

PFAS in All Policies: *A Municipal Approach to Improving Public Health on Nantucket*

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Agenda

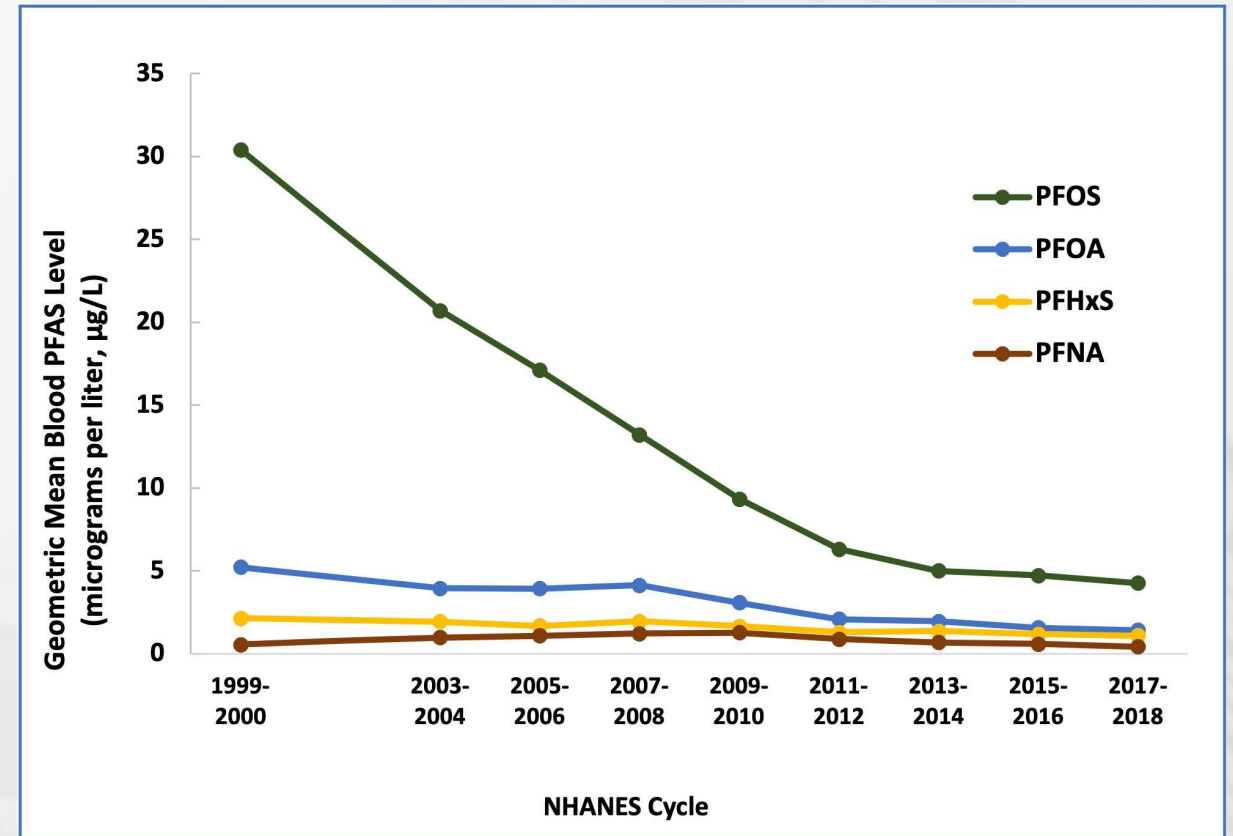
- What are PFAS?
- PFAS Exposure
- State/Federal PFAS Regulations
- Health effects of PFAS
- Environmental Contamination Administrator Role
- Private Well Regulations
- Support Across Departments
- Community Exposure Assessments
- PFAS Awareness and Education

What are PFAS?

- Per- and polyfluoroalkyl substances
- Man-made chemicals used since the 1940s
- “Forever chemicals”
- Found in :
 - Food packaging
 - Stain- and water-resistant materials
 - Cosmetic products
 - Firefighting foam
 - Drinking water
 - Living organisms

PFAS Exposure

- Since 2002, production and use of PFOS and PFOA in the U.S. have declined.
- From 1999-2000 to 2018-2019:
 - Blood PFOS levels declined by more than 85%.
 - Blood PFOA levels declined by more than 70%.



