

# PFAS in Wastewater

Advancing Source Control by Understanding the PFAS Cycle on Nantucket

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# Presentation Outline

- Why assess PFAS on Nantucket?
  - Importance of Public Communication
- The Assessment Phase
- Building a Community-specific PFAS Cycle
  - Working to “break” the PFAS Cycle
- Wastewater and Biosolids on the Island
  - Current Practices and Issues
  - Program to Identify PFAS Sources to the WWTF
  - Preliminary Findings
- Next Steps





Why assess PFAS on Nantucket?



## About Nantucket

- Located 30 miles off the south coast of Cape Cod
- Solely dependent on the infrastructure and resources existing within 48 square miles
- Population of around 14,000 swells to around 80,000 or more in the summer
- Drinking water is dependent on **Sole Source Aquifer**
- Protection of the aquifer and public health is a top priority
- Municipal drinking water supply and approximately 4,500 private wells on Nantucket
- Participated on UMass/DEP drinking water monitoring program for PFAS



### EPA **Sole Source Aquifer** definition:

- Aquifer supplies at least 50% of the drinking water for its service area
- No reasonable available alternative drinking water sources should the aquifer become contaminated



# Risk Communication and Public Outreach

- Goal
  - Keeping the public informed and being transparent
- Action
  - Formal Public Outreach Plan
  - Response to public inquires and FAQs
  - Town website content [www.nantucket-ma.gov/pfas](http://www.nantucket-ma.gov/pfas)
  - Meeting/sharing info with public interest/action groups
  - Infographics for public education on PFAS related projects
  - Fact Sheets: island wide assessment, compost, and domestic well sampling
- Accomplishments
  - Public and Town multi-department collaboration
  - Collaboration with community groups
  - Support and funding for projects and future projects





## The Assessment Phase





# Project Objectives

- Develop a unified PFAS management plan for the Town focused on protecting the groundwater resources of Nantucket, which provide drinking water to residents, visitors, and businesses
- Create a public outreach plan to inform residents and ensure consistent communication
- *Long-Term Goal:* Develop and implement a PFAS source control and reduction plan to reduce risks associated with PFAS releases into the environment

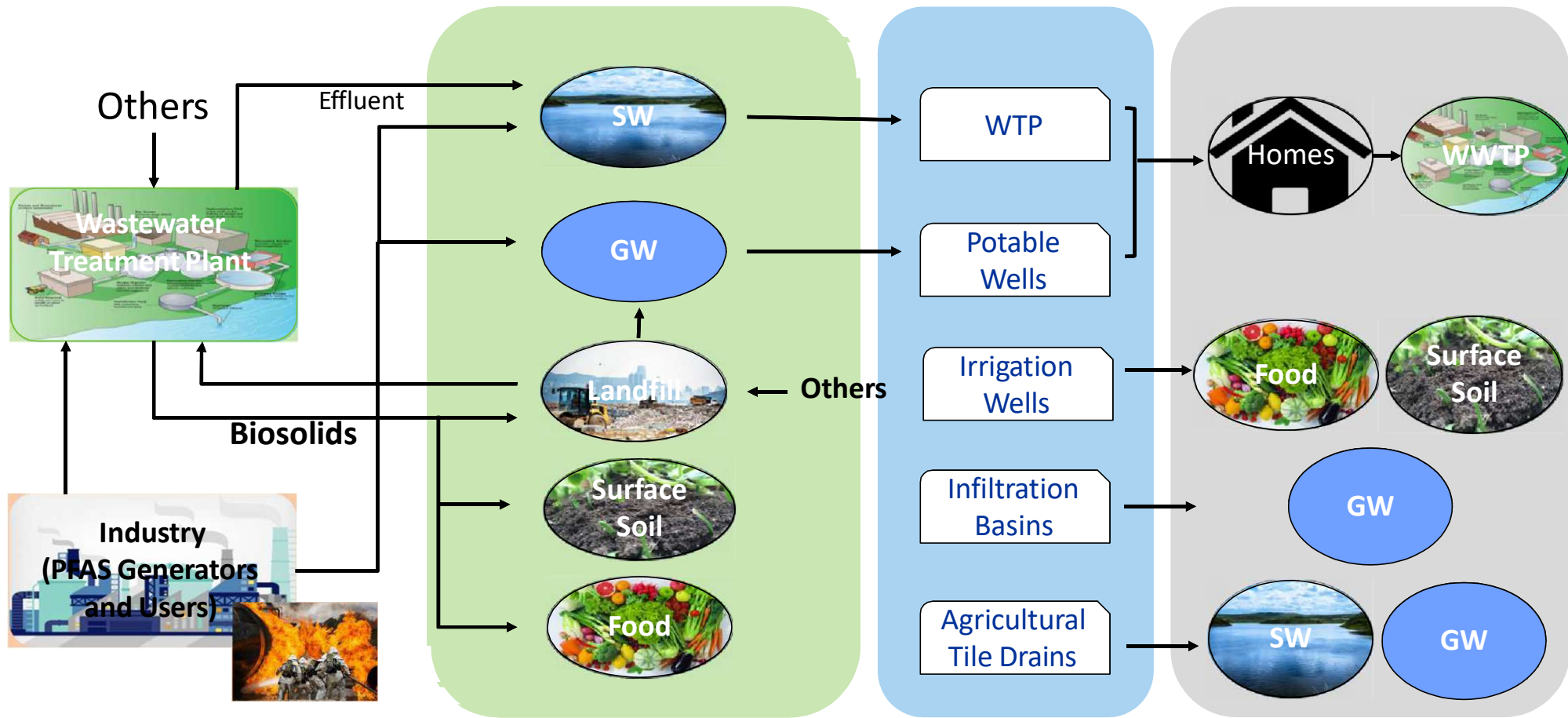
## PFAS Fire Fighting Foams



## Domestic PFAS Sources



# PFAS Cycle





# Building a Community-specific PFAS Cycle for Nantucket

- Where is PFAS potentially present?
- What are the potential receptors?
- How are these sources, handlers, and receptors connected?
- Build the PFAS Cycle

