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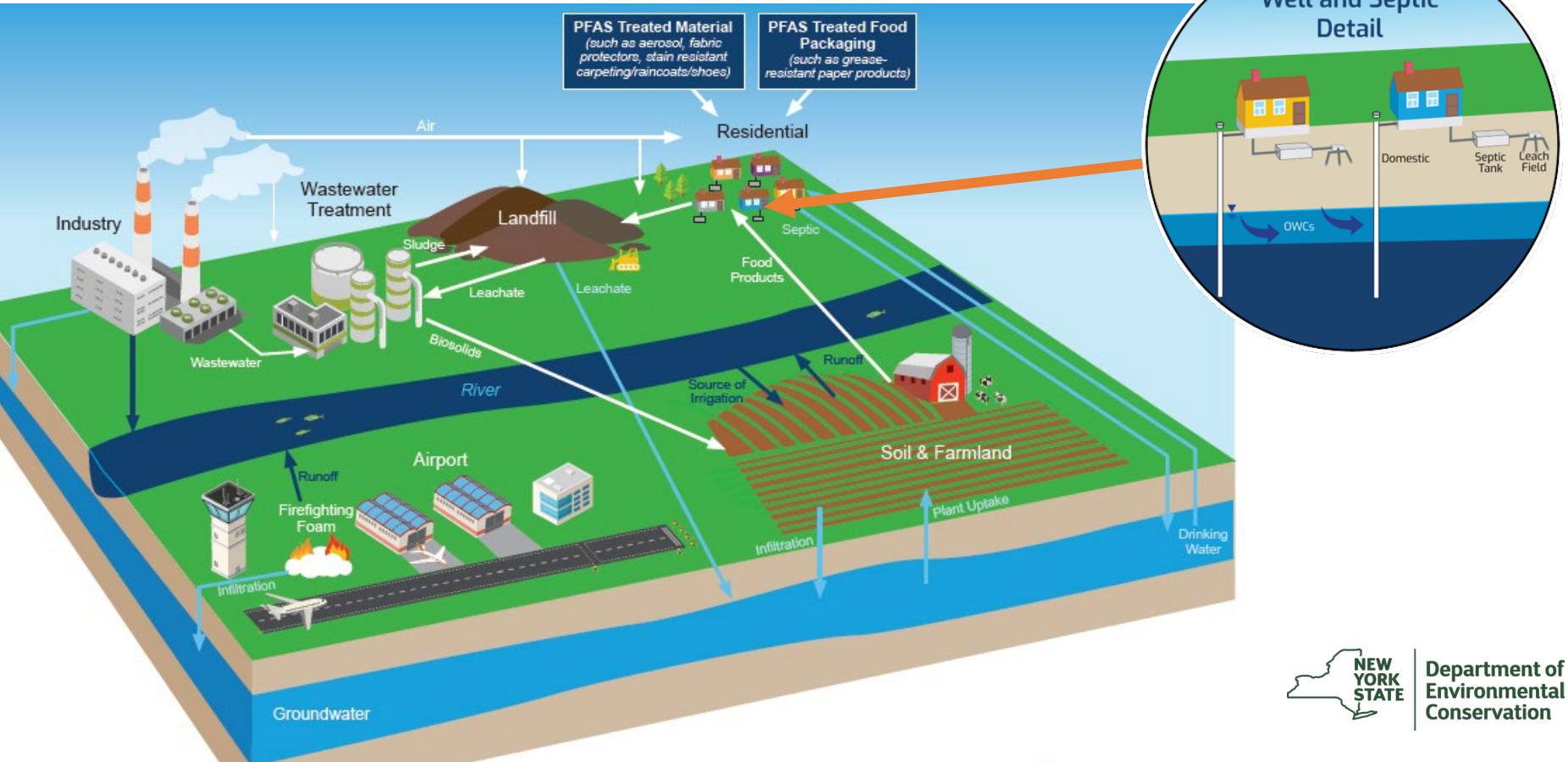
Two Case Studies: Exploring commercial, industrial, and wastewater sources of PFAS

Upstate New York and the Hudson Valley

December 11, 2024

PFAS in the Environment



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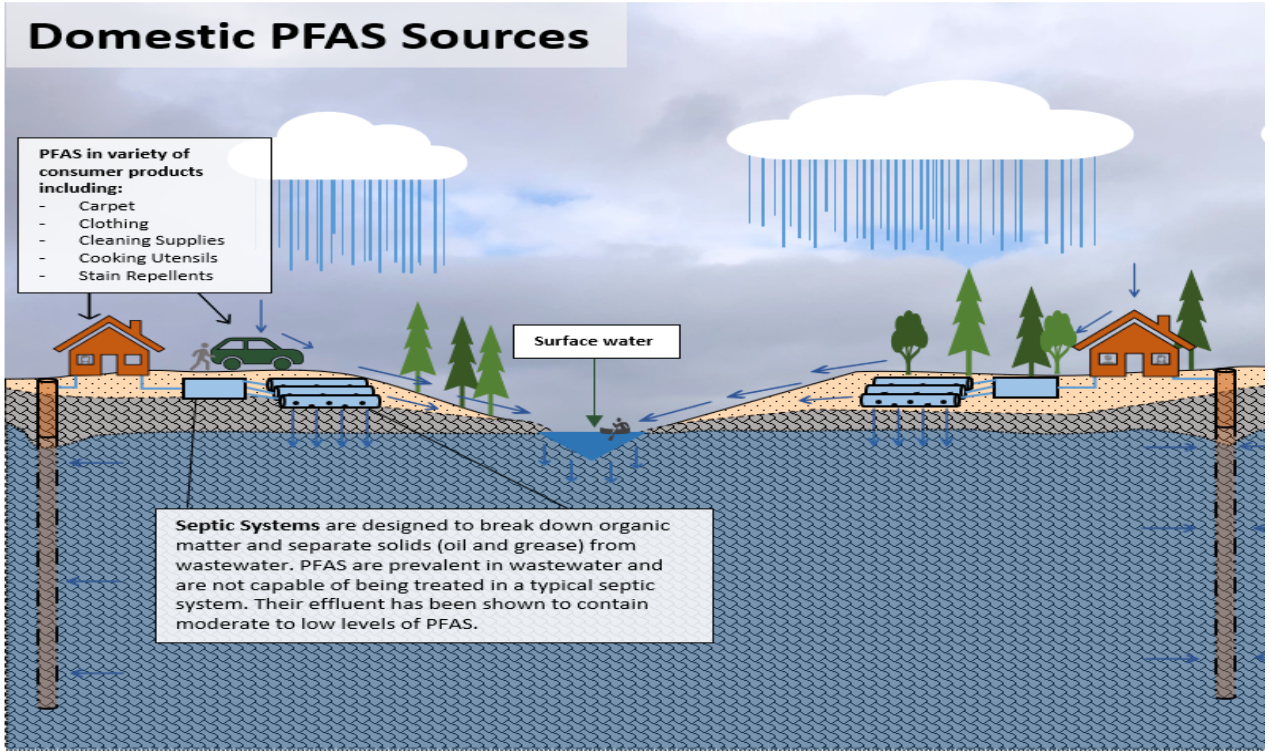
Domestic Sources of PFAS

PFAS are used widely in industry and household products

- Carpeting
- Cleaning products
- Non-Stick cookware
- Water resistant / stain resistant fabrics



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Septic Tracers: A valuable line of evidence

Artificial sweeteners (acesulfame-k and sucralose)

- Known presence in food and beverage products
- Not naturally occurring
- Presence/absence evaluation
- Does not indicate the presence of other septic-related contaminants

Artificial sweeteners and PFAS

- Not a causal relationship
- Sweeteners should not be used as the only line of evidence to differentiate between industrial and domestic sources of PFAS

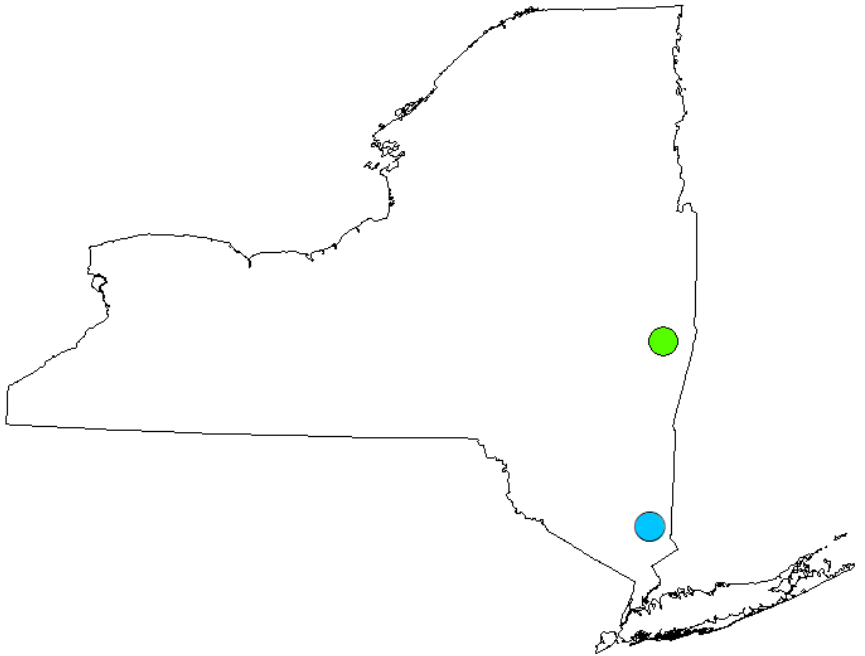
Case Studies: Background

Case Study 1 – Upstate New York

- Public well MCL exceedance at a school

Case Study 2 – Hudson Valley

- Existing SSF site, previously remediated for CVOCs
- PFOA and PFOS exceedances identified



