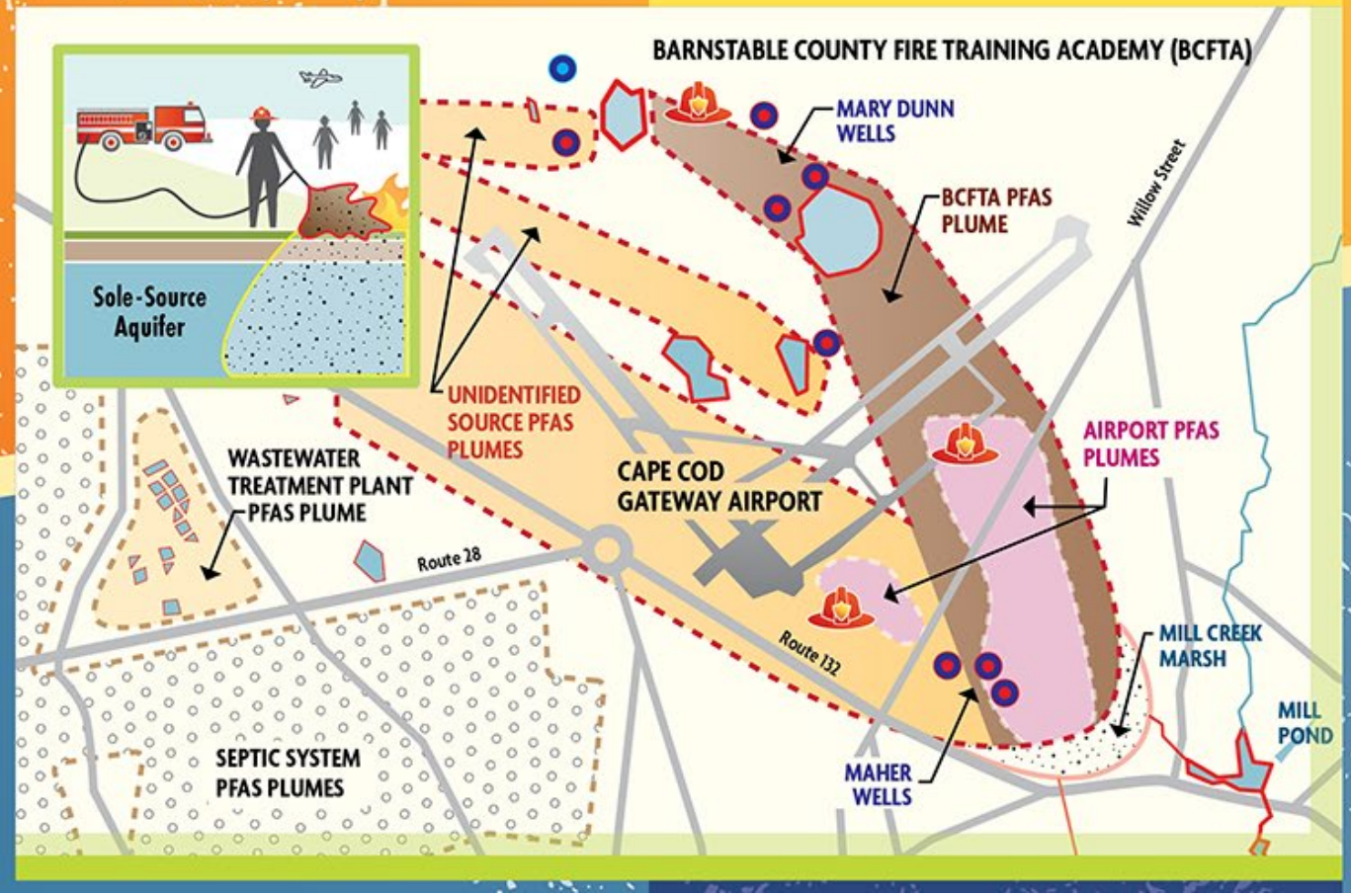
PFAS Contamination in Hyannis:

KNOWNS, UNKNOWNS & NEXT STEPS

Tuesday, October 29
5:30 - 6:30 via ZOOM



PUBLIC INFORMATION SESSION
presented by
Hyannis PFAS Working Group

Hyannis PFAS Community Working Group

Steering Committee

- Betsy Young, Greater Hyannis Civic Association
- Linda Bolliger, Hyannis Park Civic Association
- Chris Powicki, Sierra Club's Cape Cod & Islands Group

Other Regular Participants

- Concerned citizens
- Members of Barnstable Town Council

Launched Spring 2023 for grassroots discussion, coordination, and collaboration focused on understanding and controlling PFAS contamination emanating from contaminated sites at Cape Cod Gateway Airport and former Barnstable County Fire Training Academy (FTA)

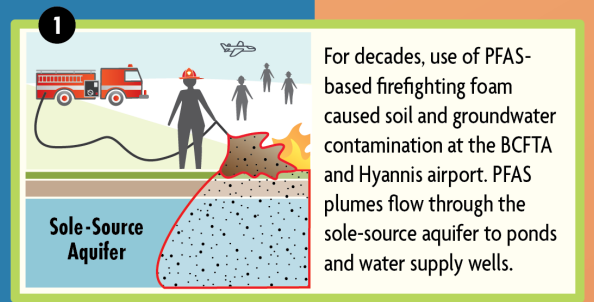
Milestones

- Hosted information sessions and forums addressing PFAS contamination issues and met with and provided updates to Barnstable, Yarmouth, Barnstable County, Airport, MassDEP, and other officials
- Coordinated public comments and questions relating to Airport/FTA sites and Airport Master Plan
- Conducted community-based, grant-funded sampling for PFAS in surface waters downstream of Maher Wells
- Received 2024-2025 Technical Assistance Grant (TAG) from MassDEP's Waste Site Cleanup Program to address public concerns and pursue comprehensive understanding of how interacting PFAS plumes from DEP-regulated sites and other sources are contaminating our sole-source aquifer and creating health risk exposures
  - **TAG Tasks**: Represent community interests by analyzing data, participating in technical meetings, synthesizing information, conducting outreach, and facilitating engagement
  - **TAG Consultant/Licensed Site Professional**: Tom Cambareri, Sole-Source Consulting

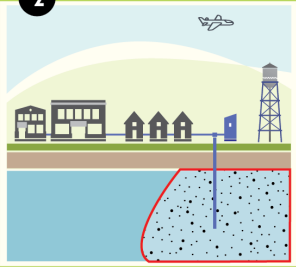
How did the contamination occur?

What is the extent of contamination?

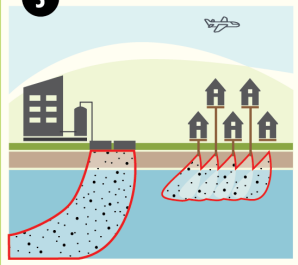
What are the ongoing concerns?



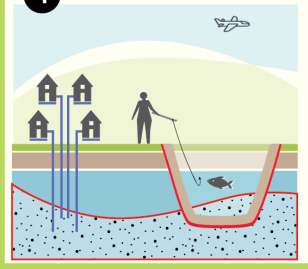
1 For decades, use of PFAS-based firefighting foam caused soil and groundwater contamination at the BCFTA and Hyannis airport. PFAS plumes flow through the sole-source aquifer to ponds and water supply wells.



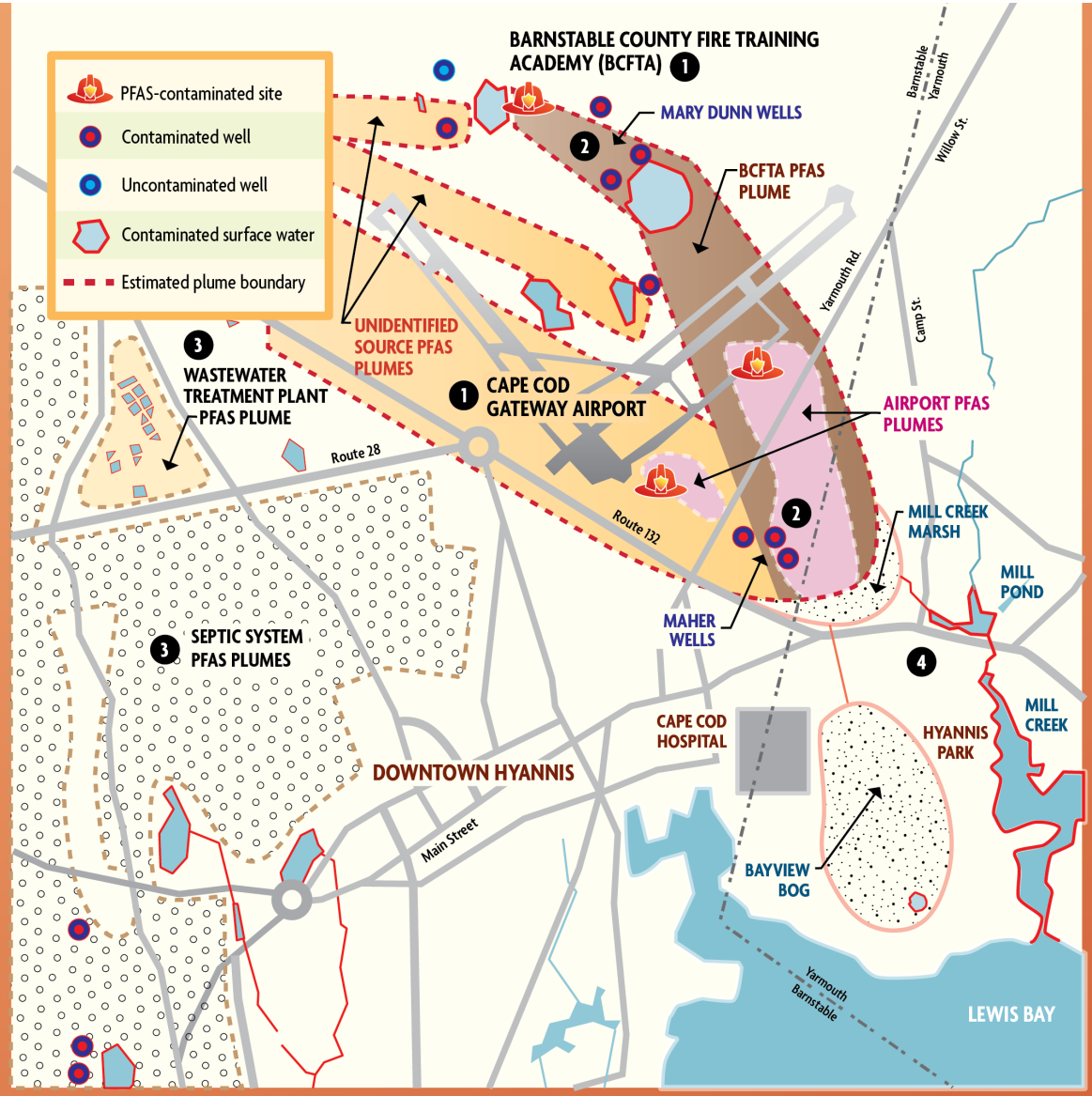
2 Prior to 2016, public wells supplied PFAS-contaminated water to homes and buildings throughout Hyannis, creating human health exposures. PFAS removal systems at all public wells now ensure safe drinking water.



3 PFAS-contaminated discharges from residential septic systems and the central wastewater treatment plant have reintroduced PFAS to groundwater across town.



4 Water quality data show that comingled PFAS plumes impacting the Maher Wells are spreading beyond known boundaries, creating potential health exposures in Hyannis and Yarmouth.