## Where are PFAS occurring on Island?

### Potential Sources



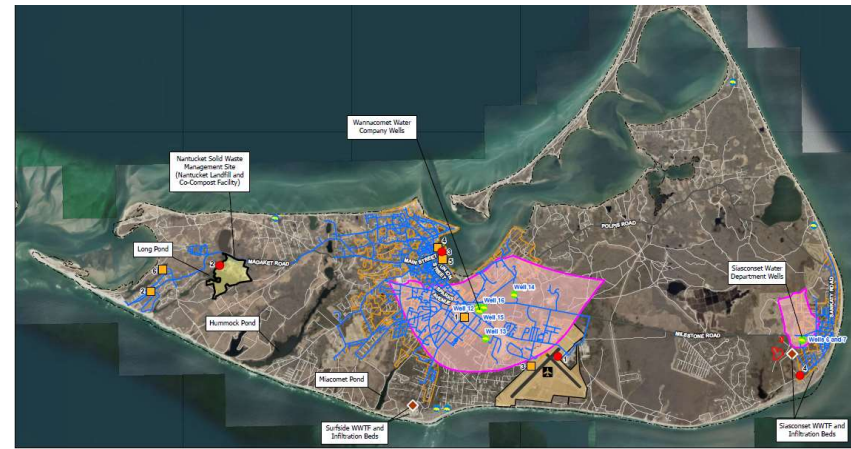
### Waste Receivers/Handlers



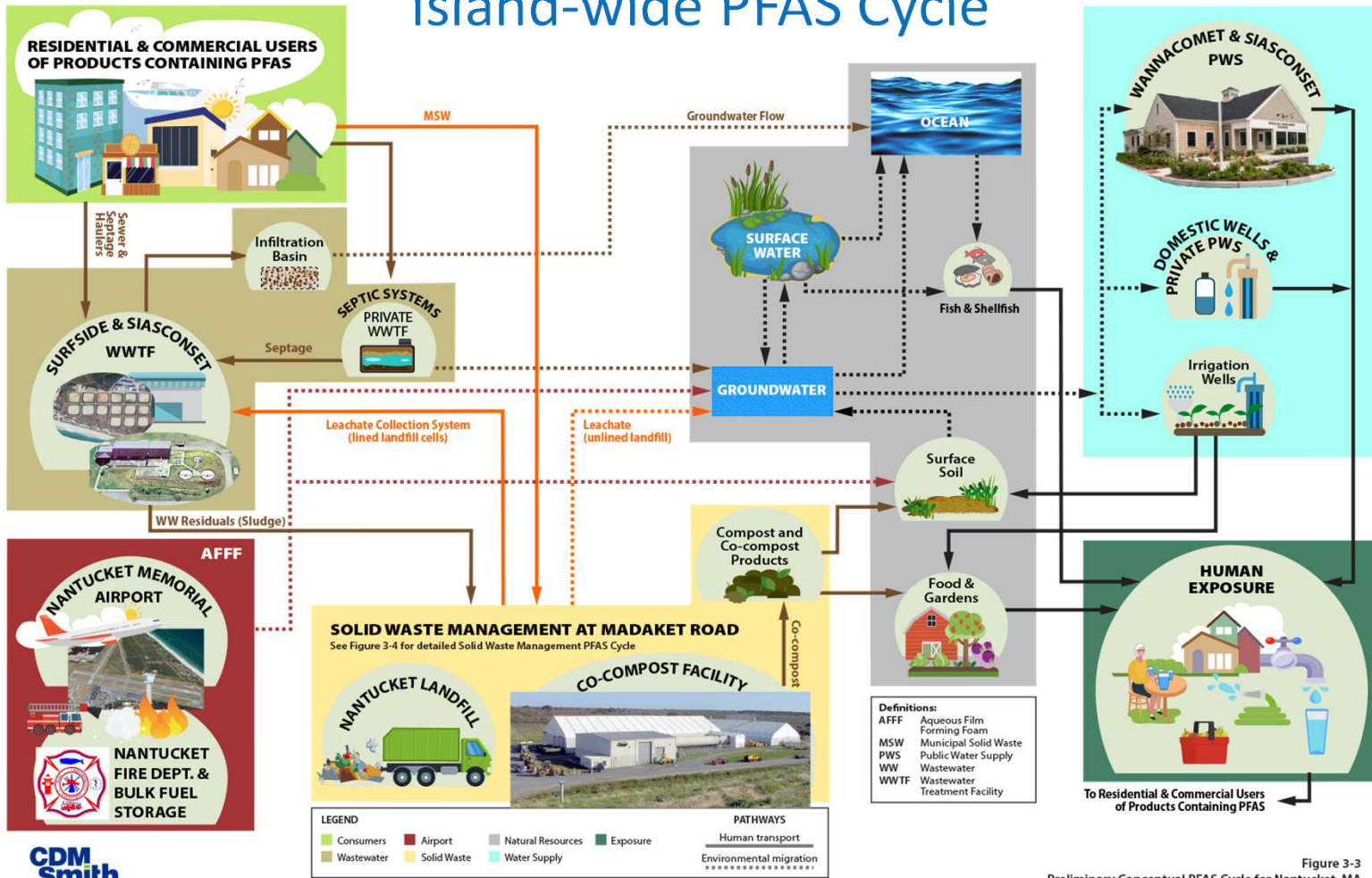
# Qualitative Assessment of PFAS Concerns

*The assessment focused on potential PFAS Sources, Receivers/Handlers, and Receptors*

Area of Assessment	Potential PFAS Source	Impacted Media	Potential Receptors
Airport	Past AFFF use	DW, GW, Soil	<ul style="list-style-type: none"> <li>Domestic Wells near Airport</li> </ul>
Compost Use at Residents/Businesses	Compost comprised of WWTF residuals and MSW	Soil, GW	<ul style="list-style-type: none"> <li>Gardening and human consumption</li> <li>Drinking Water Wells</li> </ul>
Municipal Fire Protection and Fire Suppression Systems	Class B Foams	GW, SW, DW, Soil	<ul style="list-style-type: none"> <li>Drinking Water Wells</li> </ul>
Private Septic Systems	PFAS containing consumer products	GW	<ul style="list-style-type: none"> <li>Drinking Water Wells</li> </ul>
Solid Waste Management	Unlined Landfilled MSW and onsite soil and compost piles	GW, SW, DW, Soil	<ul style="list-style-type: none"> <li>Domestic Wells</li> <li>Fish &amp; shellfish in Long Pond</li> <li>Wetlands biological species</li> </ul>
WWTF Effluent and Residuals	<ul style="list-style-type: none"> <li>- Sewer collection</li> <li>- Septage haulers</li> <li>- Landfill leachate</li> </ul>	Residuals - > compost	Refer to Compost
		WWTF discharge -> GW	<ul style="list-style-type: none"> <li>Ocean</li> <li>Private public supply wells near Surfside WWTF infiltration beds</li> </ul>
Municipal Wellhead Protection Area	Unknown	DW, GW	<ul style="list-style-type: none"> <li>Municipal wells</li> </ul>



