Southern New Hampshire PFAS Sampling Update

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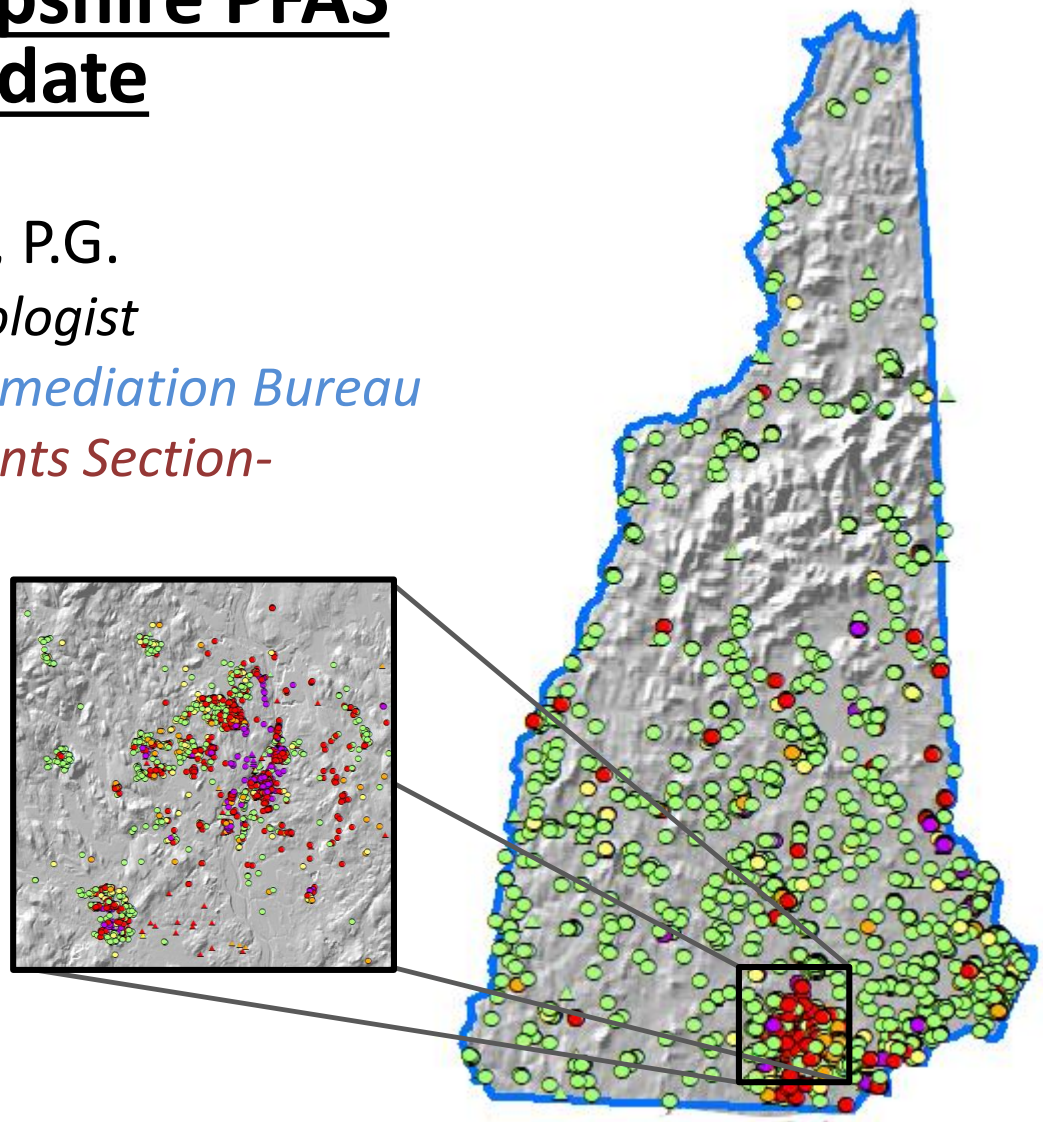

Presented to the

Commission on the Environmental and Public Health Impacts of Perfluorinated Chemicals

