

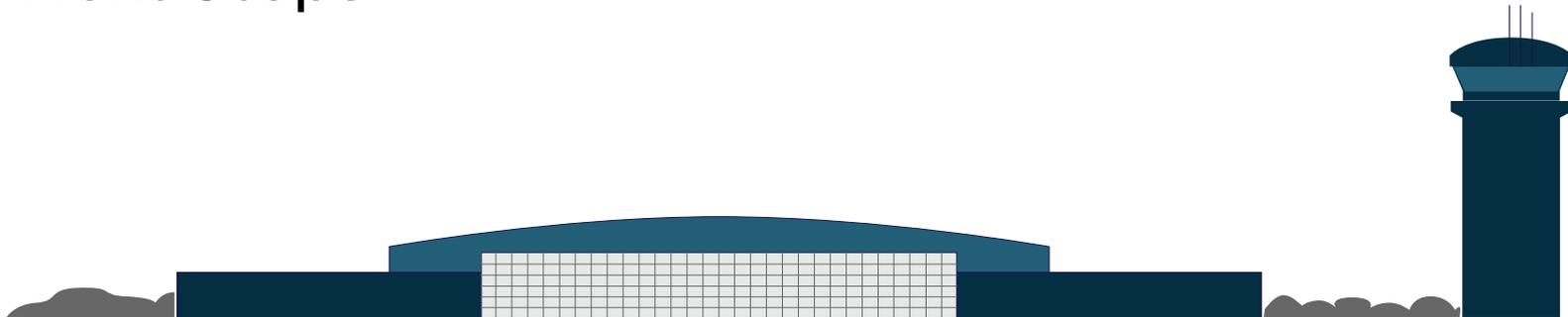
# Cape Cod Gateway Airport PFAS Discussion

April 11, 2024



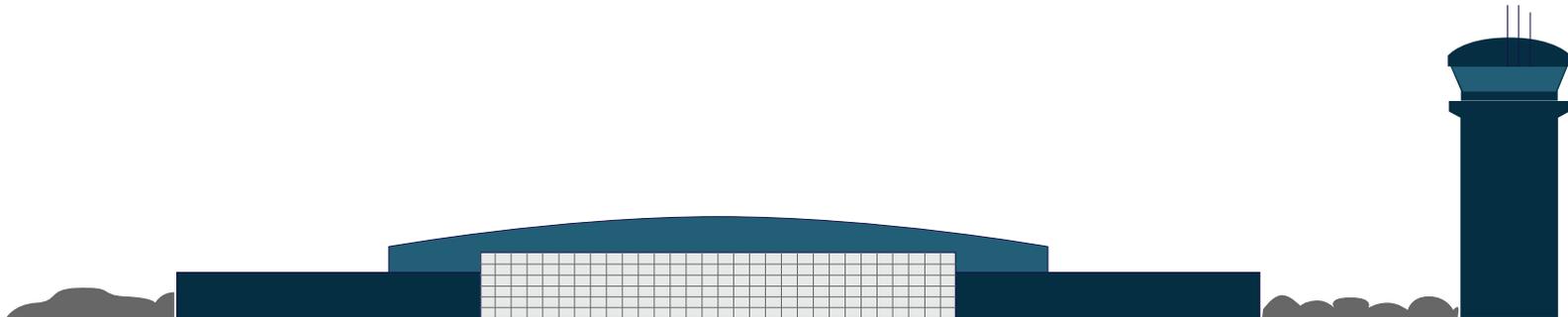
# Today's Discussion...

- Airports Investigation Timeline
- Aqueous Film Forming Foam (PFAS Containing Fire Fighting Foam) Use at the Airport
- Airport PFAS Investigation
  - Nature and extent of PFAS impacts
  - Completion of Protective Caps in Areas where PFAS was Used
  - PFAS Plume Modeling
  - Next Steps



# Airport Timeline and Investigation

- The airport began investigating PFAS in 2016 at the request of MassDEP.
- Between 2016 and 2023, the Airport has collected:
  - Over 131 soil samples,
  - 210 groundwater samples,
  - 8 fire truck spray samples, and
  - 3 surface water (Upper Gate and Lewis Pond) samples for PFAS analysis.