Source: [ATSDR](#)

PFAS Exposure

- 45% of U.S. taps have at least one detectable PFAS present ([Smalling et al. \(2023\)](#))
- 47%-69% of private well users in Massachusetts have at least one detectable PFAS present ([Tokranov et al. \(2024\)](#))
- 86-98% of public water supplies that rely on groundwater in Massachusetts have at least one detectable PFAS present ([Tokranov et al. \(2024\)](#))
- At least 172 public water systems in 96 Massachusetts cities and towns have exceeded the state's drinking water standard for PFAS ([PIRG](#))
- 98% of Americans have PFAS in their blood (CDC)

State PFAS Regulations

- Massachusetts Maximum Contaminant Level (MMCL) for public drinking water supplies: 20 parts per trillion (ppt) for PFAS6 (the sum of PFOA, PFOS, PFHxS, PFNA, PFHpA, PFDA)
- Massachusetts Contingency Plan (MCP) reportable concentration: same as MMCL

Federal PFAS Regulations

- Federal – EPA’s Maximum Contaminant Levels (MCLs) – initial testing required by 2027, compliance by 2029
- “The MCLG represents the level below which adverse health effects over a lifetime of exposure are not expected to occur, including for sensitive populations and life stages, and with an adequate margin of safety.”

Compound	Final MCLG	Final MCL (enforceable levels) ¹
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

¹ Compliance with MCLs is determined by running annual averages at the sampling point.

Health Effects of PFAS – PFOA

- EPA Human Health Toxicity Assessment

Health Effects Identified for PFOA

The EPA's systematic review of over [780 human and animal health studies](#) demonstrated PFOA exposure elicits adverse noncancer and cancer health effects (see table below). Consistent with [EPA's Guidelines for Carcinogen Risk Assessment](#), the EPA concluded that **PFOA is Likely to Be Carcinogenic** to Humans via the oral route of exposure.

	 Immune	 Developmental	 Cardiovascular	 Liver	 Cancer
Effects observed in human studies	↓ Vaccine response in children	↓ Infant birth weight	↑ Serum lipids (total cholesterol and LDL) ↑ Blood pressure in adults	↑ Serum liver enzymes (ALT) indicative of liver damage in adults	Kidney and testicular cancer in adults
Effects observed in animal studies	↓ Immune response	↓ Pup survival ↓ Fetal and pup body weight Delayed developmental timing	Change in serum lipids	↑ Liver cell death and serum liver enzymes (ALT) indicative of liver damage	Testicular, pancreatic, and liver tumors

Health Effects of PFAS – PFOS

- [EPA Human Health Toxicity Assessment](#)

Health Effects Identified for PFOS

The EPA's systematic review of over [700 human and animal health studies](#) demonstrated PFOS exposure elicits adverse noncancer and cancer health effects (see table below). Consistent with [EPA's Guidelines for Carcinogen Risk Assessment](#), the EPA concluded that **PFOS is Likely to Be Carcinogenic** to Humans via the oral route of exposure.

	 Immune	 Developmental	 Cardiovascular	 Liver	 Cancer
Effects observed in human studies	↓ Vaccine response in children	↓ Infant birth weight ↑ Risk of preterm birth ↓ Gestational age	↑ Serum lipids (total cholesterol and LDL) ↑ Blood pressure in adults	↑ Serum liver enzymes (ALT) indicative of liver damage in adults	Liver cancer in adults
Effects observed in animal studies	↓ Immune response ↑ Toxicity on the immune system	↓ Pup survival ↓ Fetal and pup body weight	Changes in serum lipids	↑ Liver cell death and serum liver enzymes (ALT) indicative of liver damage	Liver, pancreatic, and thyroid tumors

International Agency for Research on Cancer

World Health
Organization

IARC MONOGRAPHS VOL. 135
PERFLUOROOCTANOIC ACID (PFOA) AND
PERFLUOROOCTANESULFONIC ACID (PFOS)
(7–14 NOVEMBER 2023)

IARC GROUP

MAIN USES

EXPOSURE

PFOA

PFOS

Group 1
Carcinogenic to humans

Sufficient evidence for cancer in animals and strong mechanistic evidence in exposed humans:

Epigenetics Immunosuppression

Limited evidence for cancer in humans
(for renal cell carcinoma and testicular cancer)

Group 2B
Possibly carcinogenic to humans

Strong mechanistic evidence in exposed humans:

Epigenetics Immunosuppression

Historically, production of fluoropolymers and stain-, oil-, and water-resistant surface treatments.