March 12, 2021

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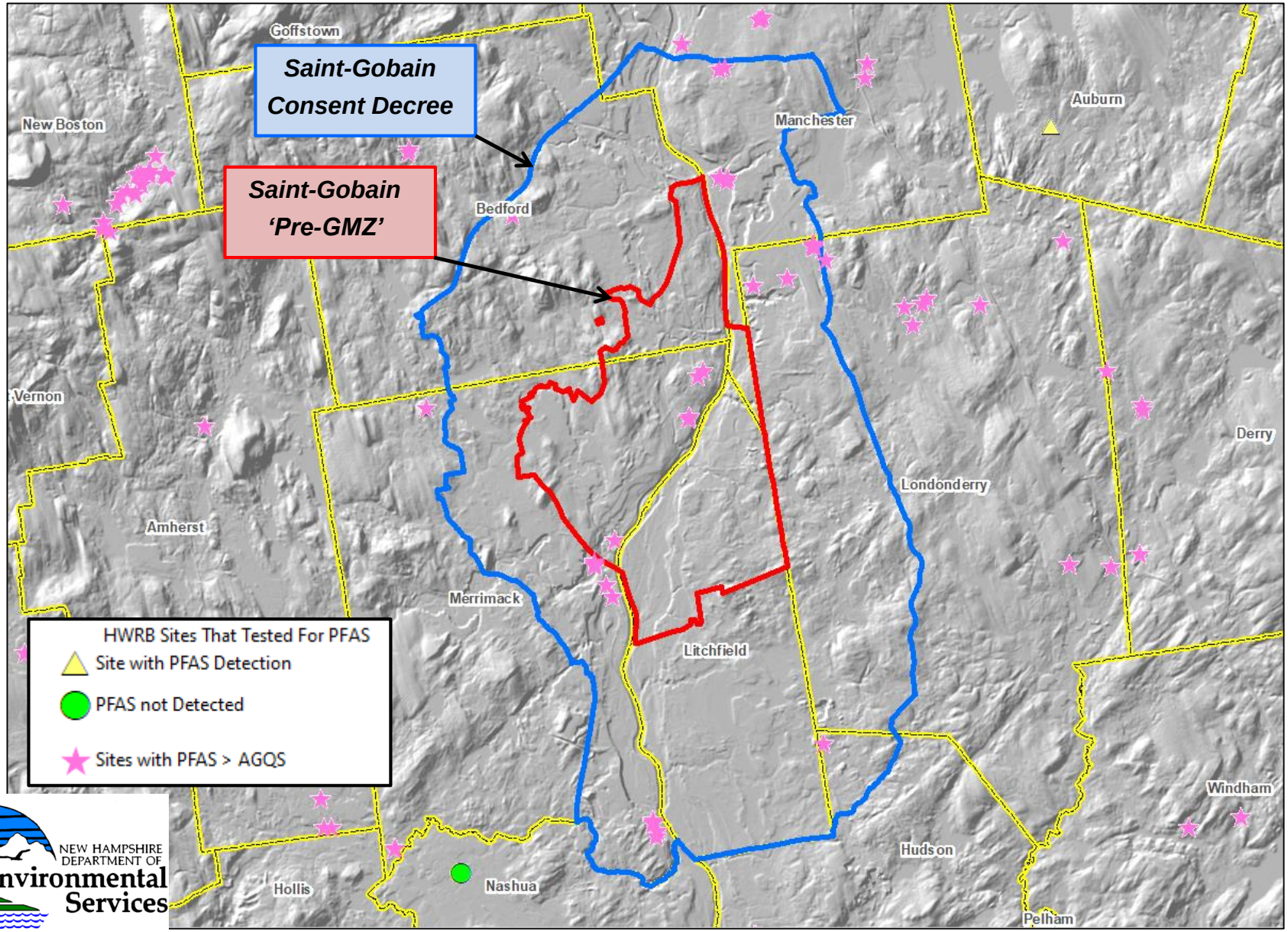
Saint-Gobain and Discrete PFAS Sites



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Water Supply Well Sampling

Saint-Gobain - NHDES - Discrete Sites – Public Water Supplies

- Saint-Gobain (Inside Consent Decree)
  - Responsible for evaluating extent of AGQS violations inside Consent Decree due to discharges from its Merrimack Facility.
    - Work Plan Submitted September 2019
    - 7 Addenda Submitted to NHDES
    - Bi-Weekly Updates and Bi-Monthly Reports Submitted to NHDES
- NHDES – (Outside Consent Decree)
  - NHDES Sampling Outside the Consent Decree Area
    - Private Well Testing Request Form (Survey Monkey)
    - Notification Sampling (Properties within 500 feet of AGQS exceedance)
- Discrete Sites – (Responsible Parties)
- Public Water Supplies (Public Water System Operators)

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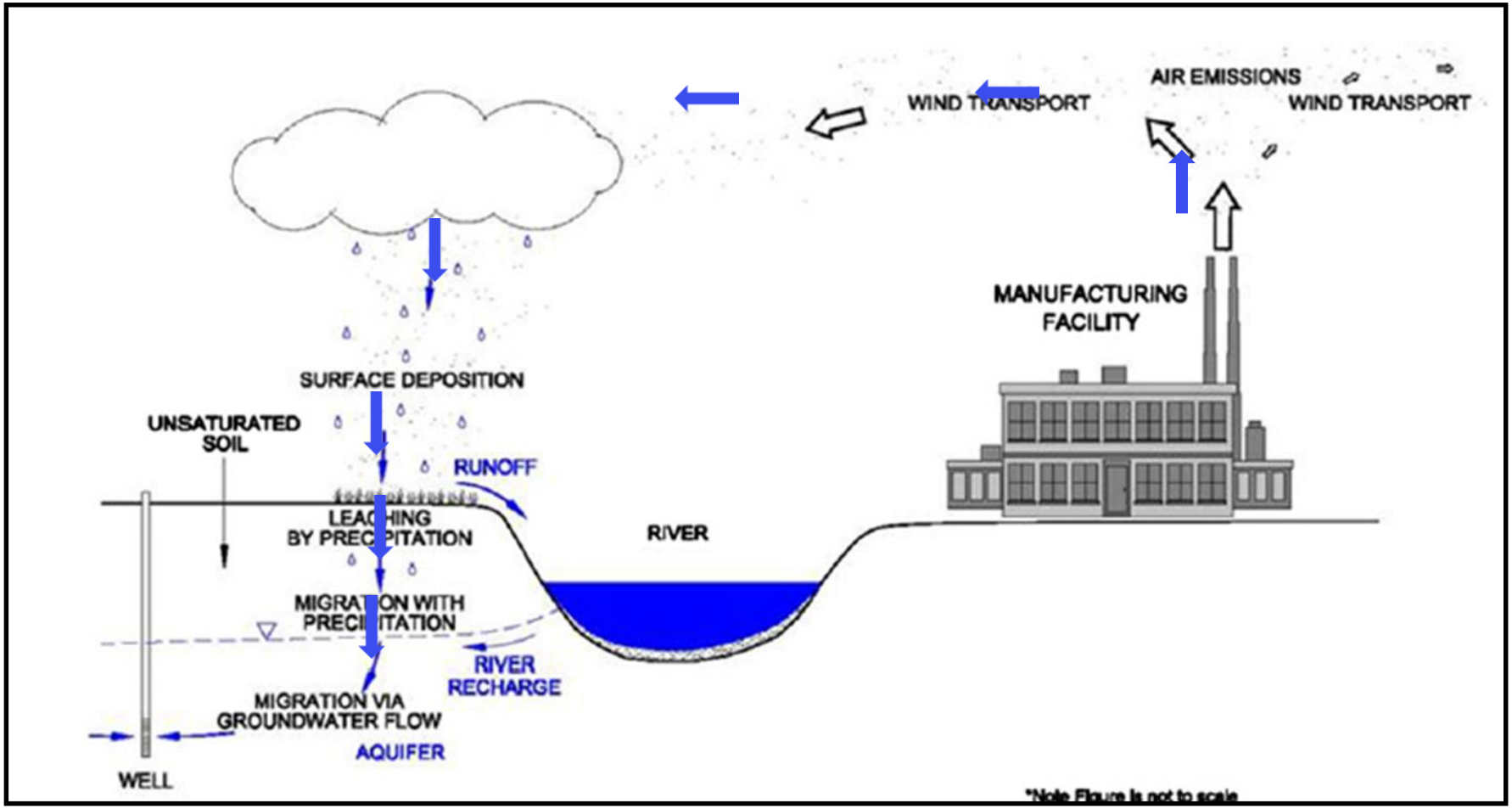
Air Release

