid (PFHxS) | NH-P,PA |
| Perfluoro-4-oxapentanoic acid (PFMPA) | NH-P,PA |
| Perfluoro-5-oxahexanoic acid (PFMBA) | NH-P,PA |
| 6:2 Fluorotelomersulfonic acid (6:2FTS A) | NH-P,PA |
| Perfluoropentanesulfonic acid (PFPeS) | NH-P,PA |
| Perfluoroundecanoic acid (PFUnA) | NH-P,PA |
| Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) | NH-P,PA |
| Perfluoroheptanoic acid (PFHpA) | NH-P,PA |
| Perfluorooctanoic acid (PFOA) | NH-P,PA |
| Perfluorooctanesulfonic acid (PFOS) | NH-P,PA |
| Perfluorononanoic acid (PFNA) | NH-P,PA |

Con-Test, a Pace Environmental Laboratory, operates under the following certifications and accreditations:

| Code | Description | Number | Expires |
|---|---|---|---|
| NH-P | New Hampshire Environmental Lab | 2557 NELAP | 09/6/2023 |
| PA | Commonwealth of Pennsylvania DEP | 68-05812 | 06/30/2024 |

23E3794 KAF

Pace Analytical®

http://www.pacelabs.com

CHAIN OF CUSTODY RECORD

Phone: 413-525-2332
Fax: 413-525-6405
Access COC's and Support Requests
39 Spruce Street
East Longmeadow, MA 01028

Doc # 381 Rev 5_07/13/2021



Company Name: Horsley Witten Group
Address: 90 Route 6A Sandwich, MA
Phone: 508-833-6600
Project Name: HYA
Project Location: Hyannis, MA
Project Number:
Project Manager: Bryan Massa
Pace Quote Name/Number:
Invoice Recipient: bmassa@horsleywitten.com
Sampled By: Caroline Armstrong

**Requested Turnaround Time:** 7-Day ☐ 10-Day ☐ PFAS 10-Day (std) ☒ Due Date:

**Rush-Approval Required:** 1-Day ☐ 3-Day ☐ 2-Day ☐ 4-Day ☐

**Dissolved Metals Samples:** ○ Field Filtered ○ Lab to Filter

**Orthophosphate Samples:** ○ Field Filtered ○ Lab to Filter

**Data Delivery:** Format: PDF ☒ EXCEL ☒
Other:
CLP Like Data Pkg Required: ☐
Email To:
Fax To #:

**PCB ONLY**
SOXHLET ☐
NON SOXHLET ☐

ANALYSIS REQUESTED

| Pace Work Order# | Client Sample ID / Description | Beginning Date/Time | Ending Date/Time | COMP/GRAB | [1] Matrix Code | Conc Code | VIALS | GLASS | PLASTIC | BACTERIA | ENCORE | PFAS (isotope dilution) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | ME-1 | 5/20/23 | 845 | g | w | | | | 2 | | | X |
| 2 | ME-2 | ↓ | 855 | g | w | | | | 2 | | | X |
| 3 | ME-3 | | 850 | g | w | | | | 2 | | | X |

[2] Preservation Code

Courier Use Only
Total Number Of:
VIALS ____
GLASS ____
PLASTIC ____
BACTERIA ____
ENCORE ____

Glassware in the fridge? Y / N
Glassware in freezer? Y / N
Prepackaged Cooler? Y / N

*Pace Analytical is not responsible for missing samples from prepacked coolers

[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)

| Signature | Date/Time |
|---|---|
| Relinquished by: (signature) Caroline Armstrong | 5/30/23 1143 |
| Received by: (signature) [signature] Pace | 5/30/23 1143 |
| Relinquished by: (signature) [signature] Pace | 5/30/23 1606 |
| Received by: (signature) [signature] 2.4 | 5/30/23 1606 |
| Relinquished by: (signature) | |
| Received by: (signature) | |
| Relinquished by: (signature) | |
| Received by: (signature) | |

Client Comments:

**Detection Limit Requirements**
MA: GW-1
CT:
Other:

**Special Requirements**
☑ MA MCP Required
MCP Certification Form Required
☐ CT RCP Required
RCP Certification Form Required
☐ MA State DW Required
PWSID #

Please use the following codes to indicate possible sample concentration within the Conc Code column above:
H - High; M - Medium; L - Low; C - Clean; U - Unknown

NELAC and AIHA-LAP, LLC Accredited

Project Entity
Government ☐ Federal ☐ City ☐
Municipality ☐ 21 J ☐ Brownfield ☐
MWRA ☐ School ☐ MBTA ☐
WRTA ☐

Other
☐ Chromatogram
☐ AIHA-LAP,LLC

Lab Comments:

39 Spruce St.
East Longmeadow, MA. 01028
P: 413-525-2332
F:413-525-6405
www.pacelabs.com

ENV-FRM-ELON-0001 V05__Sample Receiving Checklist

# Log In Back-Sheet

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

Pace
PEOPLE ADVANCING SCIENCE

Client Horsley Witten Group

Project HYA

MCP/RCP Required MA MCP

Deliverable Package Requirement GW-1

Location Hyannis, MA

PWSID# (When Applicable) N/A

Arrival Method:

Courier ☑ Fed Ex ☐ Walk In ☐ Other ☐

Received By / Date / Time SR 5/30/23 1606

~~Back-Sheet By / Date / Time~~ SR 5/30/23 1857

Temperature Method gun # 2

Temp ☑ < 6° C Actual Temperature 2.4

Rush Samples: Yes / (No) Notify

Short Hold: Yes / (No) Notify

| | True | False |
|---|---|---|
| Received on Ice | ☑ | ☐ |
| Received in Cooler | ☑ | ☐ |
| Custody Seal: DATE TIME | ☐ | ☑ |
| COC Relinquished | ☑ | ☐ |
| COC/Samples Labels Agree | ☑ | ☐ |
| All Samples in Good Condition | ☑ | ☐ |
| Samples Received within Holding Time | ☑ | ☐ |
| ~~Is there enough Volume~~ | ☑ | ☐ |
| Proper Media/Container Used | ☑ | ☐ |
| Splitting Samples Required | ☐ | ☑ |
| MS/MSD | ☐ | ☑ |
| Trip Blanks | ☐ | ☑ |
| Lab to Filters | ☐ | ☑ |
| COC Legible | ☑ | ☐ |