# See Airport Website for all PFAS Reports

<https://flyhya.com/airport-info/pfas/>



VISIT CAPE COD

FLIGHTS

PARKING + TRANSPORTATION

AIRPORT INFO

CAPE COD WEATHER



52°F  
mist



52°F 48°F



55°F 48°F



50°F 45°F



54°F 45°F



55°F 48°F

## FISHING ON THE CAPE!

EASTHAM

SELECT PFAS

ABOUT THE AIRPORT

DOING BUSINESS

MANAGER'S MESSAGE

AIRPORT EVENTS

AIRPORT COMMISSION

RFPS

NEWS

HISTORY

PLANS & REPORTS

MASTER PLAN

ENVIRONMENTAL ASSESSMENT

PFAS

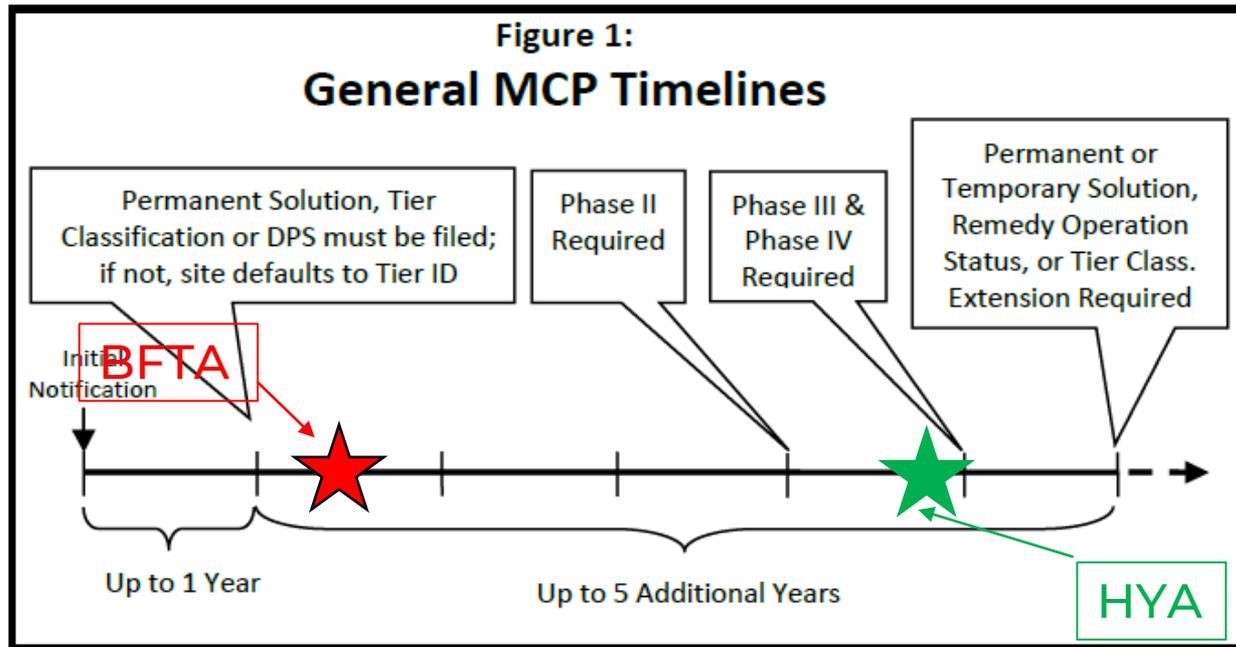
NOISE ABATEMENT

# Extent of PFAS Plumes



\* Cape Cod Commission (CCC) Groundwater Contours

# Regulatory Reporting Since 2016-Continued

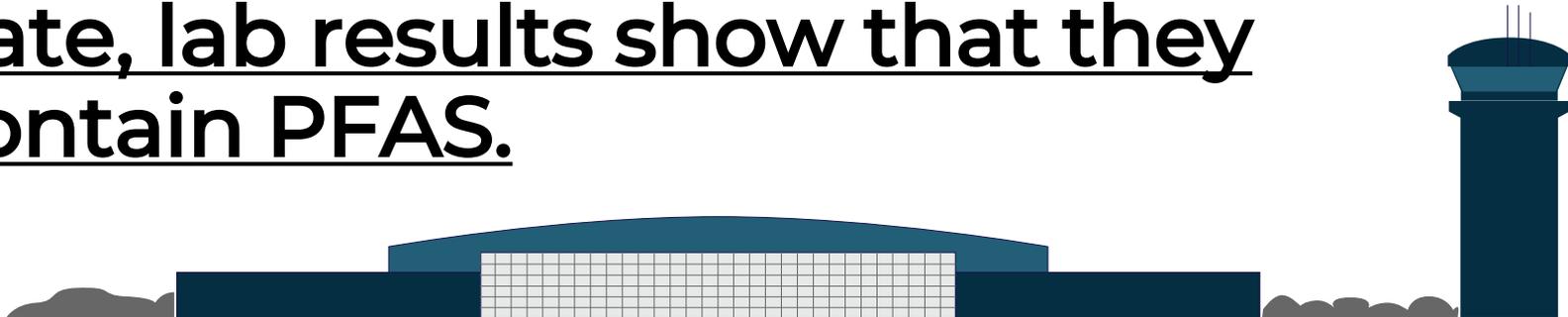


<https://flyhya.com/airport-info/pfas/>



# Use of Aqueous Film Forming Foam (AFFF) at the Airport

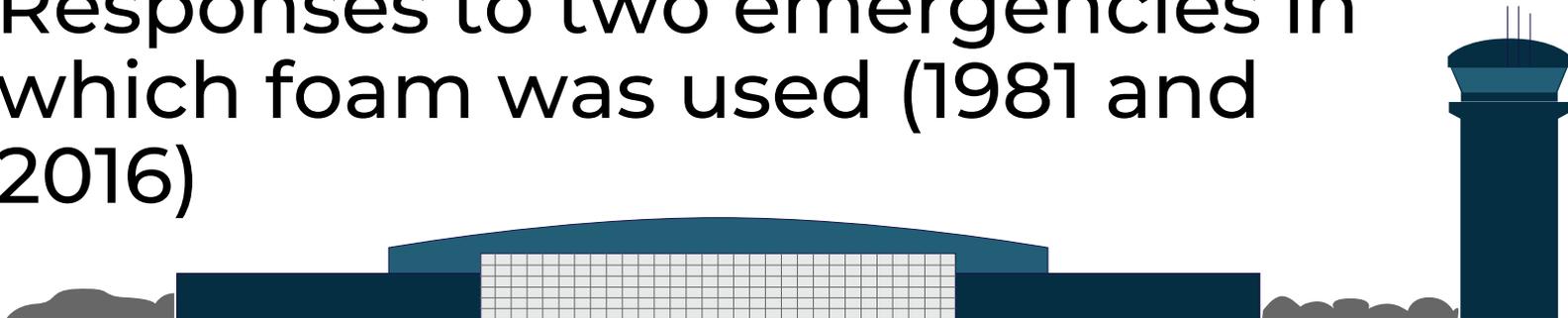
- Aqueous Film Forming Foam (AFFF) contains PFAS
- It is used for emergency responses when fires are possible.
- It is required by the FAA.
- The FAA is investigating other AFFF substances that are PFAS free but to date, lab results show that they contain PFAS.



# Use of Aqueous Film Forming Foam (AFFF) at the Airport (Continued)

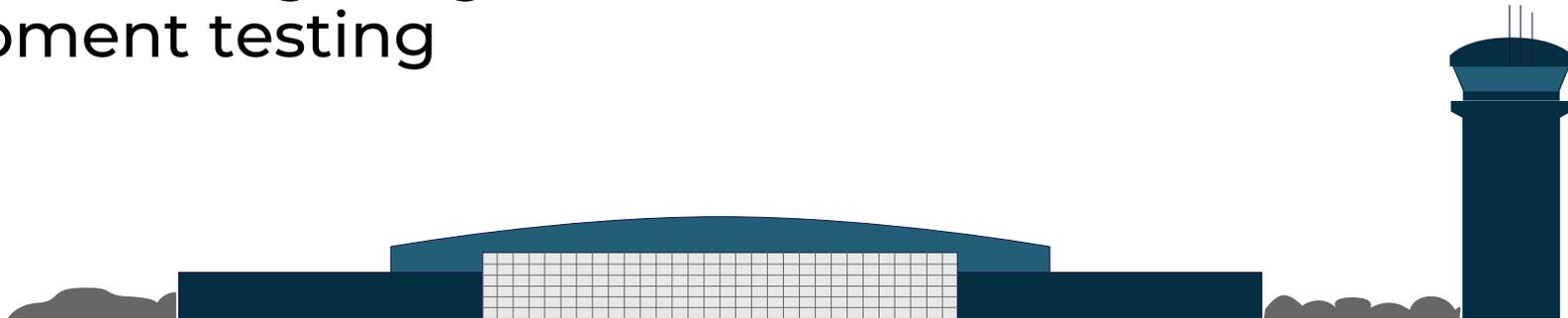
→ Historically, AFFF used during:

- Triannual training exercises (1991 to 2012)
- Annual testing of firefighting equipment as required by the FAA (2004 to 2015)
- Responses to two emergencies in which foam was used (1981 and 2016)



# Ecological Cart

- First airport in Massachusetts to purchase the ecologic unit (2016)
- Unit purchased before receipt of FAA approvals for use
- Eliminates the need to use/spray foam during annual FAA required firefighting equipment testing



# Recent Use of AFFF at the Airport

- Since 2015 AFFF has not been used for training or testing at the Airport
- AFFF was last used in 2016 to respond to an aircraft accident
  - 10 gallons of foam concentrate applied to asphalt at the site of the accident
  - Foam captured in an enclosed catch basin, vacuumed out and removed from the site for disposal.



# Airport Evaluation and PFAS Source Delineation

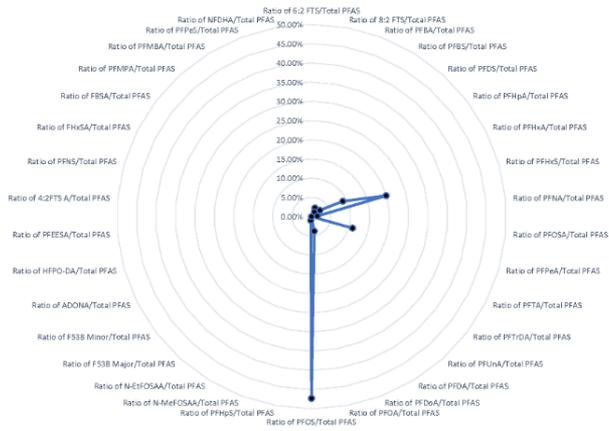
- Airport has collected
  - Over 131 soil samples,
  - 210 groundwater samples,
  - 8 fire truck spray samples, and
  - 3 surface water samples (Upper Gate and Lewis Ponds) for PFAS analysis.
- **Forensic analysis** used to determine extent of PFAS plumes relating to:
  - Airport
  - Barnstable Fire Training Academy (BFTA)
  - Others
  - Analysis included hundreds of samples collected by the Airport and others to define the Airports signature.
- Airport plume extent was estimated using a model developed by USGS that incorporated pumping rates at the Maher Wells. This model has been accepted by industry professionals.

→ *Of the 639-acre airport parcel – less than 2-acres required mitigation*



# Forensics Applications

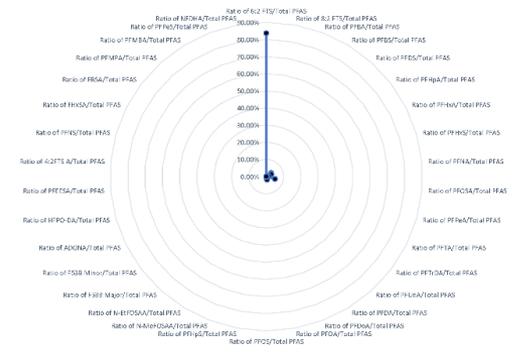
MaHer Well 2 (9/17/2020)



**Year  
2020**

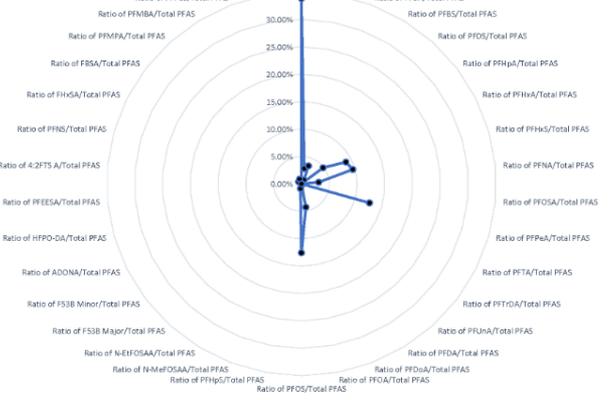
**MaHer 2  
Signature  
= BFTA**

HW-[c] (5/8/2020)



**Airport  
Signature  
Reference**

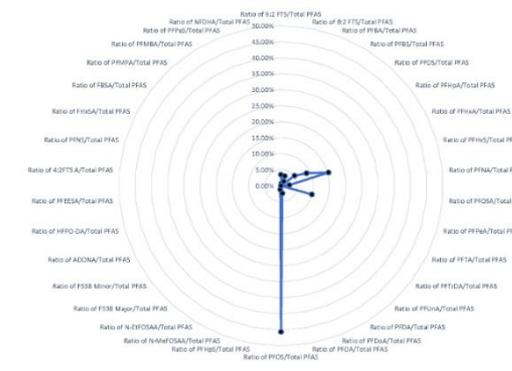
MaHer Well 2 (9/17/2020)



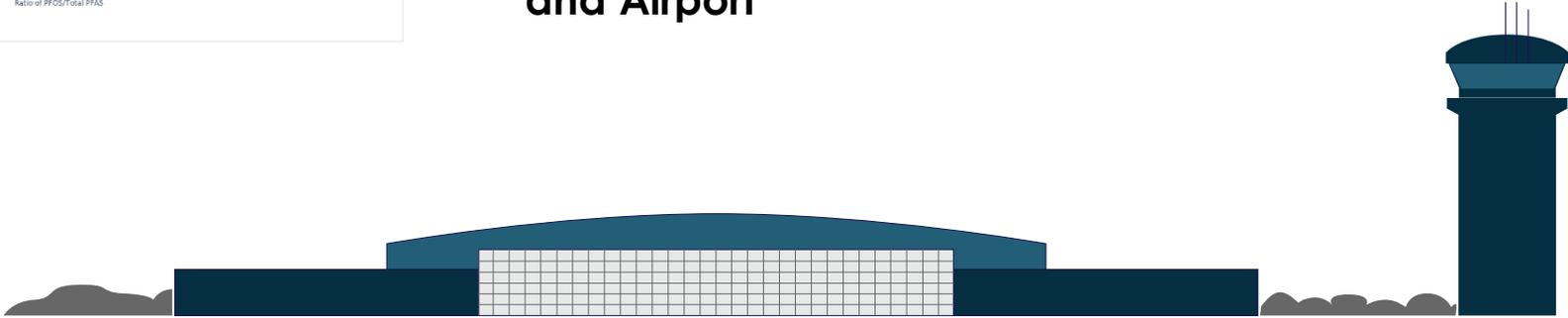
**Year  
2022**

**MaHer 2  
Signature =  
Both BFTA  
and Airport**

PC-24 (01/07/2015)



**BFTA  
Signature  
Reference**



# Soil Sample Locations and Extent of PFAS in Soil from AFFF Usage



Deployment Area

Airport Rescue and Fire Fighting/Snow Removal Building (ARFF/SRE)

**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	100 - 200
0.5 - 1	200 - 500
1 - 5	500 - 1000
5 - 20	1000 - 2000
20 - 100	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.