Conceptual Pathway to Groundwater Contamination



Davis et al., 2007, *Chemoshpere*

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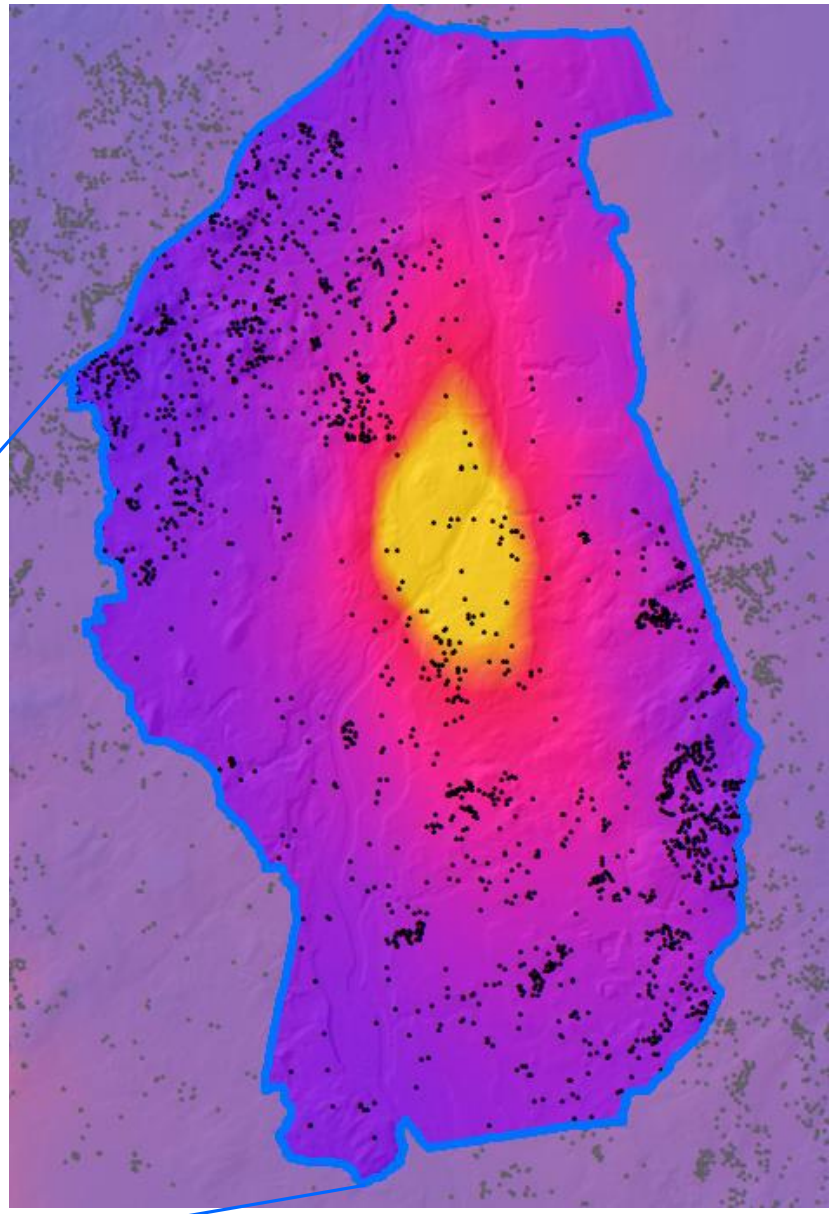
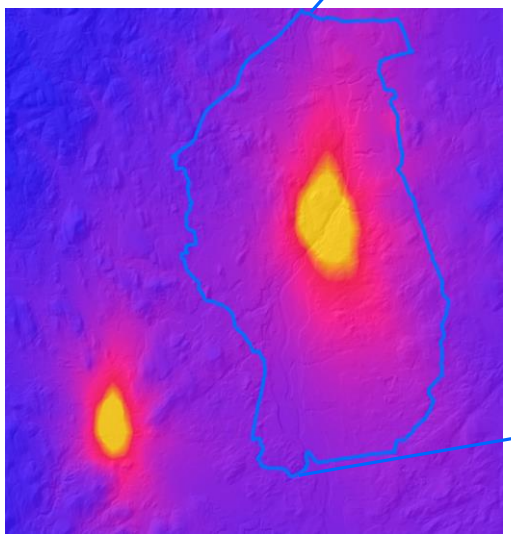
64 Square Mile Consent Decree Area

Saint-Gobain entered into a Consent Decree with NHDES that defined a 64 square-mile area.

Thousands of wells, both private and public, are located in this area.



NHDES modeled air deposition from TCI (2019) and Saint-Gobain. Warmer colors represent greater modeled air deposition of PFAS; cooler coolers represent relatively less deposition.