HYANNIS PFAS CONTAMINATION MAP

Prior to 2016, Hyannis residents, visitors, and workers consumed drinking water containing high levels of dangerous PFAS chemicals. Health impacts are still being studied, but all public water supplies are now treated for PFAS removal. Continuing contamination of our sole-source aquifer, by both known and unknown PFAS sources, is impacting groundwater, surface waters, sediments, and ecosystems across our community. Health risks are unknown.

Topics that will be Covered this Evening

Background of PFAS contamination in the Hyannis Area

- Sources
- Secondary Sources
- Groundwater Flow
- PFAS Migration in the Aquifer
- Identified Concentrations in Wells and Ponds

Sampling by the Hyannis Park Civic Association

- PFAS in Mill Creek and relation to the Airport Contamination

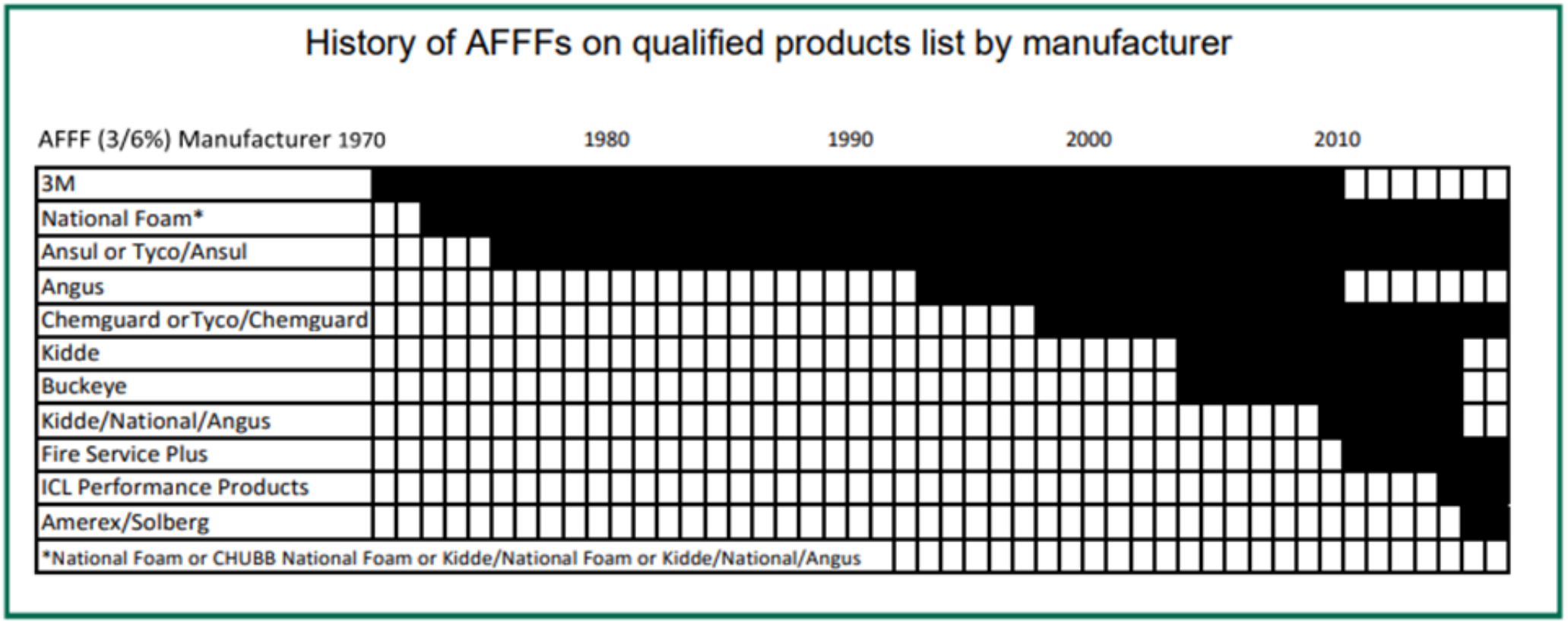
PFAS concentrations at Airport and continuing leaching

Findings and Conclusions

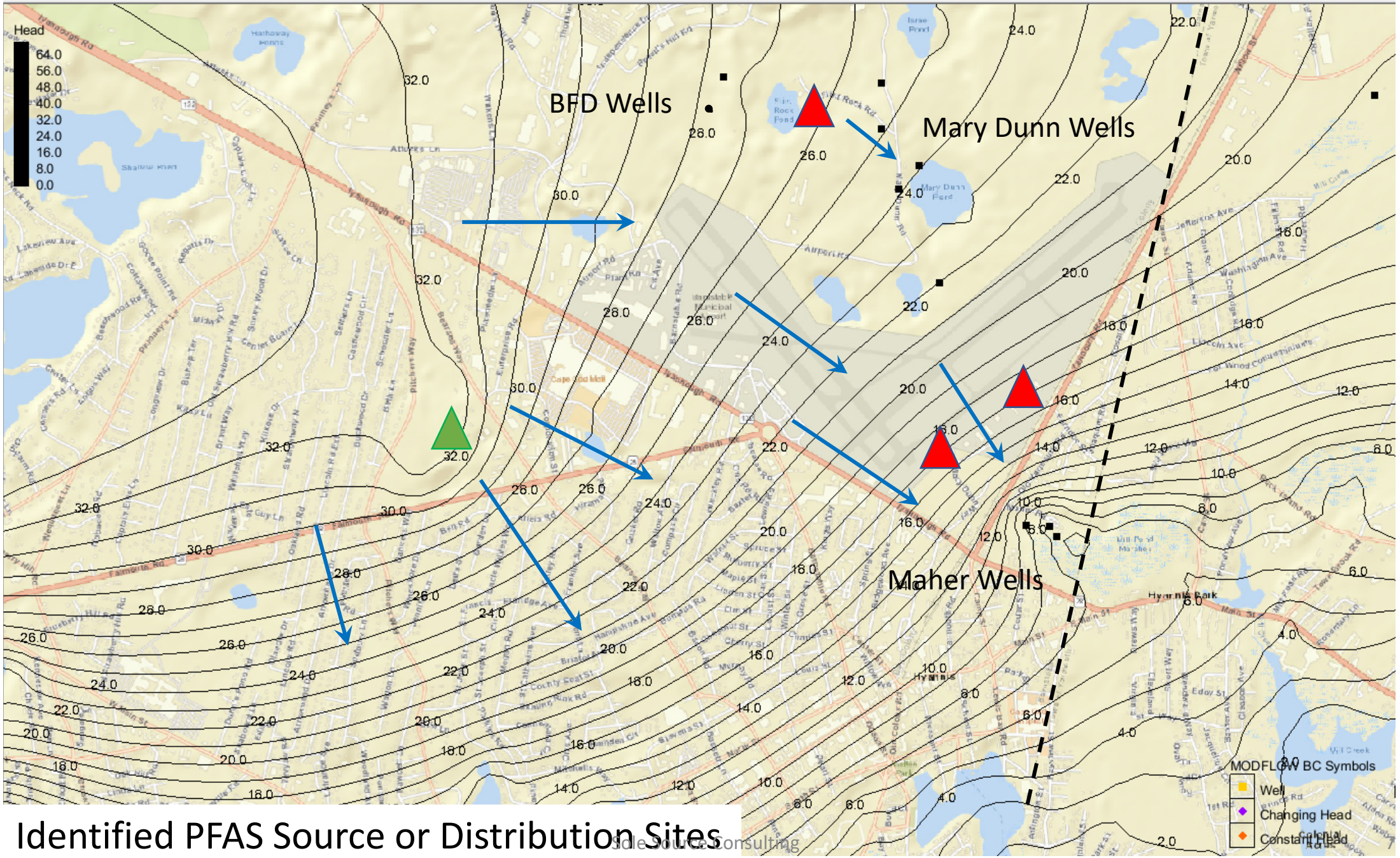
The 1958 Ford / Maxim Crash Truck was demonstrated at an October 1959 open house and dedication of the new Barnstable County Fire Academy located in the woods behind the airport.

Cape Cod Fire Departments Training at Hyannis Airport, 1956

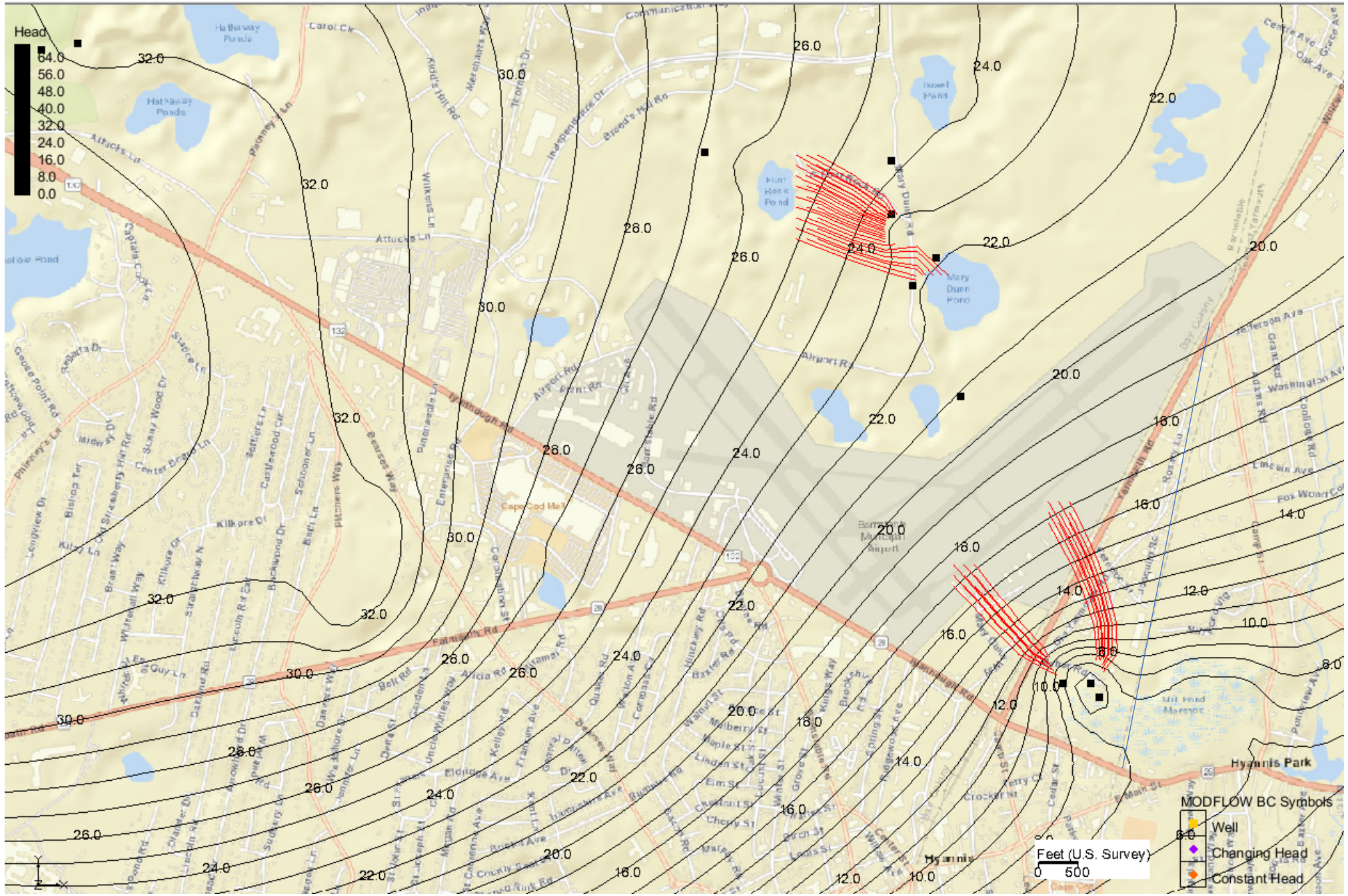
Legacy AFFF >> PFOS Fluorotelomer AFFF >>>6:2 FTS

