

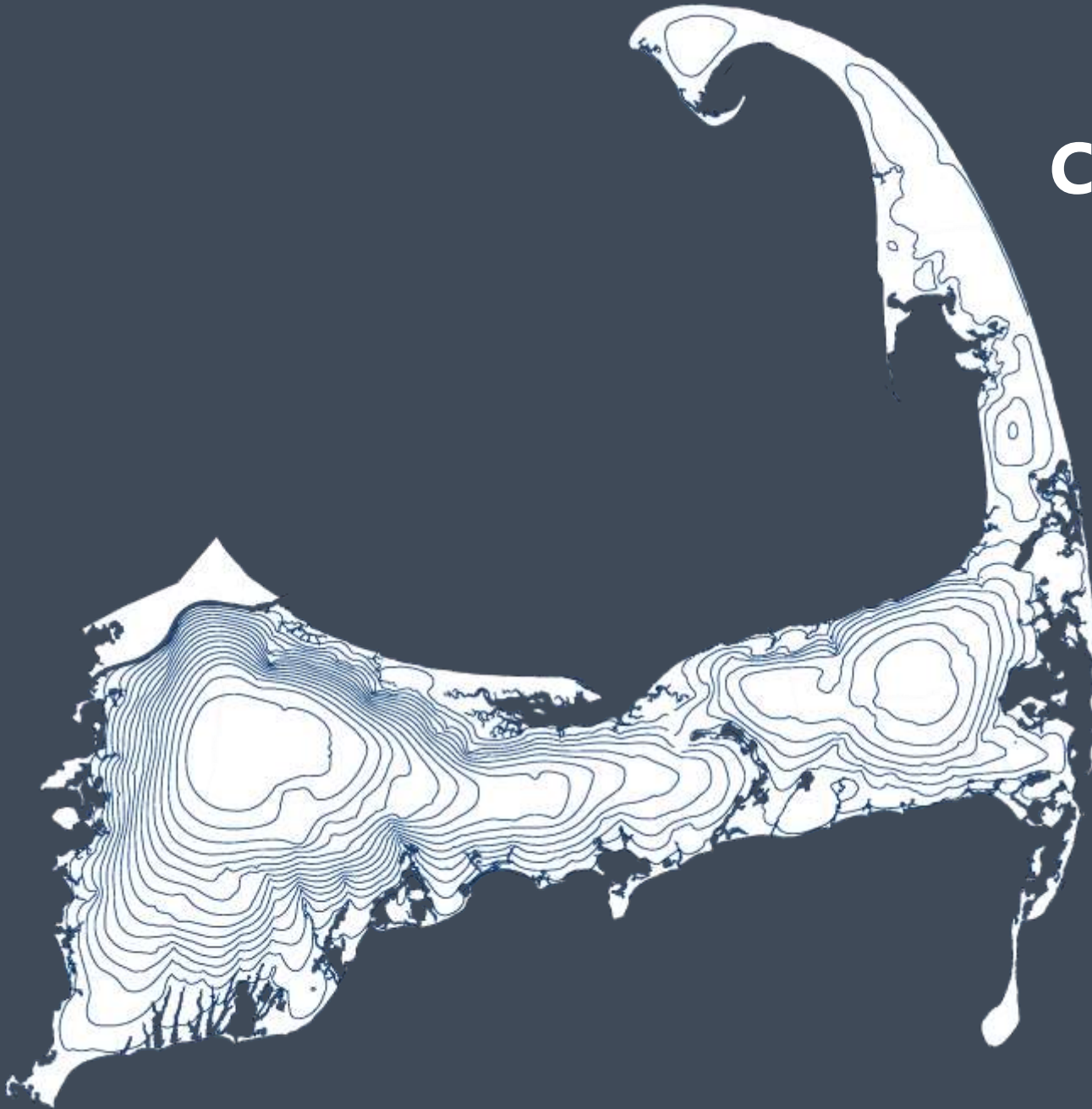


# Occurrence of Poly and Per Fluoro Alkyl Substances (PFAS) in Groundwater on Cape Cod

COASTAL CONFERENCE | DECEMBER 5, 2018

Thomas C Cambareri, LSP, CGWP  
Director of Technical Services for Water  
Cape Cod Commission