Case Studies: Similarities

1. Sensitive receptors nearby (impacted drinking water wells)
2. Densely populated residential areas
3. Private drinking water wells and septic systems
4. Geology supports the potential for overburden and drinking water source communication
5. Unknown source(s) of PFAS = **Source investigation**

Case Study 1

- Conducted initial focused investigation at the school property
- Surface water, sediment, groundwater, & soil sampling

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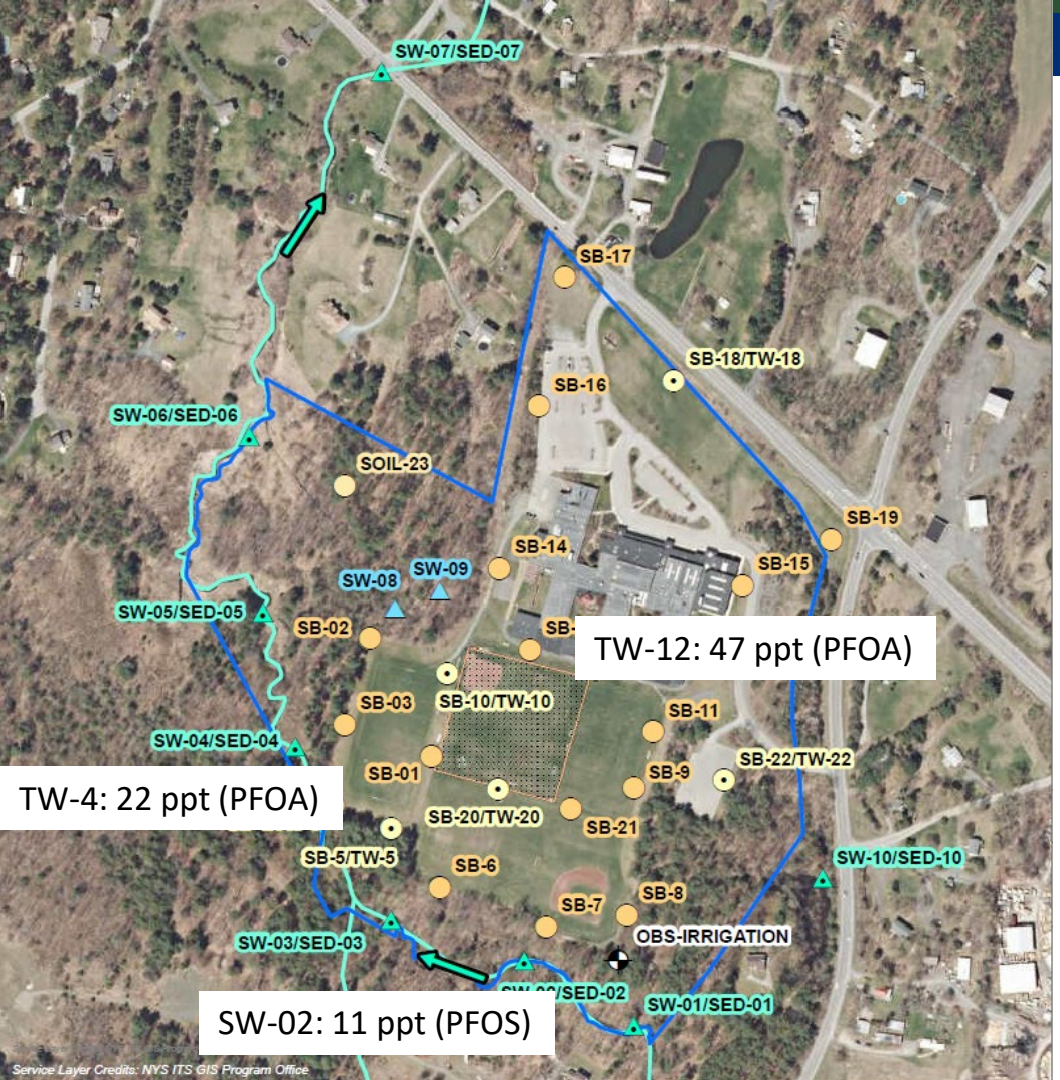
Case Study 1

Results:

- Detections observed were relatively low when compared to sites with obvious sources of PFAS
- Additional sampling was warranted on and off the school property



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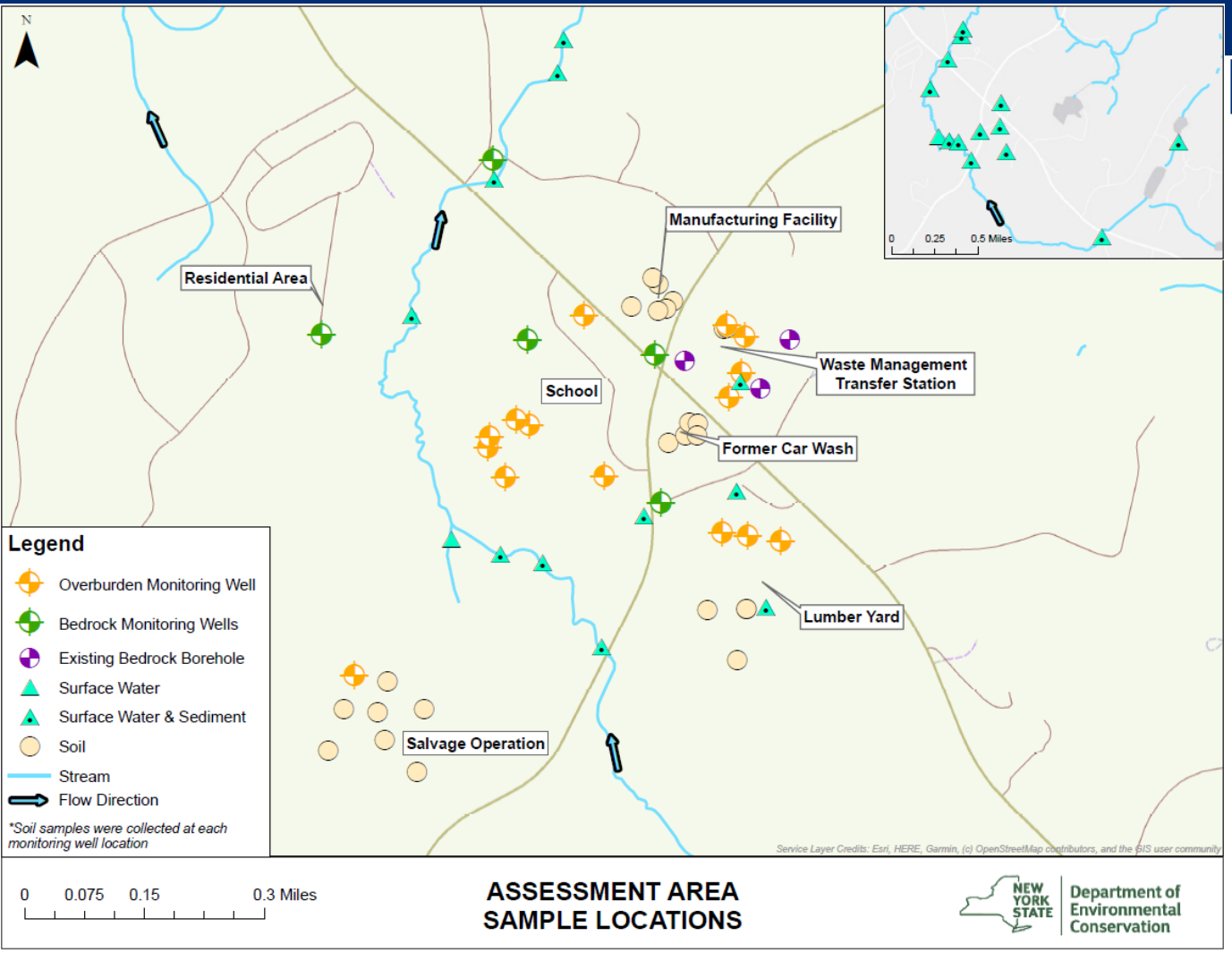