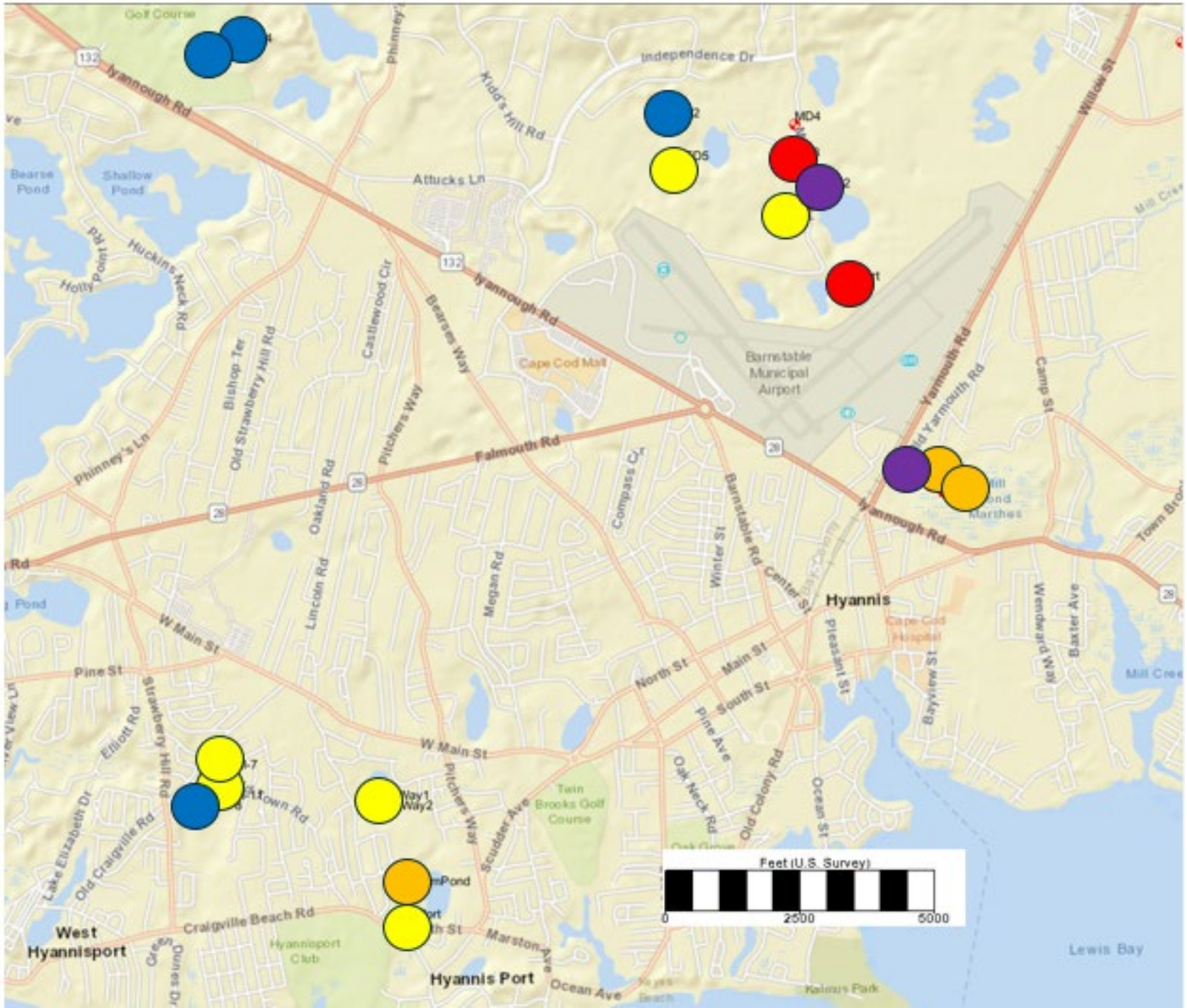


6:2 fluorotelomer thioether amido sulfonate (6:2 FtTAoS)



Identified PFAS Source or Distribution Sites


Head
64.0
56.0
48.0
40.0
32.0
24.0
16.0
8.0
0.0
MODFLOW BC Symbols
Well
Changing Head
Constant Head
Feet (U.S. Survey)
0
500
Hyannis Park
Hyannis
Mary Dunn Pond
Hathaway Ponds
Mill Pond Marsh
Barnstable Municipal Airport
Cape Cod Mall



PFAS in Groundwater from Public Water Supply Wells*

PFAS6 ng/l

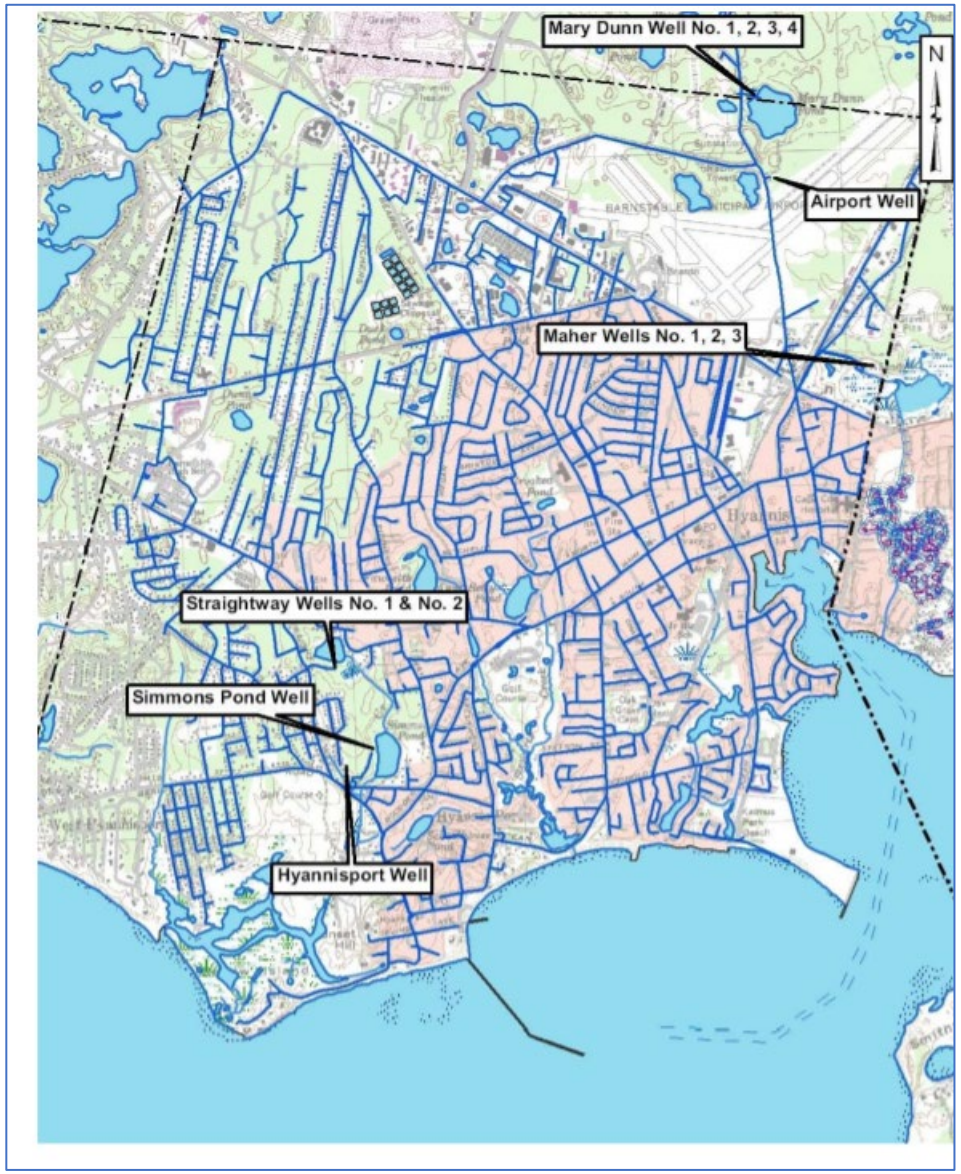
May 27, 2020**

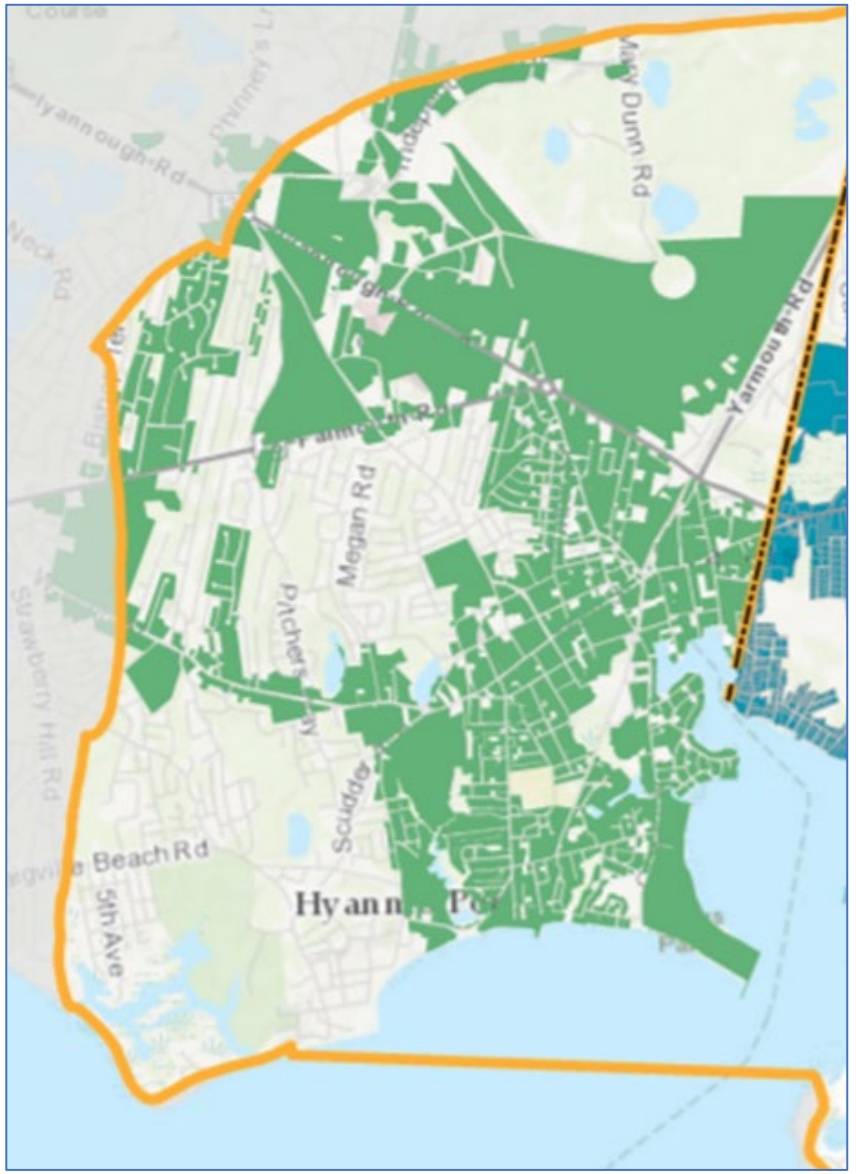
●	≤ 20	The MCL
●	≤ 100	
●	≤ 200	
●	≤ 300	
●	≤ 600	