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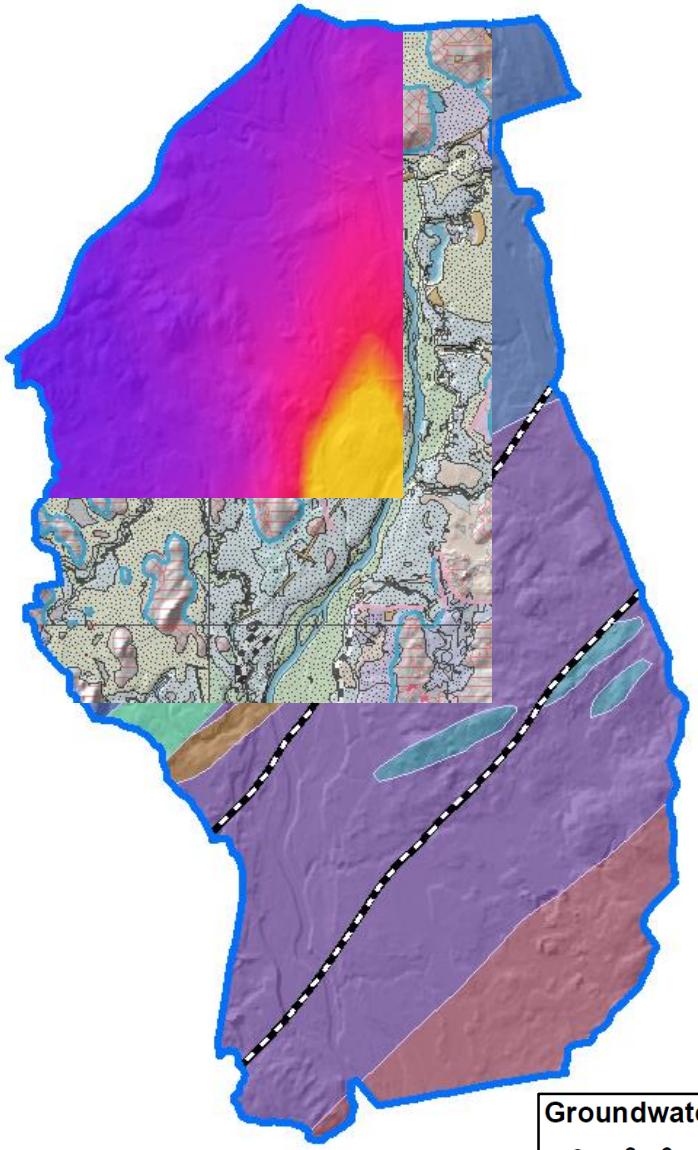
Wells georeferenced in the NHDES water well inventory are shown as black dots (above).



Air Deposition +

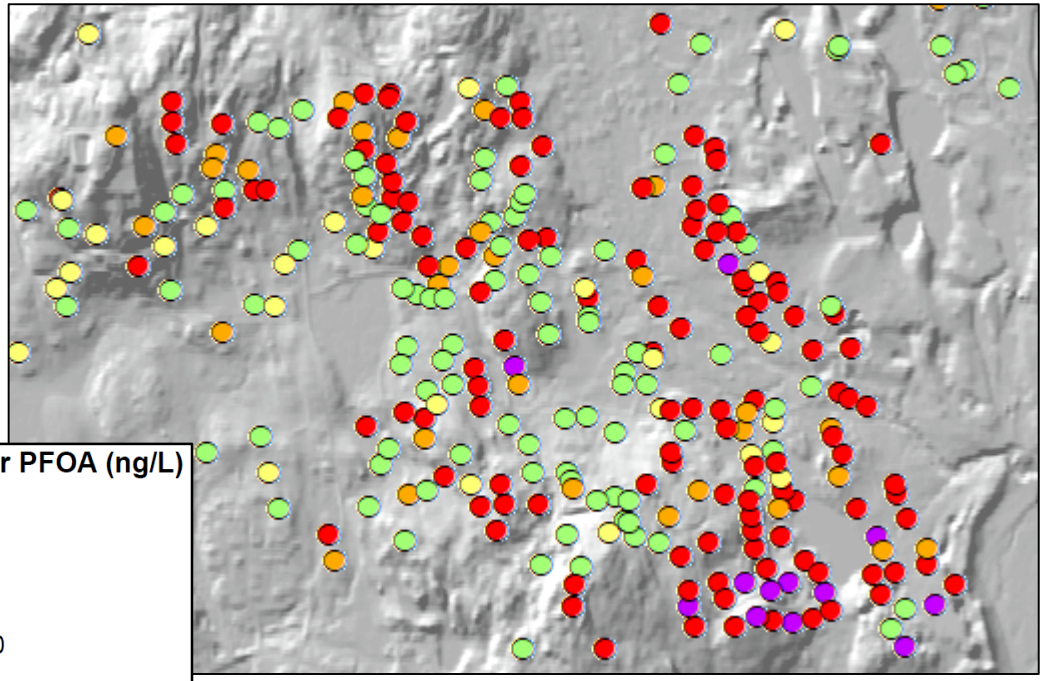
Surficial Geology +

Bedrock Geology +

Time-related Factors =

(e.g. changes in chemicals released, precursor transformations, seasonal variation, etc.)

Complex Spatial Distribution of PFAS in Groundwater



Groundwater PFOA (ng/L)