Today, uses are limited by the Stockholm Convention and other regulations.

Historically, manufacture of electric and electronic parts, stain-, oil-, and water-resistant surface treatments, and firefighting foams.

Today, uses are limited by the Stockholm Convention and other regulations.

General population, mainly by contaminated drinking-water and food, and potentially consumer products.

Workers producing and using fluorochemicals.

General population, mainly by contaminated drinking-water and food, and potentially consumer products.

Workers producing and using fluorochemicals, and firefighters.

Health Effects of PFAS – Vulnerable Populations (National Academies of Sciences, Engineering, and Medicine)

- Pregnant and nursing women
 - “Current science suggests the benefits of breastfeeding or providing human milk outweigh potential risks of PFAS” (Source: [ATSDR](#))
- Young children
- Immunocompromised

Environmental Contamination Administrator Role

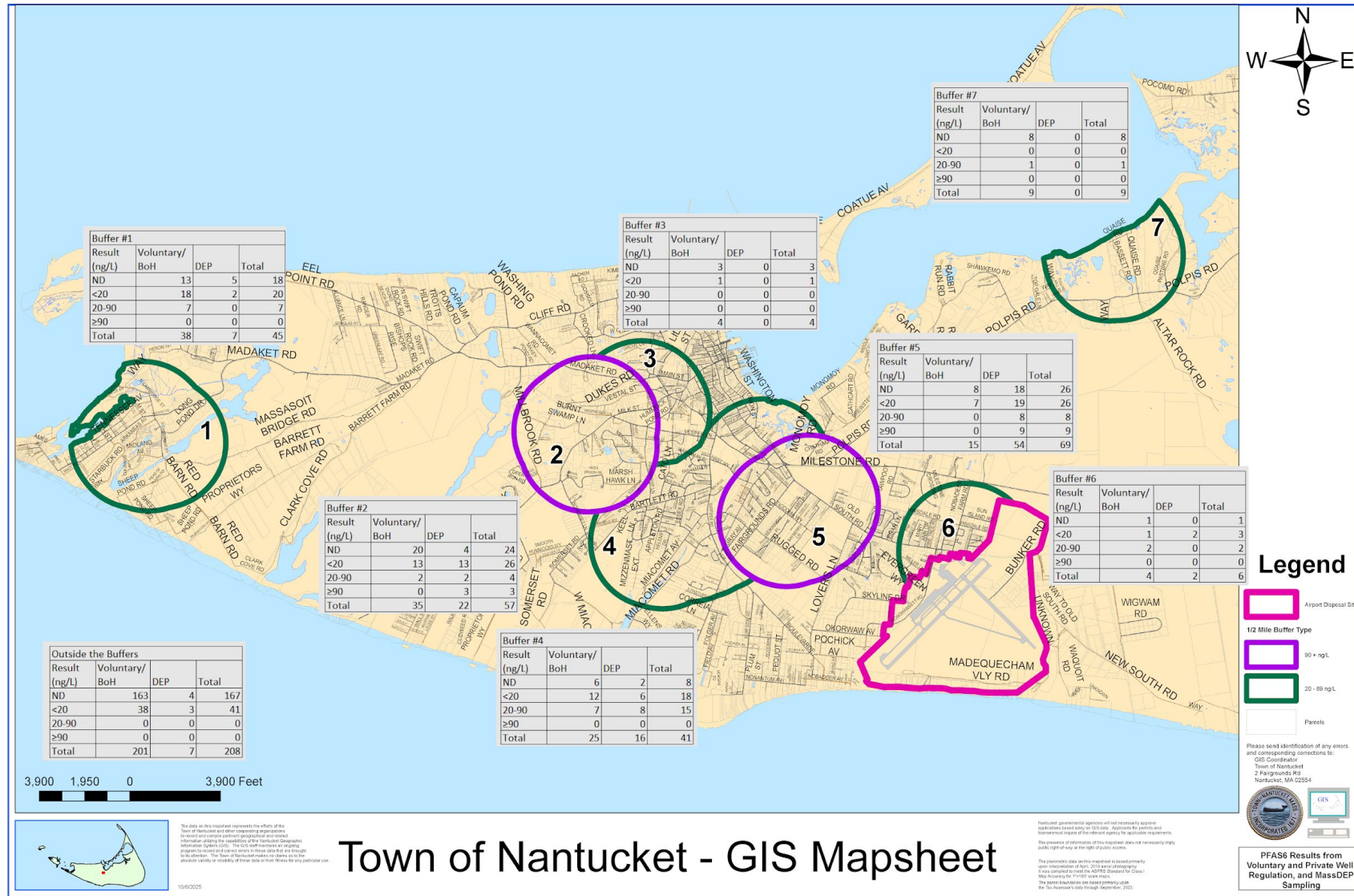
1. Implement and promote private well regulations
2. Provide technical support across departments with a focus on health risk
3. Conduct community exposure assessments
4. Increase PFAS awareness and education