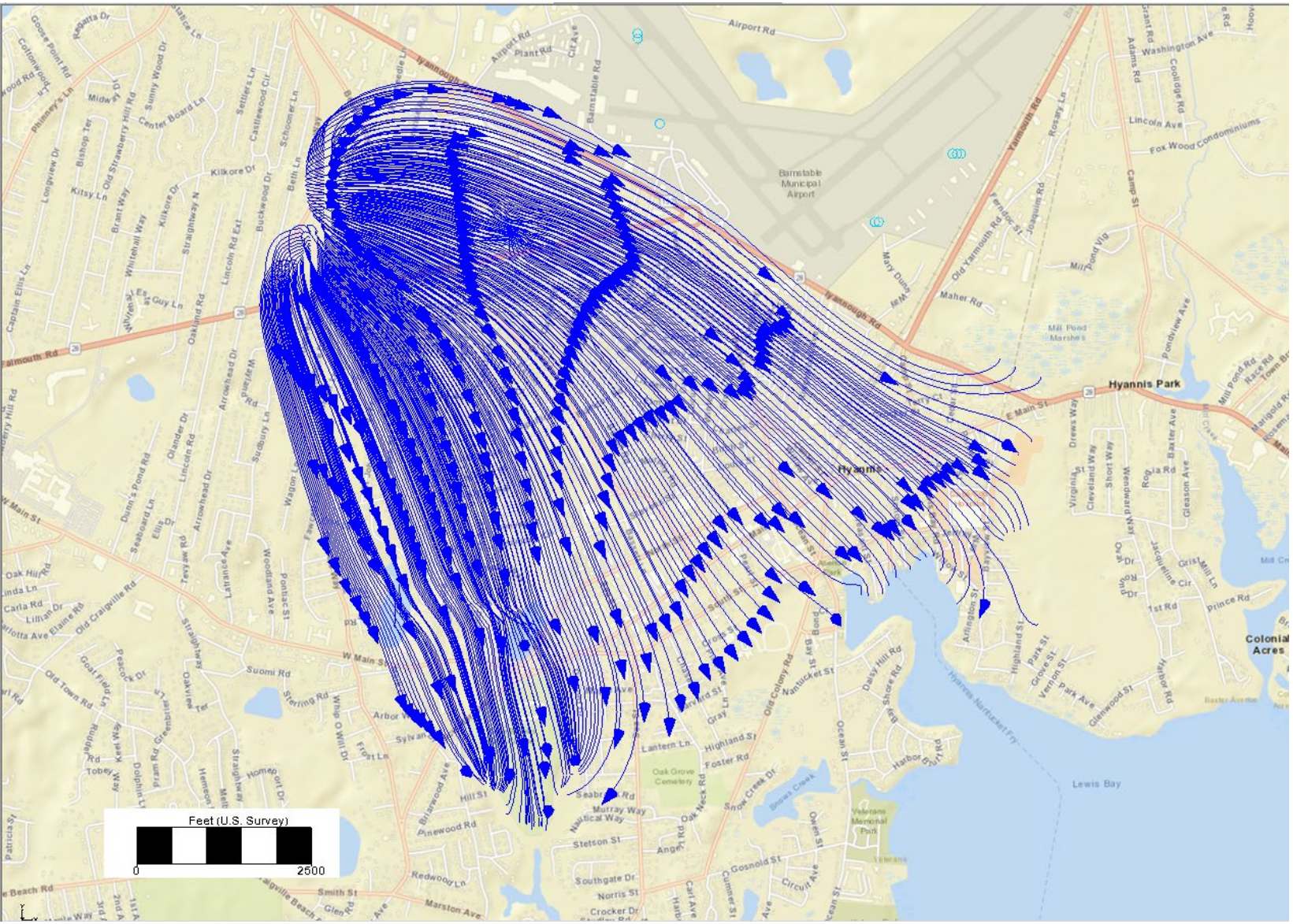
* All Drinking Water is Treated

** Maher Wells Nov 5, 2020

Water Distribution and Wastewater Collection







Particle Tracks from the WPCF at 1.7 MGD

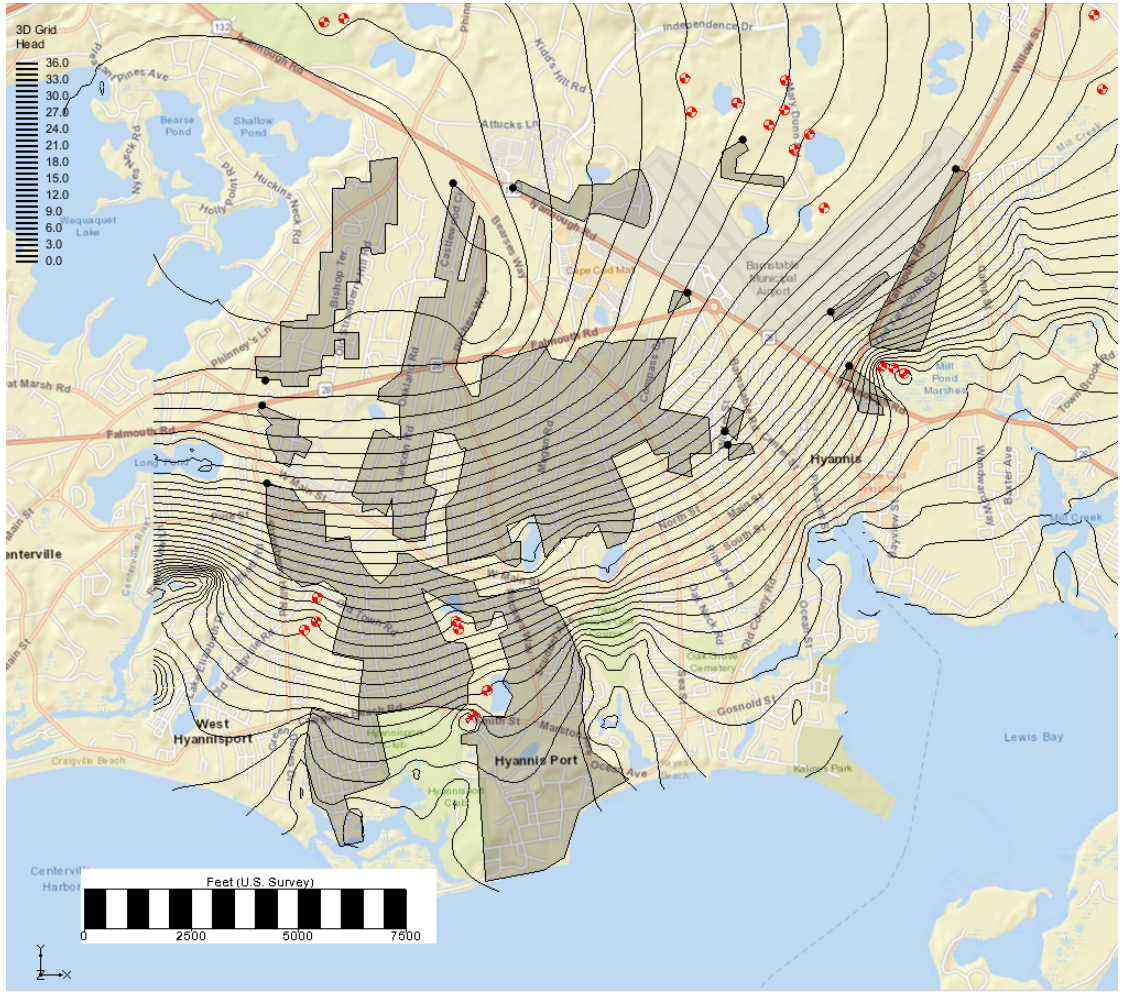
All Tracks are for 50 years

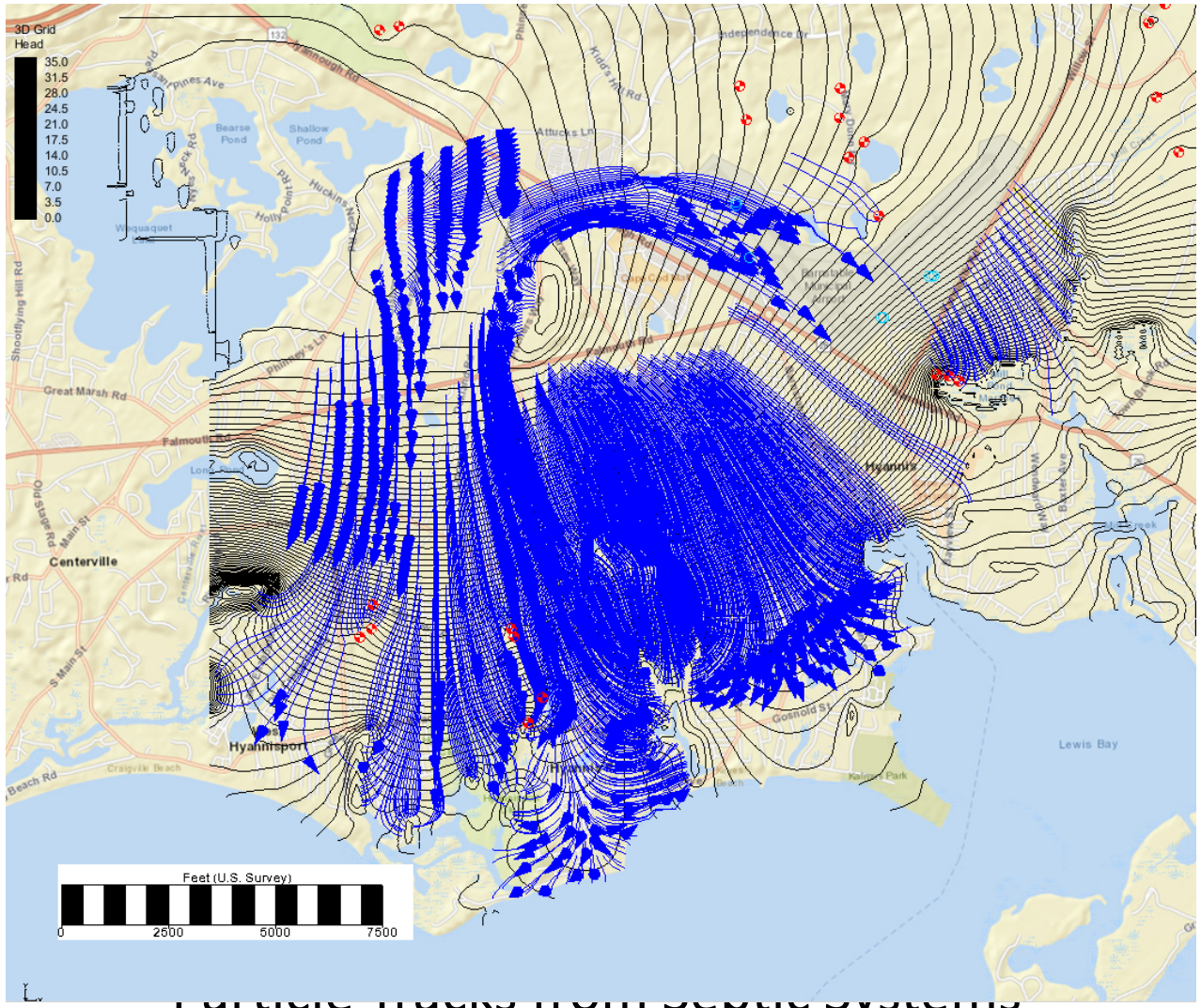
Arrows are a 50-year Time Marker

Groundwater flow is fast to the towards Aunt Bettys Pond and Stewards Creek

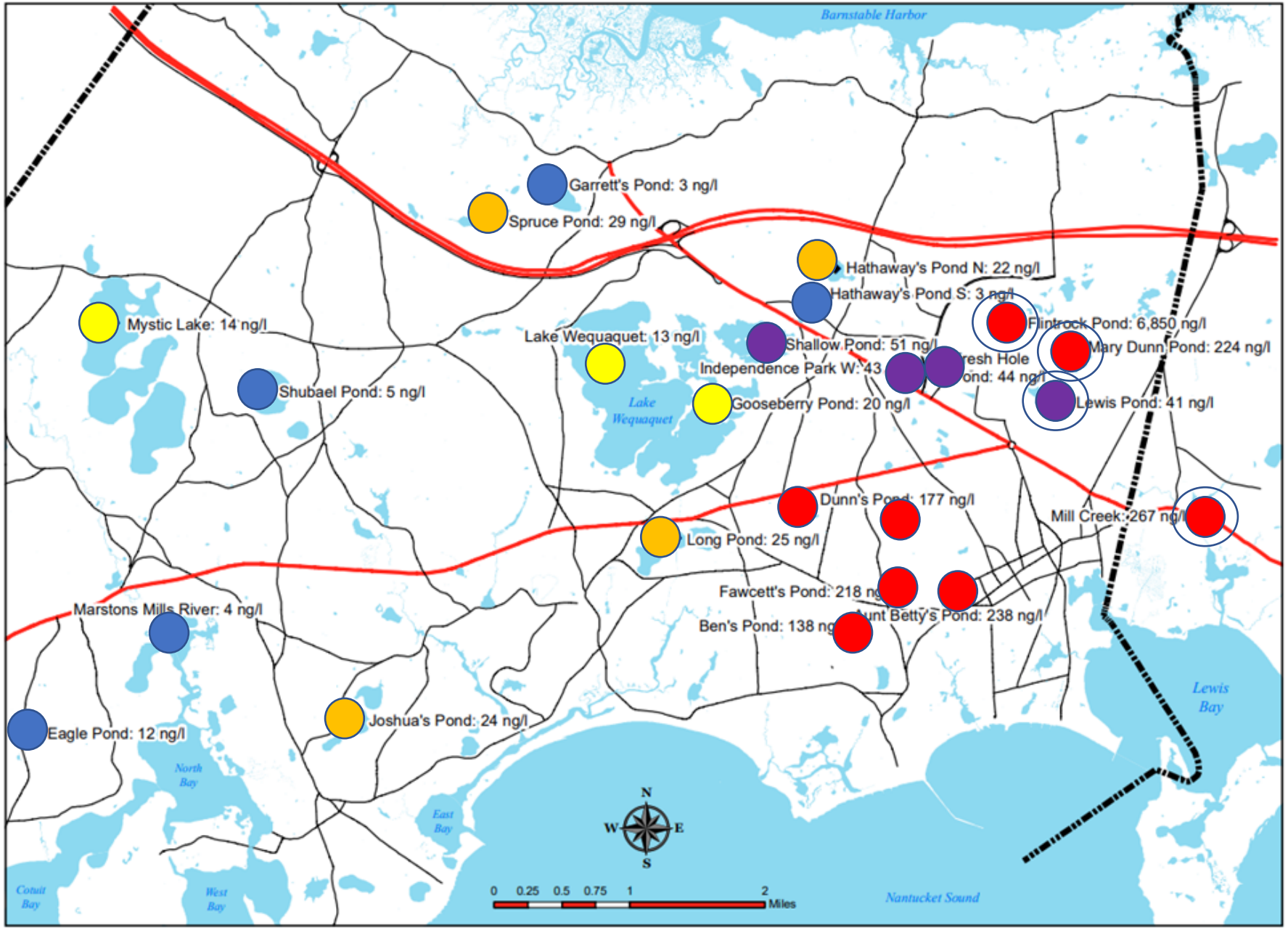