- 0 - 6
- >6 - 9
- >9 - 12
- >12 - 70
- >70

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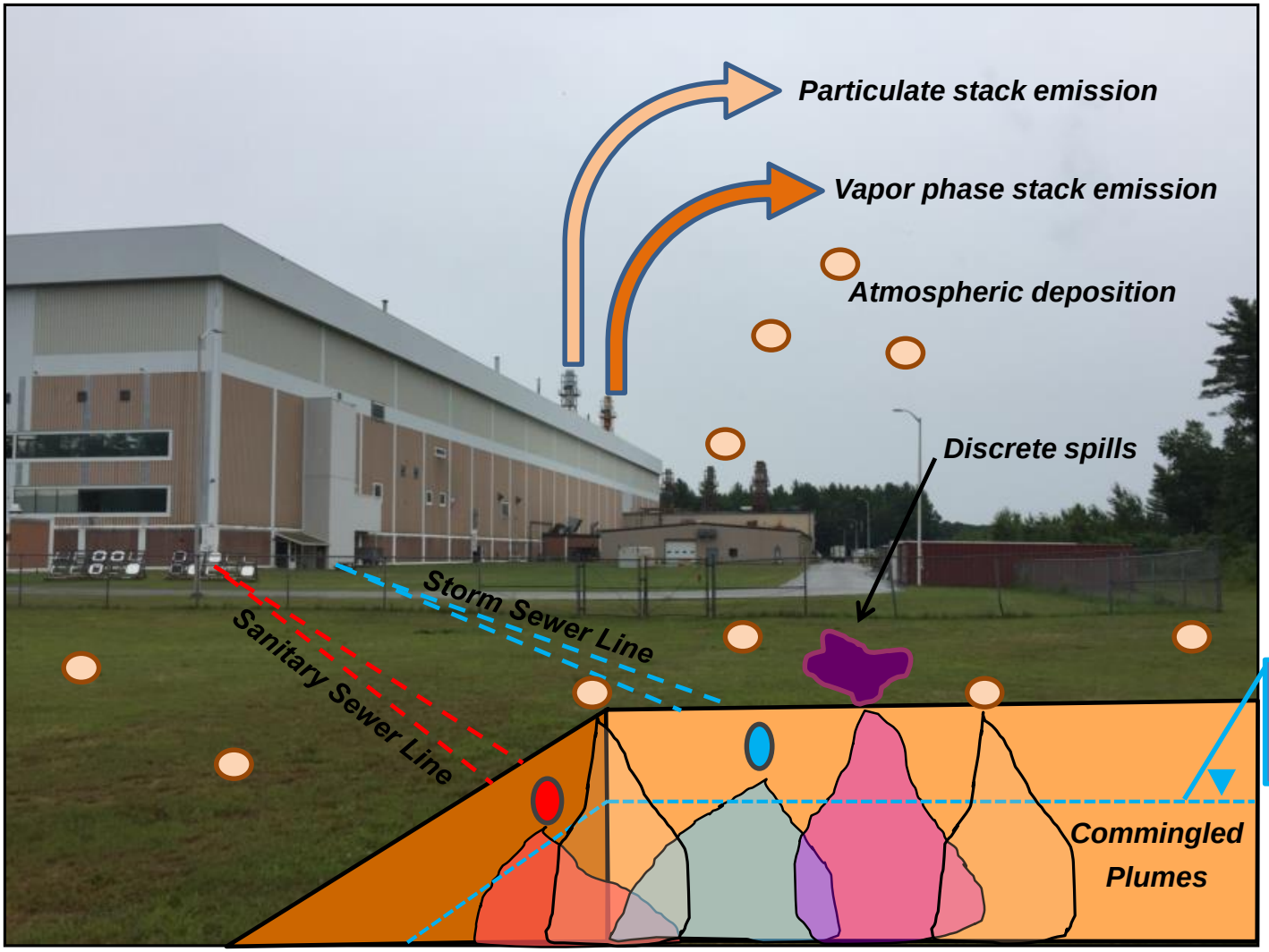
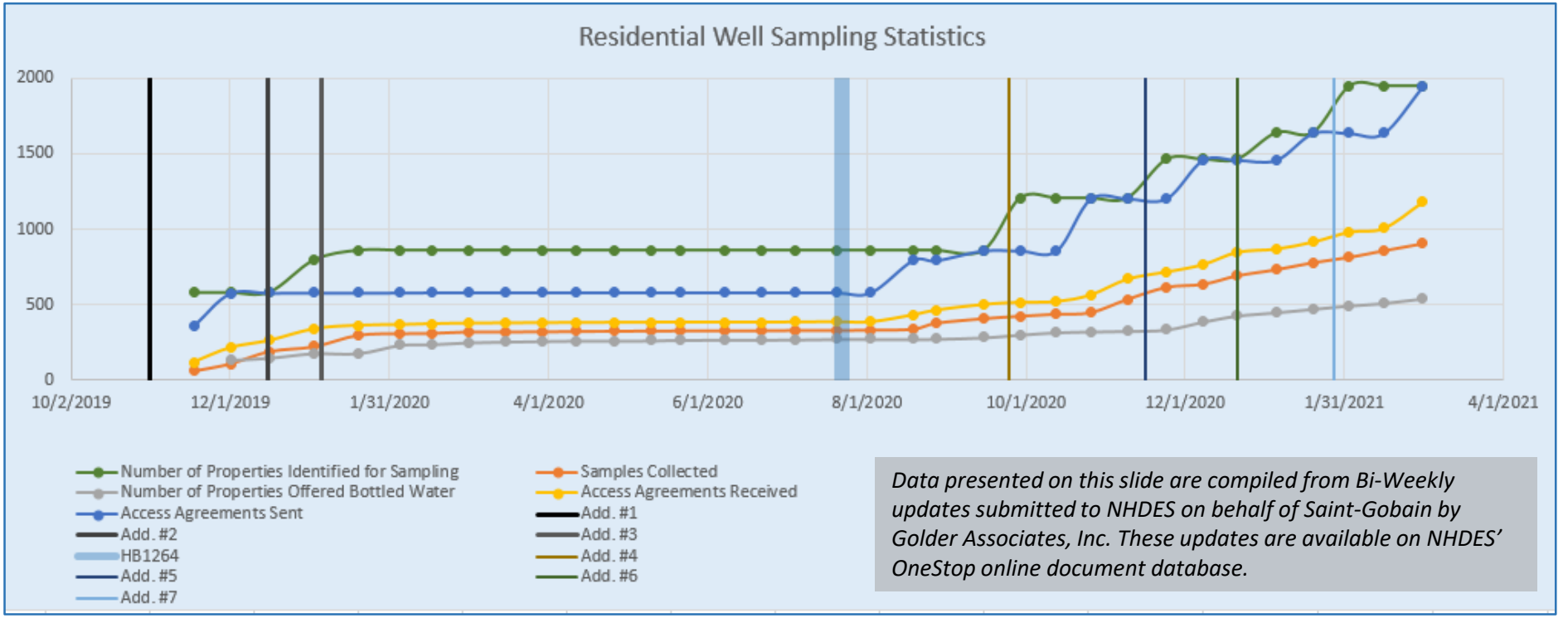
Potential Release Pathways Under Investigation – *Regional Analogy*



Schematic representation of potential PFAS release pathways and commingled plumes for illustration purposes only (<u>not intended to reflect actual site conditions</u>).