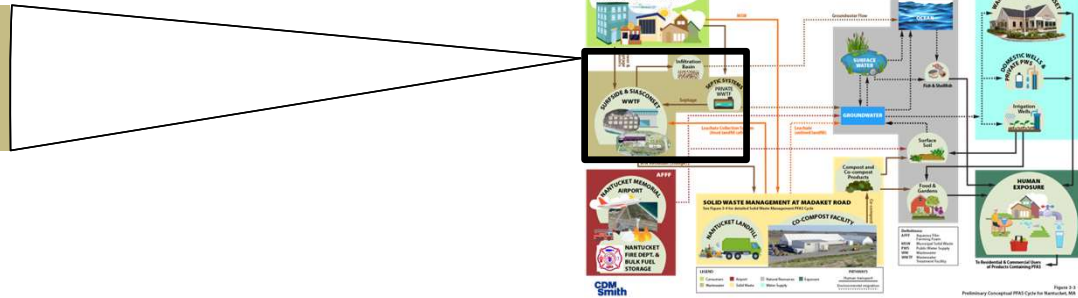
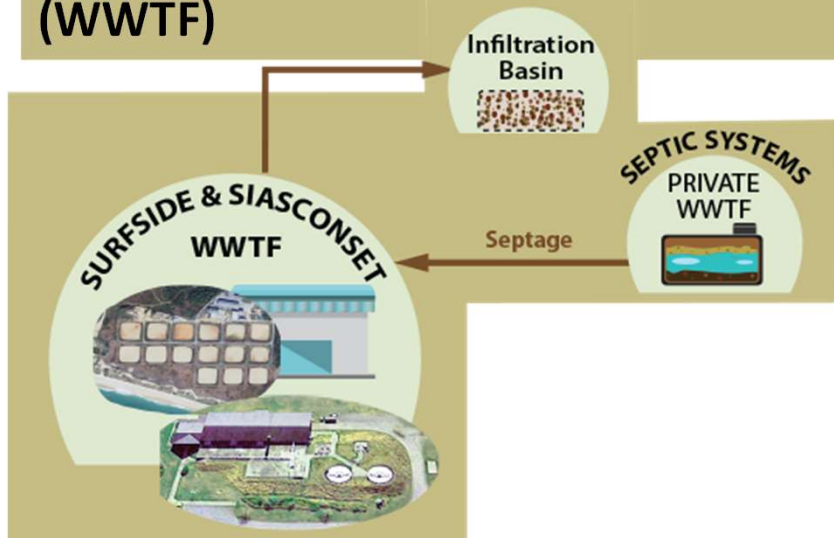
# Island-wide PFAS Cycle



- Sources
- Handlers and/or Transporters
- Receptors
- Pathways

Figure 3-3  
Preliminary Conceptual PFAS Cycle for Nantucket, MA

# Surfside Wastewater Treatment Facility (WWTF)



- **Goals**
  - Identification and management of PFAS at the Surfside WWTF
- **Actions**
  - Decision matrix and sampling plan
  - Evaluation of PFAS destruction technologies
- **Accomplishments**
  - Sampling program underway
  - Identification of contributions to WWTF
  - Path forward for source identification and mitigation