**Horsley Witten Group**  
 Sustainable Environmental Solutions  
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 508.533.8608 • horsleywitten.com

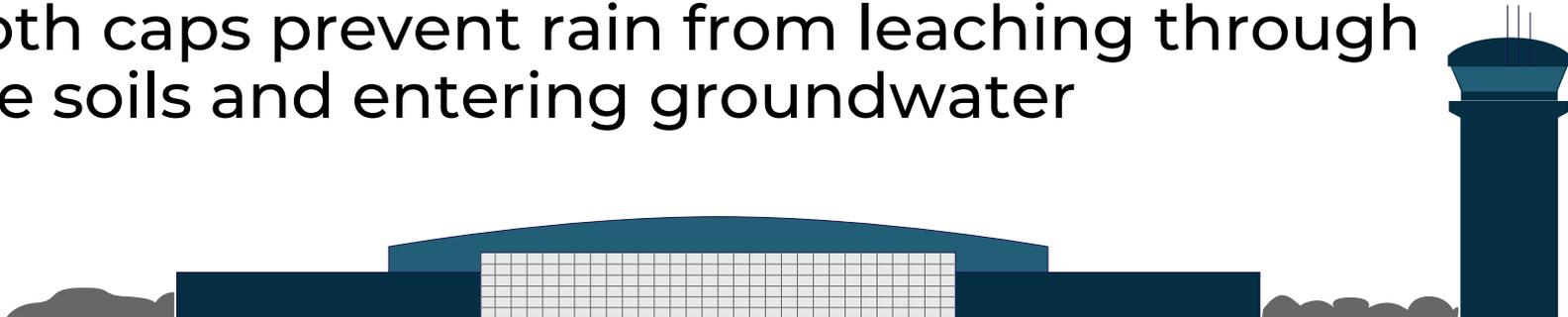
Estimated Disposal Site  
 Boundary for Soil  
 Barnstable Municipal Airport  
 Hyannis, MA

\* Cape Cod Commission (CCC) Groundwater Contours

Path: K:\Projects\HYA\17027 BMA PFOS 1-4 IRA\GIS\Maps\2011030\_Soil\PFASTotalZoom.mxd

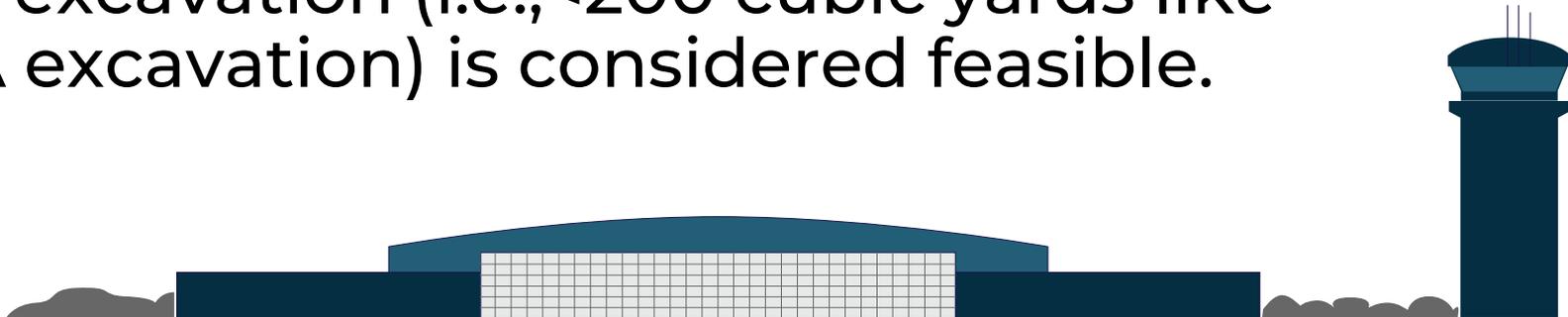
# PFAS Caps Installed

- PFAS impacted soil in the Deployment Area and at the ARFF/SRE Building Area has been capped to prevent further groundwater impacts
  - ARFF/SRE Building Area – Pavement used to create the cap
  - Deployment Area – Geomembrane (30 mil Plastic liner), covered by topsoil and grass
  - Caps prevented over 3,000 trucks carrying 105,000 cubic yards of PFAS impacted soil through Hyannis to out of state off-Site disposal facilities.
- Both caps prevent rain from leaching through the soils and entering groundwater

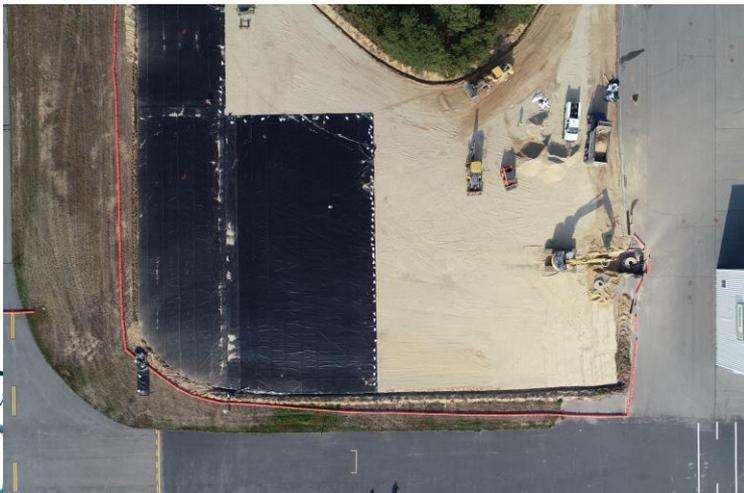


# PFAS Caps Installed (Continued)

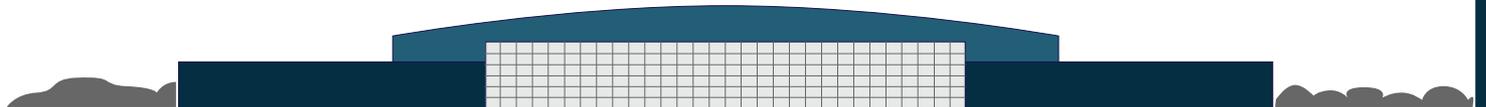
- Caps chosen as the best remedial alternative as detailed in the Phase III Report.
- Significant soil disposal was evaluated through a benefit-cost analysis consistent with the MCP and was found to not be feasible.
- Large scale soil disposal (i.e., >200 cubic yards) is considered infeasible. Small scale excavation (i.e., <200 cubic yards like BFTA excavation) is considered feasible.