COC Included: (Check all included)

Client ☑ Analysis ☑ Sampler Name ☑
Project ☑ IDs ☑ Collection Date/Time ☑

All Samples Proper pH: (N/A) ☐ ☐

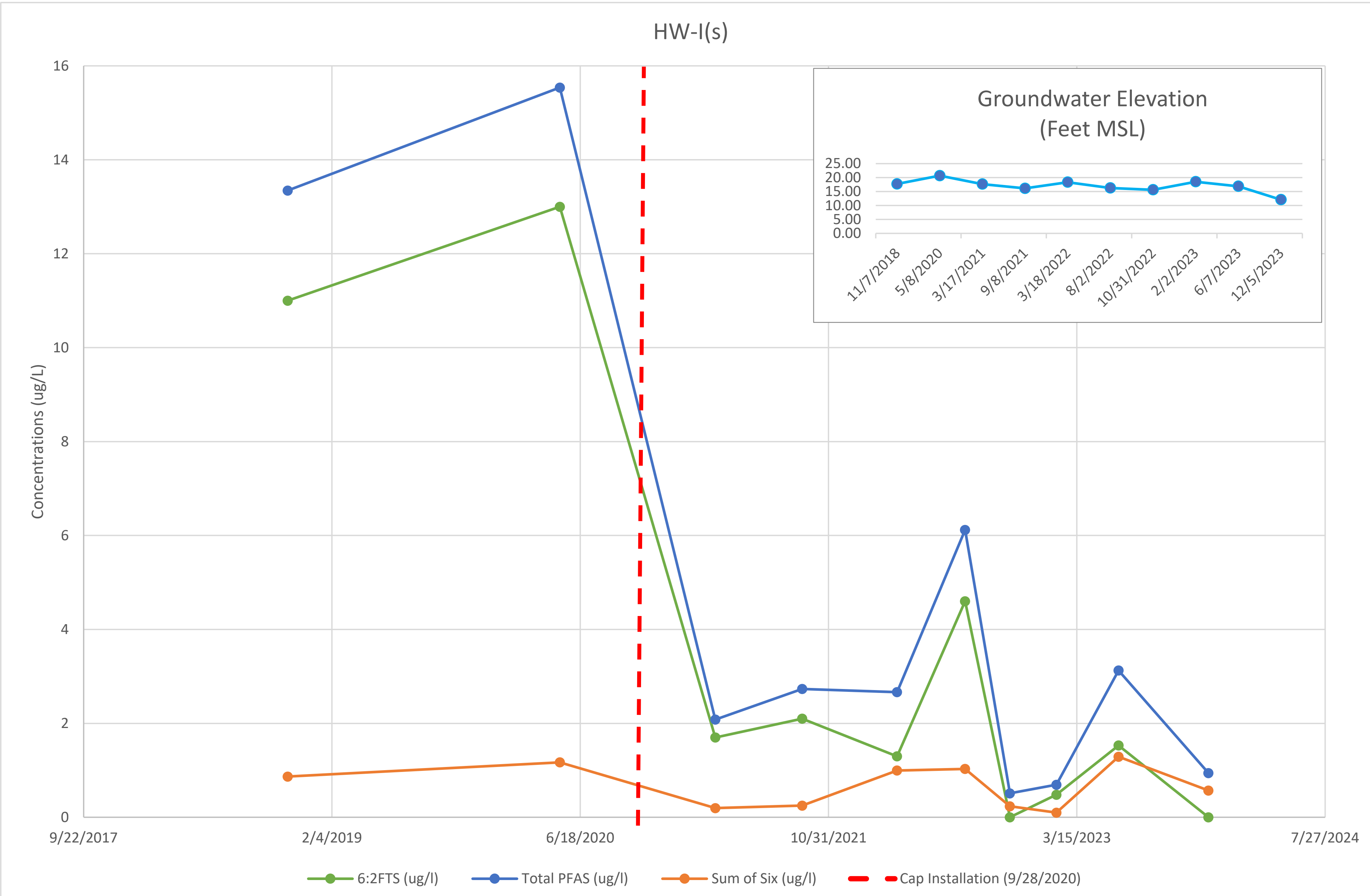
## Notes regarding Samples/COC outside of SOP:

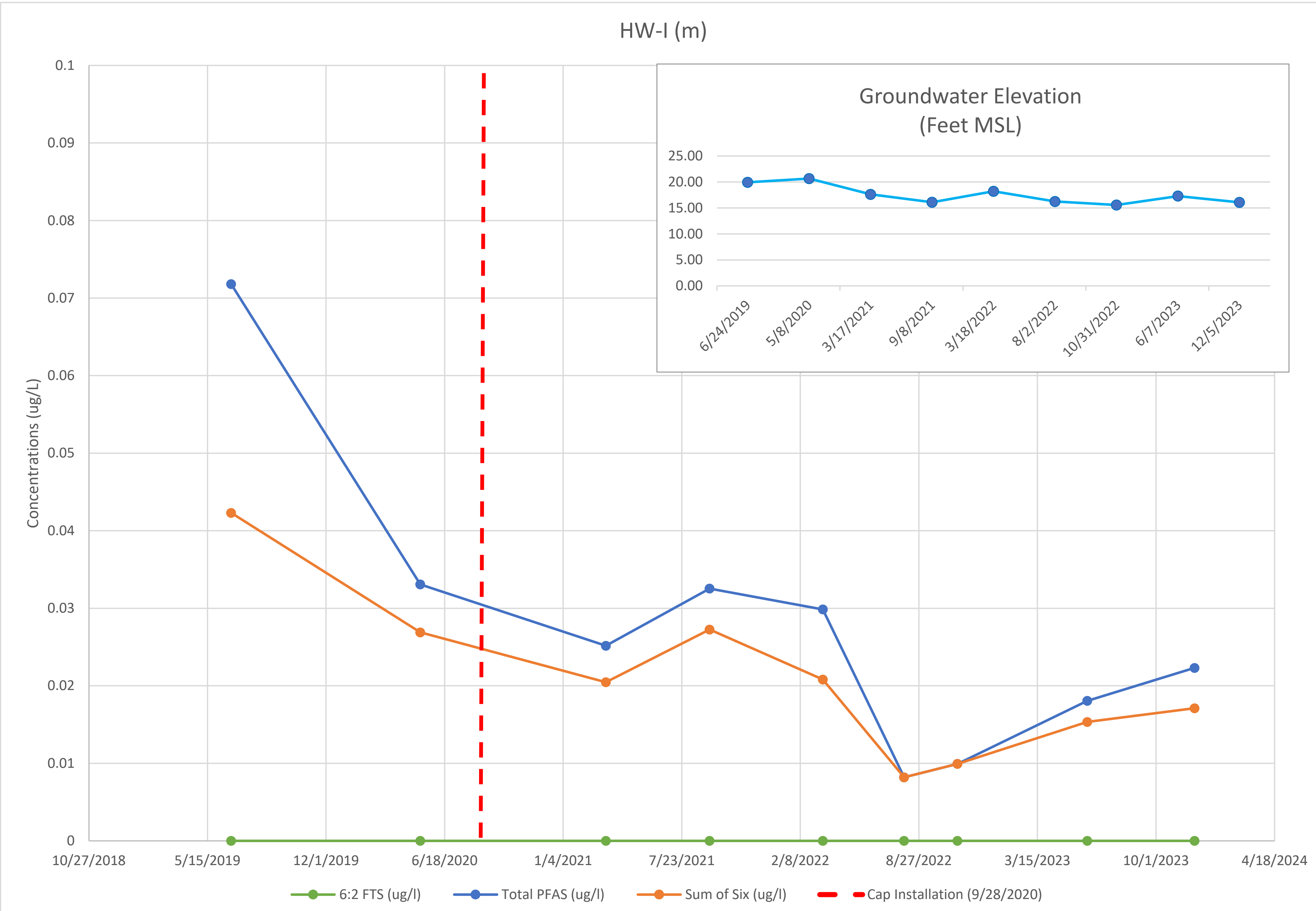
## Additional Container Notes

| Sample | Soils Jars (Circle Amb/Clear) | | | | Ambers | | | | | | | Plastics | | | | | | | | | | VOA Vials | | | | | Other / Fill in | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1 Liter | | | 250mL | | | 100mL | 1 Liter | | 500mL | | 250mL | | | | | | | | | | | | | | | | |
| | 16oz Amb/Clear | 8oz Amb/Clear | 4oz Amb/Clear | 2oz Amb/Clear | Unpreserved | HCL | Sulfuric | Sulfuric | Phosphoric | HCl | Unpreserved | Unpreserved | Sulfuric | Unpreserved | Sulfuric | Unpreserved | Trizma | Sulfuric | Nitric | NaOH | NaOH/Zinc | Unpreserved | HCl | MeOH | D.I. Water | BiSulfate | Col/Bact | | | | | |
| 1 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 3 | | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | | | | | |
| 4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 14 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 15 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 16 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