Groundwater Flow dives into the aquifer to the North and East before it is entrained in flow to the South

Septic System Areas served by Barnstable Water Division





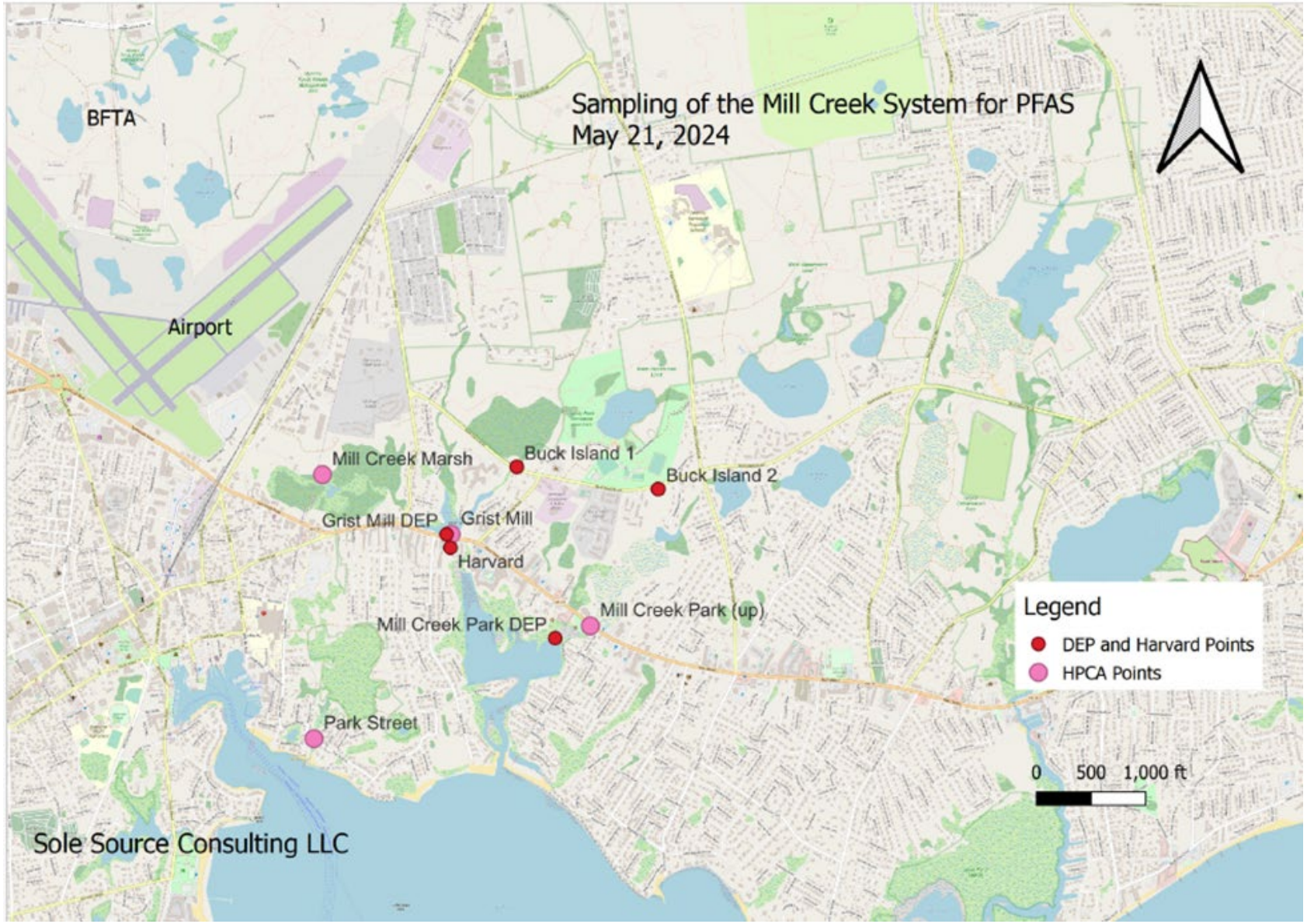
Particle Tracks from Septic Systems



Total PFAS ng/l
2019-2020

- ≤ 10
- ≤ 20
- ≤ 30
- ≤ 55
- > 100 ≤ 300

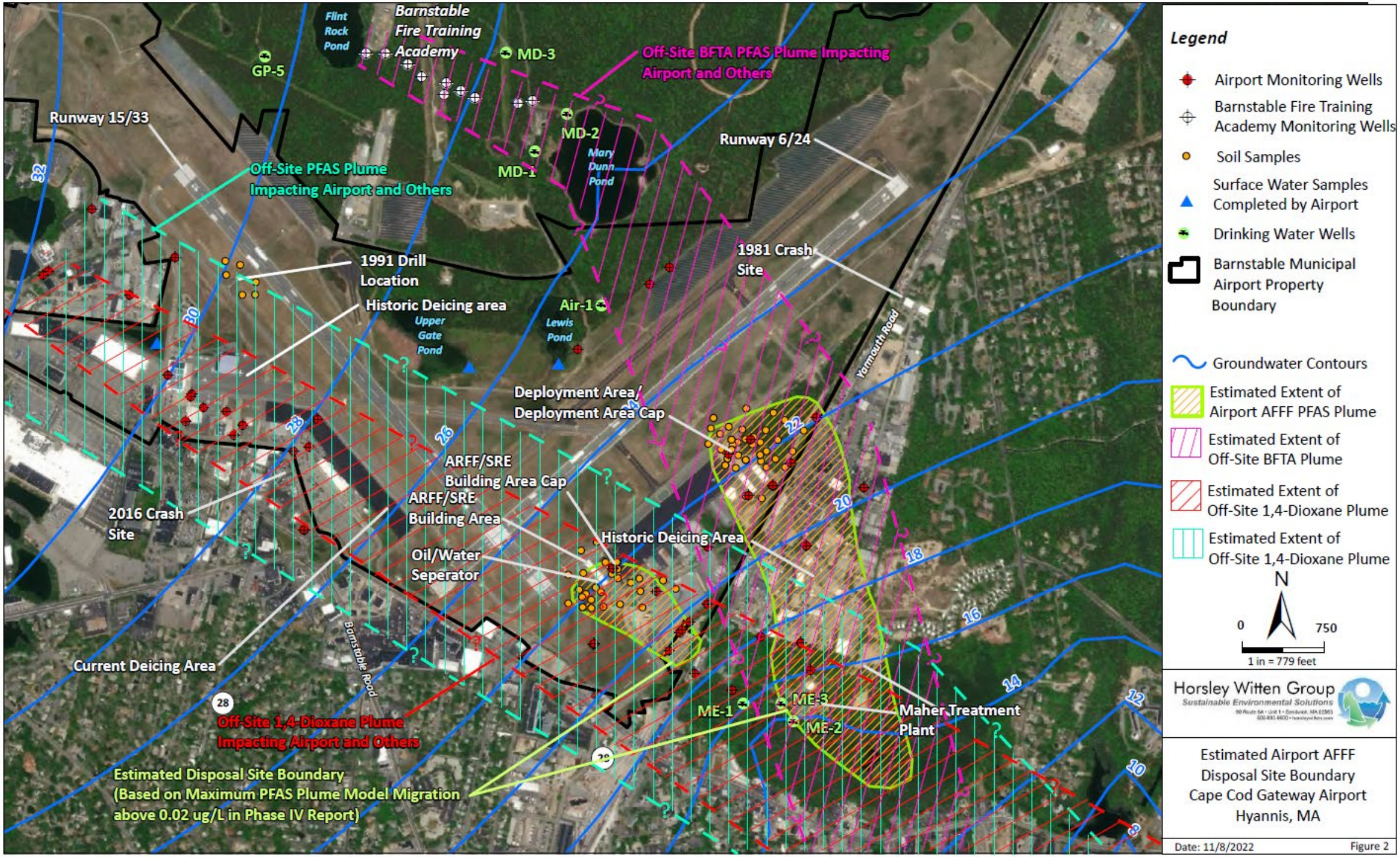
Tested by Others



Sampling Locations for the Hyannis Park Civic Association and Others:
DEP and Harvard