Water Supply Well Sampling

Saint-Gobain – Consent Decree Area



Data presented on this slide are compiled from Bi-Weekly updates submitted to NHDES on behalf of Saint-Gobain by Golder Associates, Inc. These updates are available on NHDES' OneStop online document database.

Sampling Statistics as of March 2, 2021:

- Properties Identified for Sampling: *1,953*
- Access Agreements Returned: *1,182 (~61% Return Rate)*
- Samples Collected: *904*
- Properties Offered Bottled Water: *540*

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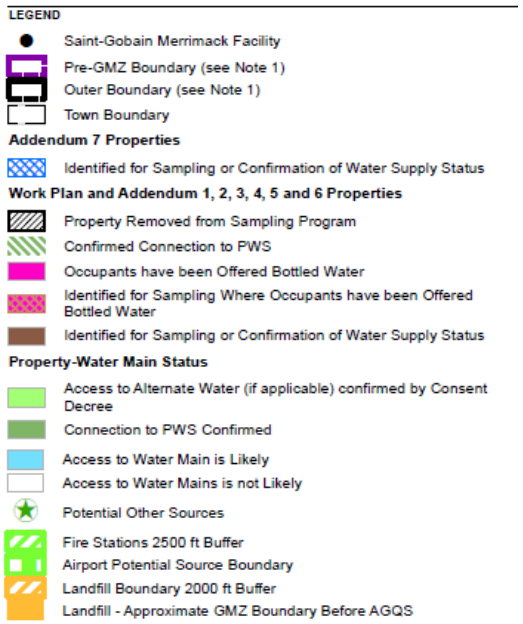
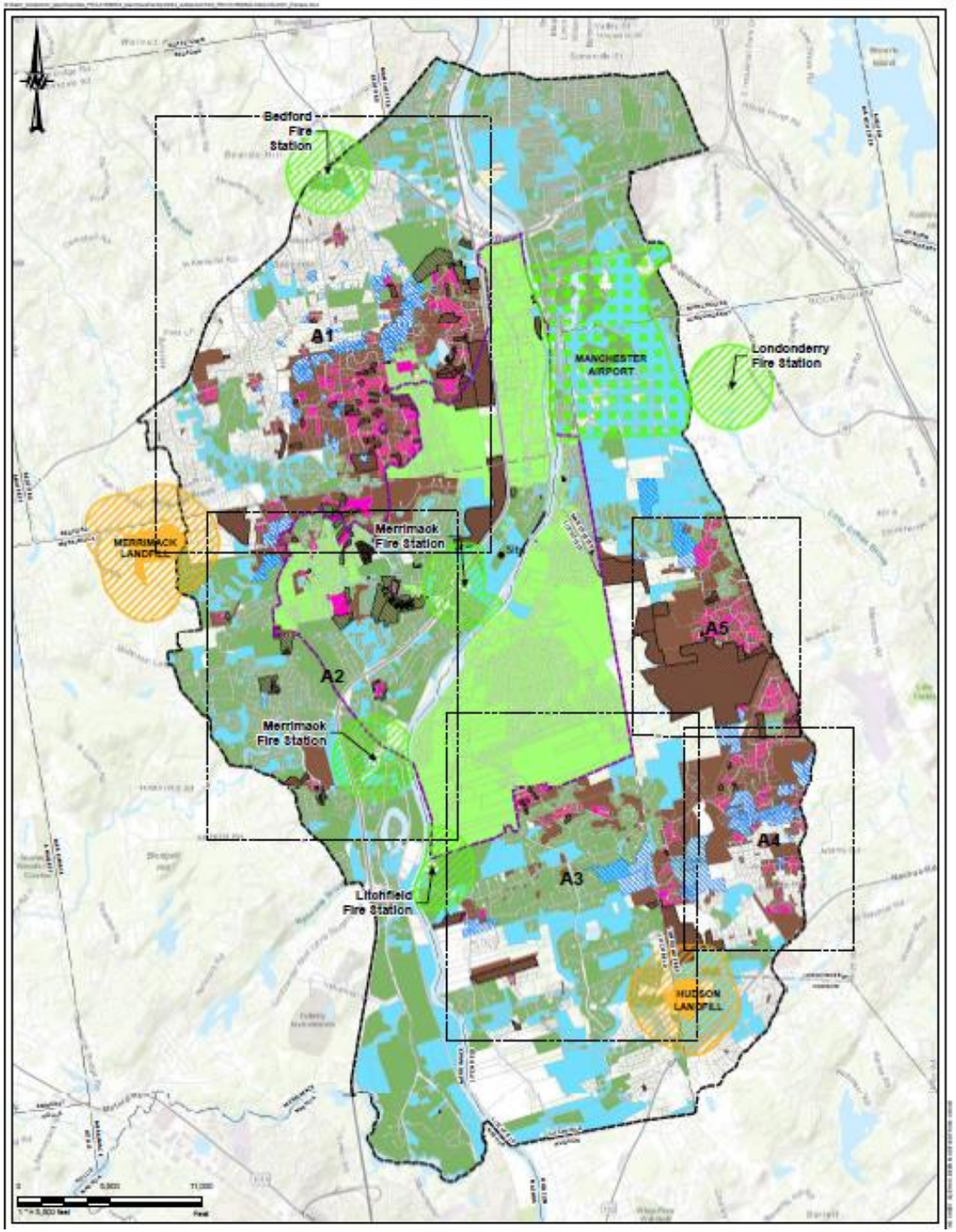
Consent Decree

Saint-Gobain Sampling Program



Golder Associates, Inc., 2021, *Work Plan for Sampling of Water Supply Wells and Provision of Alternate Water, Addendum 7,* Figure 1A