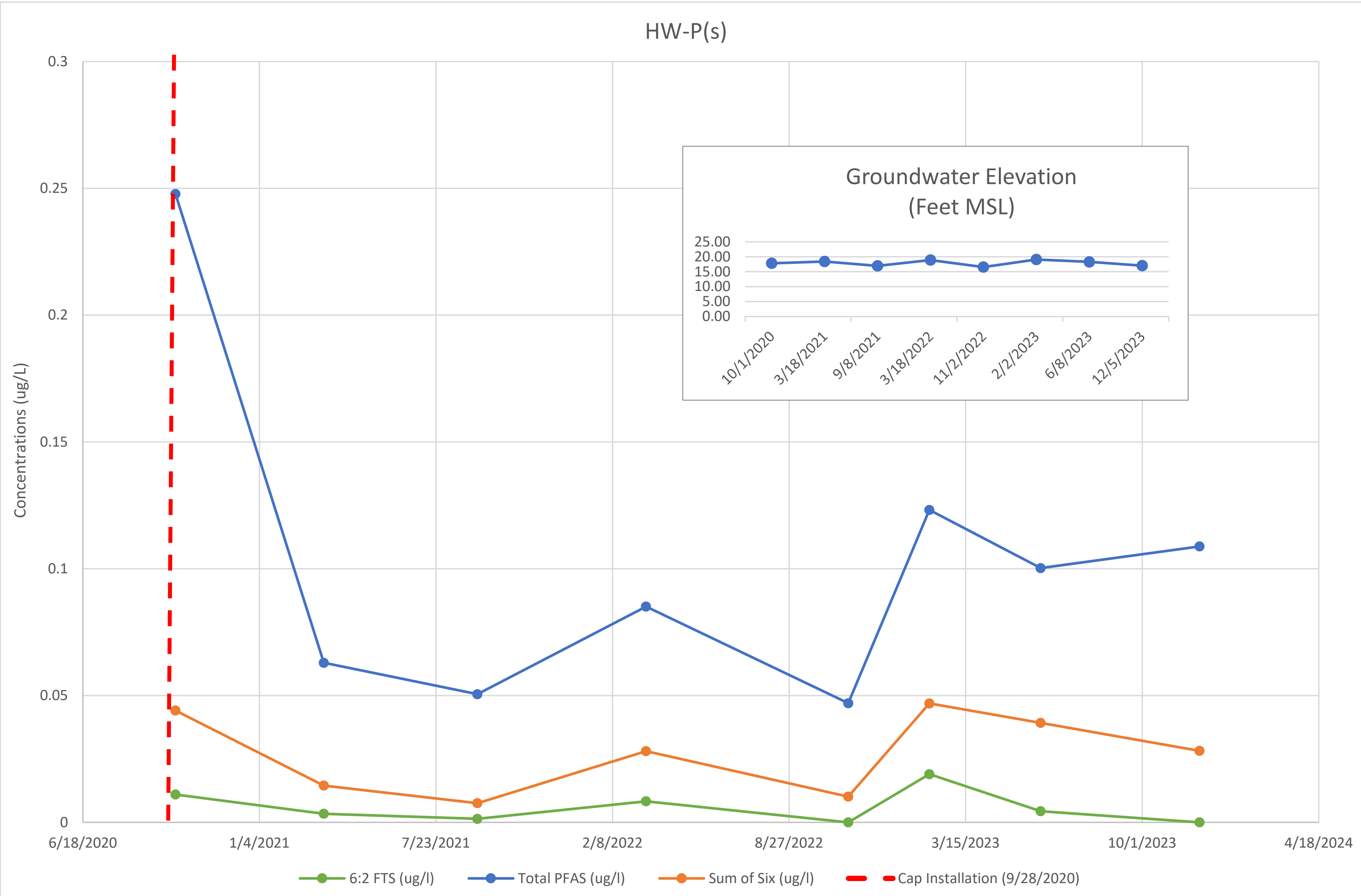
# APPENDIX C

# PFAS IN GROUNDWATER CONCENTRATION VS. TIME PLOTS


HW-I(s)
Concentrations (ug/L)
16
14
12
10
8
6
4
2
0
9/22/2017
2/4/2019
6/18/2020
10/31/2021
3/15/2023
7/27/2024
Groundwater Elevation
(Feet MSL)
25.00
20.00
15.00
10.00
5.00
0.00
11/7/2018
5/8/2020
3/17/2021
9/8/2021
3/18/2022
8/2/2022
10/31/2022
2/2/2023
6/7/2023
12/5/2023
6:2FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)


HW-I (m)
Concentrations (ug/L)
0.1
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
10/27/2018
5/15/2019
12/1/2019
6/18/2020
1/4/2021
7/23/2021
2/8/2022
8/27/2022
3/15/2023
10/1/2023
4/18/2024
6:2 FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)
Groundwater Elevation
(Feet MSL)
25.00
20.00
15.00
10.00
5.00
0.00
6/24/2019
5/8/2020
3/17/2021
9/8/2021
3/18/2022
8/2/2022
10/31/2022
6/7/2023
12/5/2023


HW-I (d)
Concentrations (ug/L)
0.42
0.36
0.3
0.24
0.18
0.12
0.06
0
10/27/2018
5/15/2019
12/1/2019
6/18/2020
1/4/2021
7/23/2021
2/8/2022
8/27/2022
3/15/2023
10/1/2023
4/18/2024
Groundwater Elevation
(Feet MSL)
25.00
20.00
15.00
10.00
5.00
0.00
6/24/2019
5/8/2020
3/17/2021
9/11/2021
3/18/2022
8/2/2022
10/31/2022
6/7/2023
12/5/2023
6:2 FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)


HW-P(s)
Concentrations (ug/L)
0.3
0.25
0.2
0.15
0.1
0.05
0
6/18/2020
1/4/2021
7/23/2021
2/8/2022
8/27/2022
3/15/2023
10/1/2023
4/18/2024
Groundwater Elevation (Feet MSL)
25.00
20.00
15.00
10.00
5.00
0.00
10/1/2020
3/18/2021
9/8/2021
3/18/2022
11/2/2022
2/2/2023
6/8/2023
12/5/2023
6:2 FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/l)
Cap Installation (9/28/2020)


HW-P (m)
Concentrations (ug/L)
0.18
0.15
0.12
0.09
0.06
0.03
0
6/18/2020
1/4/2021
7/23/2021
2/8/2022
8/27/2022
3/15/2023
10/1/2023
4/18/2024
Groundwater Elevation (Feet MSL)
20.00
15.00
10.00
5.00
0.00
10/1/2020
3/18/2021
9/8/2021
3/18/2022
11/2/2022
6/8/2023
12/5/2023
6:2 FTS (ug/l)
Total PFAS (ug/l)
Sum of Six (ug/L)
Cap Installation (9/28/2020)

# APPENDIX D

# MAHER TREATMENT PLANT 2023 REGISTRATION

COMMONWEALTH OF MASSACHUSETTS
**DEPARTMENT OF ENVIRONMENTAL PROTECTION**
DRINKING WATER PROGRAM
100 CAMBRIDGE STREET, SUITE 900, BOSTON, MA 02114 • (617) 292-5770

# 2024
# Certificate of Registration

The Department of Environmental Protection
Drinking Water Program
Hereby Recognizes the

## HYANNIS WATER SYSTEM, TOWN OF BARNSTABLE
## PWS ID # 4020004

as a Registered Public Water System in Massachusetts.
Public Water Systems must comply with
the Massachusetts Drinking Water Regulations,
310 CMR 22.00.

Yvette dePeiza, Program Director
Drinking Water Program

Certificate expires December 31, 2024

Please contact the Drinking Water Program if there are any changes in this system.

MassDEP: https://www.mass.gov/massdep-contacts-service-center

# APPENDIX E

# HYANNIS WATER SYSTEM WATER QUALITY REPORT 2022

## Information for Persons with Compromised Immune Systems

Some people are more vulnerable to contaminants in drinking water than the general population. Imuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC (Center for Disease Control and Prevention) guidelines on appropriate means to lessen the risk of infection by cryptosporidium and other microbial contaminants are available from the **Safe Drinking Water Hotline (800) 426-4791 or www.epa.gov/safewater/hotline.**

## Source Water Assessment and Protection

The Massachusetts DEP has prepared a Source Water Assessment Program (SWAP) Report for the Hyannis Water System. The report assesses the susceptibility of public water supplies to contamination and makes recommendations. This report is available from the Hyannis Water System located at 47 Old Yarmouth Road in Hyannis, the local Board of Health and also at the DEP website: **http://www.mass.gov/dep/water/drinking/sourcewa.htm#reports.**

A susceptibility ranking of HIGH was assigned to all wells in our system by the DEP due to the absence of hydrogeologic barriers, i.e., clay, in the Cape Cod Aquifer. There are activities and land uses within the Zone I, a 400 ft. radius around each well head, and the Zone II, the aquifer recharge area, that can contribute to drinking water contamination. Examples include local roads and power line easements in the Zone I, transportation corridors, residential septic systems, heating oil storage, household hazardous materials usage and storage, and stormwater from roads and lawns within the Zone II.