Table 1 PFAS from Hyannis Park Civic Association Sampling May 21, 2024

PFAS Compounds May 21, 2024	Mill Creek Marsh	Grist Mill	Hospital Bogs @Park Street	Mill Creek Park @ Rt 28
Field Id	MCK	GM	PST	MCP
Perfluorobutanoic Acid (PFBA)	87.7	8.3	4.29	4.8
Perfluoropentanoic Acid (PFPeA)	404	35.5	8.72	2.88
Perfluorobutanesulfonic Acid (PFBS)	2.54	3.87	6.26	3.12
1H,1H,2H,2H-Perfluorohexanesulfonic Acid (4:2FTS)	ND	ND	ND	ND
Perfluorohexanoic Acid (PFHxA)	206	22.2	8.96	4.41
Perfluoropentanesulfonic Acid (PFPeS)	ND	ND	2.15	ND
Perfluoroheptanoic Acid (PFHpA)	101	10	4.69	2.28
Perfluorohexanesulfonic Acid (PFHxS)	26.6	12.4	18.6	ND
Perfluorooctanoic Acid (PFOA)	40.2	8.48	9.04	4.06
1H,1H,2H,2H-Perfluorooctanesulfonic Acid (6:2FTS)	1250	34.1	ND	ND
Perfluoroheptanesulfonic Acid (PFHpS)	ND	ND	ND	ND
Perfluorononanoic Acid (PFNA)	12.4	3.65	2.62	ND
Perfluorooctanesulfonic Acid (PFOS)	178	72	23.3	3.21
Perfluorodecanoic Acid (PFDA)	ND	ND	ND	ND
1H,1H,2H,2H-Perfluorodecanesulfonic Acid (8:2FTS)	21	ND	ND	ND
Perfluorononanesulfonic Acid (PFNS)	ND	ND	ND	ND
N-Methyl Perfluorooctanesulfonamidoacetic Acid (NMeF	ND	ND	ND	ND
Perfluoroundecanoic Acid (PFUnA)	ND	ND	ND	ND
Perfluorodecanesulfonic Acid (PFDS)	ND	ND	ND	ND
Perfluorooctanesulfonamide (FOSA)	ND	ND	ND	ND
N-Ethyl Perfluorooctanesulfonamidoacetic Acid (NEtFOS	ND	ND	ND	ND
Perfluorododecanoic Acid (PFDoA)	ND	ND	ND	ND
Perfluorotridecanoic Acid (PFTrDA)	ND	ND	ND	ND
Perfluorotetradecanoic Acid (PFTA)	ND	ND	ND	ND
PFAS6	379.2	106.53	58.25	9.55
Total PFAS	2329.44	210.5	88.63	24.76



Horsley Witten Group
Sustainable Environmental Solutions

Estimated Airport AFFF Disposal Site Boundary
Cape Cod Gateway Airport
Hyannis, MA

Date: 11/8/2022 Figure 2

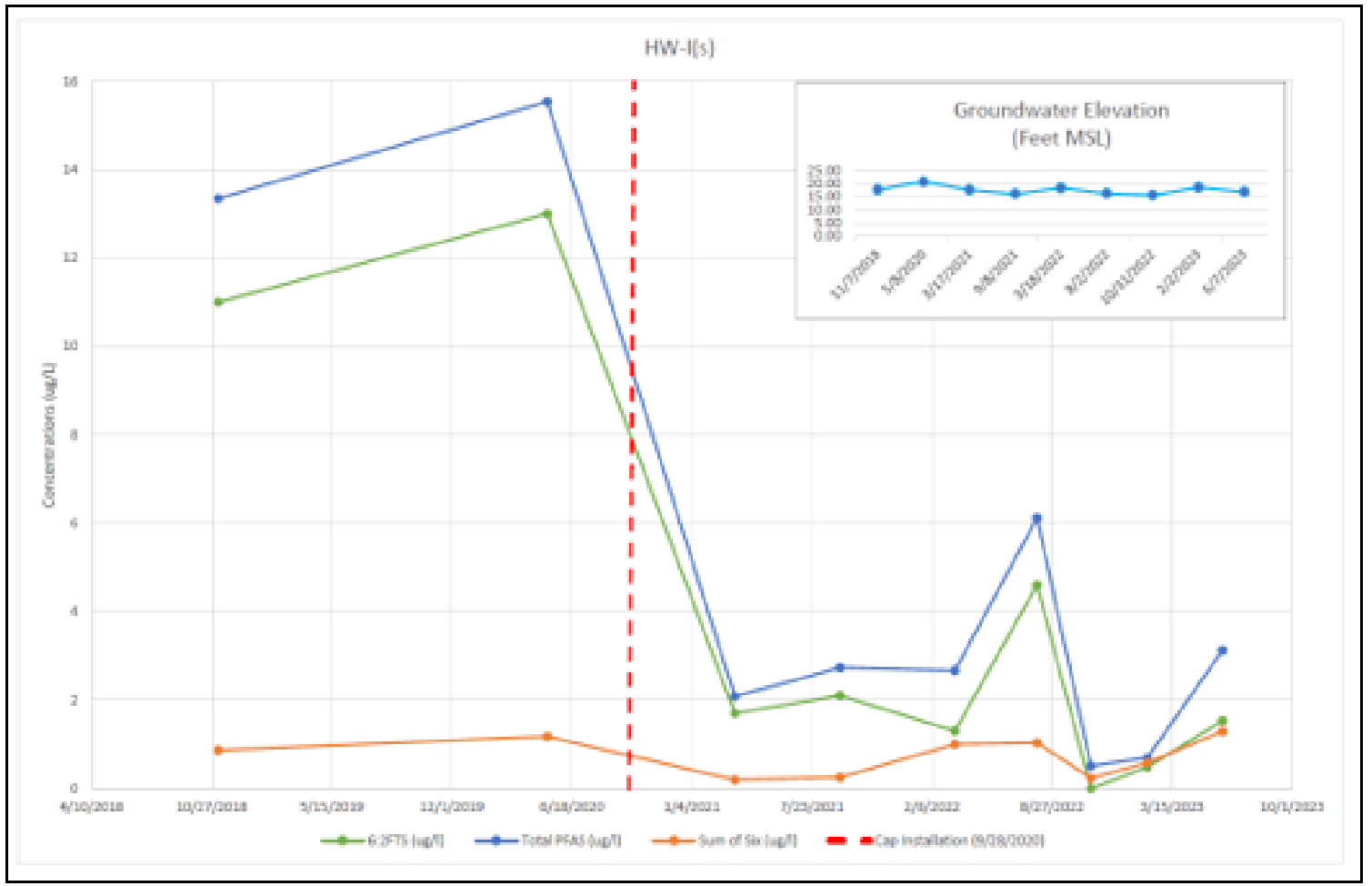


Figure 3 Graphic From Airport's Phase IV Report concluding significant PFAS reduction from the Cap Installation focusing on the non-regulated 6:2 FTS

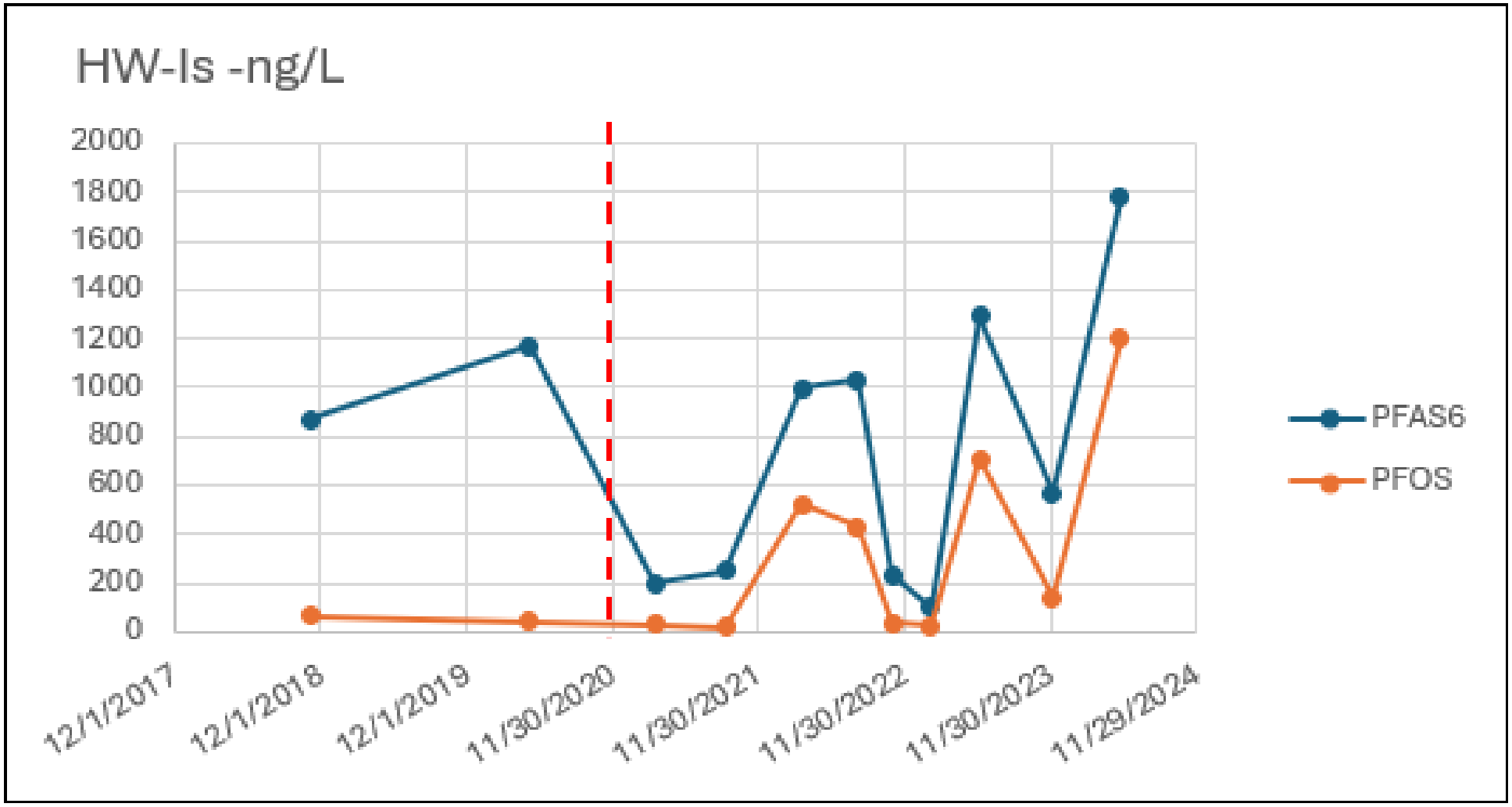
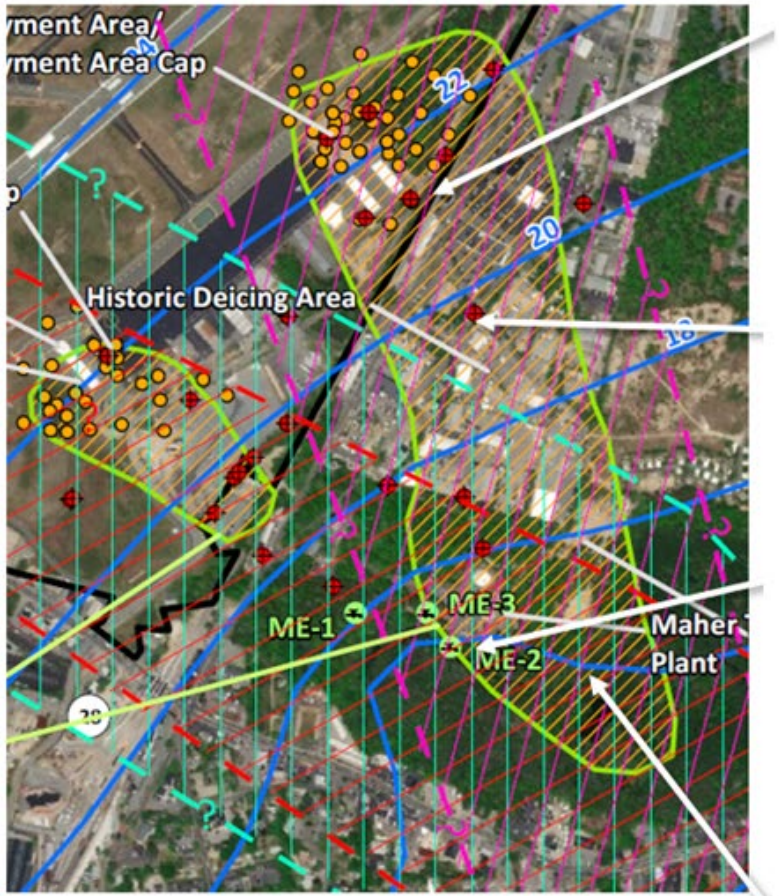
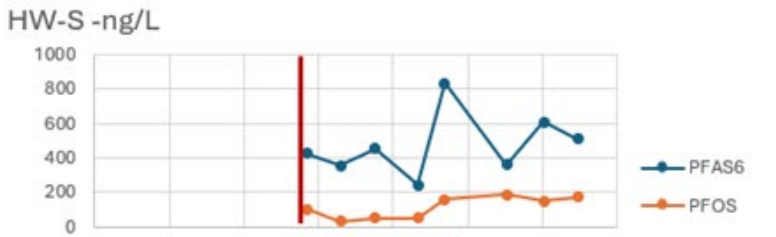
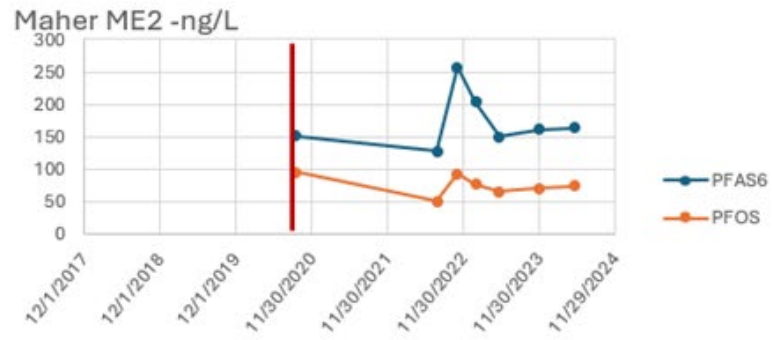