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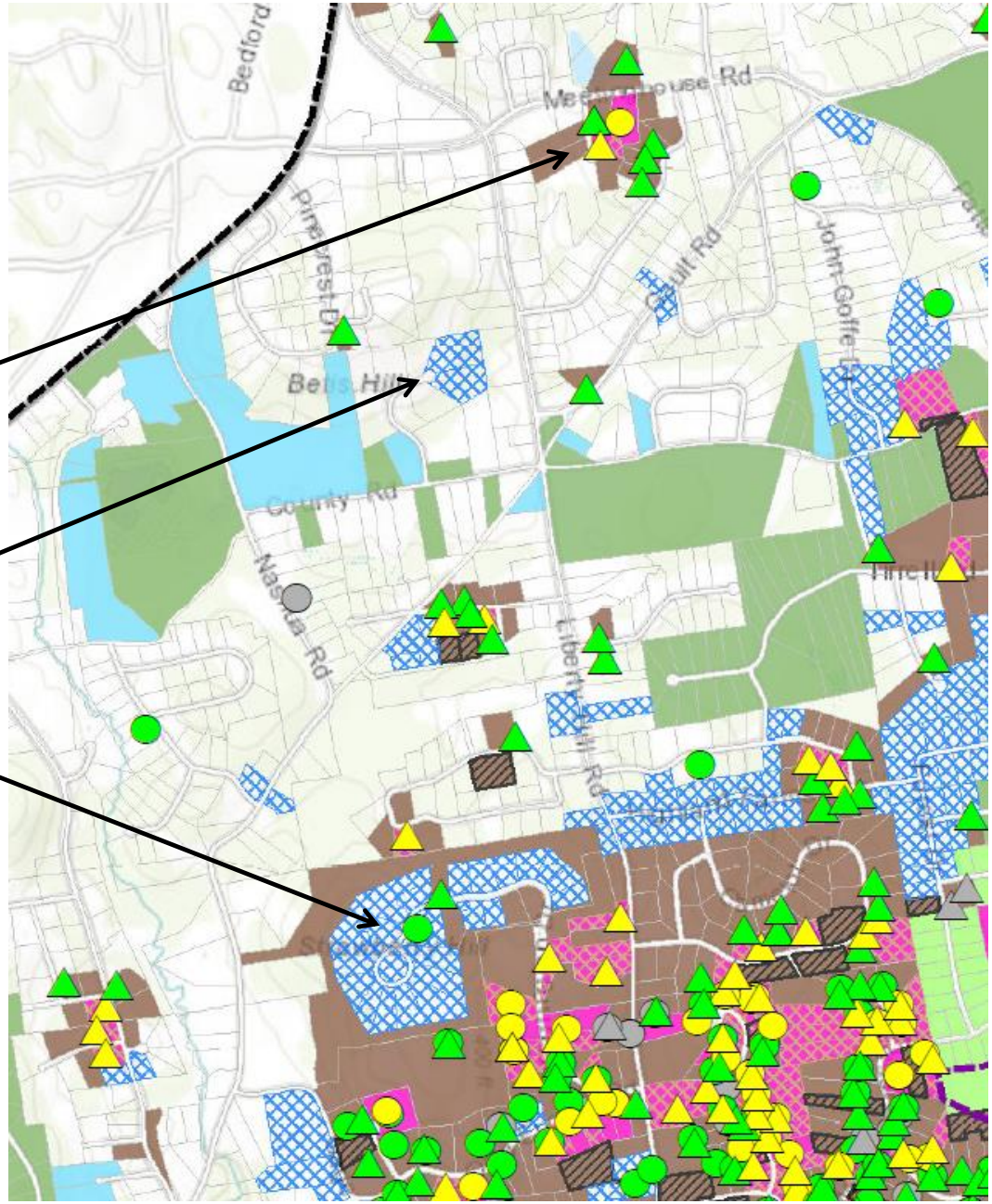
Consent Decree

Saint-Gobain Sampling Program

Why was my property selected for sampling?

- Proximity to >AGQS: *60-foot buffer on property*
- Low Sample Density: *"Quasi-Random"*
- Neighborhood-scale



PFOA Results

- Non-detect
- ≤12 ppt
- >12 ppt

Golder Associates, Inc., 2021, *Work Plan for Sampling of Water Supply Wells and Provision of Alternate Water, Addendum 7,* Figure 1B