The Hyannis Water System was commended by the Massachusetts DEP for posting water protection signs, acquiring and protecting land within Zone I areas, and working with the Town of Yarmouth to protect Zone II areas.

In conjunction with its certified operator, Veolia, the Hyannis Water System is addressing the concerns stated in the SWAP Report and welcomes your input to our planning. If you have questions, please contact Kevin Sampson at (508) 775-0063

## 2022 Hyannis Water System improvements

In 2022 the Hyannis Water System's capital improvements dealt with the 12 inch water main replacement on Phinney's Lane in conjunction with the sewer expansion and Vineyard Wind conduit installation project. The water mains at the intersection of Route 28 and Yarmouth Road were replaced as part of the Mass DOT intersection improvements.

*Fire Service Installation*

## How Many Times a Day Do You Turn on the Faucet?

The average American home uses about 100 to 130 gallons of water a day. Did you know that only 1% of our in-home water use is for drinking? The majority of our daily water consumption, about 75%, is used in the bathroom. Did you know that 14% of in-home water use is wasted by leaking taps and toilets? Conserving water is as simple as repairing leaky faucets and toilets, taking shorter showers, not leaving water running while brushing teeth, washing hands, washing fruits and vegetables. Learn more about using water wisely at www.USEPA/WaterSense.

Using water wisely benefits you and the environment.

Hyannis Water System
Operated by Veolia
47 Old Yarmouth Road
Hyannis, MA 02601-0326
(508) 775-0063

# Annual Water Quality Report

***Water testing performed in calendar year 2022***

***Hyannis Water System***
***PWS ID: #4020004***

*The night-time installation of a 3-way valve cluster during a snow event in Hyannis*

### *Hyannis Water Board*

Samuel Wilson, Chair
Amy Wrightson, Vice-chair
Jonathan Jaxtimer, Member
Louise O'Neil, Member
Timothy Stump, Member

**Este relatório contém informações importantes sobre a água potável. Ter alguém que traduzi-lo para você, ou falar com alguém que entende-lo.**

## Report on Water Quality

The Hyannis Water Board is proud to present its annual water quality report. The statistics in this report are based on testing done throughout 2022 as well as prior years. We hope you will find it helpful to know the sources of your water and the process by which safe drinking water is delivered to your home or business. We have maintained our high standards in an effort to continue delivering the best quality drinking water possible. We remain vigilant in meeting the challenges of source water protection.

### Opportunities for Public Participation

We encourage you to share your thoughts with us on the information contained in this report.
Our meetings are open public meetings.
A schedule of these meetings is posted on the Town of Barnstable website:
**http://www.town.barnstable.ma.us/HyannisWaterBoard/?brd=Hyannis+Water+Board.**
Should you ever have questions, we are available to assist you.
Call Hans Keijser, Supervisor,
Water Supply Division at **508 775-0063**

## Where Does My Water Come From?

The Hyannis Water System supplies the most densely populated residential and commercial areas of Hyannis, Hyannisport, and West Hyannisport comprising approximately 9 square miles. The water is obtained from 11 groundwater wells that are located in the Town of Barnstable and draw water from the Sagamore Lens, part of the Cape Cod Aquifer. The wells are: Airport # 1 (4020004-10g), Hyannisport Well (4020004-03g), Maher Well # 1 (4020004-07g), Maher Well # 2 (4020004-02g), Maher Well # 3 (4020004-11g), Mary Dunn Well # 1 (4020004-04g), Mary Dunn Well # 2 (4020004-05g), Mary Dunn Well # 3 (4020004-08g), Mary Dunn Well # 4 (4020004-09g), Straightway Well (4020004-12g), and the Simmons Pond Well (4020004-06g).

There are also four water storage tanks. Two located on Mary Dunn Road: Mary Dunn Tank # 1 - 370,000 gallons, Mary Dunn Tank # 2 - 1 million gallons, Maher - 800,000 gallons and Straightway - 400,000 gallons.

Water system interconnections are established with the Town of Yarmouth water system and the COMM. water system to have the ability to draw water as a backup water supply.

## Hyannis Water System Operations

United Water Environmental Services began operating the Hyannis Water System on July 1, 2009. As of November 16, 2015 United Water was consolidated under Suez and now Veolia. The operations contract includes operations and maintenance of the water treatment plants and the system's pumping stations, cross connection control services, inspection and maintenance of the distribution system, fire hydrants and gate valves, the complete rehabilitation of two system wells per year, hydrant painting, meter installation and maintenance, customer service, billing and all other duties required for the day to day operations of the public water supply treatment and distribution system. Oversight of the contract is provided by the Barnstable Department of Public Works Water Supply Division.

### Office Hours

Monday through Friday 8 AM to 5 PM
Saturday 8 AM to 12 PM

In the event of any emergency call:
(508) 775-0063
Staff is available 24/7

## Maintaining Water Quality

The Hyannis Water System continuously strives to produce the highest quality water that meets or surpasses water quality standards for safe drinking water. We monitor all our water sources and distribution system very closely. The standards that we operate under were enacted by the U. S. Congress as the Safe Drinking Water Act in 1974 and amended in 1986 and 1996.

To ensure tap water is safe to drink, the Massachusetts Department of Environmental Protection (DEP) and U.S. Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in water provided by all public drinking water systems. The Food and Drug Administration (FDA) and the Massachusetts Department of Public Health regulations establish the limits for contaminants in bottled water to provide the same protection for public health.

The Hyannis Water System meets all primary Water Quality Standards set forth by the United States Environmental Protection Agency and Massachusetts Department of Environmental Protection.

## Water Treatment

In our effort to supply safe, clean and healthy water to the Hyannis communities, chemicals are added in safe quantities to ensure that your water quality is consistently maintained.

Many drinking water sources in New England are naturally corrosive (pH of less than 7.0). This can cause active leaching of lead and copper into your water. To reduce this leaching, your water is chemically treated to raise the pH to neutral or slightly alkaline. Testing throughout the Hyannis Water System has demonstrated that this is an effective and safe treatment process.

Past commercial activities near the Hyannis Airport have contributed to the detection of Volatile Organic Compounds (VOCs) in the Maher well field. These chemicals are removed from the water using an aeration process and then adding a disinfectant to the water before it enters the distribution system.