## Cape Cod Sole Source Aquifer

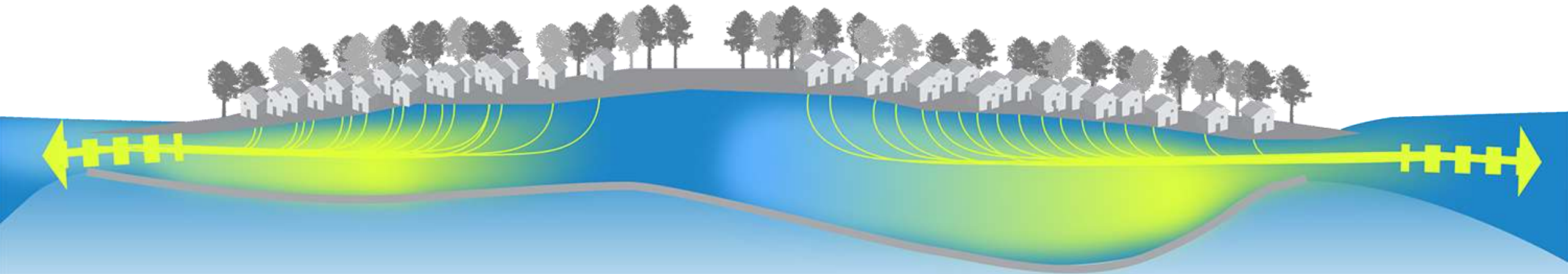
Replenished by Precipitation

Six Separate Lenses

Sole Source of Drinking Water

Feeds Kettlehole Ponds

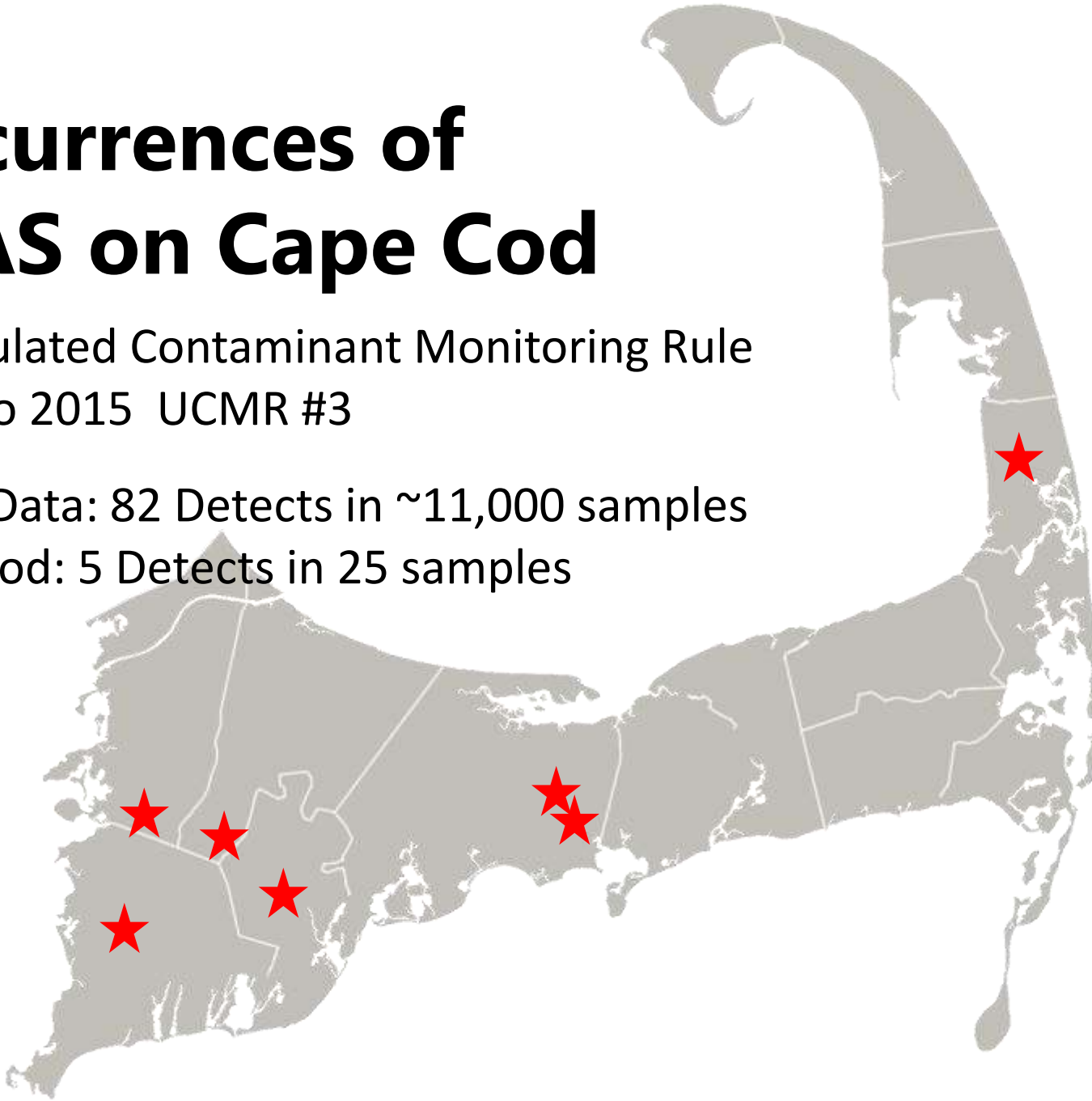
# CAPE COD HAS A WASTEWATER PROBLEM



# Occurrences of PFAS on Cape Cod

Unregulated Contaminant Monitoring Rule  
2013 to 2015 UCMR #3

All US Data: 82 Detects in ~11,000 samples  
Cape Cod: 5 Detects in 25 samples





## Wellhead Protection Areas

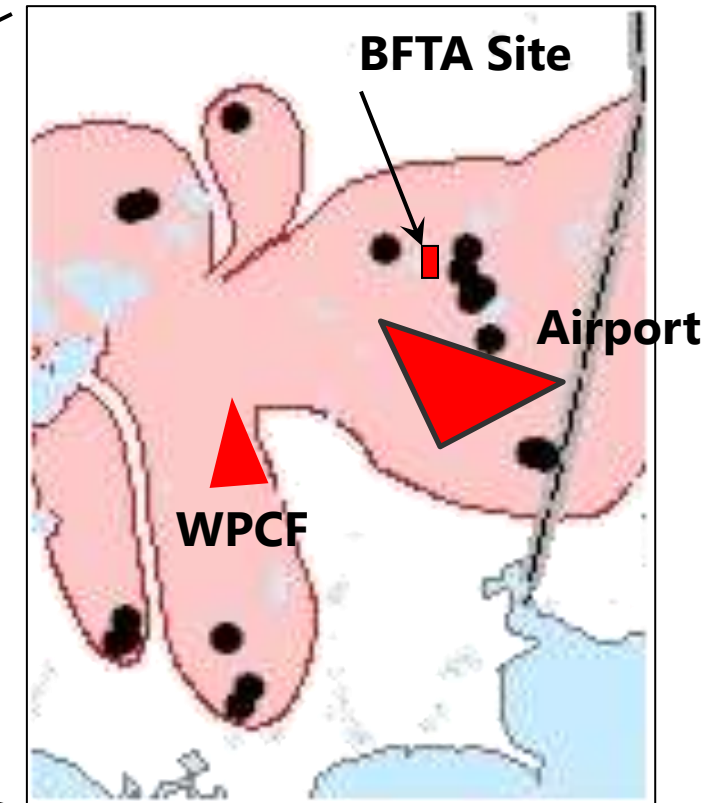
- Public Supply Wells
- Wellhead Protection Areas