Figure 4 Shallow Deployment Area Monitoring Well showing continuous release and increasing concentrations of Regulated PFAS6 and PFOS after Cap Installation

PFAS6 & PFOS in Sampled Water







PFAS6 379 ng/L PFOS 178 ng/L Mill Creek Marsh

Table 1 Compared Model and Observed PFAS Concentrations

Groundwater Model Predicted vs Observed PFAS6 Concentrations*							
		2023			2024		
	GW Model	Obseved PFAS6	Observed PFOS	Observed 6:2 FTS	Obseved PFAS6	Observed PFOS	Observed 6:2 FTS
HW-Is	200	1,290	708	1,530	1,777	1,200	990
HW-Ss	200	358	185	1,150	509	170	1,600
Maher ME2	<20	150	65	45	161	70	70
Mill Creek Marsh	<20				379	178	1,250

* Airport October 2023 Rpt, 2024 Data and Hyannis Park Civic Asso May 2024

Figure 5 Comparison of Airport Groundwater Modeling Predictions of Maximum Extent and Observed PFAS6 Concentrations (Graphic from the Airport's Report)

Clean-up Strategies of the County and Airport

- County has been operating a pump and treat system since 2015 and removed and treated highly contaminated soil
- County has installed a pilot Permeable Reactive Barrier to reduce PFAS at the Source
- County is conducting a multi-site investigation on its own with input from Technical Experts

- Airport maintains its PFAS is exclusive with a small recent footprint of contamination.
- Airport Strategy rests on Town's Treatment system of the Maher Wells to contain its contamination and a Cap to reduce PFAS leaching
- Airport's evaluation of other Treatment options was perfunctory.

Findings

- Fire Training with AFFF at the BFTA and Airport resulted in PFAS contamination of the Hyannis Water Supply Wells decades ago.
- PFAS contaminated water distributed to the WPCF and Septic Systems resulted in secondary impacts to additional wells and ponds in the Hyannis Aquifer.
- Multiple sources and impacts through the Hyannis Aquifer transcends single and separate party investigations.
- Unidentified PFAS contamination sources hav not been prioritized for investigation by DEP

Findings

- The observed fluctuations of PFAS in the Airport observation wells are typical of a chronic release of contaminants over time that occurs from historic sources of PFAS contamination.
- Small residual concentrations of PFAS in soil can dissolve regulatorily high concentrations into groundwater for a long time with associated impacts downgradient.

Conclusions

- The observations of 6:2FTS and PFAS6 from the shallow wells in the Deployment area plume are similar in space and time at the source and downgradient area.
- PFAS concentrations in the Deployment source area wells and downgradient Mill Creek System indicate the continued leaching of recalcitrant PFAS compounds associated with legacy and fluorotelomer AFFFs.
- The results of the community-based sampling of Mill Creek and TAG analysis of recent Airport monitoring indicate that the engineered barriers (caps) have not significantly reduced downstream PFAS6 concentrations

Proposed Cape Cod Gateway Airport Expansion

2020-40 Airport Master Plan Projects – Phase 1, $75 million

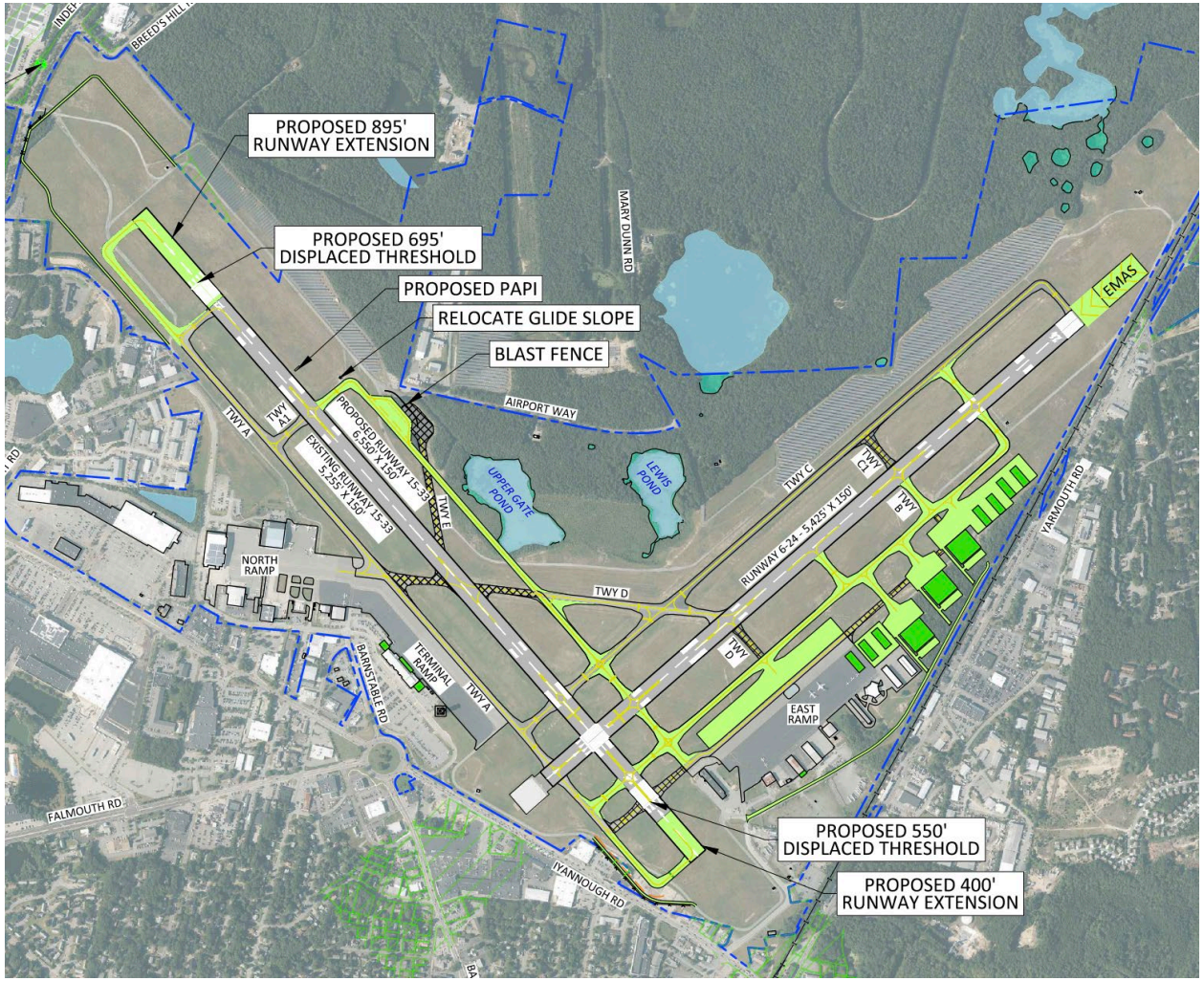
- 895-foot runway extension plus taxiway extensions and modifications for net increase in impervious area of ~40 acres
- 20,000 sq ft garage/equipment storage
- Loss of wetland/pond habitat

Final Environmental Impact Report (FEIR) for Airport Master Plan Projects (#16640)

- Comments due to MEPA Office by November 8

In Master Plan, but Not in FEIR

- 42 acres for market-based development of hangars for private jets and parking for transient aircraft