Activated carbon filtration systems are installed on all of the Hyannis Water System wells to remove PFAS contamination.

All chemicals used for the corrosion control are approved for water treatment by one or more of the following organizations: National Sanitation Foundation (NSF International) or Underwriters Laboratory, both accredited by the American National Standards Institute (ANSI). Chemicals also must meet the performance standards established by the American Water Works Association.

### Hyannis Water System

The Hyannis Water System is operated and maintained by a private company, Veolia, with oversight provided by the Town of Barnstable Department of Public Works, Water Supply Division.

### Questions about this report

Please contact:
**Hans Keijser, Supervisor, Water Supply Division**
**508-775-0063**

*This report was prepared by Veolia for the Hyannis Water System. Additional copies of this report are available upon request; please contact (508) 775-0063 for additional copies.*

## DISTRIBUTION SYSTEM WATER QUALITY

This˙ eport summarizes only those items detected durin† samplin† ˆnot all contaminants that are monitored

| Microbial Results | Highest % Positive in a Month | Range Detected | MCL | MCLG | Violation | Possible Source of Contamination |
|---|---|---|---|---|---|---|
| Total Coliform Bacteria ** | 0.0% | ˜° | >5% Monthly Samples Positive | 0 | No | Naturally present in the environment |
| E.coli (in ground water source ) ** | 1 Positive sample | ND-1 | TT | N/A | No | Human and animal fecal waste |

***Compliance with the Fecal Coliform / E.coli MCL is determined upon additional repeat testing.**

****Total Coliform:** We were notified on 10/04/2022 of an E.coli positive sample in the raw water sample from Maher well 2 (O2-G). You may remember receiving public notice of this violation on 10/04/2022. Because of this we took Maher Well 2 (O2-G) off-line on 10/04/2022 for one day till the results of the 5 samples were known. ** On 10/04/2022 We took 5 repeat samples at Maher Well 2 (O2-G) for E.coli on 10/04/2022. We were notified by the lab on 10/05/2022 that all 5 samples were absent for E.coli. We were in contact with MASS DEP and they permitted us to put Maher Well 2 (O2-G) back on-line.

. **Health Effects:** Fecal coliform and E. coli are bacteria whose presence indicates that the water maybe contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a health risk for infants, young children, some elderly, and people with severely compromised immune systems.

| Lead & Copper | Dates Collected | 90th Percentile | Action Level | MCLG | # of Sites samples | # of Sites Above Action Level | Violation | Possible Source of Contamination |
|---|---|---|---|---|---|---|---|---|
| Lead (ppm) | [illegible] | 0 | 0.015 | 0 | 30 | 0 | No | Corrosion of household plumbing systems: Erosion of natural deposits |
| Copper (ppm) | [illegible] | 0.63 | 1.3 | 1.3 | 30 | 0 | No | Corrosion of household plumbing systems: Erosion of natural deposits |

TESTING FOR LEAD - If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. **Hyannis Water System** is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

## SUMMARY OF FINISHED WATER CHARACTERISTICS

| Regulated Contaminants | Date(s) Collected | Highest Detect Value | Range Detected | MCL | MCLG | Violation | Possible Source of Contamination |
|---|---|---|---|---|---|---|---|
| **Inorganic Contaminants:** | | | | | | | |
| Barium (ppm) | 4/13/22 | 0.03 | ˜° | 2 | 2 | No | Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits |
| Cadmium (ppm) | 4/13/22 | ND | ˜° | 0.004 | 0.005 | No | Corrosion of galvanized pipes;erosion of natural deposits;discharge from metal refineries;runoff from waste batteries and paints |
| Sodium** (ppm) | 4/13/22 | 76 | ˜° | | 20 | | Road salting; erosion of natural deposits |
| Arsenic (ppm) | 4/13/22 | ND | ˜˝ ˙ˆˇ ˇ001 | 0.01 | 0.1 | No | Run ff ... ds; nd ... glass& elect nics ... duction wastes Erosion ˜ natural deposits. |
| Fluoride (˝ ) | 4/13/22 | 0.054 | ˜° | 4 | 4 | No | Disc ˇge ... ertilize and luminum ... t ies; erosion n tur l de sits |
| Selenium (˝ ) | 4/13/22 | ND | ˜˝ ˙ˆˇ ˇ002 | 0.05 | 0.05 | No | Disc ˇge ... pet leu and ... fine ies;Erosion o n ur deposits; Discharg ˇom° ines |
| Ni˝ˇ˝ e* (ppm) | 10/19/22 | 4.4 | ˜˝ -4.4 | 10 | 10 | No | Runoff from fertilizer use: leaching from septic tanks; sewage; erosion of natural deposits |
| Perchlorate*** (ppb) | 8/3/22 | 0.25 | ˇˇ091-ˇˇ25 | 2 | - | No | Rocket propellants, fireworks, munitions, flares, blasting agents ˆ(see note below)* |

| | |
|---|---|
| *Nitrate | Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask for advice from your health care provider. |
| **Sodium | Sodium is a naturally-occurring common element found in soil and water. It is necessary for the normal functioning of regulating fluids in human systems. Some people, however, have difficulty regulating fluid volume as a result of several diseases, including congestive heart failure and hypertension. The guideline of 20mg/L for sodium represents a level in water that physicians and sodium sensitive individuals should be aware of in cases where sodium exposures are being carefully controlled. For additional information, contact your health care provider, your local board of health or the Massachusetts Department of Public Health, Bureau of Environmental Health Assessment at 617-624-5757. |
| ***Perchlorate (Various Chemical Abstract Service Registry Numbers (CASRN) for different chemical species) | Perchlorate interferes with the normal function of the thyroid gland and thus has the potential to affect growth and development, causing brain damage and other adverse effects, particularly in fetuses and infants. Pregnant women, the fetus, infants, children up to the age of 12, and people with a hypothyroid condition are particularly susceptible to perchlorate toxicity. **'J'** values are required when the results are above the MDL(0.012) and below the MRL(0.05) |