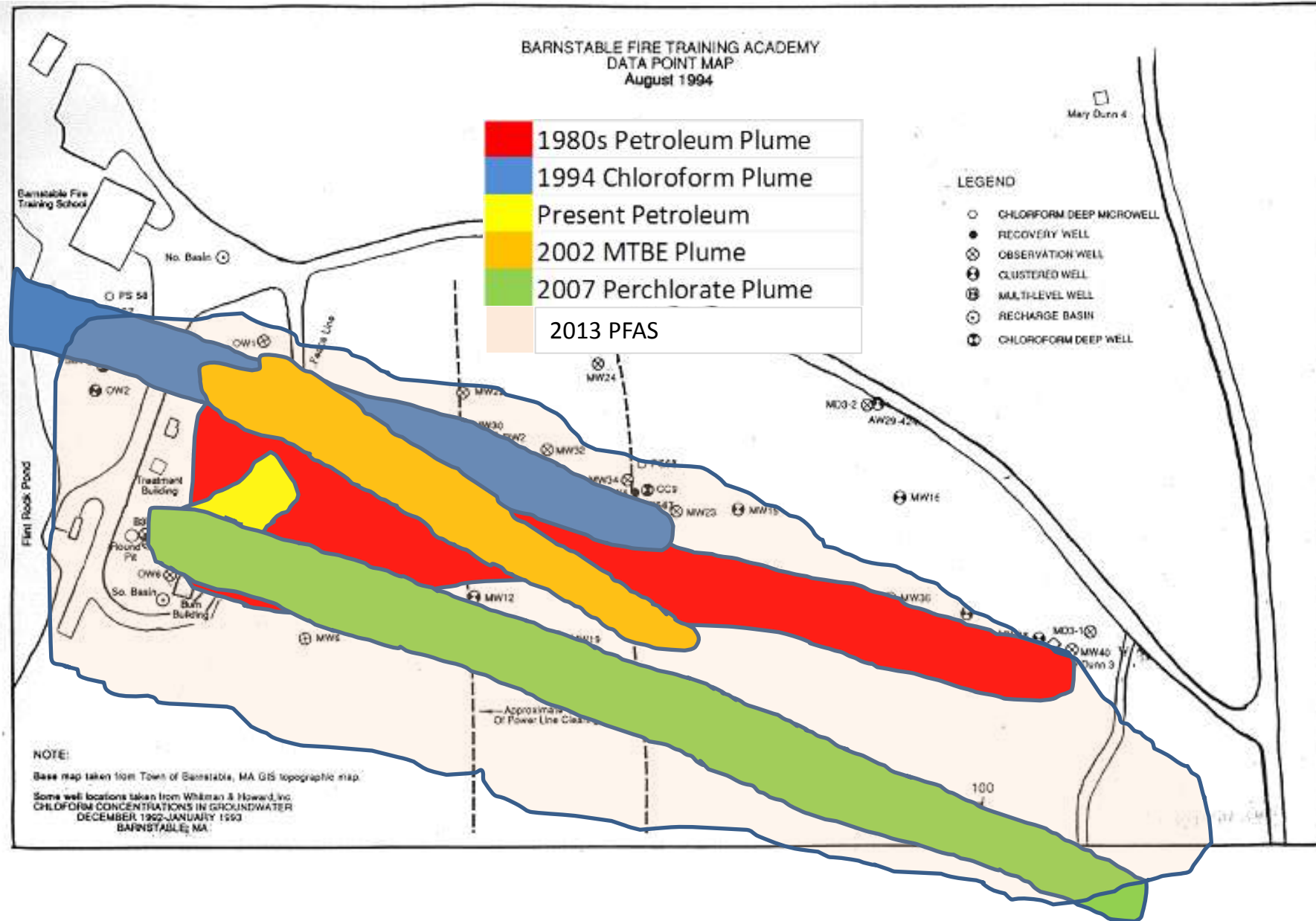
*Cape Cod Bay*

*Nantucket Sound*

## Hyannis Area Case Study



BARNSTABLE FIRE TRAINING ACADEMY  
DATA POINT MAP  
August 1994





# BCFRTA and Mary Dunn Wells and Hyannis Ponds

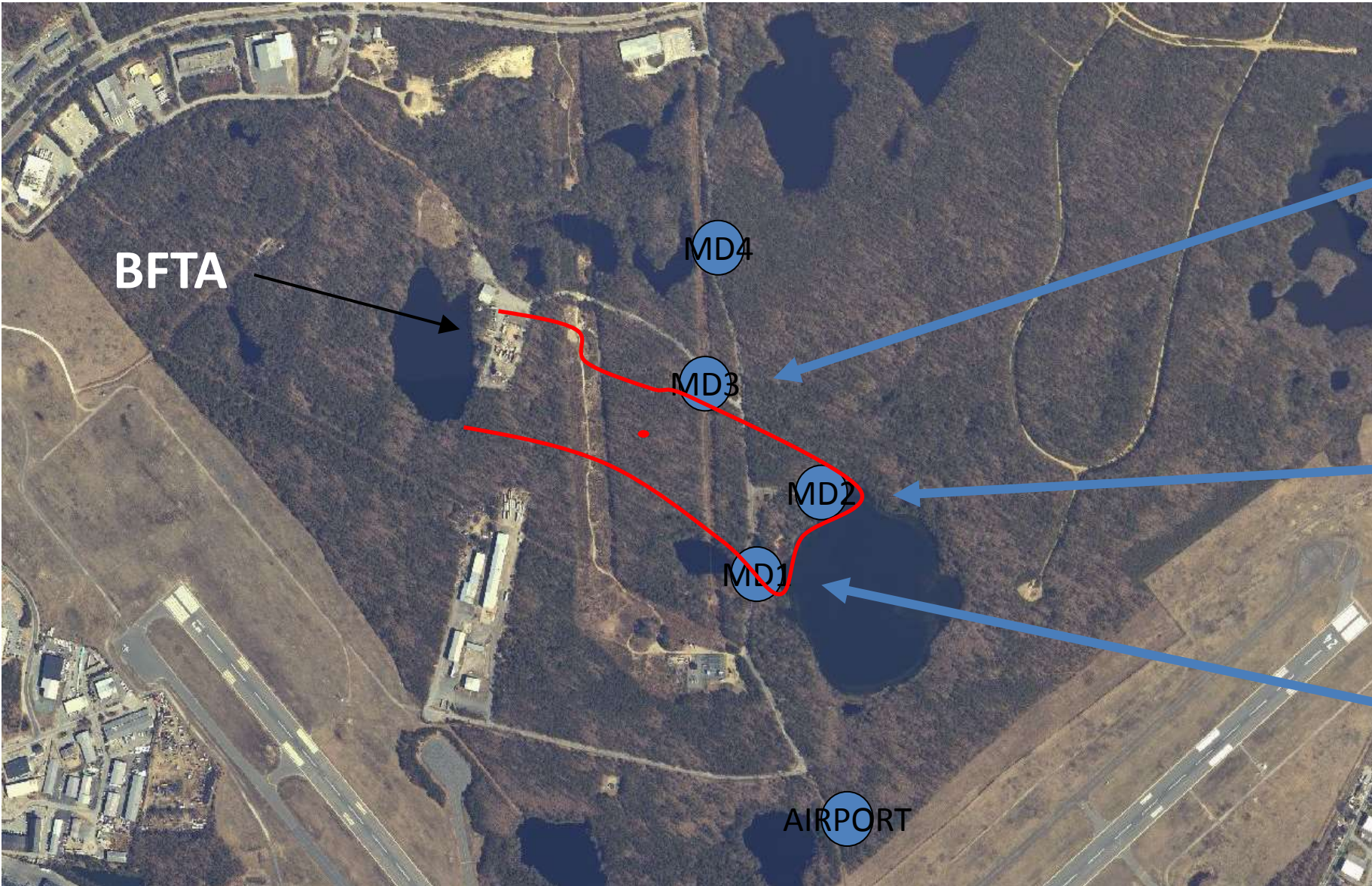
2016



2015



2015

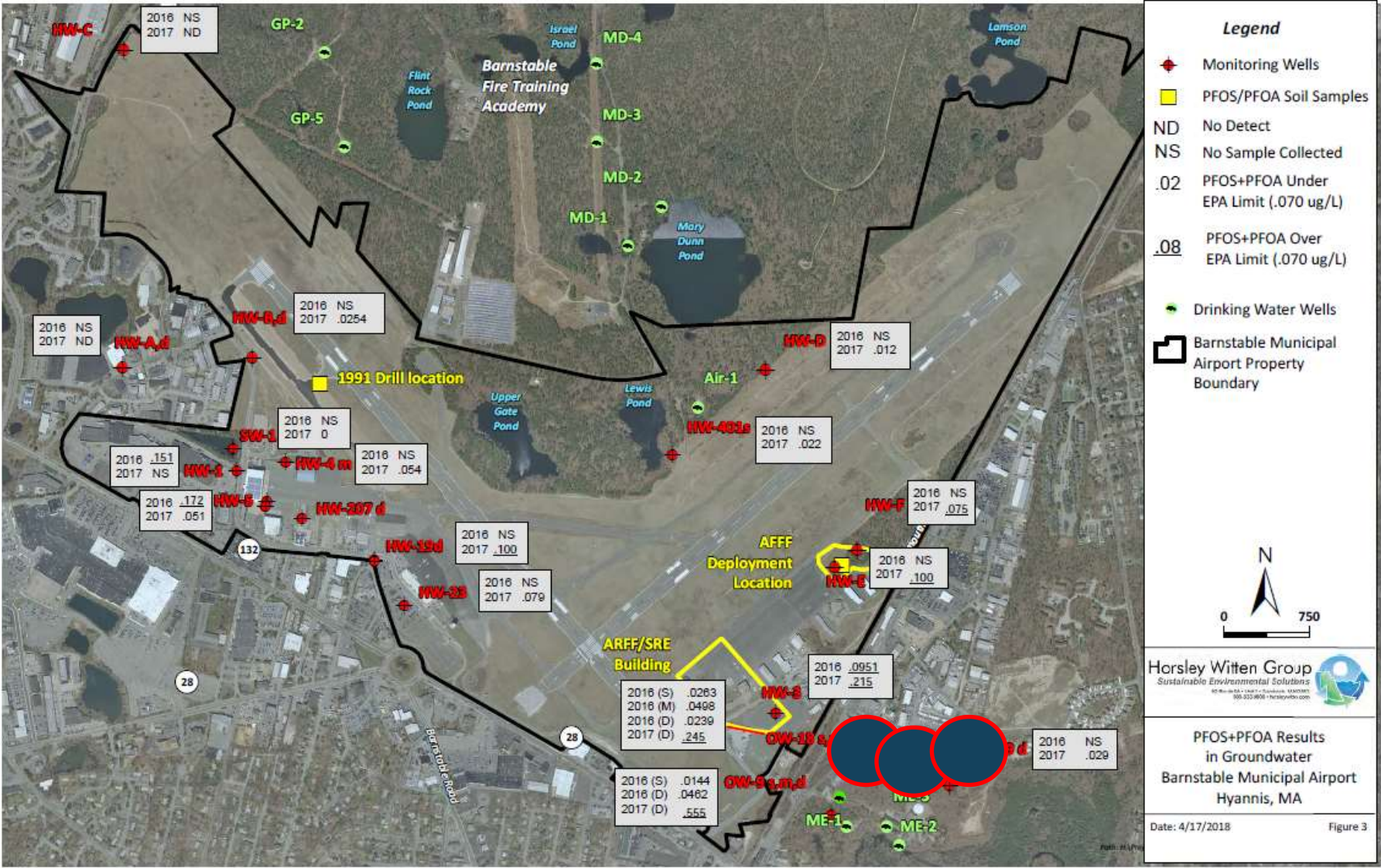




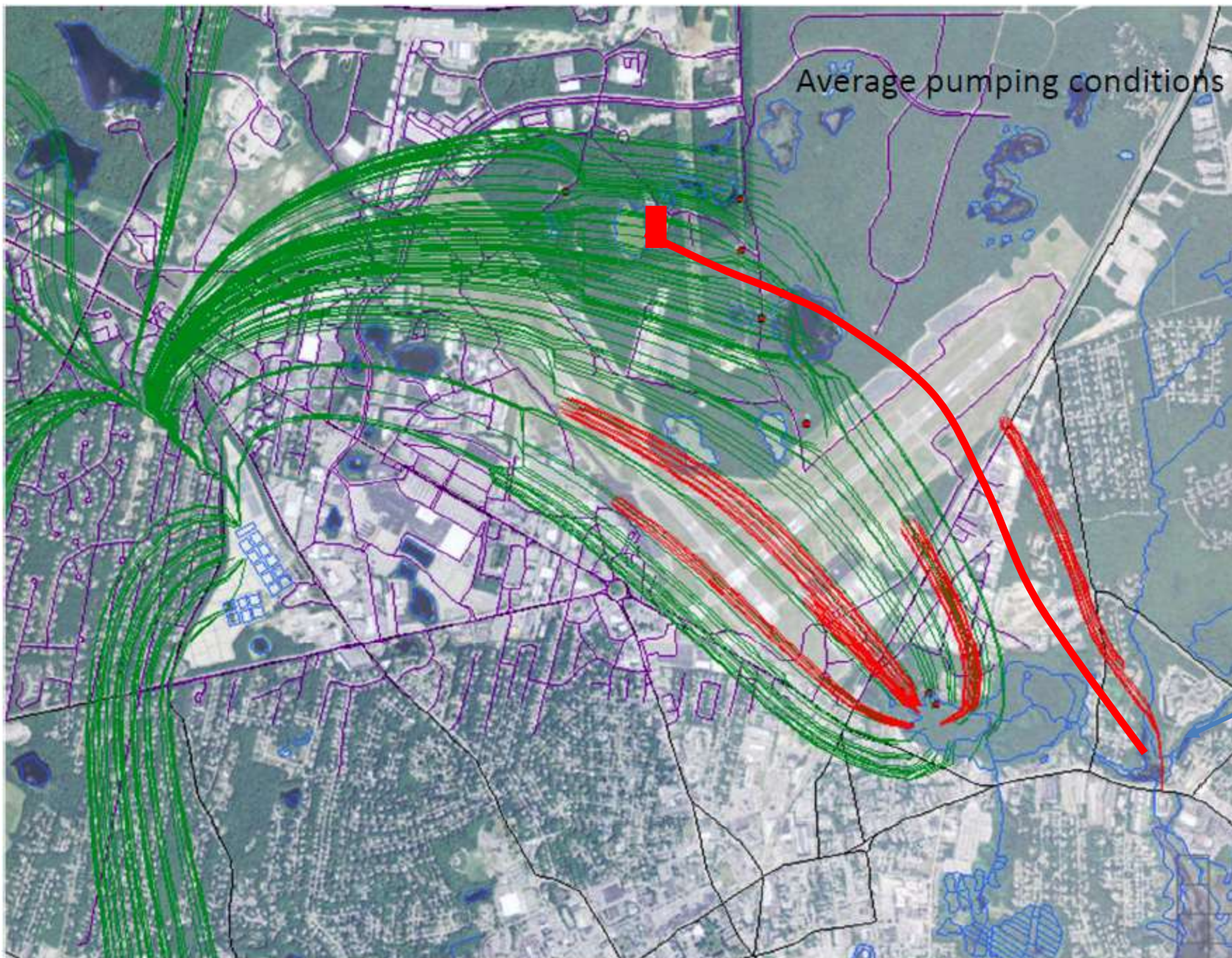
# Barnstable Municipal Airport

Low concentrations of PFAS in Soil and Groundwater

Off-site Background Soil PFOS is ND to 0.53 ug/kg







Average pumping conditions

## Two Sites and Particle Tracks

Reverse  
Forward

MILL CREEK  
Recent report  
on detection  
of PFAS and  
6:2 TF



## Wellhead Protection Areas

- Public Supply Wells