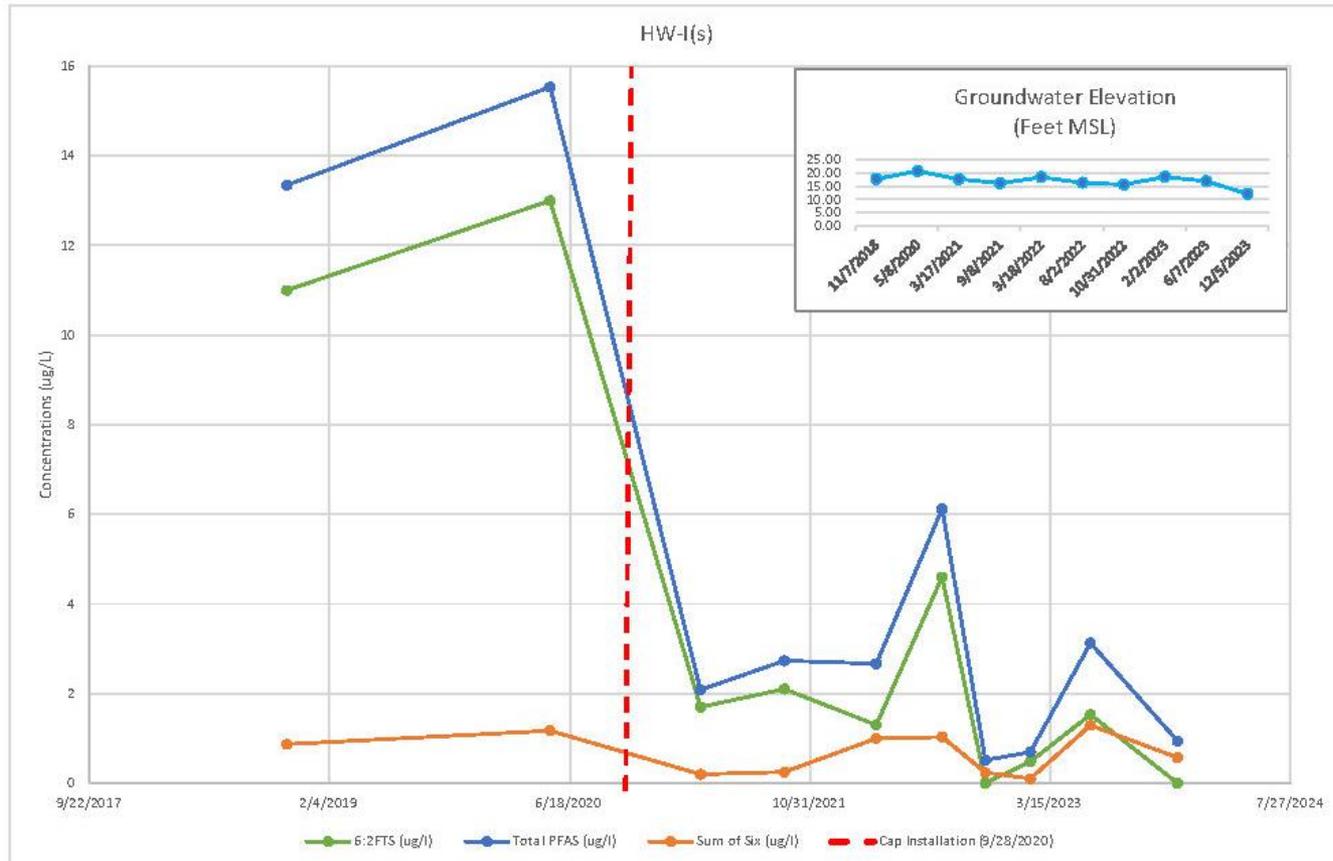
# Deployment Area Cap



# ARFF Area Cap

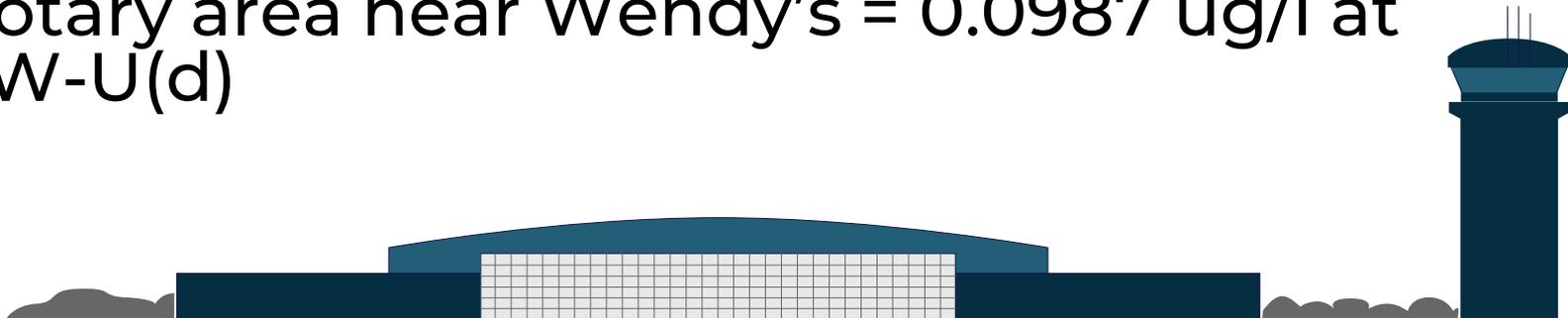


# Deployment Area Cap Effect on Groundwater Quality



# Highest Sum of Six in Groundwater Comparison

- Regulatory limit for GW-1 is 0.02 micrograms per liter (ug/l) or 20 nanograms per liter (ng/l)
- Regulatory limit for GW-3 ranges from 500 to 40,000 ug/l (individual PFAS)
- **Airport = 1.2902 ug/l at HW-1(s)**
- Barnstable Fire Training Academy = 320 ug/l at PC-11
- Industrial park area (Airport Road) = 0.0574 ug/l at HW-M
- Rotary area near Wendy's = 0.0987 ug/l at HW-U(d)