## Wastewater and Biosolids on the Island





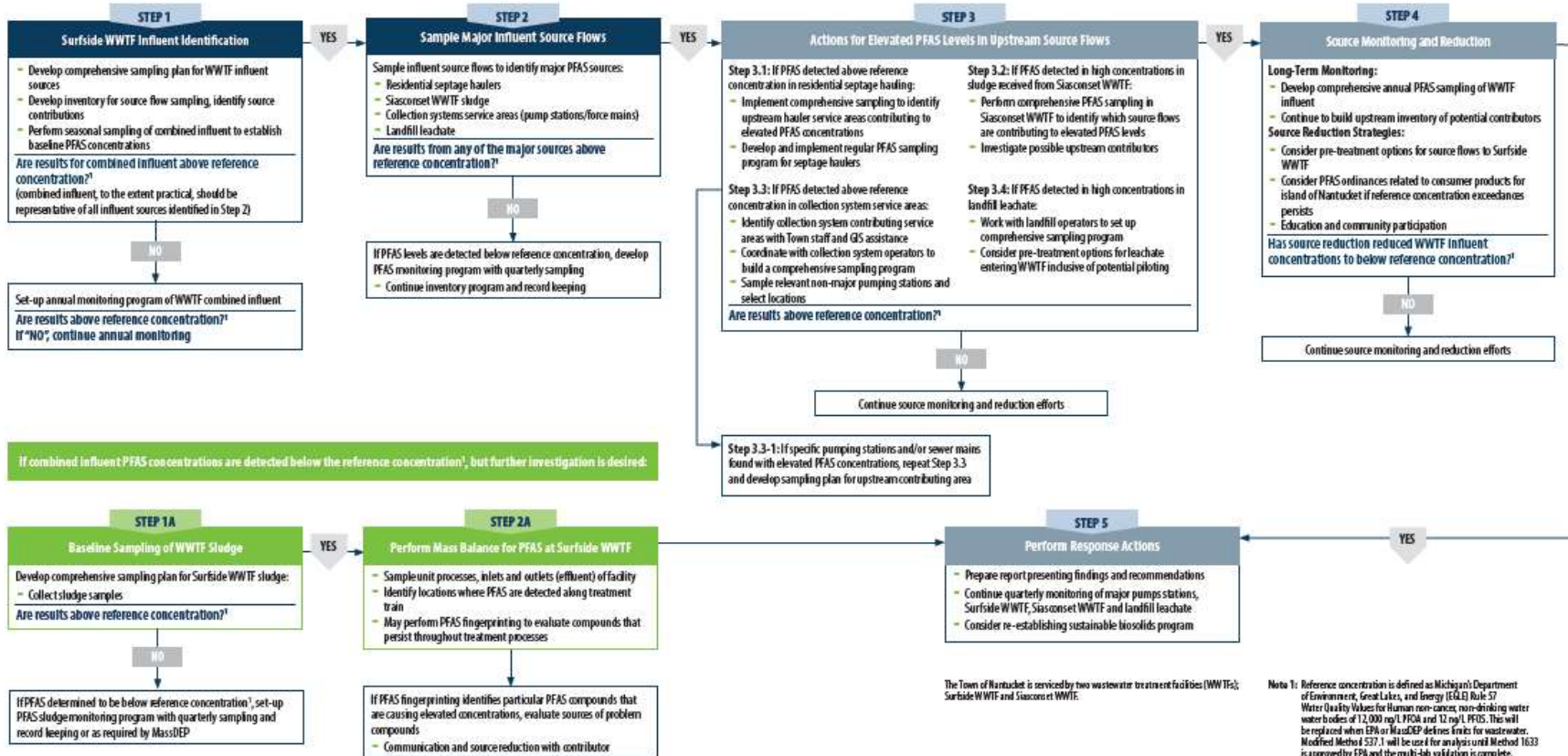


# Decision Matrix for Nantucket Wastewater Treatment PFAS Assessment | Town-wide PFAS Assessment | Town of Nantucket, MA



**Purpose:** Establish a long-term program to identify and assess PFAS sources to the wastewater treatment facility (WWTF) such that influent concentrations can be understood, and plans can be directed towards the goal of identifying, building a baseline of, and reducing PFAS concentrations.

## WASTEWATER TREATMENT PFAS ASSESSMENT



CONTINUED IMPLEMENTATION OF ISLAND-WIDE PFAS PUBLIC OUTREACH PLAN

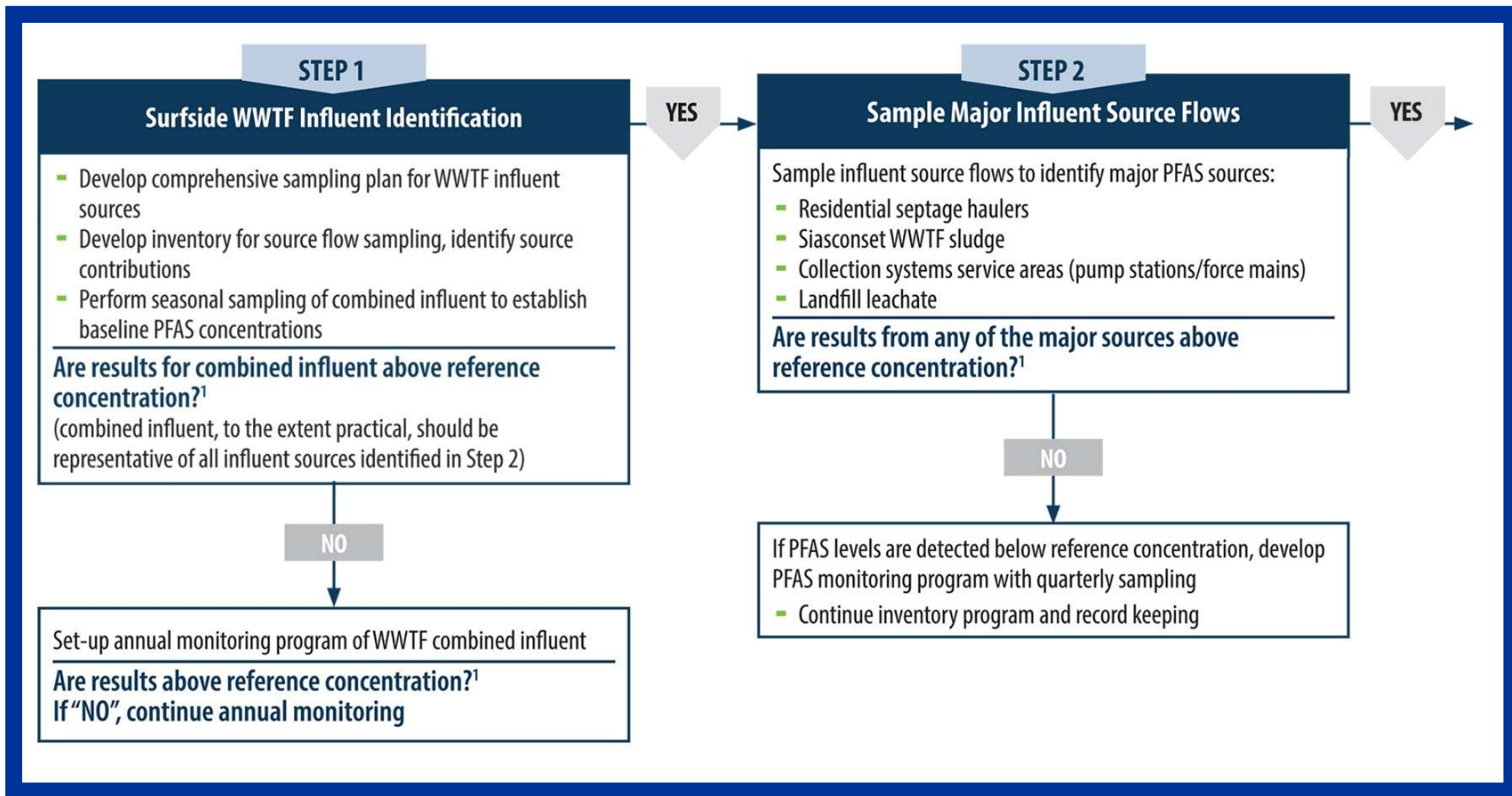
The Town of Nantucket is serviced by two wastewater treatment facilities (WWTFs): Surfside WWTF and Siasconset WWTF.

**Note 1:** Reference concentration is defined as Michigan's Department of Environment, Great Lakes, and Energy (EGLE) Rule 57 Water Quality Values for Human non-cancer, non-drinking water water bodies of 12,000 ng/L PFOA and 12 ng/L PFOS. This will be replaced when EPA or MassDEP declines limits for wastewater. Modified Method 537.1 will be used for analysis until Method 1633 is approved by EPA and the multi-lab validation is complete.