- Wellhead Protection Areas



*Cape Cod Bay*

*Nantucket Sound*

## Bourne and Mashpee Case Studies



## 2000 Tanker Truck #1

*500 gallons of AFFF*



Cape Cod Times Photograph

## 1995 Tanker Truck #2

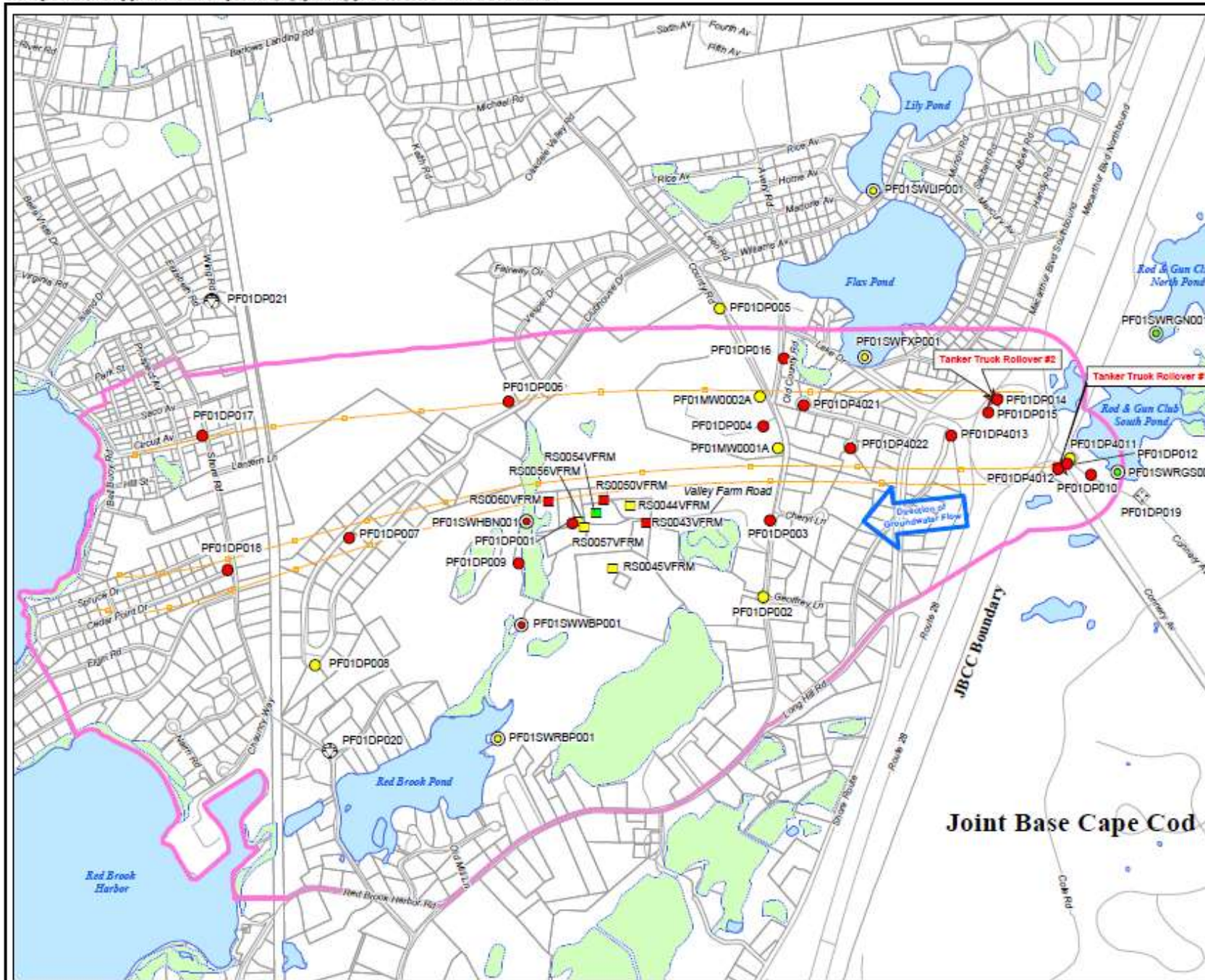
*500 gallons of AFFF*



Cape Cod Times Photograph

Tanker rollover incident, Route 28 southbound at Otis Rotary facing south, morning of September 19, 1997.





### Legend

- Outreach Area
- Parcel
- ★ Tanker Truck Rollover Site
- ↗ Recently Installed Direct Push Boring
- Joint Base Cape Cod Boundary
- Particle Track
- Proposed Direct Push Location

### Sum of PFOS/PFOA Detections in Private Wells (Based on Maximum Concentration Detected)

- Sum of PFOS and PFOA At or Below HA
- Sum of PFOS and PFOA Above HA
- No Detection

### Sum of PFOS and PFOA Detections in Groundwater

- Sum of PFOS and PFOA at or Below HA
- Sum of PFOS and PFOA Above the HA

### Sum of PFOS and PFOA Detections in Surface Water

- Sum of PFOS and PFOA Above the HA
- Sum of PFOS and PFOA At or Below the HA
- No Detection

EPA HA (PFOS + PFOA) = 0.07 µg/L  
 PFOS = Perfluorooctane Sulfonic Acid  
 PFOA = Perfluorooctanoic Acid  
 EPA HA = U.S. Environmental Protection Agency Health Advisory



Data Source:  
 AFCEC, July 2018  
 JBCC Boundary from Massachusetts Air National Guard 2011  
 2009 Aerial Photography from MassGIS