Phase II

- Manufacturing Facility
- Waste Management Transfer Station
- Lumber Yard
- Former Car Wash
- Salvage Operation

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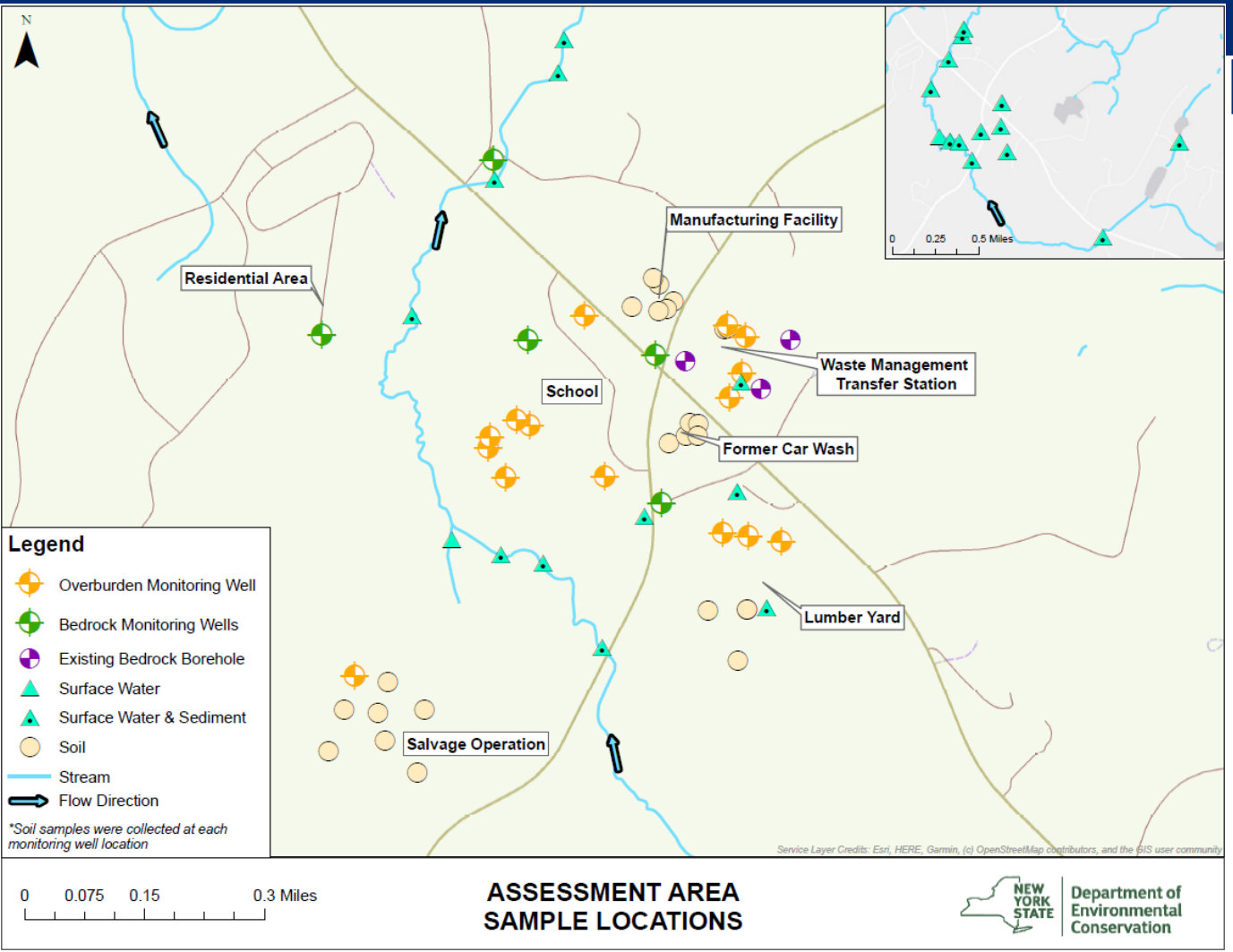

Phase II

Overburden Exploration

- Permanent well installations
- Nearby property investigations

Bedrock Exploration

- Open borehole geophysics
- Packer testing
- Well installation
- Transducer deployment

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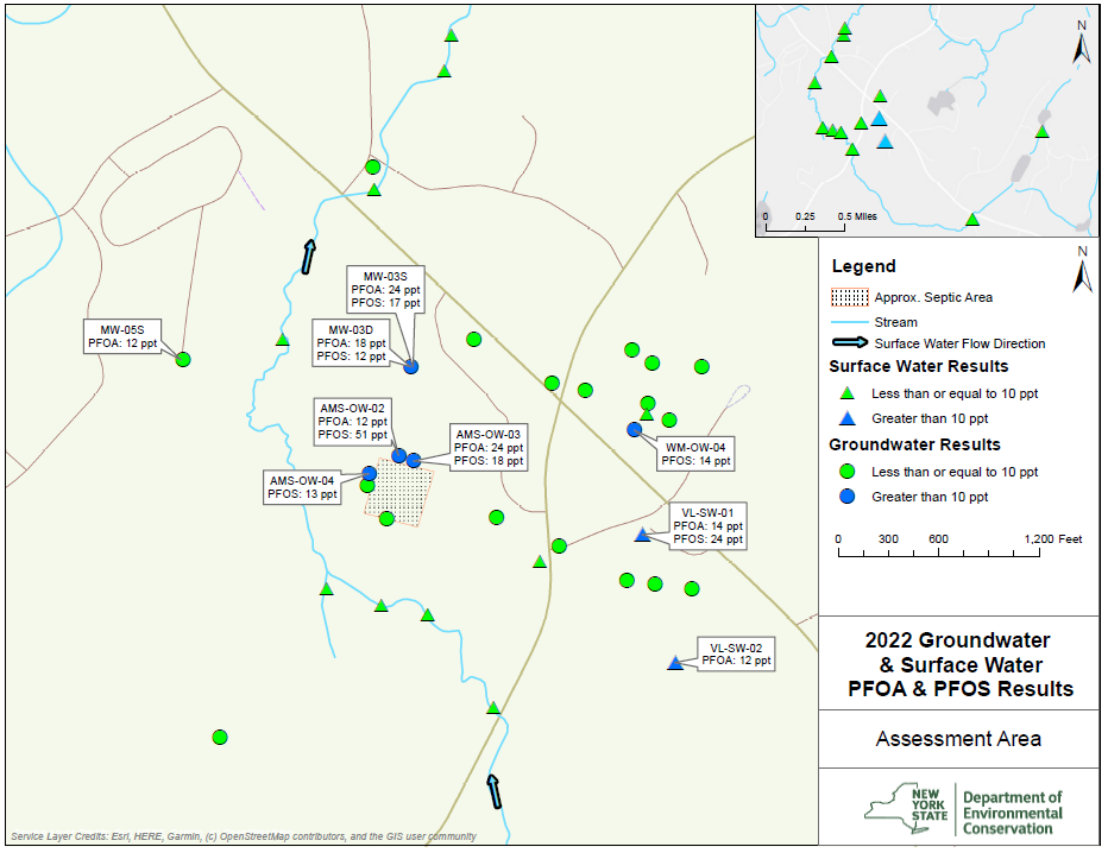
1. Low-level PFAS detections



- Low-level detections throughout the Assessment Area
- 1 discrete exceedance of Residential Use soil guidance values
- 9 total locations that exhibited PFOA and/or PFOS above the 10 ppt NYS Drinking Water MCL
- No indication of a source that requires remedial action