Nantucket Well Regulations

Nantucket regulations §386:

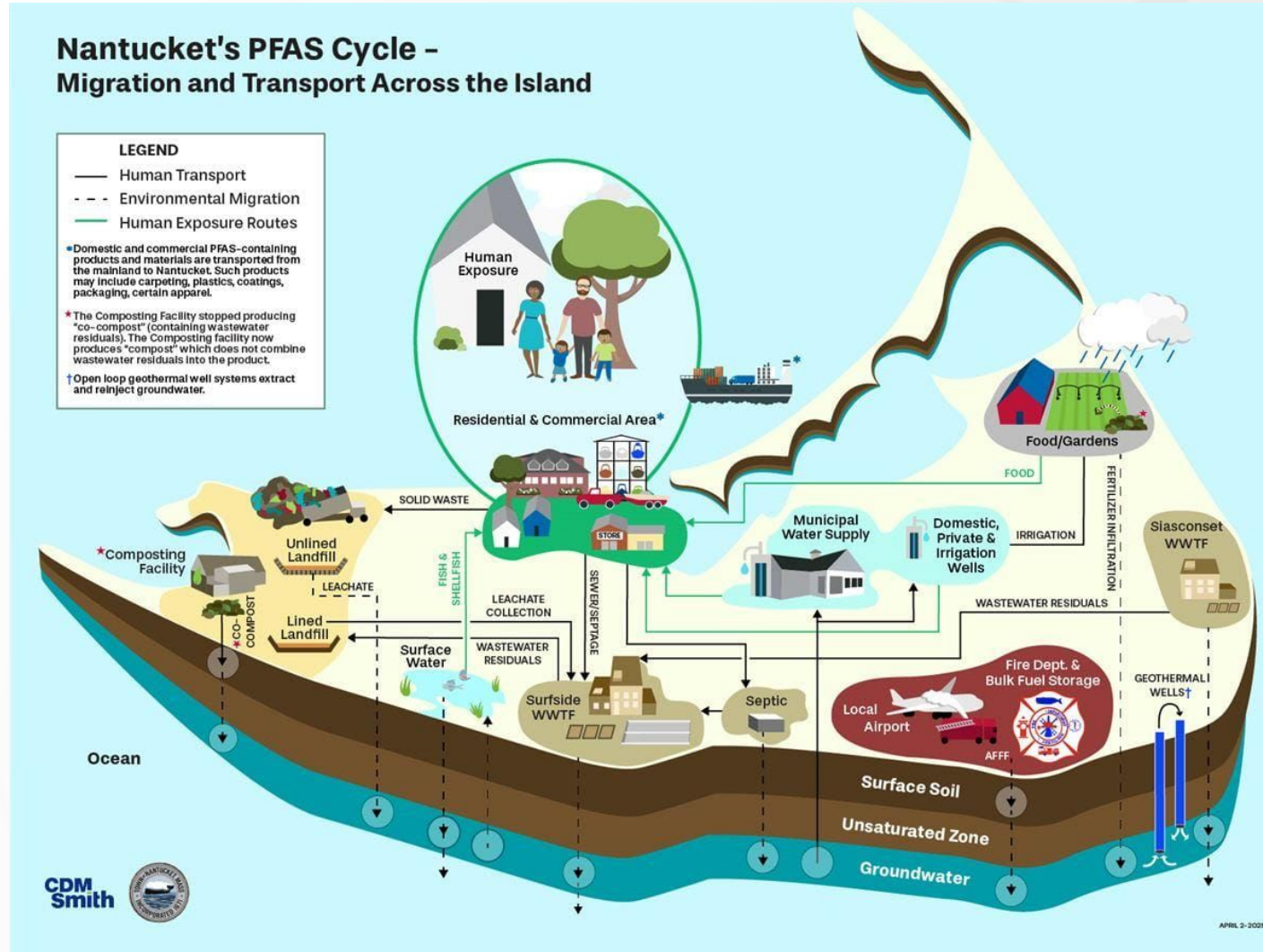
“Prior to selling, conveying, or transferring title to real property, the owner shall have tested the water of every private drinking water well serving that property. A water sample from each well shall be submitted to a Massachusetts certified laboratory for testing for the parameters listed in the water quality section of this document. This water quality testing shall have been performed not more than **one year prior to transfer of the property. Results of the water quality testing shall be submitted to the Board of Health prior to property.”**