FIGURE 3

**TANKER TRUCK ROLLOVER SITES PFOS AND PFOA DETECTIONS IN GROUNDWATER**  
 AFCEC - Joint Base Cape Cod  
 29 August JBCCCT Meeting



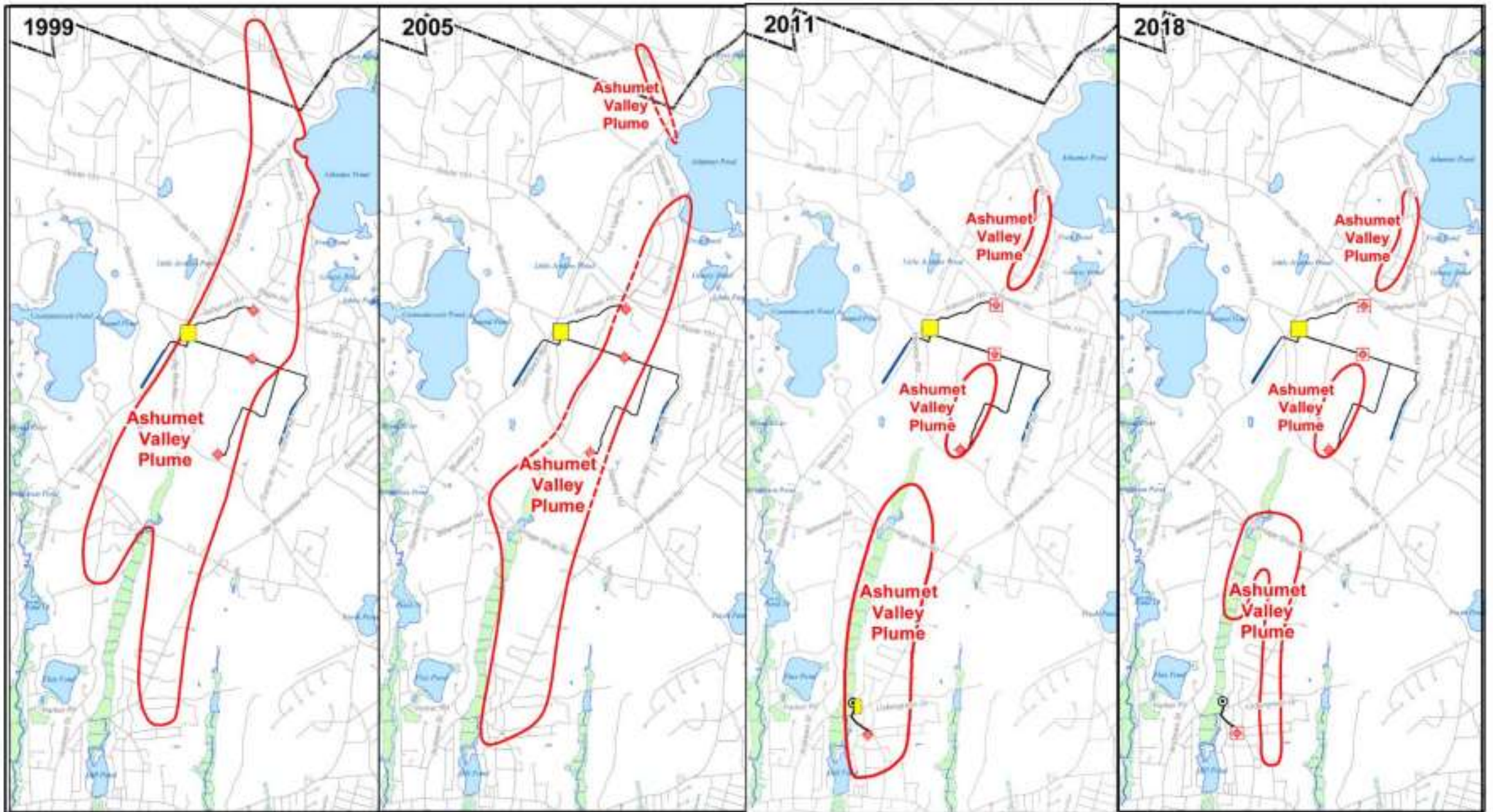