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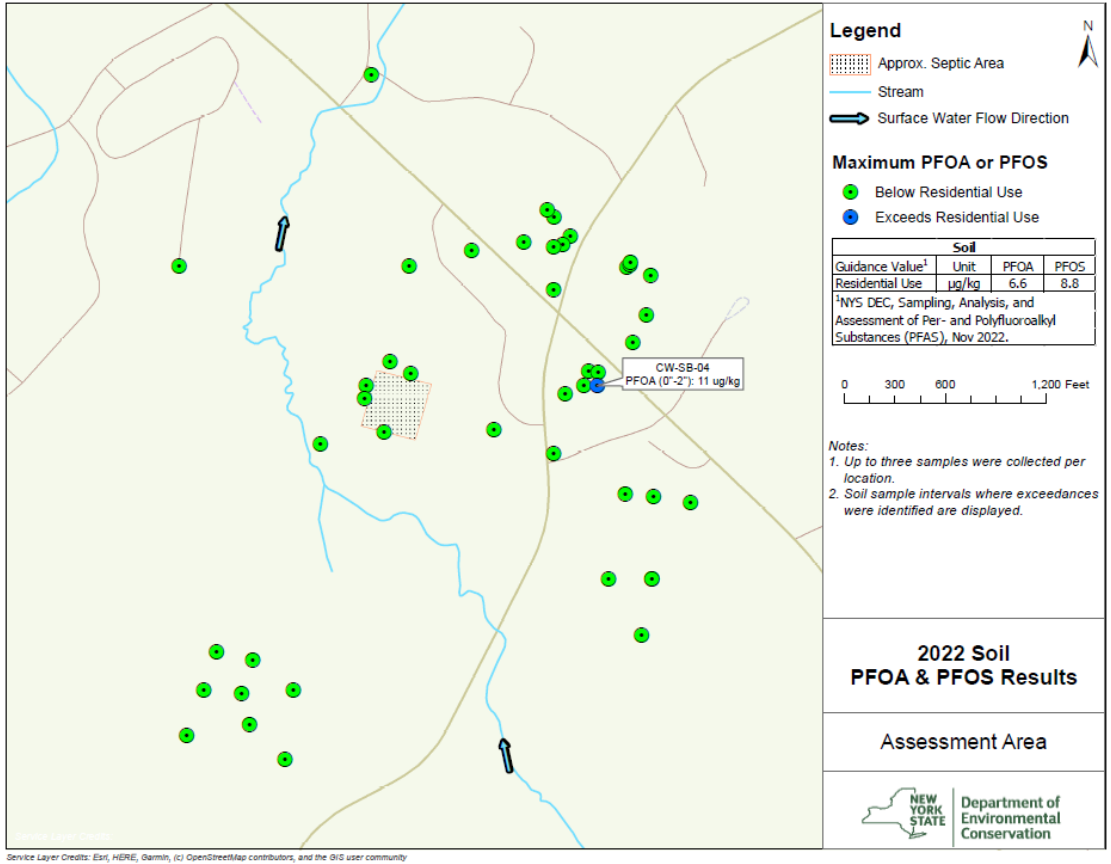
1. Low-level PFAS detections



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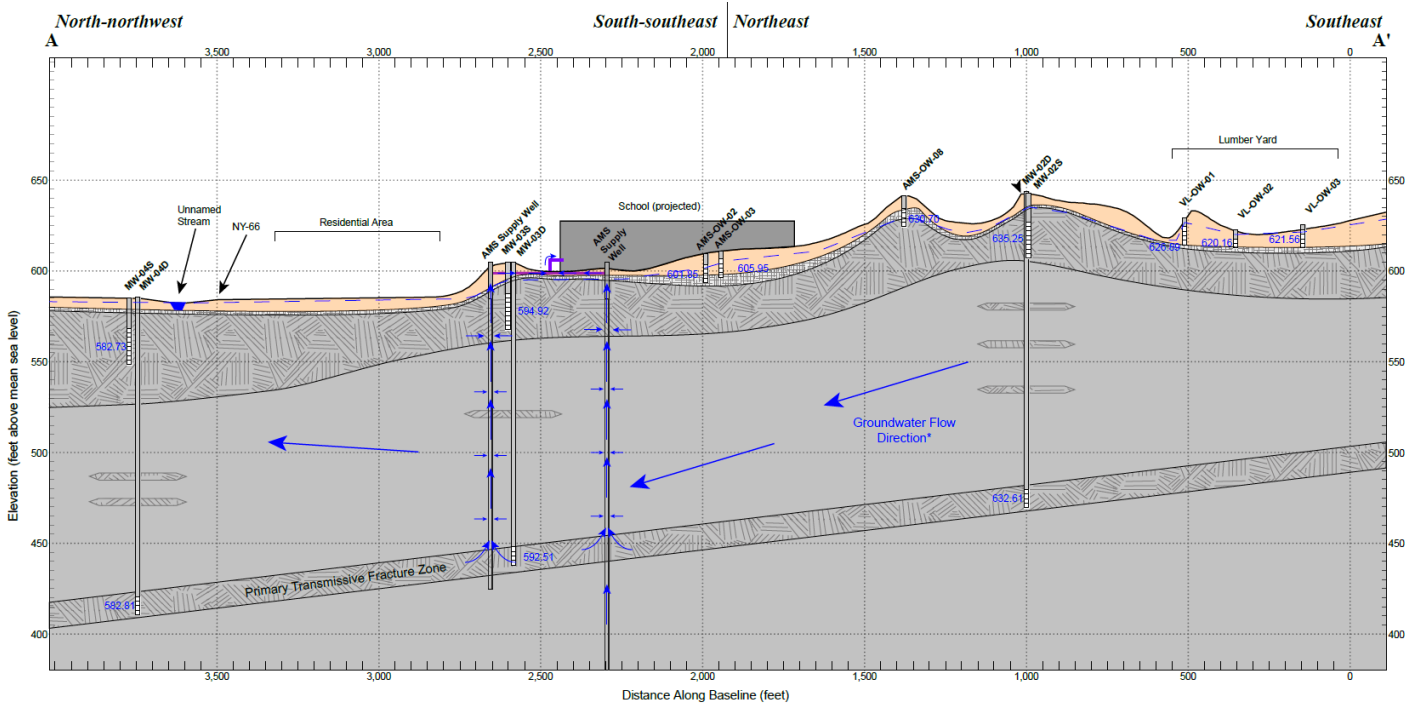
2. Geology



- Thin overburden layer underlain by shallow bedrock
- Shallow weathered fracture zone
- Deep primary transmissive zone

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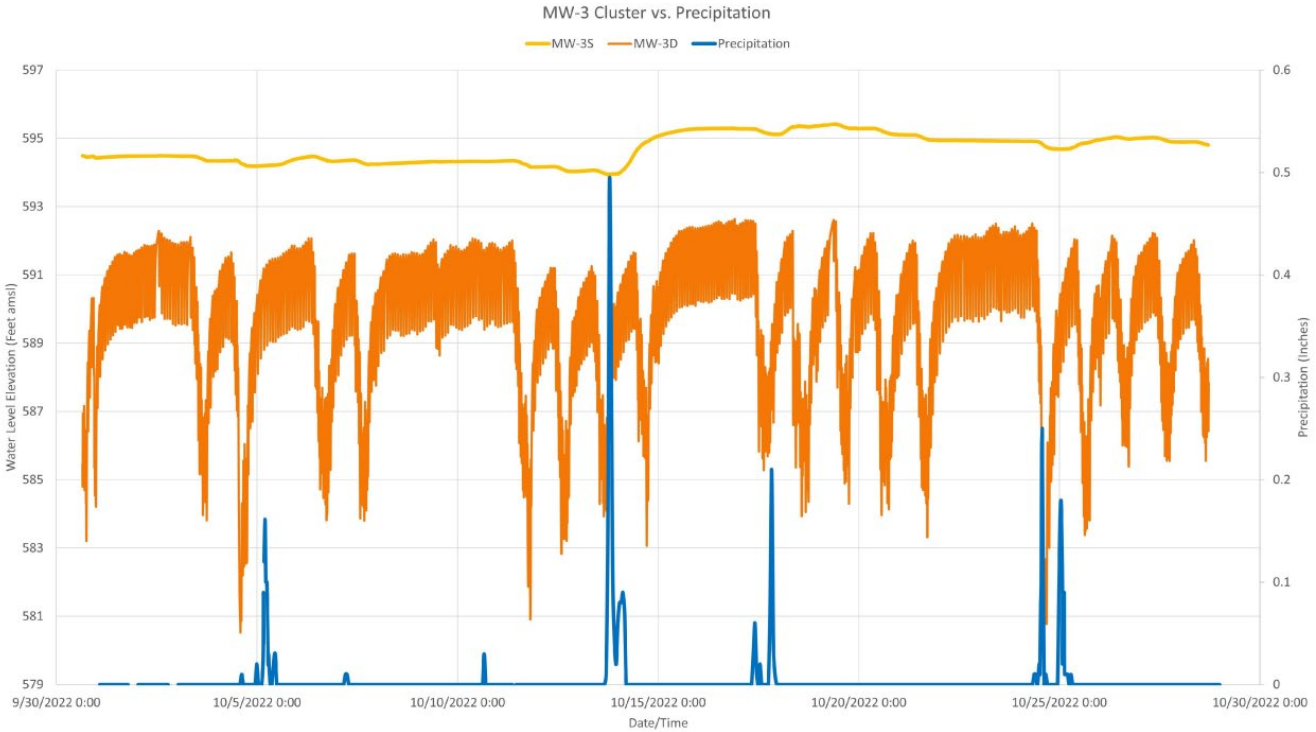
2. Geology



Transducer data showed:

- Connection between the surface and bedrock
- Connection between fracture zones

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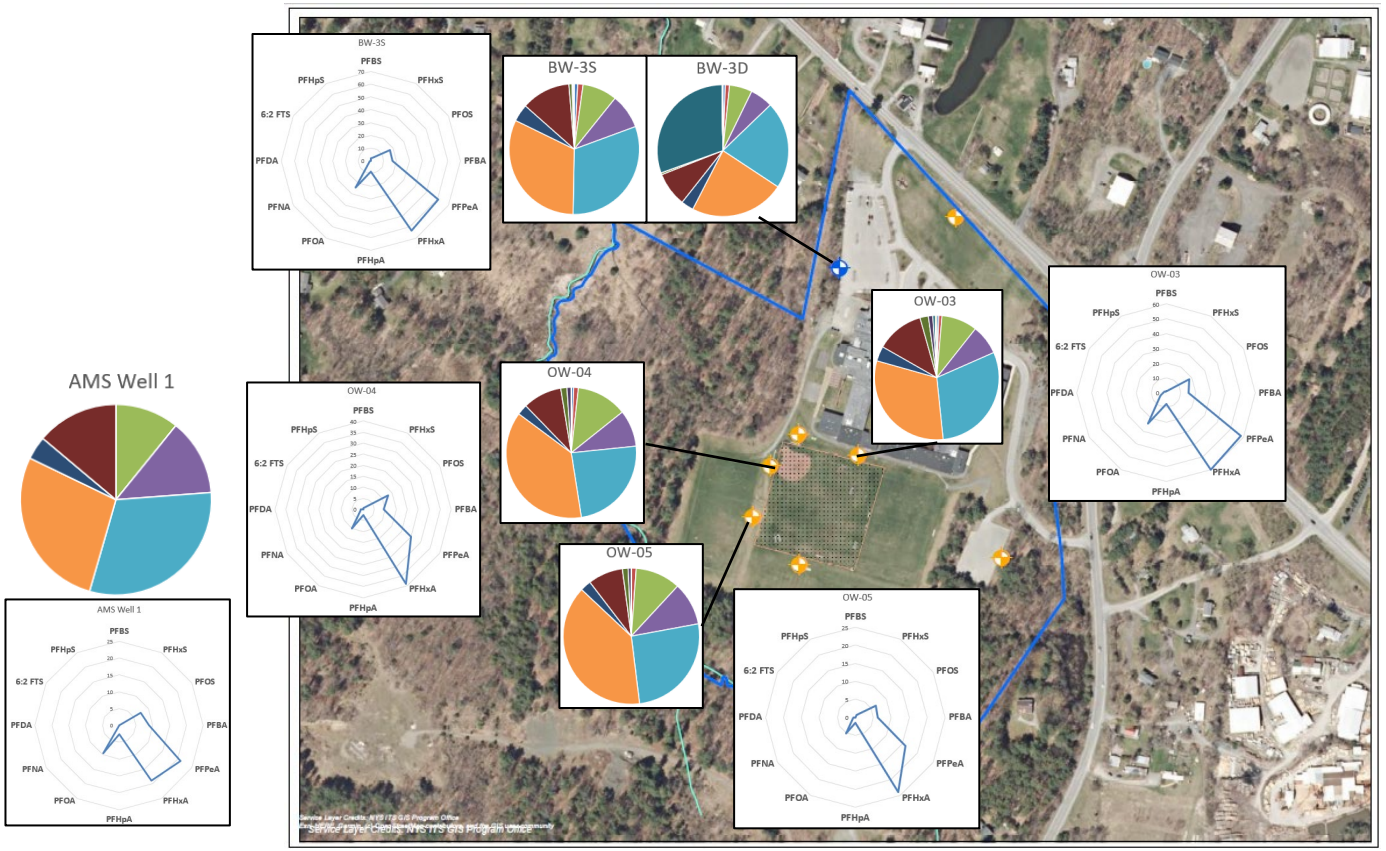
3. PFAS Fingerprinting



- PFAS patterns <u>are similar</u> at the School indicating a similar source
- Patterns at other properties are <u>not</u> the same indicating multiple non-discrete sources

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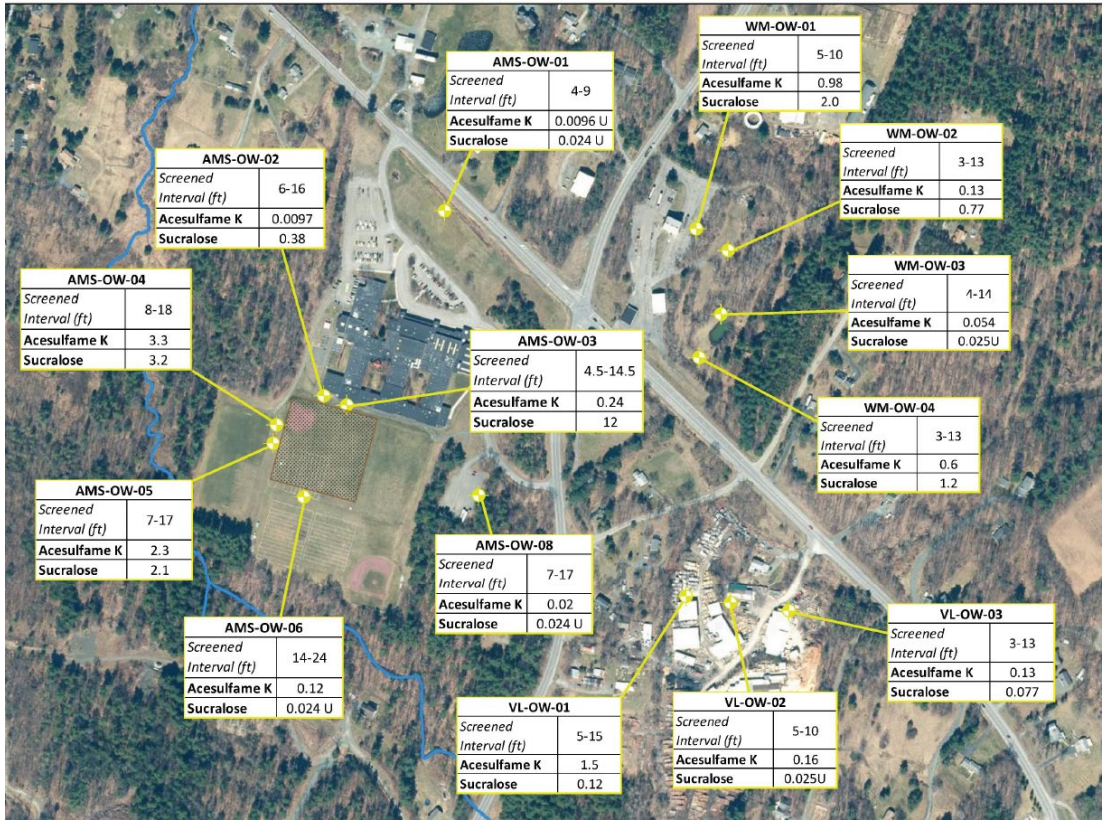
4. Artificial Sweeteners



- Artificial sweeteners are found throughout the Assessment Area including in bedrock wells.
- Presence of sweeteners further supports the connection between the surface and bedrock

Schaider, L., Ackerman, J., and Rudel, R. 2016. "Septic systems as sources of organic wastewater compounds in domestic drinking water wells in a shallow sand and gravel aquifer." Science of the Total Environment 547:470-481.

Conclusions: Case Study 1

Multiple low-level contributors of PFAS to the environment, including septic systems.

Supported by:

- Geology supports the connection between the overburden and bedrock aquifers
- PFAS fingerprints and concentrations
- Artificial sweeteners
- Area utilizes septic systems

Poll Question

Which septic tracers were used in the case study?

a. PFAS
b. Artificial Sweeteners
c. Boron
d. Dye

Poll Question

Which septic tracers were used in the case study?