**Note 2:** Steps 1A, 2A, 3, 4, and 5 may be modified as needed after Steps 1 and 2 are complete.

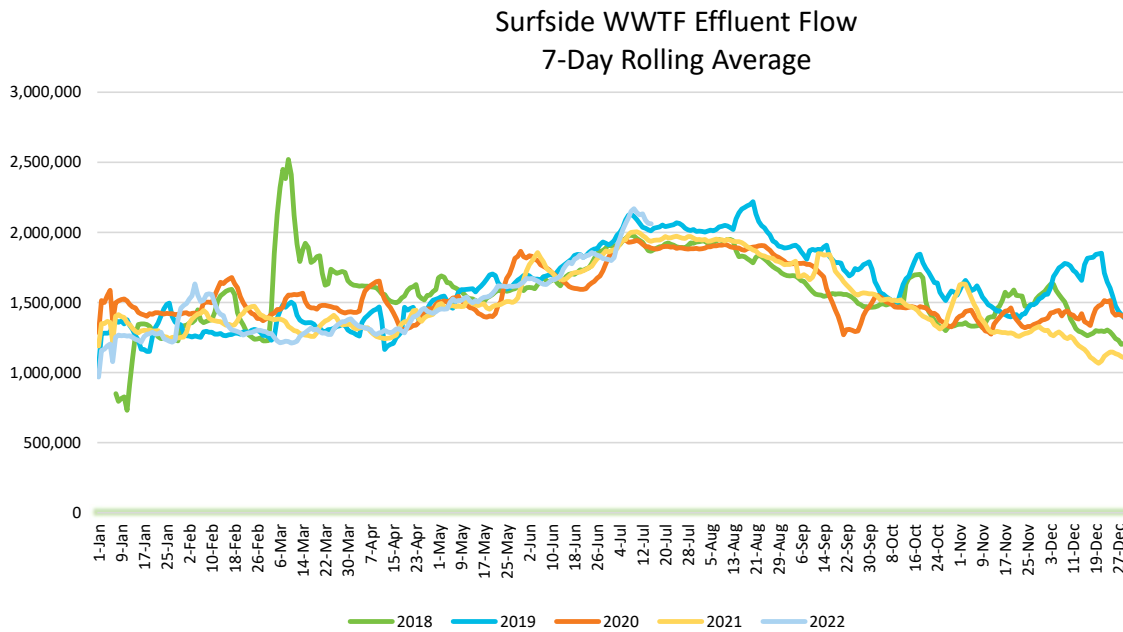






# Nantucket Wastewater – Seasonal Variation

- Peak flow in summer (Jul/Aug)
- Lowest flows observed in winter (Nov/Dec/Jan)



Aerial view of Surfside WWTF



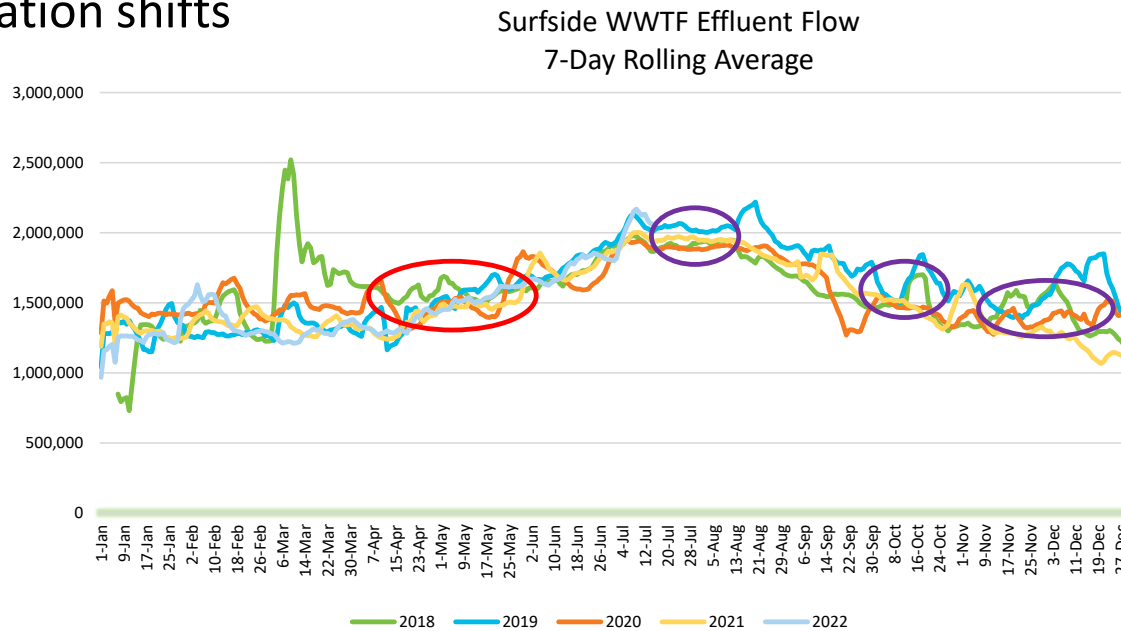
Madaket Landfill In-Vessel Composter

# Nantucket Wastewater – Seasonal Variation

- Peak flow in summer (Jul/Aug)
- Lowest flows observed in winter (Nov/Dec/Jan)
- Sample dates selected with Town to represent on-island population shifts