Nantucket Well Regulations



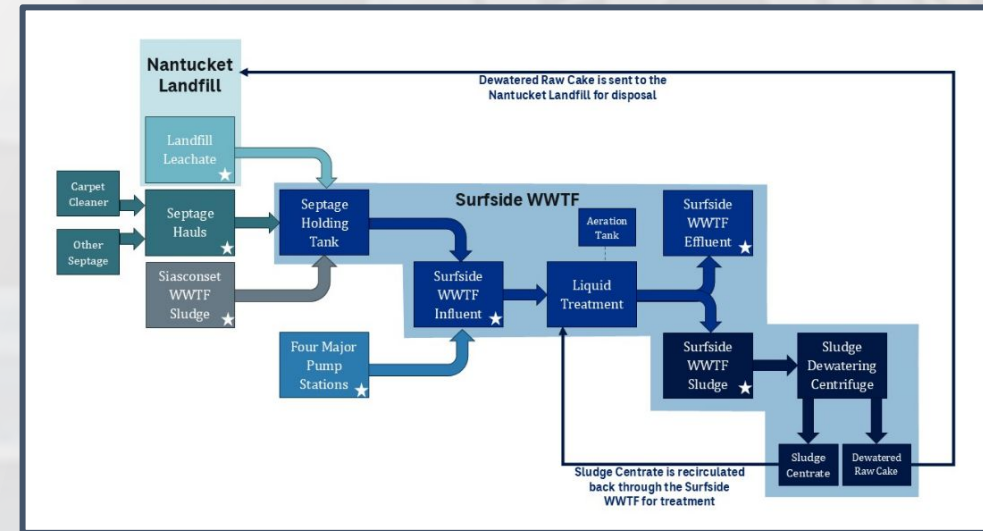
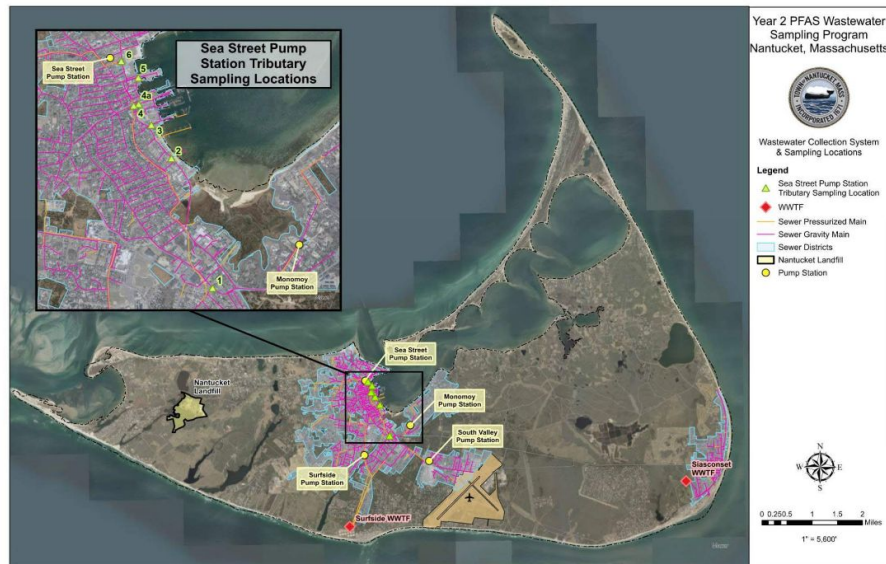
Town of Nantucket - GIS Mapsheet