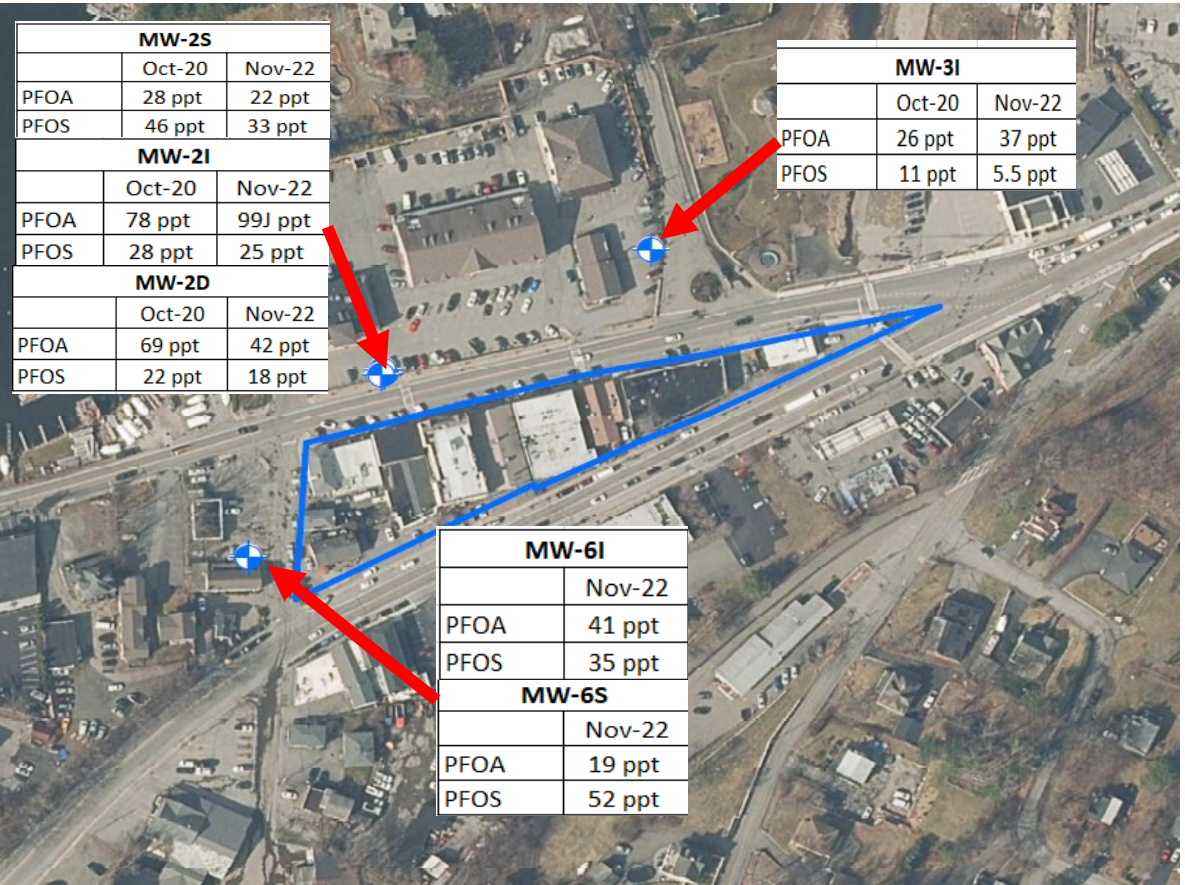
a. PFAS

b. Artificial Sweeteners

c. Boron

d. Dye

Case Study 2



Maximum Detected Onsite:

- PFOA: 99 ppt
- PFOS: 52 ppt

Maximum Detected Residential Sampling within ½ mile:

- PFOA: 47 ppt
- PFOS: 190 (outlier, next 85) ppt

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Source Investigation Locations

12 Potential Sources Identified:

- Commercial/Industrial
- Waste management
- Areas of known fires

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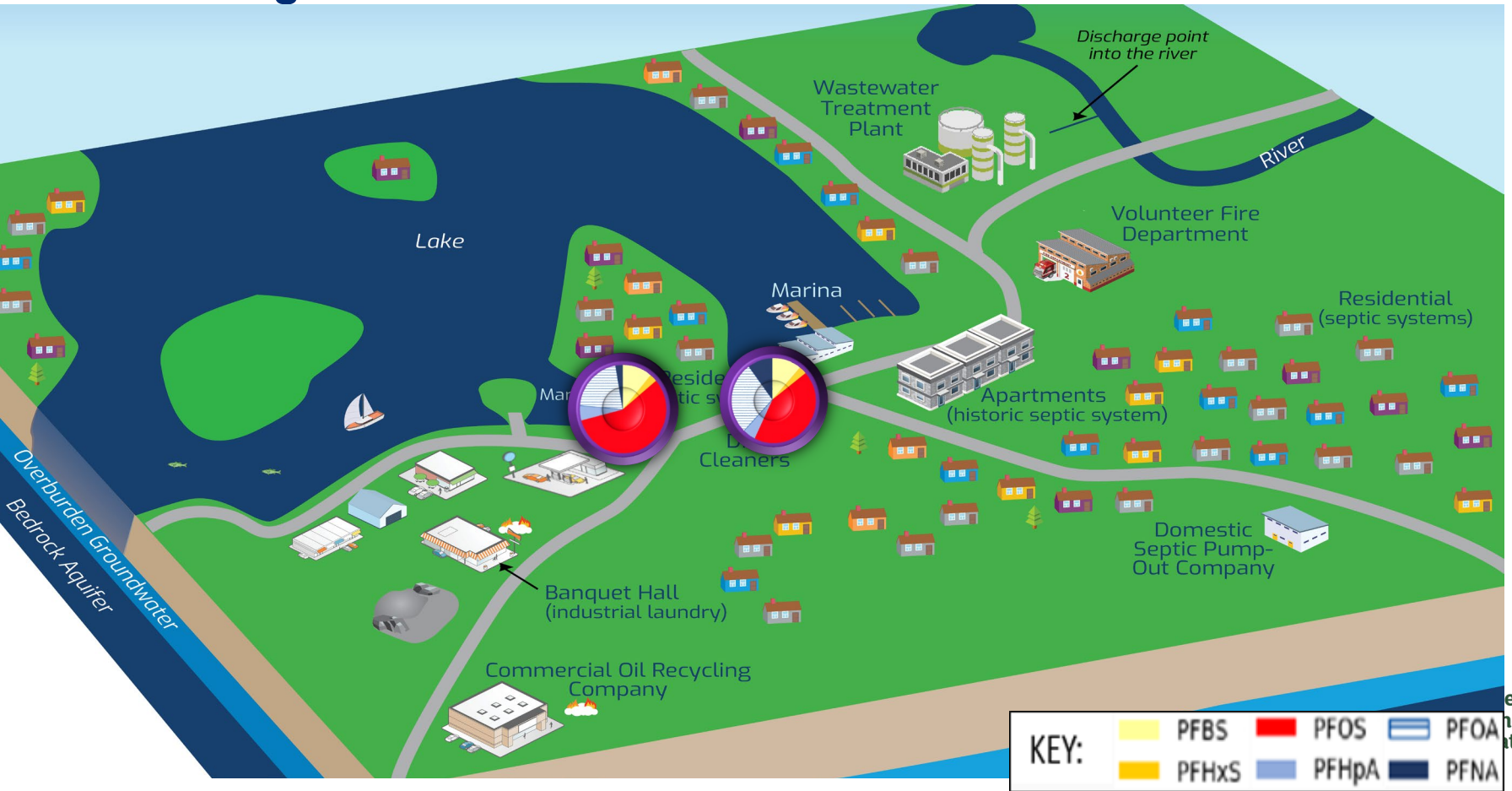
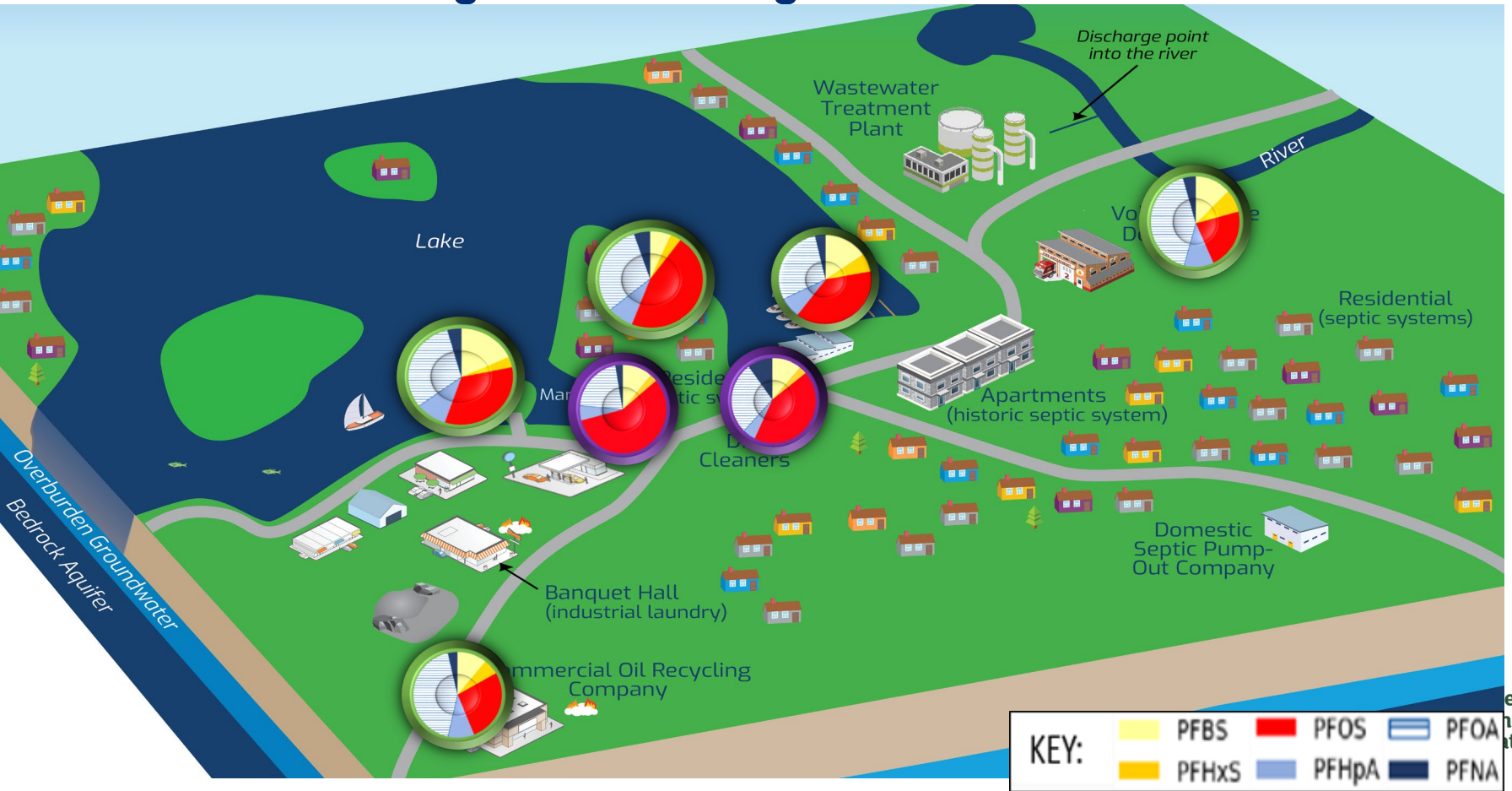
Select Groundwater Source Investigation PFOA/PFOS Range:

Location	PFOA Low	PFOA High	PFOS Low	PFOS High
Onsite SSF	19	99	5.5	52
Private Drinking Water Wells	ND	47	ND	85 (outlier was 190)
Overburden GW on Peninsula	32	42	42	61
Marinas	16	48	14	27
Fire Department	3.8	20	10	11
Area of known fire (unknown foam use)	4.3	18	4	13

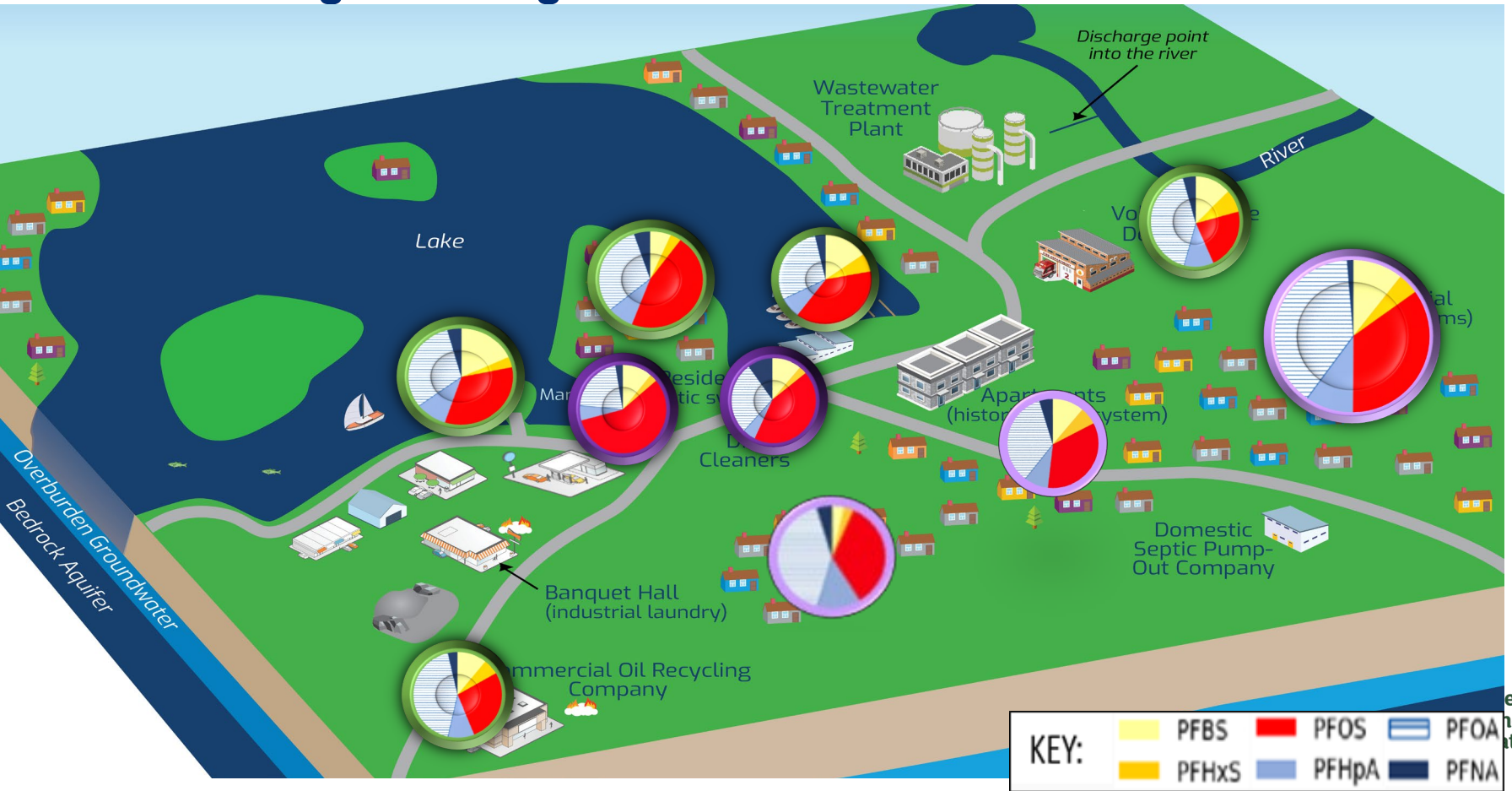
SSF PFAS Signatures



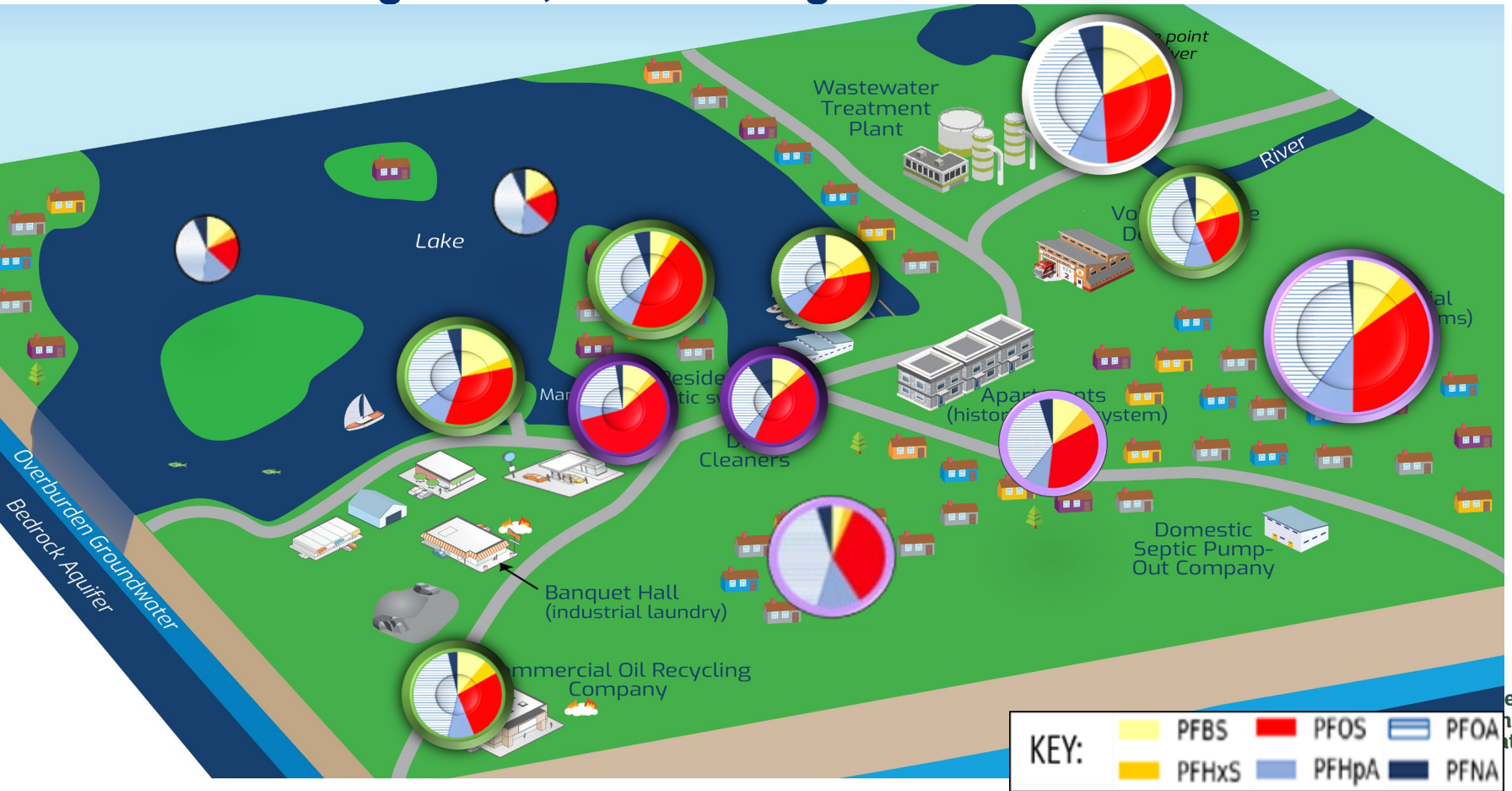
Select Source Investigation PFAS Signatures