| Regulated Contaminants | Date(s) Collected | Highest Detect Value | Range Detected | MCL | MCLG | Violation | Possible Source of Contamination |
|---|---|---|---|---|---|---|---|
| **Organic Contaminants:** | | | | | | | |
| Tetrachloroethylene (PCE) (ppb) | 02/23/2022-7/19/2022 | 0.51 | ˜˝ ˙ˆˇ.51 | 5 | † | No | Discharge from factories and dry cleaners |
| šˇomodichlorom˝hane (ppb) | 7/19/22 | ND | ˜˝ | NA | NA | No | š•†produc˝ õf drinking ... ˇchlorination |
| Chlorodibromom˝hane ˜ppb) | 7/19/22 | ND | ˜˝ | NA | NA | No | š•†produc˝ õf drinking ... ˇchlorination |
| Dibromochlorom˝hane | 7/19/22 | ND | ˜˝ | NA | NA | No | š•†produc˝ õf drinking ... ˇchlorination |
| ˜° ˝ ° ˝ˆ ˇppb) | 7/19/22 | ND | ˜˝ | NA | NA | No | By-product drinking wate° chlorination |
| Chloroform (ppb) | 7/19/22 | ND | ˜˝ | ORSG 70 | NA | No | By-product of drinking water chlorination |
| **Stage 2 Disinfectants and Disinfection Byproducts** | | | | | | | |
| Chlorine ˆ˘ˇ˝ ) | 4th Quarte° | ’.91 | ’š76-’š91 | 4 | 4 | No | Water additive used to control microbes |
| TTH•‡ˆˆStage 2) —€tal ˆ€ihalomethanes– ˆppb) | Quarterly | 8.2 | ˜˝ -8.2 | 80 | - | No | By-product of drinking water chlorination |
| HAA5‡˜.tage 2) Haloaceti ˆAcid‡(HAA5) ˇppb) | Quarterly | 1šƒ | NDˆ 1šƒ | 60 | - | No | By-product of drinking water chlorination (TT) |

** Note highest detected value is highest Running Annual Average (RAA). ***Local Running Annual Average

* Note: THM ,HAA and Chlorine minimum and maximum levels in the ranges of results are site specific.

| Secondary Contaminants | Date(s) Collected | Highest Detect Value | Range Detected | SMCL | ORSG | Possible Source of Contamination |
|---|---|---|---|---|---|---|
| Magnesiu˝ˆ˘ˇ˝ ) | 9/27/22 | 4.1 | 1.ƒ “š1 | | | Natural Mineral and Organic Matter |
| Chloride (ppm) | 9/27/22 | 82 | NDƒ 2 | 250 | NA | Natural Mineral, Road Salt |
| Calciu˝ˆ˘ˇ˝ ) | 9/27/22 | 13 | 2.1-13 | | | Natural Mineral and Organic Matter |
| Coppe°˘˘ˇ˝ ) | 9/27/22 | 0 | ˜˝ | 1 | - | Naturally occurring element;corrosion of household plumbing |
| Iron (ppm) | 9/27/22 | 0 | ˜˝ | 0.3 | NA | Erosion of Natural Deposits, and oxidation of iron components |
| Manganese (ppm)* | 9/27/22 | 0.04 | ˇˇ01-ˇˇ04 | 0.05 | ’š‹ | Erosion of Natural Deposits |
| Potassium ˆ˘ˇ˝ ) | 9/27/22 | ‹š2 | 1.“ˆ’˜2 | - | | Natural Mineral and Organic Matter |
| Sulfate (ppm) | 9/27/22 | 19 | ˜˝ ˙ˆ19 | 250 | 250 | Natural Sources |
| Alkalinity (ppm) | 9/27/22 | 16 | ˜˝ -1“ | | | Natural Sources |
| Odor (ton) | 9/27/22 | 0 | ˇ | 3 | | Naturally occurring organic materials that form ions when in water; seawater influence |
| Hardness (ppm) | 9/27/22 | 49 | 12.“ˆ49 | | | Natural Sources |
| Total Dissolved solids (ppm) | 9/27/22 | 320 | 220-320 | 500 | | Runoff and leaching from natural deposits; seawater influence |
| PH | 9/27/22 | 7.3 | 7.2-7.‹ | 6.5-8.5 | | Runoff and leaching from natural deposits; seawater influence |
| Turbidity (NTU) | 9/27/22 | ND | ND | | | Soil runoff |
| Zinc (ppm) | 9/27/22 | 0.11 | ’š09-’š11 | 5 | NA | Erosion of Natural Deposits, and Industrial Discharge |

*EPA has established a lifetime health advisory (HA) for manganese at 0.3ppm and an acute at 1ppm

| UCMR3 EPA unregulated contaminants | Date(s) Collected | Highest Detect Value | Range Detected | Average Detected | ORSG | Possible Source of Contamination |
|---|---|---|---|---|---|---|
| 1,4-Dioxane (ppb) | Quarterly(2022) | 0.23 | ND - 0.23 | 0.060 | 0.3 ppb | Solvent or stabilizer used in processing of paper, cosmetics, shampoos, coolant |

**Third Unregulated Contaminant Monitoring Rule (UCMR3)**
IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER - Availability of Monitoring Data for Unregulated Contaminants for Hyannis Water System
As required by US Environmental Protection Agency (EPA), our water system has sampled for a series of unregulated contaminants. Unregulated contaminants are those that don't yet have a drinking water standard set by EPA. The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should have a public health protection standard. As our customers, you have a right to know that these data are available. If you are interested in examining the results, please contact Hans Keijser at (508) 775-0063 or 47 Old Yarmouth Road Hyannis, MA 02601.
This notice is being sent to you by the Hyannis Water System. State Water System ID#: 4020004.
For more information visit the AWWA FAQ UCMR 3 link: http://www.drinktap.org/home/water-information/water-quality/ucmr3.aspx