Technical Support Across Departments



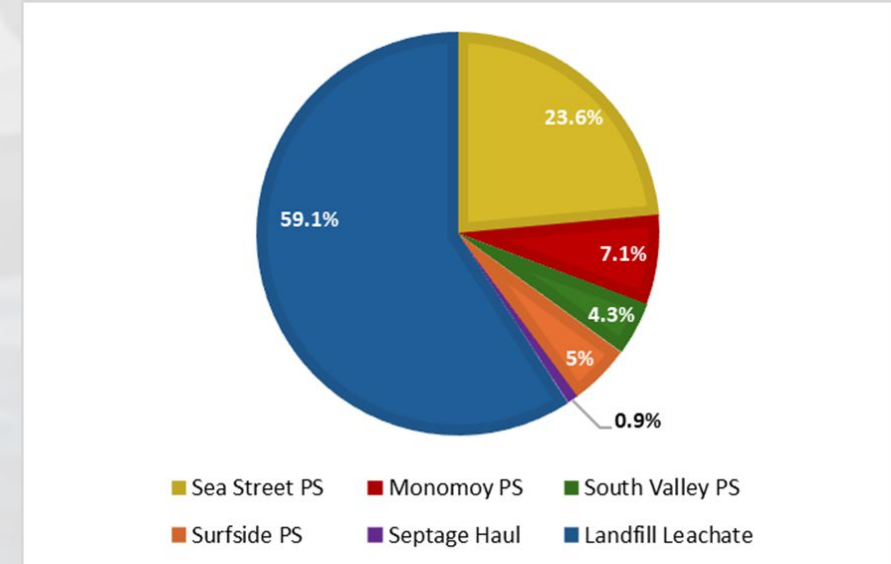
Technical Support Across Departments (Wastewater)