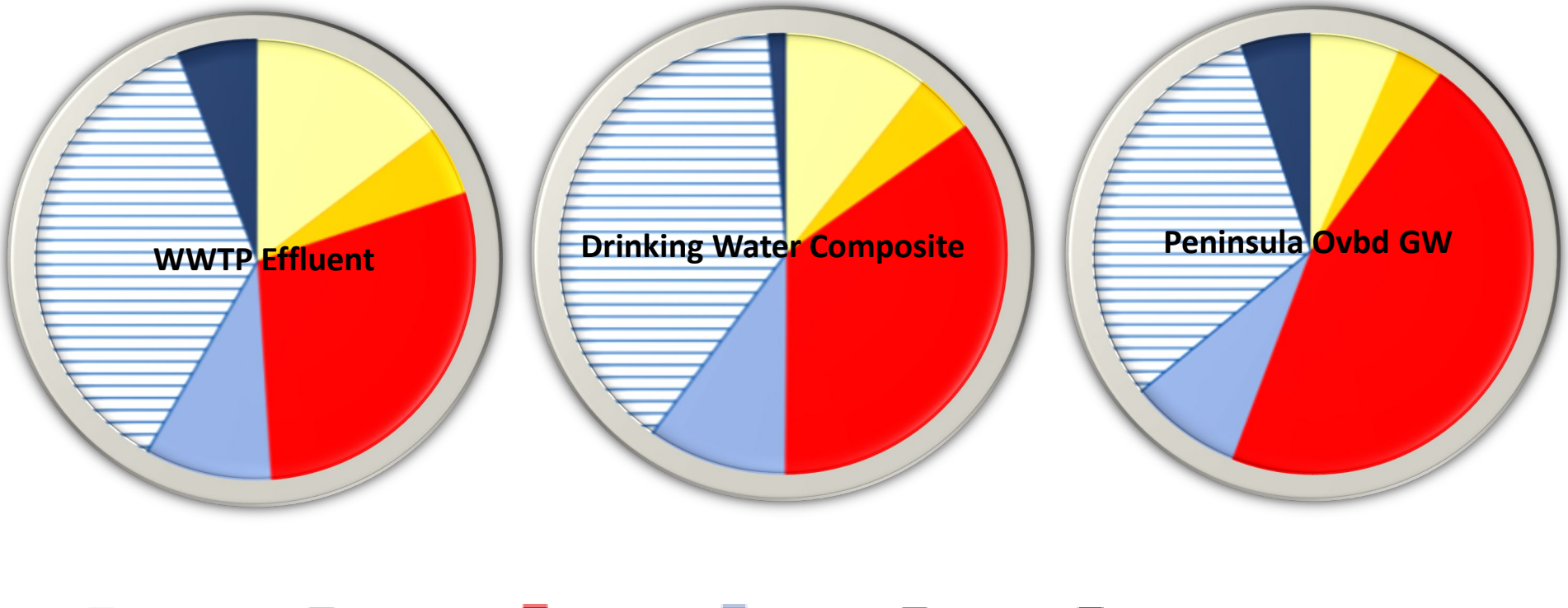


Private Drinking Water Signatures



WWTP Effluent Signature, Lake SW signatures





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Artificial Sweetener Samples

Septic Tracer Results Compared to PFAS Results					
Septic Tracers:		Ace-K (ug/L)	Sucralose (ug/L)	PFOA (ppt)	PFOS (ppt)
Maximum Contaminant Level:		NC	NC	10	10
Sample Type	Location	Result	Result	Result	Result
Potable Water	PW-01	0.26	0.13	**46**	**14**
	PW-02	0.3	2.9	**21**	**22**
	PW-03	0.58	24	**35**	**85**
	PW-04	0.32	10	**23**	**32**
	PW-05	0.31	20	**20**	**29**
	PW-06	0.82	1.4	**25**	**37**
	PW-07	0.24	3.2	**25**	**11**
Groundwater	GW-01	0.25	0.35	**38**	**42 J**
	GW-02	2.2	6.0	**42**	**61**

- Artificial sweeteners were identified in drinking water supply and groundwater wells across the peninsula
- Presence of sweeteners further supports the connection between the overburden and drinking water supply wells

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Conclusions: Case Study 2

Multiple low-level contributors of PFAS to the environment, including a domestic waste-water source.

Supported by:

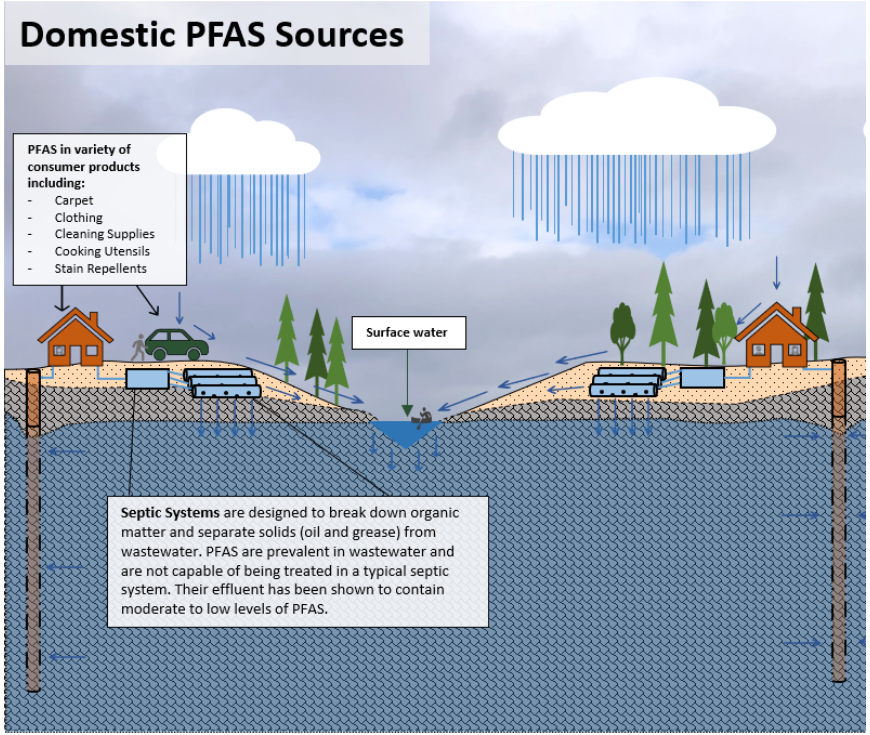
- Geology
- Densely populated area using septic systems
- Similarities in PFAS concentrations between onsite, source investigation areas, and private drinking water wells
  - No investigated source area requiring remedial action
- Septic tracers detected
- Similarities in PFAS signatures across the area

Wastewater as a Contributing Source

PFAS are used widely in industry and household products

Multiple lines of evidence:

- Lack of a commercial or industrial source of PFAS
- Areas using private wells and septic systems
- Geology
- PFAS Fingerprints
- Septic tracers



Public Relations

Consistent Communication is Key:

- Fact sheets or community updates
- Availability sessions
- DECinfo Locator (https://dec.ny.gov/maps/interactive-maps/decinfo-locator)

Short-term Recommendations

- Education and outreach
- Routine sampling and maintenance of private water supply wells
- Proper maintenance of septic systems
- Explore options of managing wastewater at schools and other larger facilities with septic systems

Long-term Solutions

Remove PFAS from the environment:

- Controlling industrial discharges
- Identifying and remediating PFAS contaminated sites
- Enacting laws and regulations aimed at manufacturers who use PFAS
- Phase out of intentionally added PFAS
- Offer take-back programs for PFAS containing materials

Additional Resources

https://dec.ny.gov/environmental-protection/site-cleanup/pfas

https://www.health.ny.gov/environmental/chemicals/chemicals_and_health/

https://extapps.dec.ny.gov/docs/materials_minerals_pdf/inactivelandfillreportfinal202207.pdf

https://dec.ny.gov/environmental-protection/water/emerging-contaminants

https://dec.ny.gov/environmental-protection/waste-management/solid-waste-management-planning/nys

Thank You

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