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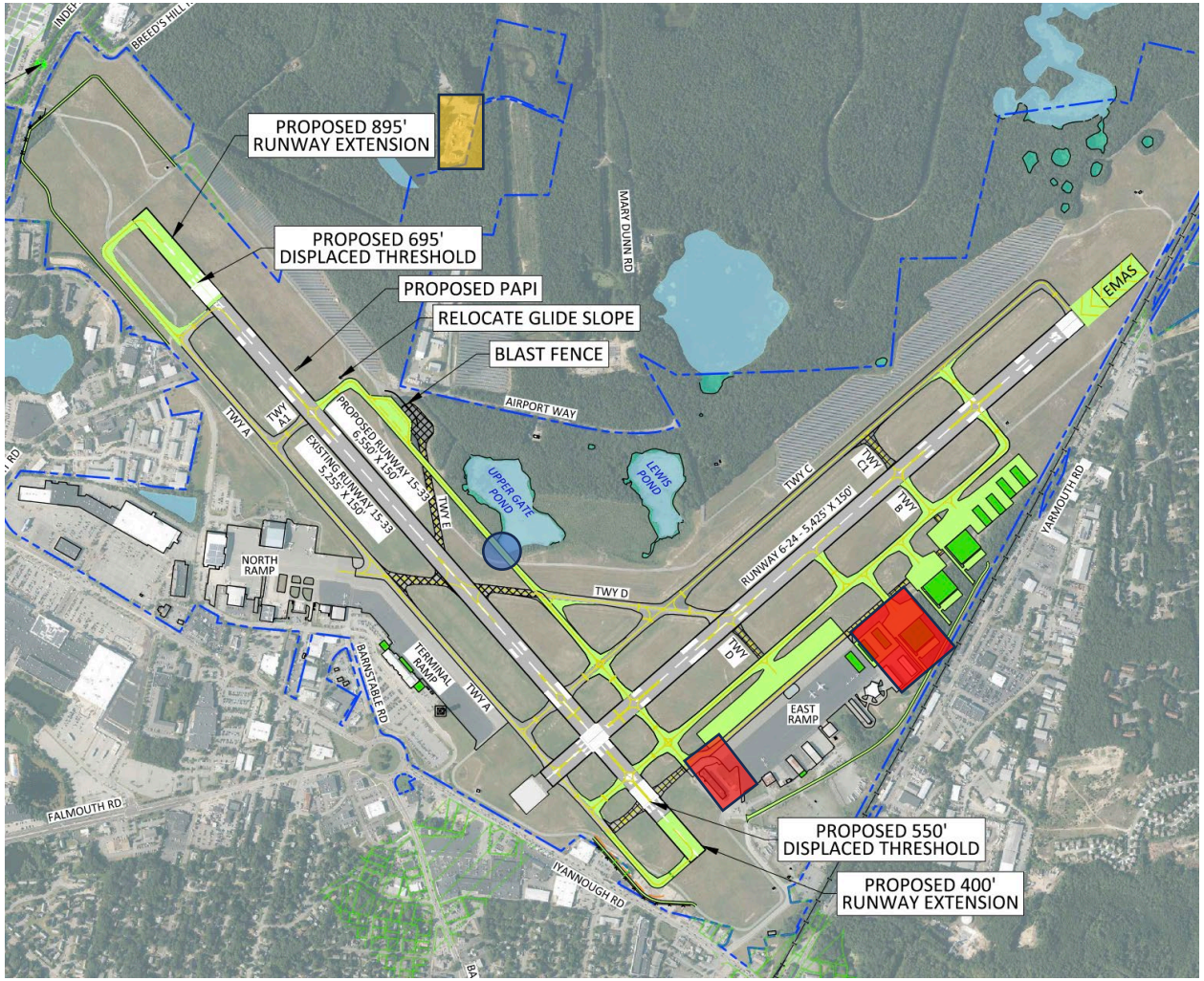

“No PFAS Cleanup? No Hyannis Airport Expansion!”

Airport PFAS Claims

- PFAS plumes have “caused no exposure to the community” and that temporary plastic and asphalt caps “prevent further groundwater contamination”
  - *FEIS does not address findings from community-based PFAS sampling and analysis*
- Construction activities, including use of earth-moving equipment to handle hundreds of thousands of cubic yards of soil, will not disturb caps or impact groundwater contamination
  - *FEIS does not include site cleanup: soil removal, pump and treat, permeable reactive barrier, etc.*

Hyannis area communities—including state-designated environmental justice populations—should not be required to live under “forever” threats from ”forever” chemicals.

Scan to submit comments opposing Airport expansion without PFAS cleanup

Airport Greenhouse Gas (GHG) Emissions Claims

- Expansion will not increase airport operations nor GHG emissions due to aircraft fuel usage
  - *FEIS is based on faulty assumptions and excludes planned facilities for private jets from analysis*

GHG emissions attributable to the most carbon-intensive form of travel to and from Cape Cod should be accurately inventoried and adequately mitigated.

The Airport’s FEIR is inadequate and should be rejected. Comments are due to the state by November 8. For more information and to submit comment, visit https://act.sierraclub.org/actions/Massachusetts?actionId=AR0489244

Next Steps for Hyannis PFAS Community Working Group

- Regular meetings of concerned community members and officials
- Publication and dissemination of “Hyannis PFAS Contamination Map”
- Outreach to and engagement with the public and community groups
- Participation and community representation in public meetings and technical sessions involving Airport and FTA sites
- Continued pursuit of grants for community-based PFAS sampling and expert representation
- Advocacy to elected officials and responsible parties urging comprehensive characterization of PFAS contamination, accelerated cleanup at the source, and needs for federal and state funding

Scan to submit comments opposing Airport expansion without PFAS cleanup

Additional Slides

Environmental Science & Technology

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Article

Characterizing the Areal Extent of PFAS Contamination in Fish Species Downgradient of AFFF Source Zones

Heidi M. Pickard,* Bridger J. Ruyle, Faiz Haque, John M. Logan, Denis R. LeBlanc, Simon Vojta, and Elsie M. Sunderland

Cite This: *Environ. Sci. Technol.* 2024, 58, 19440−19453

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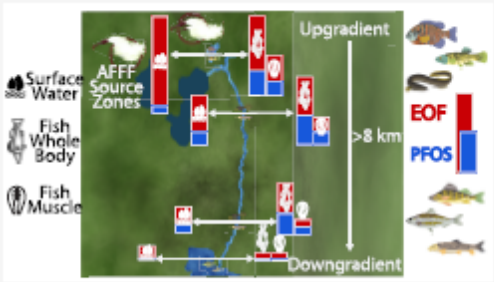
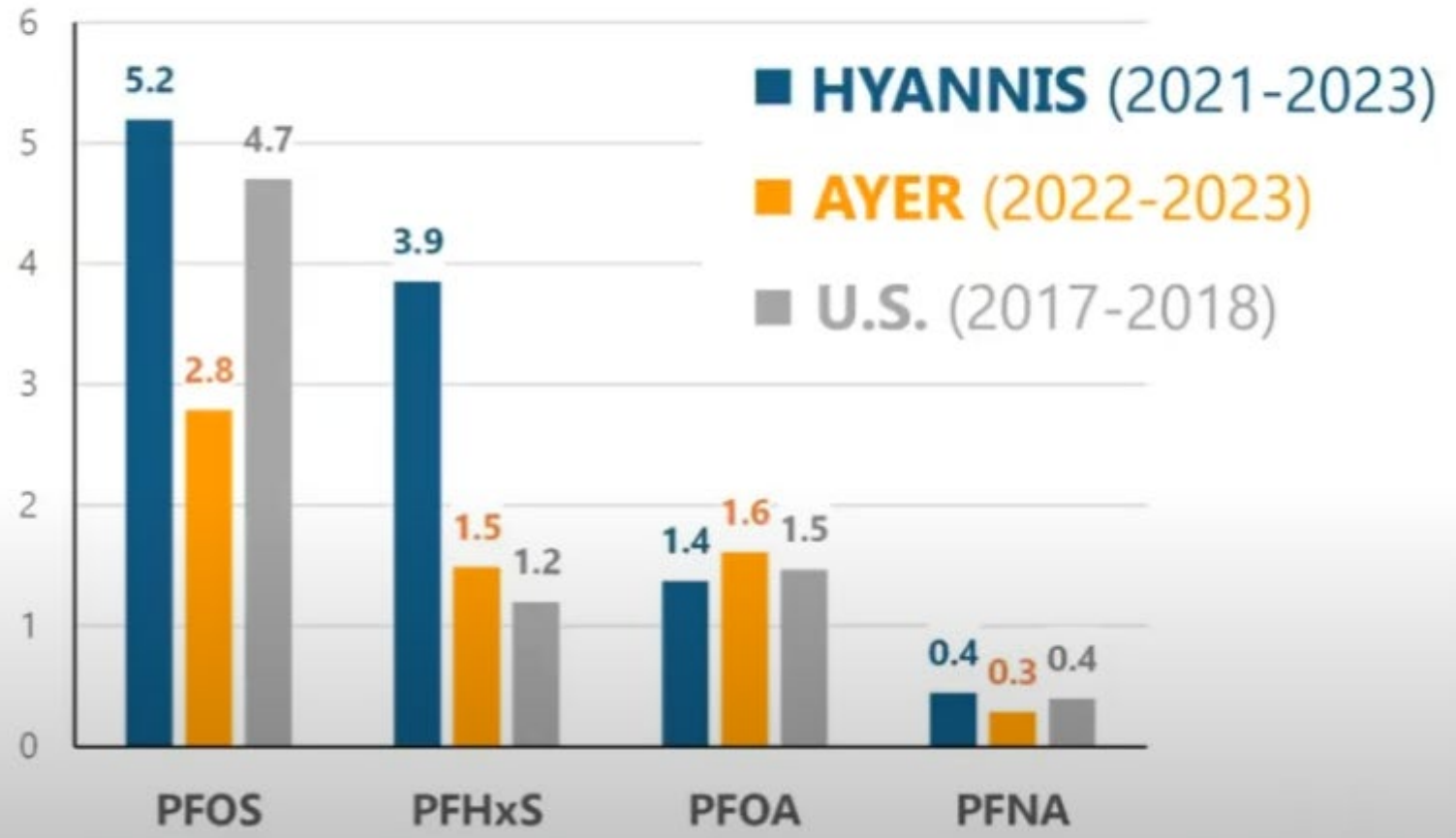
ABSTRACT: Most monitoring programs next to large per- and polyfluoroalkyl substances (PFAS) sources focus on drinking water contamination near source zones. However, less is understood about how these sources affect downgradient hydrological systems and food webs. Here, we report paired PFAS measurements in water, sediment, and aquatic biota along a hydrological gradient away from source zones contaminated by the use of legacy aqueous film-forming foam (AFFF) manufactured using electrochemical fluorination. Clustering analysis indicates that the PFAS composition characteristic of AFFF is detectable in water and fishes >8 km from the source. Concentrations of 38 targeted PFAS and extractable organofluorine (EOF) decreased in fishes downgradient of the AFFF-contaminated source zones. However, PFAS concentrations remained above consumption limits at all locations within the affected watershed. Perfluoroalkyl sulfonamide precursors accounted for approximately half of targeted PFAS in fish tissues, which explain >90% of EOF across all sampling locations. Suspect screening analyses revealed the presence of a polyfluoroketone pharmaceutical in fish species, and a fluorinated agrochemical in water that likely does not accumulate in biological tissues, suggesting the presence of diffuse sources such as septic system and agrochemical inputs throughout the watershed in addition to AFFF contamination. Based on these results, monitoring programs that consider all hydrologically connected regions within watersheds affected by large PFAS sources would help ensure public health protection.



KEYWORDS: *per- and polyfluoroalkyl substances (PFAS), perfluoroalkyl sulfonamides (FASA), aquatic biota, fish, shellfish, aqueous film-forming foam (AFFF), source zones, contamination*

Median levels of 4 PFAS in Hyannis and Ayer adults compared to the general population

MEDIAN
concentration
micrograms per liter
(µg/L)



Note: Hyannis and Ayer medians are adjusted to the age distribution of NHANES

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