# Extent of PFAS Plumes



\* Cape Cod Commission (CCC) Groundwater Contours

Path: K:\Projects\HTA\17027 BMA PFOS 1-4-IRA\GIS\Maps\Disposal Site Map bjm 2.mxd

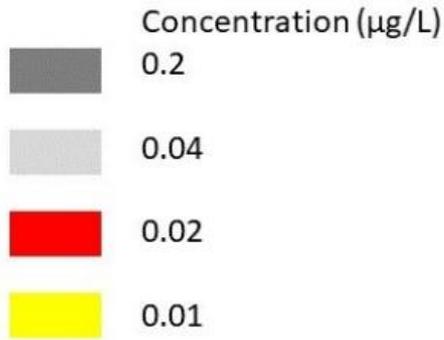
# Groundwater Travel Times (~285 feet per year)

- Travel time from BFTA to Mary Dunn Wells 1&2 = **5.6 years.**
- Travel time from BFTA to Maher ME 2&3 = **26.3 years.**
- Travel time from Airport to Maher ME-2 = **8.7 years**
- Travel time from WWTP to Maher ME-1 = **32.75 years.**
- Treatment of Airports PFAS plume before Maher Wells is not feasible
  - Reduces available water to Maher Wells
  - Potentially exacerbates plume/limited discharge locations
  - Redundant
    - Fire Training Academy Opens: 1959 - AFFF in use (ITRC): 1960's
    - Airports first recorded use of AFFF: 1991 to 2012 (every three years MCI) and annually 2004 to 2016



# Airport PFAS in Groundwater Modeling (Airport Plume Only)

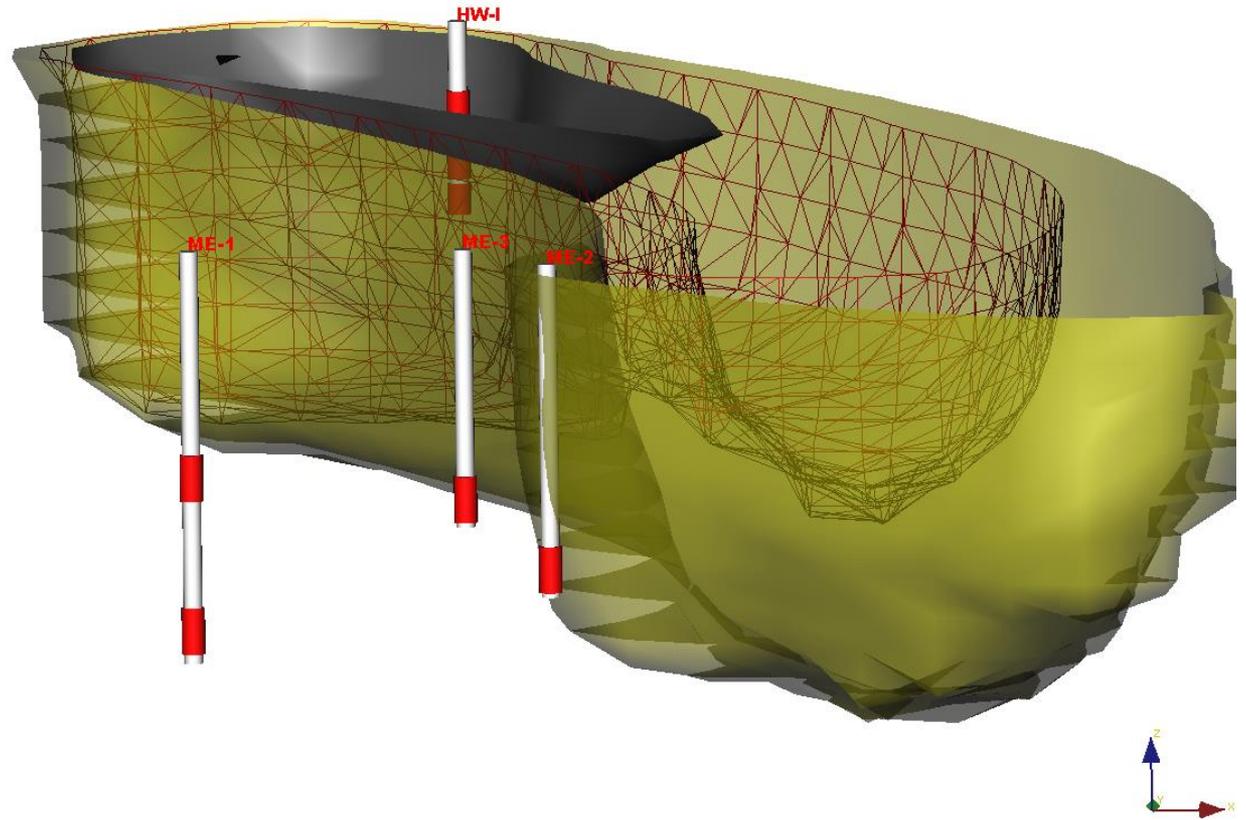
## Legend



MassDEP Method 1 Standards:  
 GW-1 = 0.02  $\mu\text{g/L}$   
 GW-3 = 500 to 40,000  $\mu\text{g/L}$