Aerial view of Surfside WWTF

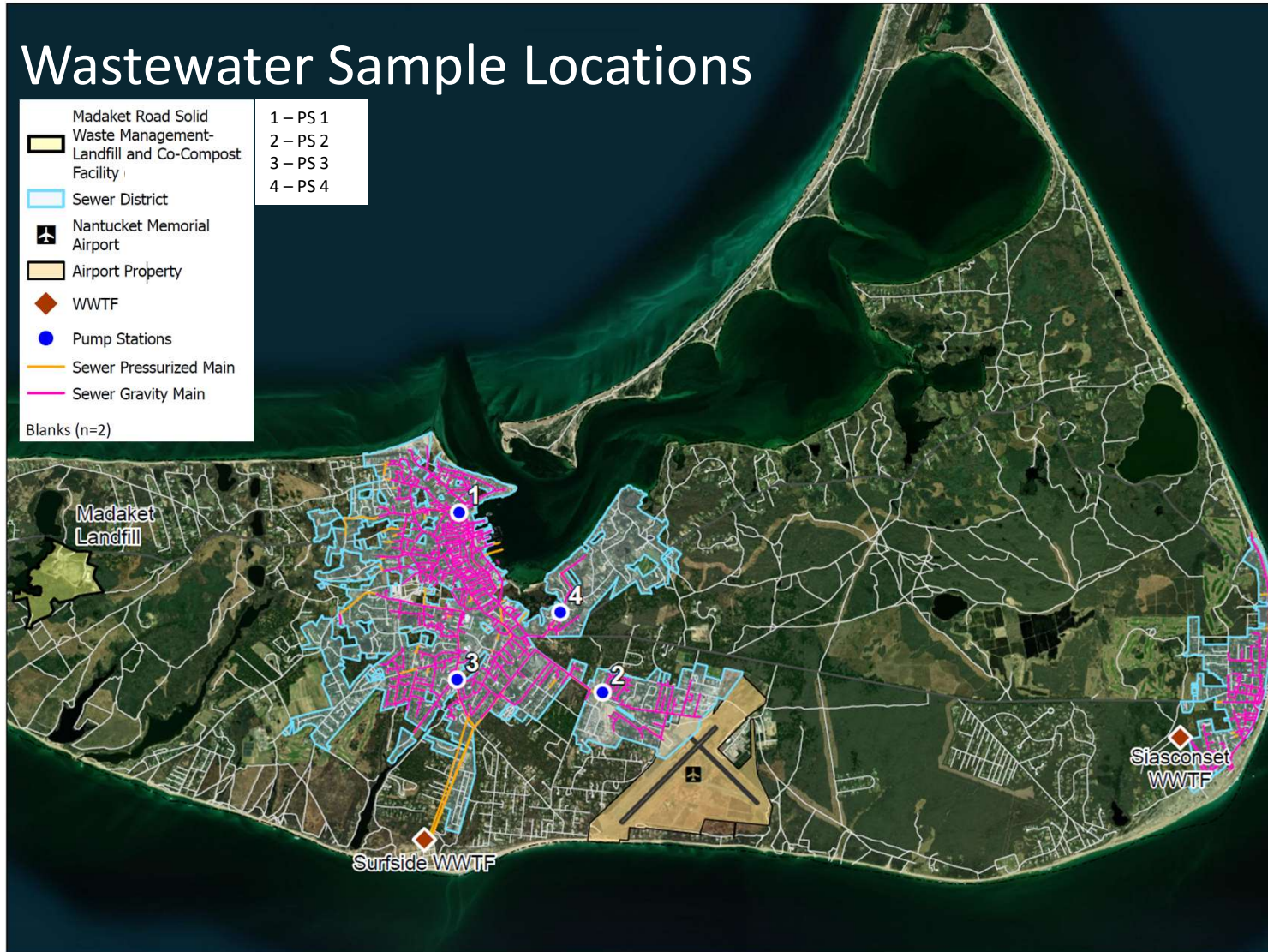


- Aug. 10 & 11, 2022
- Oct. 10 & 11, 2022
- Nov. 28 & 29, 2022
- April/May, 2023



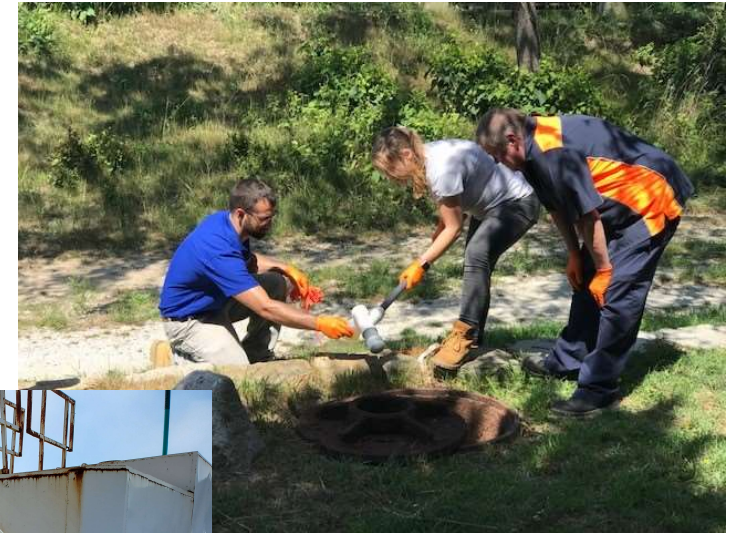
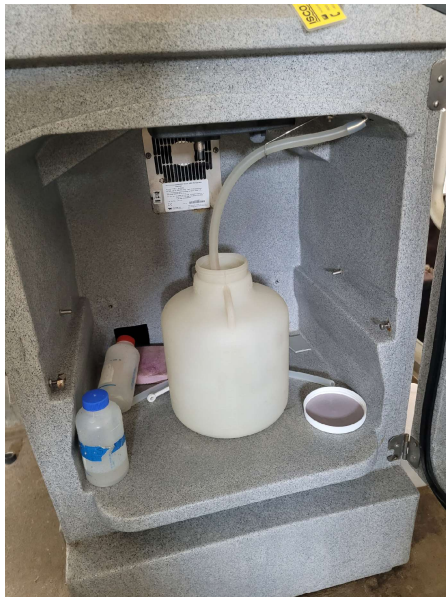
# Wastewater Sample Locations

	Madaket Road Solid Waste Management-Landfill and Co-Compost Facility	1 – PS 1
	Sewer District	2 – PS 2
	Nantucket Memorial Airport	3 – PS 3
	Airport Property	4 – PS 4
	WWTF	
	Pump Stations	
	Sewer Pressurized Main	
	Sewer Gravity Main	
Blanks (n=2)		