# Fire Training Area



Used for fire training from  
1958 to 1985

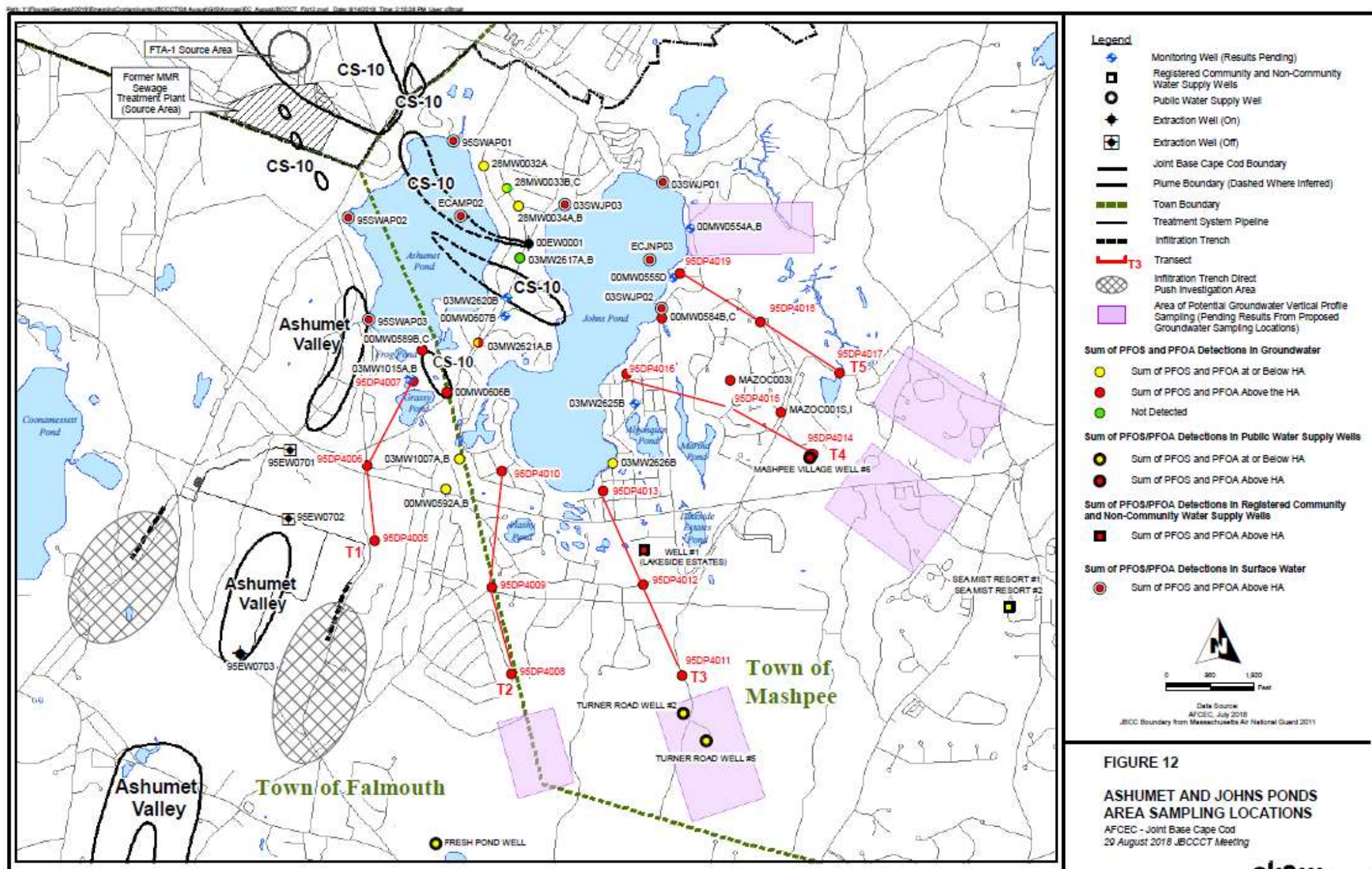


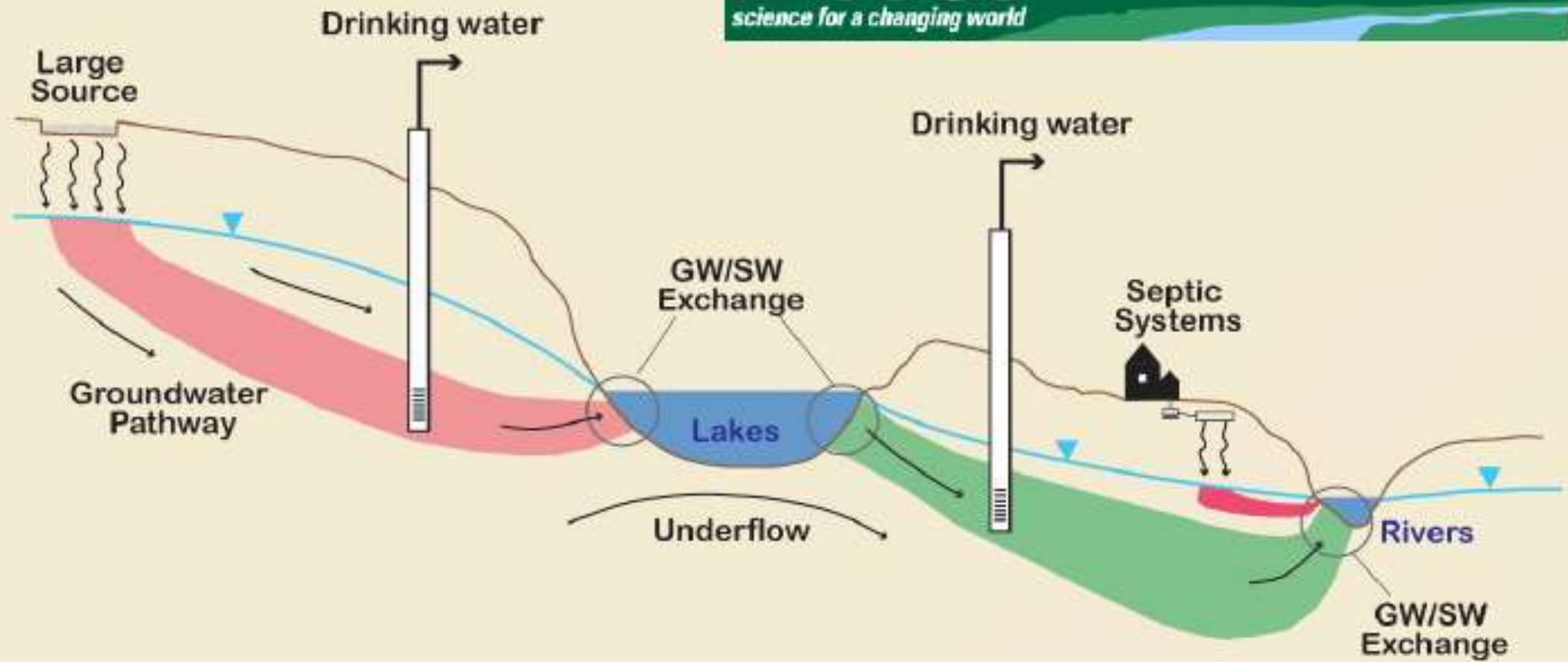
Primary source of contaminants  
in Ashumet Valley Plume