# Airport PFAS in Groundwater Modeling (Airport Plume Only)



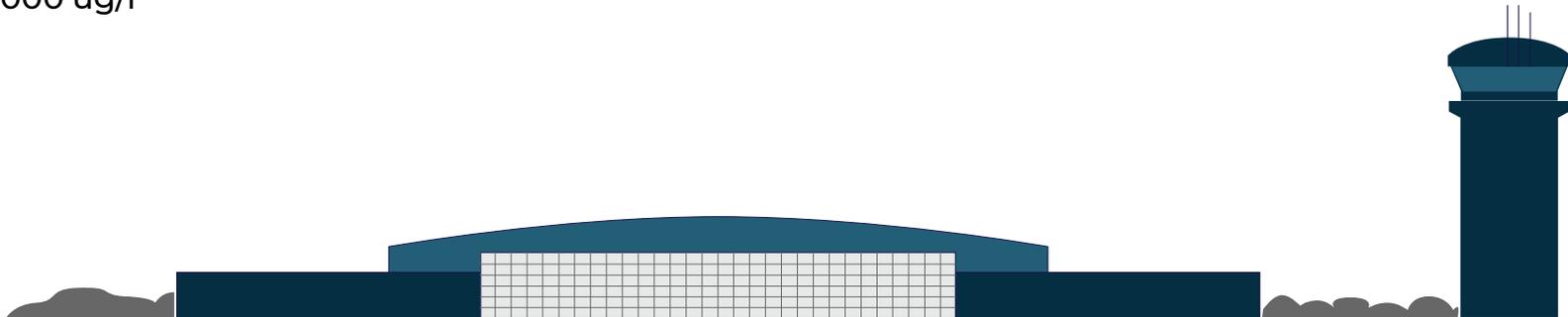
## Legend

	Concentration ( $\mu\text{g/L}$ )
	0.2
	0.04
	0.02
	0.01

MassDEP Method 1 Standards:

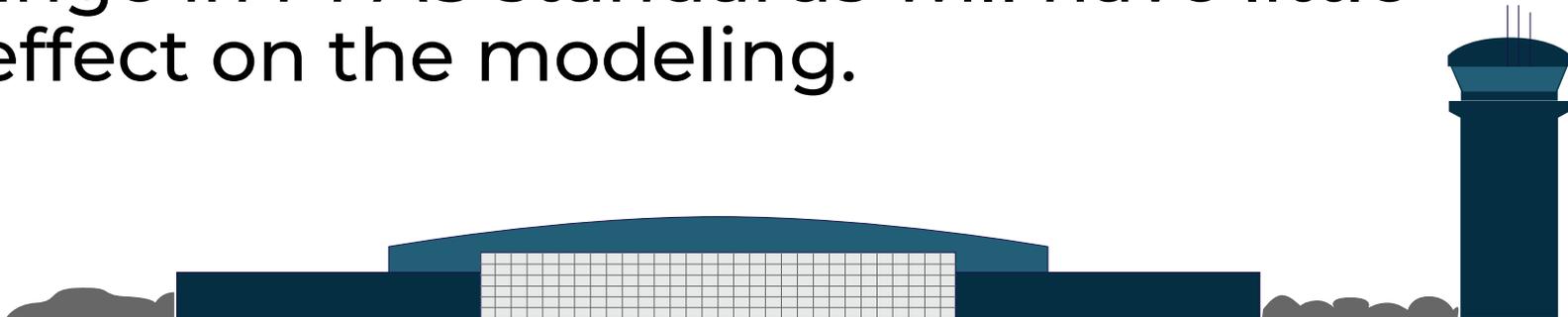
GW-1 = 0.02 ug/L

GW-3 = 500 to 40,000 ug/l



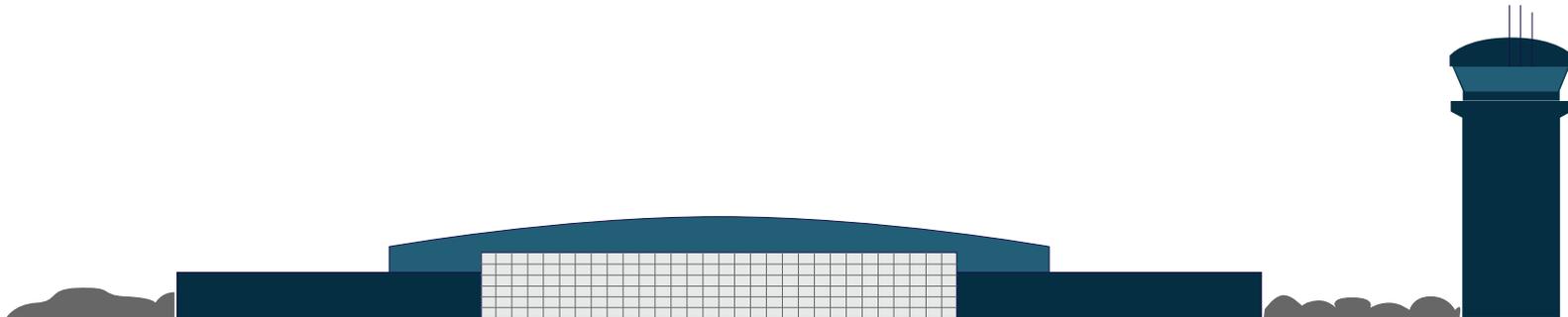
# Airport PFAS In Groundwater Modeling-Continued

- The models in the slides above are overly conservative and detail a worst-case scenario.
- The Airport is aware of the recent change in regulatory standards for PFAS and will reevaluate the models detailed above, as necessary.
- At this time, it is believed that the change in PFAS standards will have little to effect on the modeling.



# PFAS Detections in Mill Creek – Harvard Study

- A PFAS study of Cape Cod surface waters included the collection of surface water samples from Mill Creek.
- These samples were collected approximately three years before the Airport's plume was detected in the Maher Wells
- Total PFAS detected in 2018 = 0.2696 ug/l



# PFAS Detections in Mill Creek – Harvard Study (Cont.)

- MADPH has a surface screening value of 23 ug/l for swimming for PFOS, PFOA, PFNA, PFHxS and/or PFOS.
- Concentrations for these analytes ranged from 5.54 ng/l to 45.05 ng/l.
- Modeling by the Airport indicates the PFAS plume heading towards this area is less than 10 ng/L for the Sum of Six.
- *This is below the individual PFAS guidance value from the Department of Public Health of 23 ng/L indicating that the Airports PFAS Plume is not impacting Mill Creek above regulatory levels.*