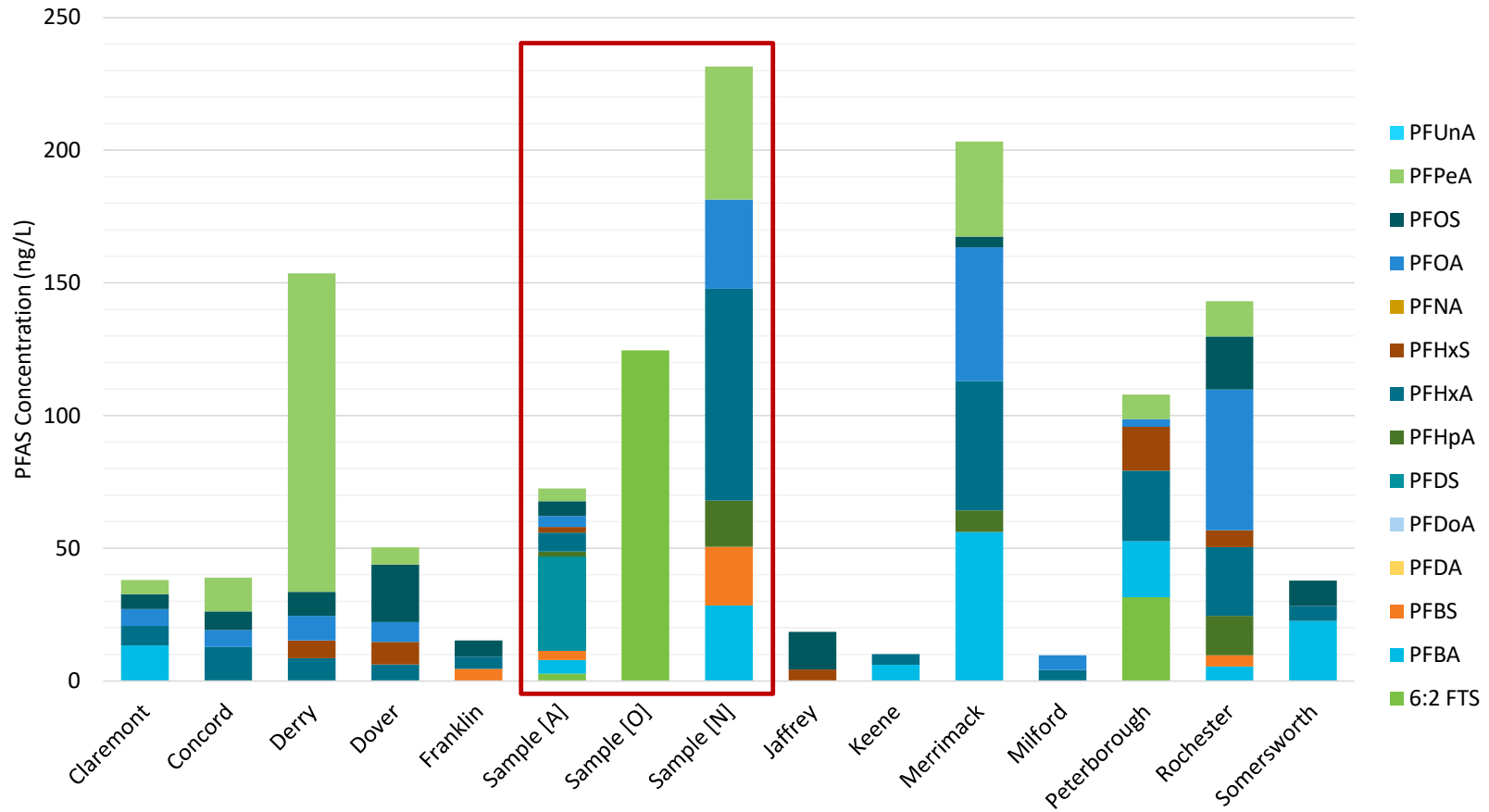


# Data Qualifications

- Preliminary observations only
- Rounds 1-3 completed, 4 planned, and future
- Additional quality review needed