- Objectives:
 - Identify PFAS sources contributing to the Surfside WWTF



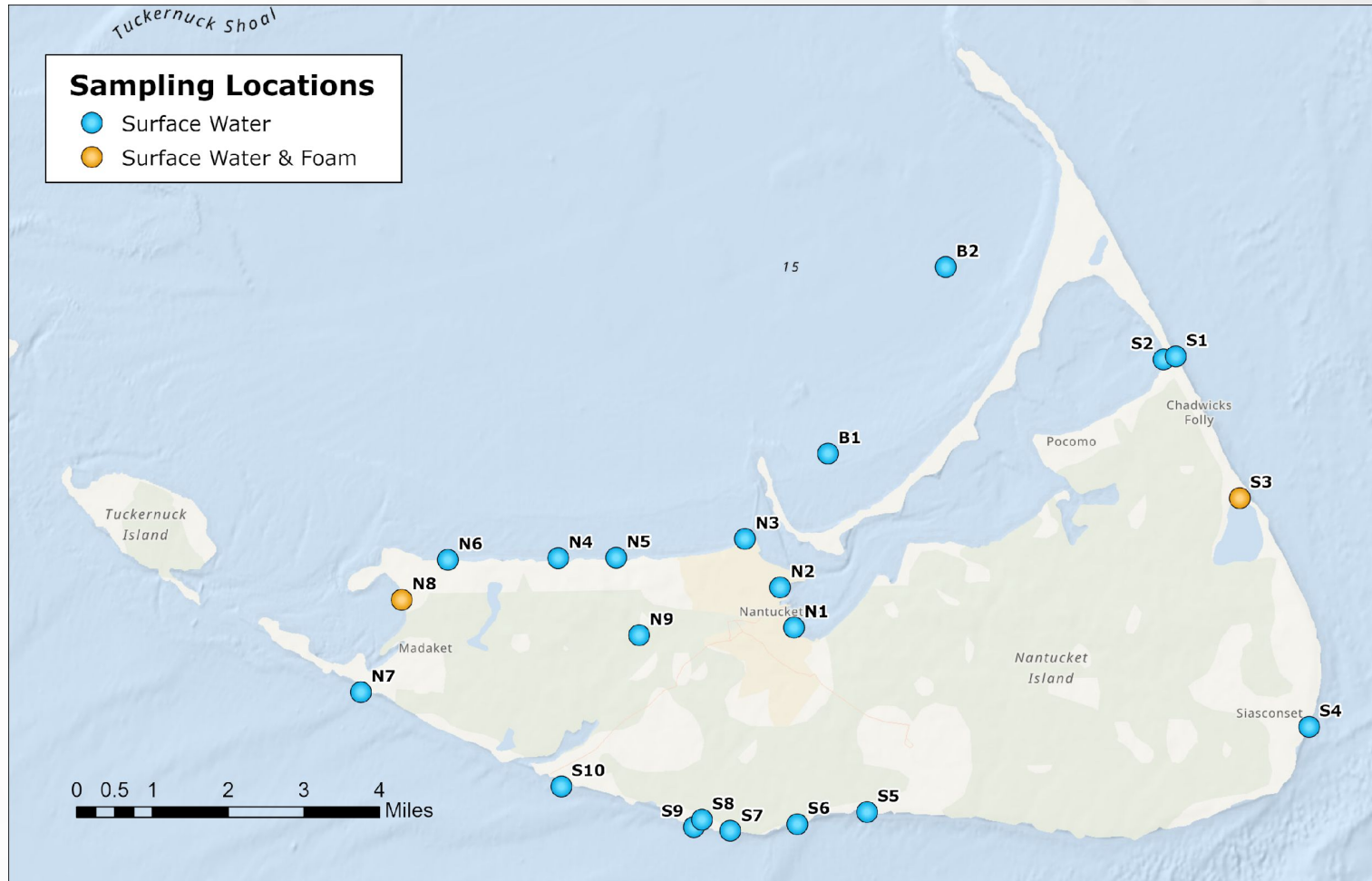
Technical Support Across Departments (Wastewater)

- Accomplishments:
 - Year 4 sampling underway
 - Establishment of a path forward for source identification and mitigation
 - Bench-scale study revealed potential opportunity to treat WWTF dewatering centrate to avoid recirculating PFAS
 - Foam fractionation of landfill leachate is viable for long-chain PFAS (including Massachusetts PFAS6)
- Next Steps:
 - Evaluate technologies by bench-scale study for PFAS removal from dewatering centrate
 - Move forward with on-site pilot of foam fractionation of landfill leachate



PFAS influent sources to Surfside WWTF

Community Exposure Assessments (Surface Water and Foam)



Community Exposure Assessments (Surface Water and Foam)

- In May 2024, MA DPH published its *Operational Guidance for Bathing Beaches at PFAS-Impacted Waterbodies*
 - Establishes initial screening values of 20 ppt for eight individual PFAS
- 7/8 – First round of sampling. PFAS detected in some samples, but none over MA DPH surface water action levels
- 8/21 – provided update to BOH based on first round of sampling
- 8/22 – issued foam advisory
- 8/26 – second round of sampling completed

PFAS Awareness and Education

- PFAS Newsletter | www.nantucket-ma.gov/PFAS
- Instagram
- Twitter / X
- Newspaper
- Radio
- Select Board public updates
- Board of Health public updates
- Regular website updates
- Town Manager's Earth Day e-News – How to Shop PFAS-Free
- Following up on every PFAS test ordered through Barnstable Water Quality Laboratory
- Internal Communications – PFAS-Free purchasing for Town procurement, based on Massachusetts Operational Services Division
 - *PFAS Free Buying Guide* - <https://www.mass.gov/news/pfas-free-buying-guide>
 - *Environmentally Preferable Products and Services Guide* - <https://www.mass.gov/doc/environmentally-preferable-products-and-services-guide/download>
- PFAS Community meetings
 - 11/17 – Dr. Laurel Schaider (Silent Spring Institute) on PFAS Exposure Reduction
 - 12/11 – Dr. Tamarra James-Todd (Harvard School of Public Health) on PFAS Health Effects

Questions?

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