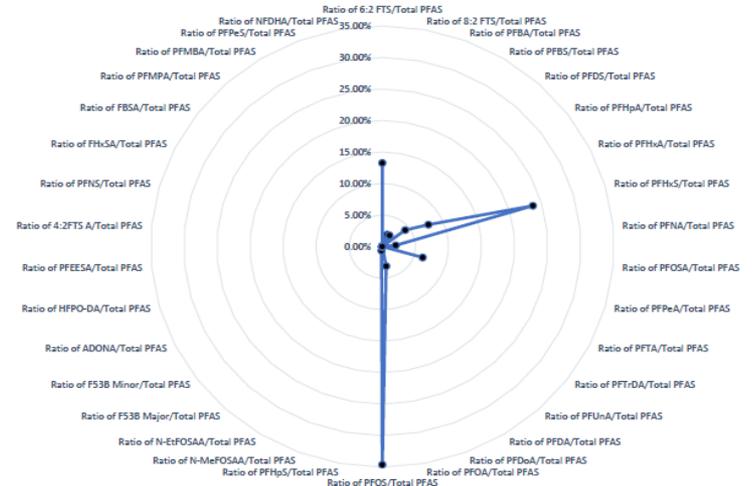
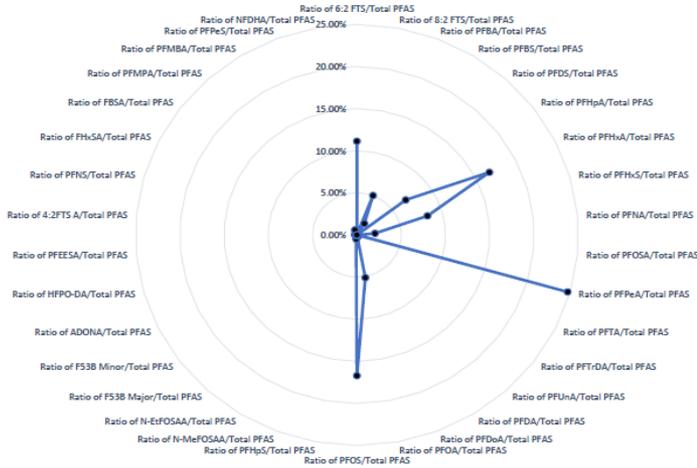


# Mill Creek Fingerprint Comparison (Radar Plots)

Mill Creek

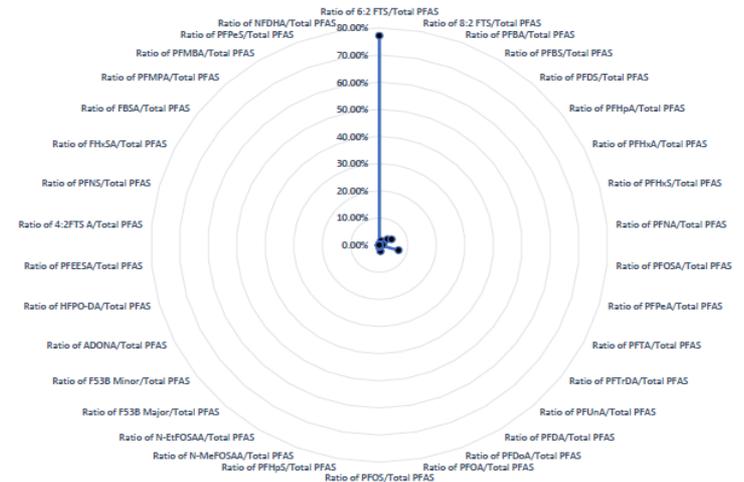
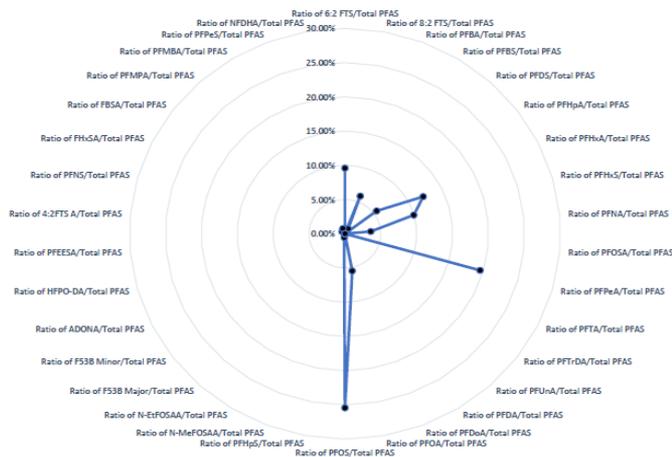
Fire Training Academy

Mill Creek 2018 (Harvard Study)



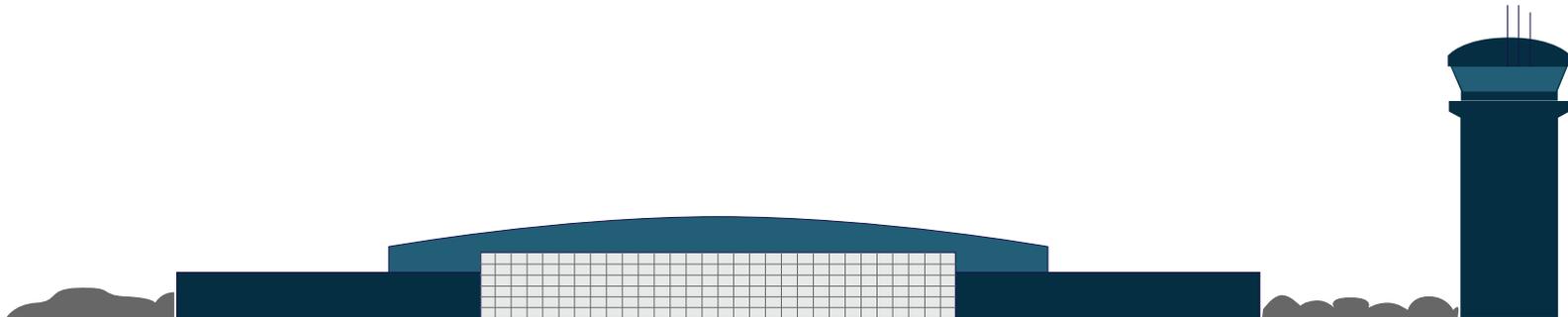
Maher Well 1

Airport



# Next Steps

- Continue Monitoring Airport PFAS in Groundwater to Evaluate the Performance of the Caps
  - Monitoring Funds Included in Airport Capital Improvement Plan Budget (CIP – FY2023 A.O. 2022-132).
- Continued inspection of the Caps to verify integrity.
- Final resolution to include financial contribution to support ongoing PFAS treatment at Maher Wells.



# Next Steps (Continued)

- The Town of Barnstable continues to provide drinking water to residents that meets MassDEP regulatory requirements for PFAS.
- The Town of Barnstable also meets the new EPA MCLs for PFAS at Maher Wells.
- *Highest SUM of Six Concentrations at the Airport = less than GW-3 standards which are protective of surface water.*



# Questions?