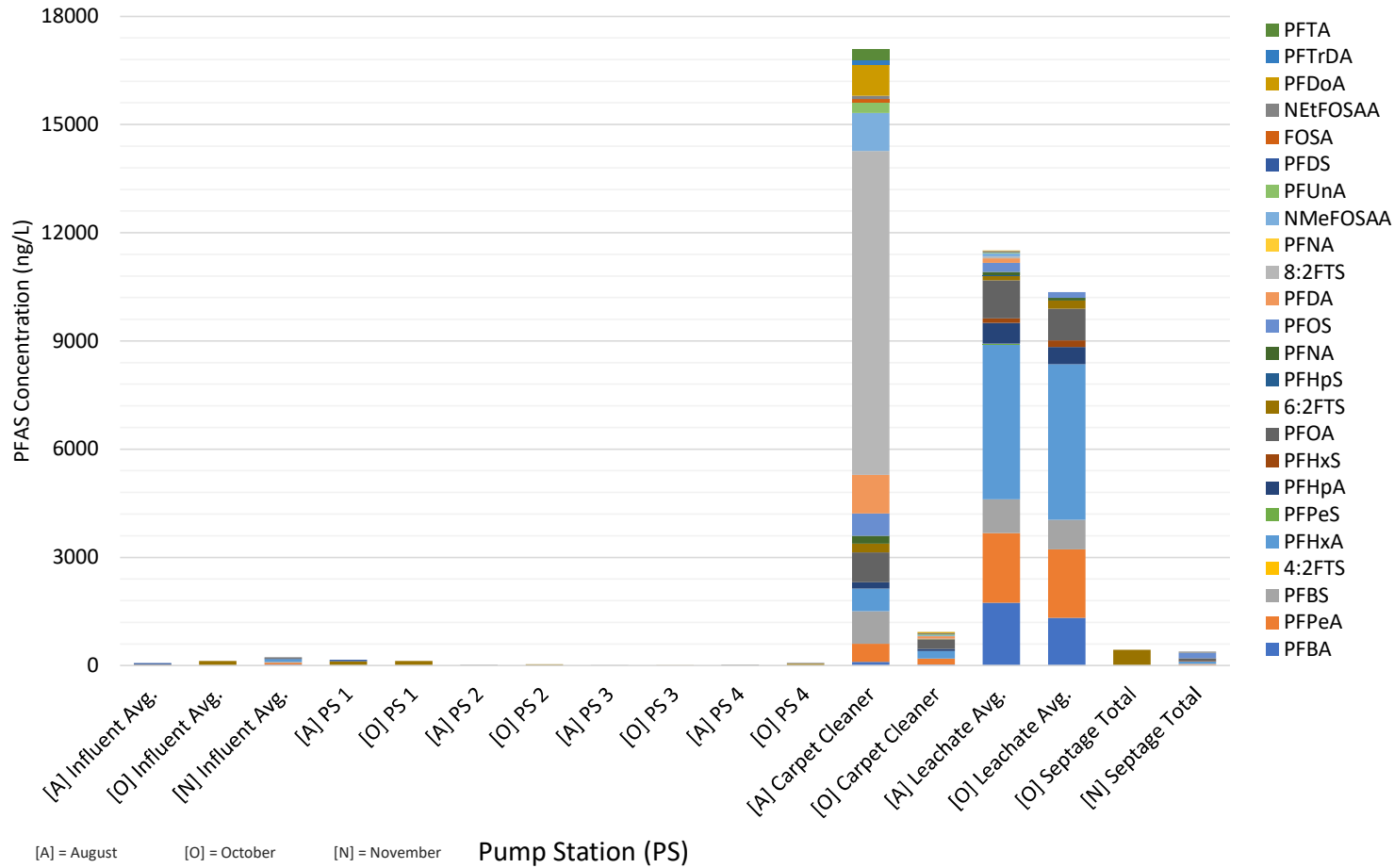


# Benchmark – Preliminary Influent PFAS Concentrations





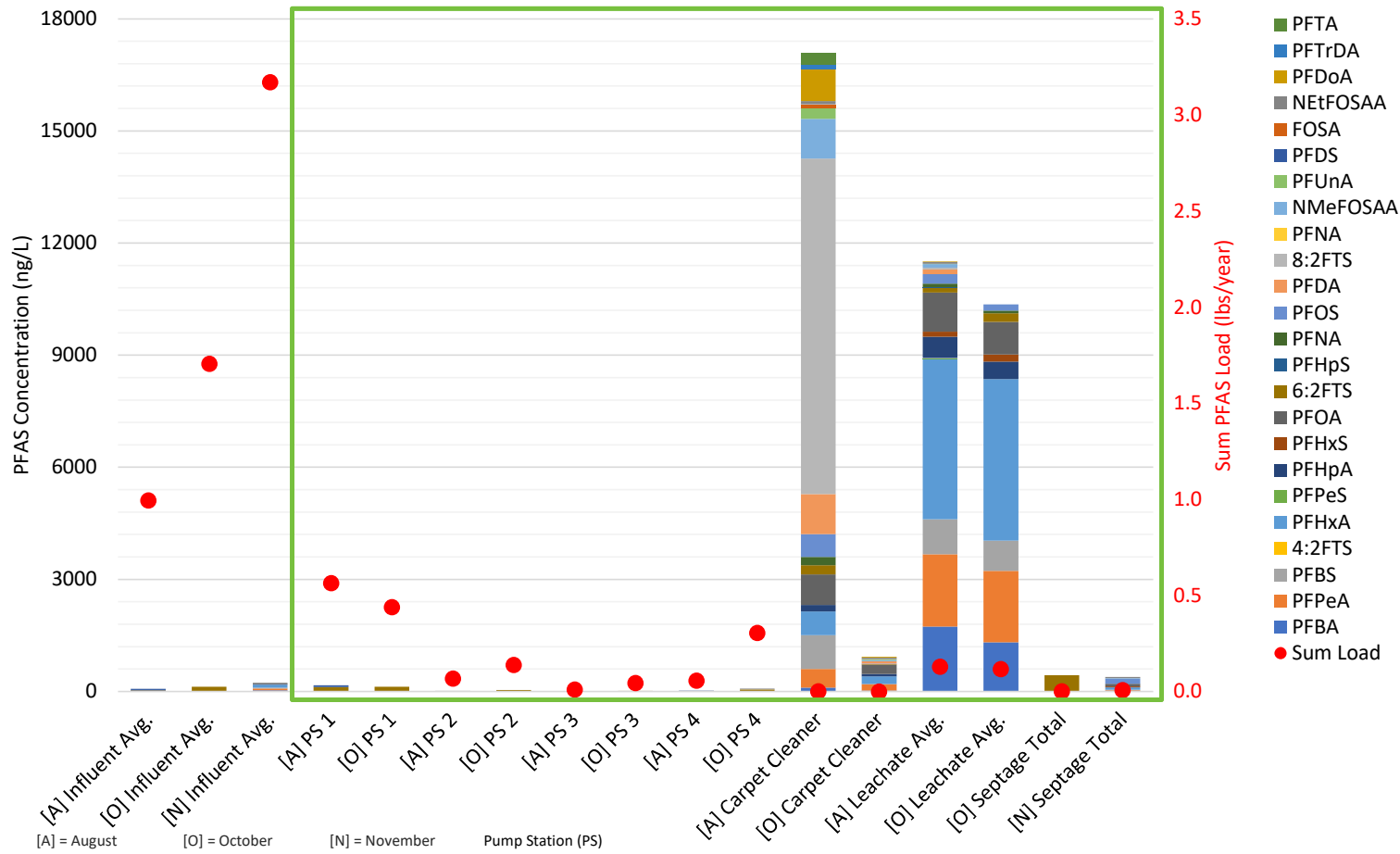
# PFAS Concentrations Detected



## Initial Observations:

- Highest PFAS concentrations detected in carpet cleaners and landfill leachate samples
- November Influent PFAS sum was 3x August
- Carpet cleaner sample concentrations appear higher in Aug. than Oct.
- Higher concentrations of PFAS were detected in landfill leachate samples

# PFAS Concentrations Versus Load



## Initial Observations:

- Not final data analysis; one sampling event remaining
- Carpet cleaners and landfill leachate loads contribute to less of the overall load compared to influent
- From initial analysis, Pump Station 1 contributes a greater load of PFAS compared to other pump stations



## Next Steps



## Preliminary Observations and Next Steps

- Based upon 3 data sets –complete sampling event 4 and incorporate all data
  - Importance of concentrations vs load
  - Pump Station 1 consistently an outlier in PS PFAS detections and loading
  - Landfill leachate loading may attribute to overall WW loading
    - Similar fingerprints for leachate and influent, but cannot jump to causation
  - Spike in November influent needs further investigation
- Aeration Tank and Leachate Foam Study
- Proceed with Steps 3 and 4 of Decision Matrix



# Acknowledgements



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## Questions?

Find more insights through our water partnership at [cdmsmith.com/water](https://cdmsmith.com/water) and [@CDMSmith](https://twitter.com/CDMSmith)



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