## CCR Regulated Chart for PFAS detects in 2022

| Regulated Contaminant | Date(s) Collected | Range Detected ppt | Average Detected ppt | MCL ppt | Possible Source of Contamination | Health Effects |
|---|---|---|---|---|---|---|
| PFOS, PFOA, PFNA, PFHxS, PFHpA,PFDA | Quarterly | ND | 0.23 * | 20 | Man-made chemicals. Used as surfactants to make products stain or water resistant, in fire-fighting foam, for industrial purposes, and as a pesticide. Used in fluoropolymers (such as teflon) cosmetics, greases and lubricants, paints, adhesives and photographic films. PFOS U.S. manufacturing phased out in 2002; PFOS may still be generated incidentally or in imported products. | Long-term exposure to PFOS and PFOA in drinking water may affect the liver, cholesterol and thyroid hormone levels. Some studies indicate that exposure to elevated levels of PFOS and PFOA could cause immunological effects, developmental effects and some types of cancer in laboratory animals. Scientists are working to better understand the degree of risk to people. Based on studies of laboratory animals and chemical similarity to PFOS and PFOA depending on the level and length of exposure, PFNA, PFHxS, PFHpA and PFDA in drinking water may affect the liver, cholesteral levels, thyroid and immune system and may cause developmental effects. |
| PerfluoroHexanoic (PFHxA) | Quarterly | ND-4.38 | 0.96 | ** | Man-made chemical; used in products to make them stain, grease, heat and water resistant. | Based on studies of laboratory animals, people exposed to elevated levels of PFHxA for several years could experience effects on the liver. It is less toxic and is cleared from the body much faster than PFOS, PFOA and other longer-chain PFAS. |

On October 2, 2020, the Massachusetts Department of Environmental Protection (MassDEP) published final regulations establishing a drinking water standard, or a Maximum Contaminant Level (MCL), for the sum of six per- and polyfluoroalkyl substances (PFAS). The MCL is 20 parts per trillion (ppt) for what the regulations call PFAS6, or the sum of six PFAS compounds: perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorohexane sulfonic acid (PFHxS), perfluorononanoic acid (PFNA), perfluoroheptanoic acid (PFHpA), and perfluorodecanoic acid (PFDA). PFAS are a family of chemicals widely used since the 1950s to manufacture common consumer products. They have been linked to a variety of health risks, particularly in women who are pregnant or nursing, and in infants. In using the sum of six PFAS compounds, the new standard protects public health for sensitive subgroups including pregnant women, nursing mothers and infants. Please consult your health practitioner if you have any health related questions. For a consumer factsheet on PFAS see: https://www.mass.gov/doc/massdep-fact-sheet-pfas-in-drinking-water-questions-and-answers-for-consumers/download

* Running Annual Average** There is no ORS Guidline or UCMR3 reference concentration health benchmark for this compound. However, the Minnesota Department of Health established a drinking water guidance value of 2,000 ppt for PFBS. See http://www.health.state.mn.us/divs/eh/risk/guidance/gw/pfbsinfo.pdf. EPA also has draft toxicity assesments for PFBS at https;//www.epa.gov/pfas/genx-and-draft-toxicity-assesments

## SAFE DRINKING WATER ACT – WATER QUALITY STANDARD DEFINITIONS

***Action Level (AL):*** The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

***HA:*** Health Advisory.

***Massachusetts Maximum Contaminant Levels (MMCL):*** The Massachusetts maximum contaminants listed in the drinking water regulations consist of promulgated US EPA MCLs which have become effective, plus a few MCLs set specifically by Massachusetts.

***Maximum Contaminant Level (MCL):*** The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

***Maximum Contaminant Level Goal (MCLG):*** The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

***Minimum Detection Limit (MDL):*** Is the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte is greater than zero.

***Secondary Maximum Contaminant Level (SMCL):*** These standards are developed to protect the aesthetic qualities of drinking water and are not health based.

***Maximum Residual Disinfectant Level (MRDL):*** The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of disinfectant is necessary for control of microbial contaminants

***Maximum Residual Disinfectant Level Goal (MRDLG):*** The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectant to control microbial contamination.

***Primary Standards:*** Federal drinking water regulations for substances that are health-related. Water suppliers must meet all primary drinking water standards.

***Secondary Standards:*** Federal drinking water measurements for substances that do not have an impact on health. These reflect aesthetic qualities such as taste, odor and appearance. Secondary standards are recommendations, not mandates.

***Treatment Technique (TT):*** A required process intended to reduce the level of a contaminant in drinking water.

***Massachusetts Office of Research and Standard Guideline (ORSG):*** This is the concentration of a chemical in drinking water, at or, below which, adverse, non-cancer health effects are unlikely to occur after chronic (lifetime): exposure. If exceeded, it serves as an indicator or the potential for further action.

***Third Unregulated Contaminant Monitoring Rule (UCMR3):*** As required by US Environmental Protection Agency (EPA), our water system has sampled for a series of unregulated contaminants. Unregulated contaminants are those that don't yet have a drinking water standard set by EPA. The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should have a public health protection standard.

***KEY***

***CU:*** Color unit.

***NA:*** Not applicable.

***ND:*** Not detected.

***Ug/L:*** Micrograms per liter=ppb

***ppb:*** Parts per billion. The equivalent of one second in 32 years.

***ppm:*** Parts per million. The equivalent of one second in 12 days.

***ppt:*** Parts per trillion.

***pCi/L:*** Picocuries per liter. The Equivalent of one second in 32 million years.

***NTU:*** Nephelometric Turbidity Unit.

***TON:*** Threshold Odor Number.

***TI:*** Treatment Technique.

### Water Source Characteristics

The sources of drinking water (for both tap and bottled water) include rivers, lakes, streams, ponds, springs, reservoirs and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals, and, in some cases, radioactive materials, and can pick up substances resulting from the presence of animals or human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewer treatment plants, septic systems, agricultural livestock operations and wildlife.
- Inorganic contaminants, such as salts and metals, which can be naturally occurring or result from urban storm water runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban storm water runoff and residential uses.
- Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production. These contaminants can also come from gasoline storage, urban storm water runoff, and septic systems.
- Radioactive contaminants, which can be naturally occurring or be the result of oil or gas production and mining activities.

### For Your Information

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of these contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline at (800) 426-4791.

Where to go for more information: The Massachusetts DEP at (617) 292-5885 or www.state.ma.us/dep or the Massachusetts Drinking Water Education Partnership at www.madwep.org.