**Volatile Organic Compounds Cleanup Status from 1999 to 2015**







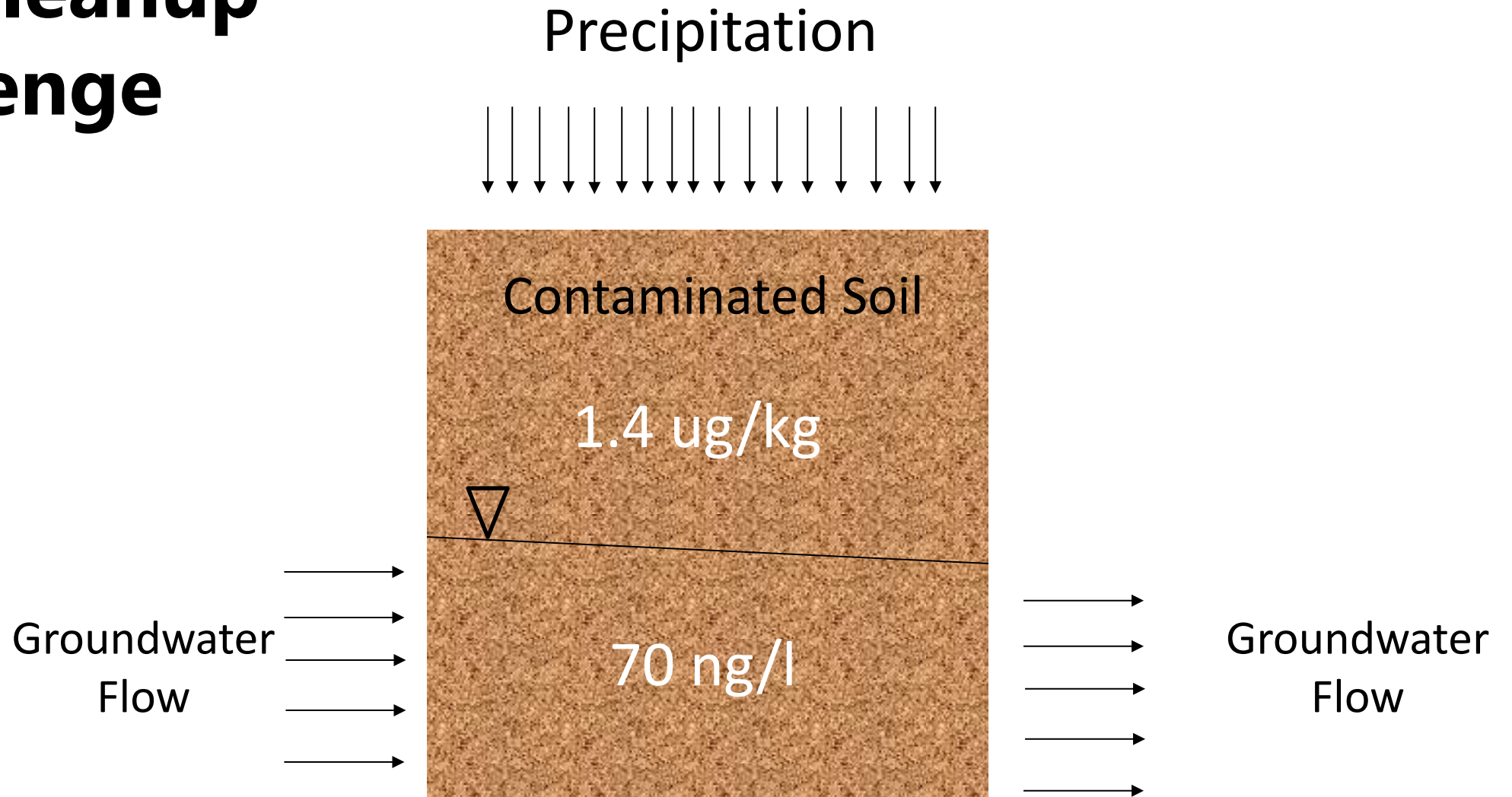


# The Changing Regulatory Environment

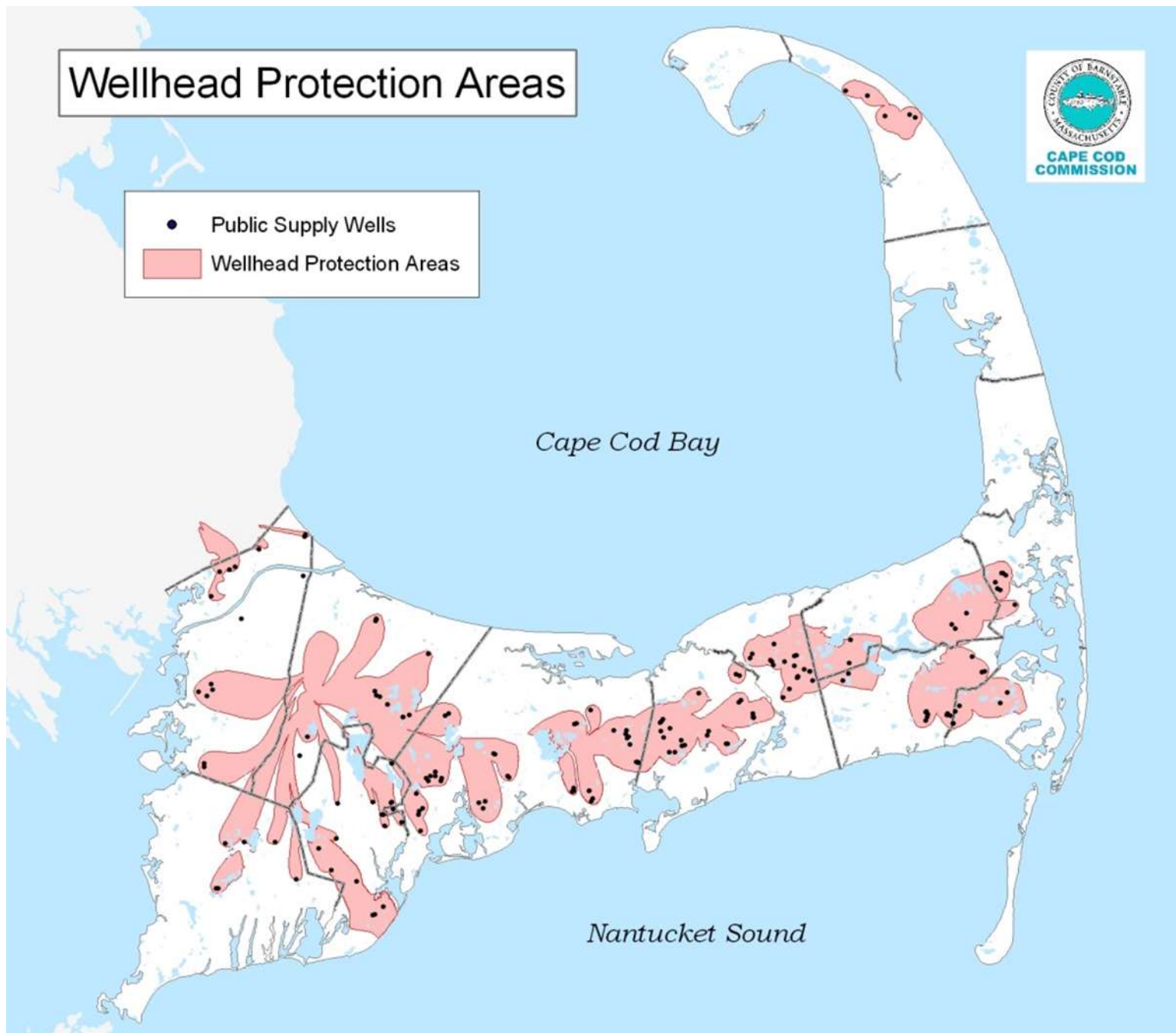
## Health Advisories

|      | <u>2009</u> | <u>2016</u>              | <u>2018</u>  |           |
|------|-------------|--------------------------|--------------|-----------|
| PFOS | 200 ng/l    | PFOS }<br>PFOA } 70 ng/l | PFOS         | } 70 ng/l |
| PFOA | 400 ng/l    |                          | PFOA         |           |
|      |             |                          | PFNA         |           |
|      |             |                          | <u>PFHxS</u> |           |
|      |             |                          | <u>PFHpA</u> |           |
|      |             |                          | PFBS         |           |

# Soil Cleanup Challenge







# Ending Thoughts

Tom Cambareri  
[www.capecodcommission.org](http://www.capecodcommission.org)