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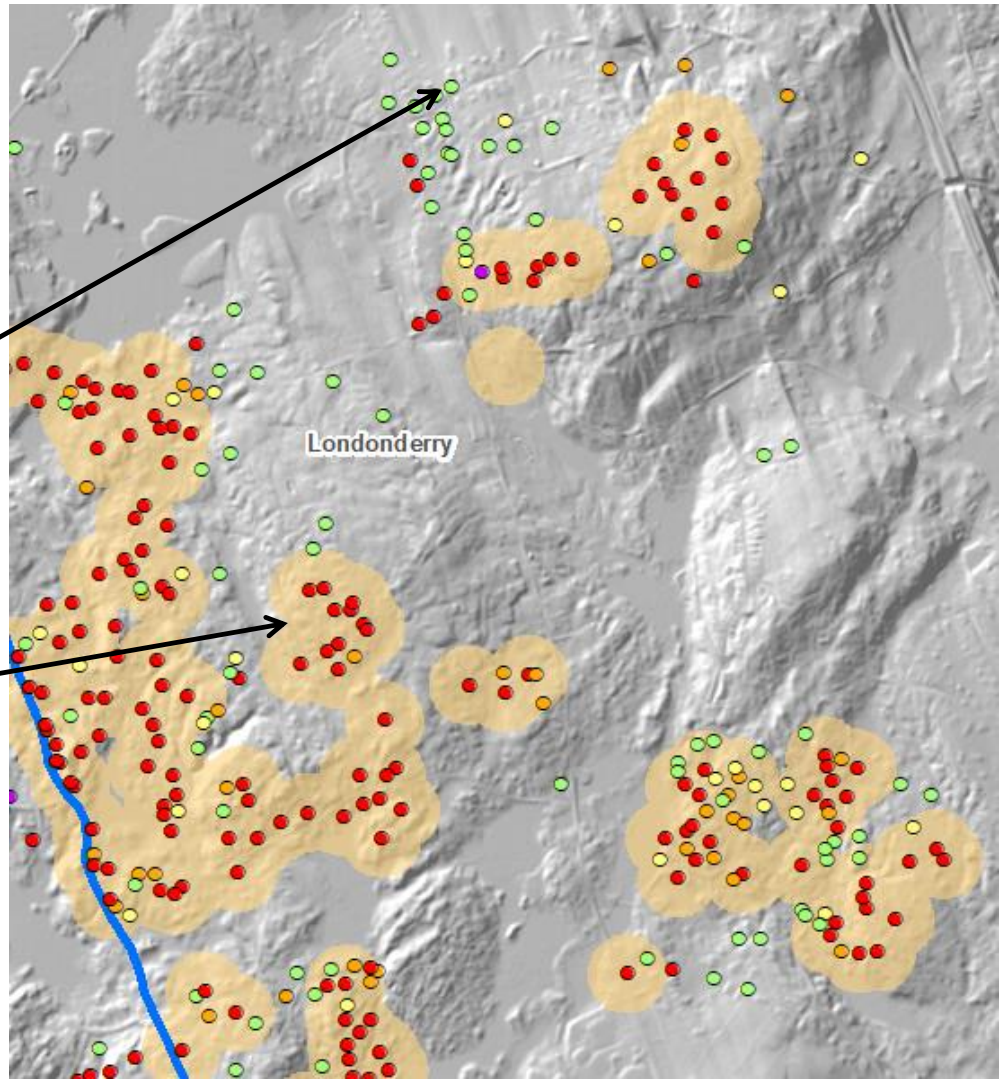
Outside Consent Decree

NHDES Londonderry Sampling

- Initially, sampling primarily focused on on-line well sampling requests
- Current focus is on 'Notification' sampling: *500-foot buffer around well >AGQS*



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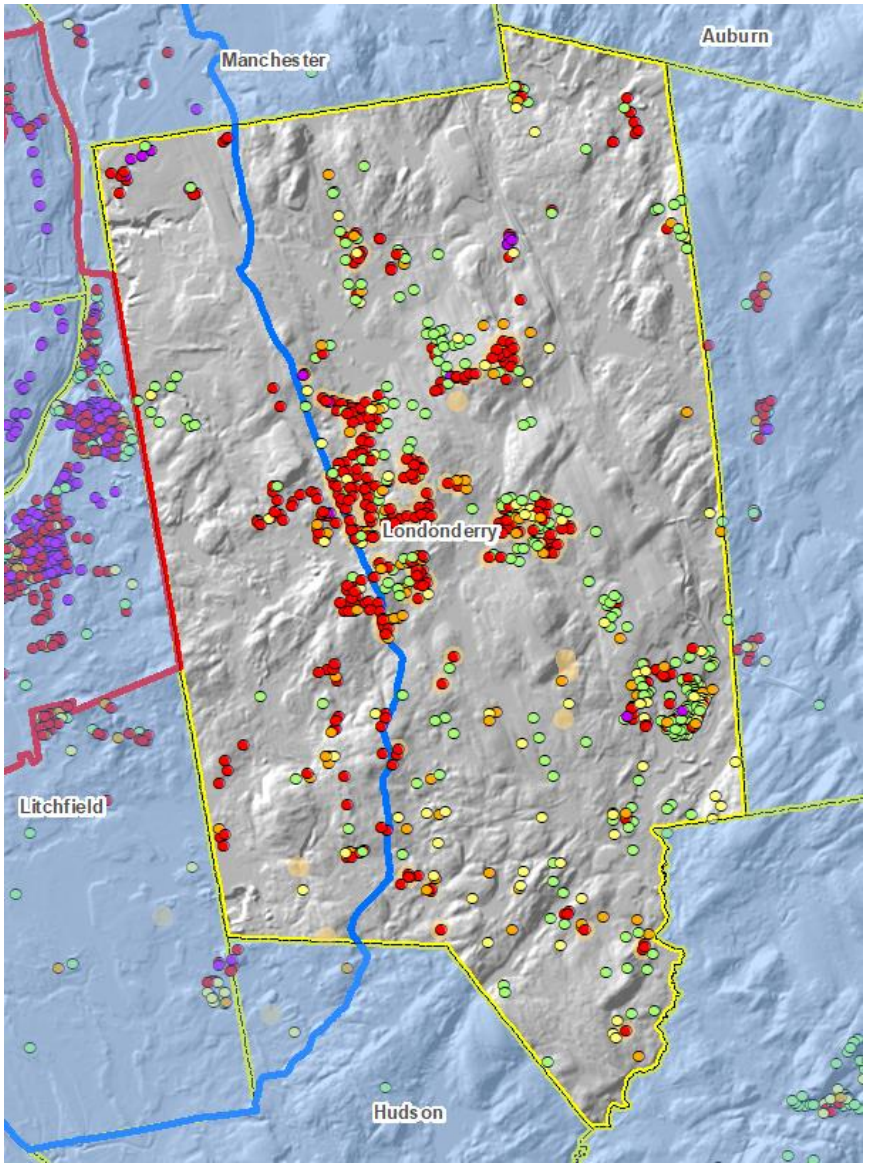
Water Supply Well Sampling

NHDES – Londonderry Outside Consent Decree Area

Notification/Sampling Statistics as of March 8, 2021:

- Notification Letters Sent: *~1,225 (Batches Sent ~Monthly)*
- Samples Pending Lab Analysis: *71*
- Appointments Scheduled: *>138*
- Wells sampled in Londonderry Outside Consent Decree: *~675**

  **This total includes wells (including monitoring wells) sampled by others and uploaded to EMD. It does not include public water supply wells.*



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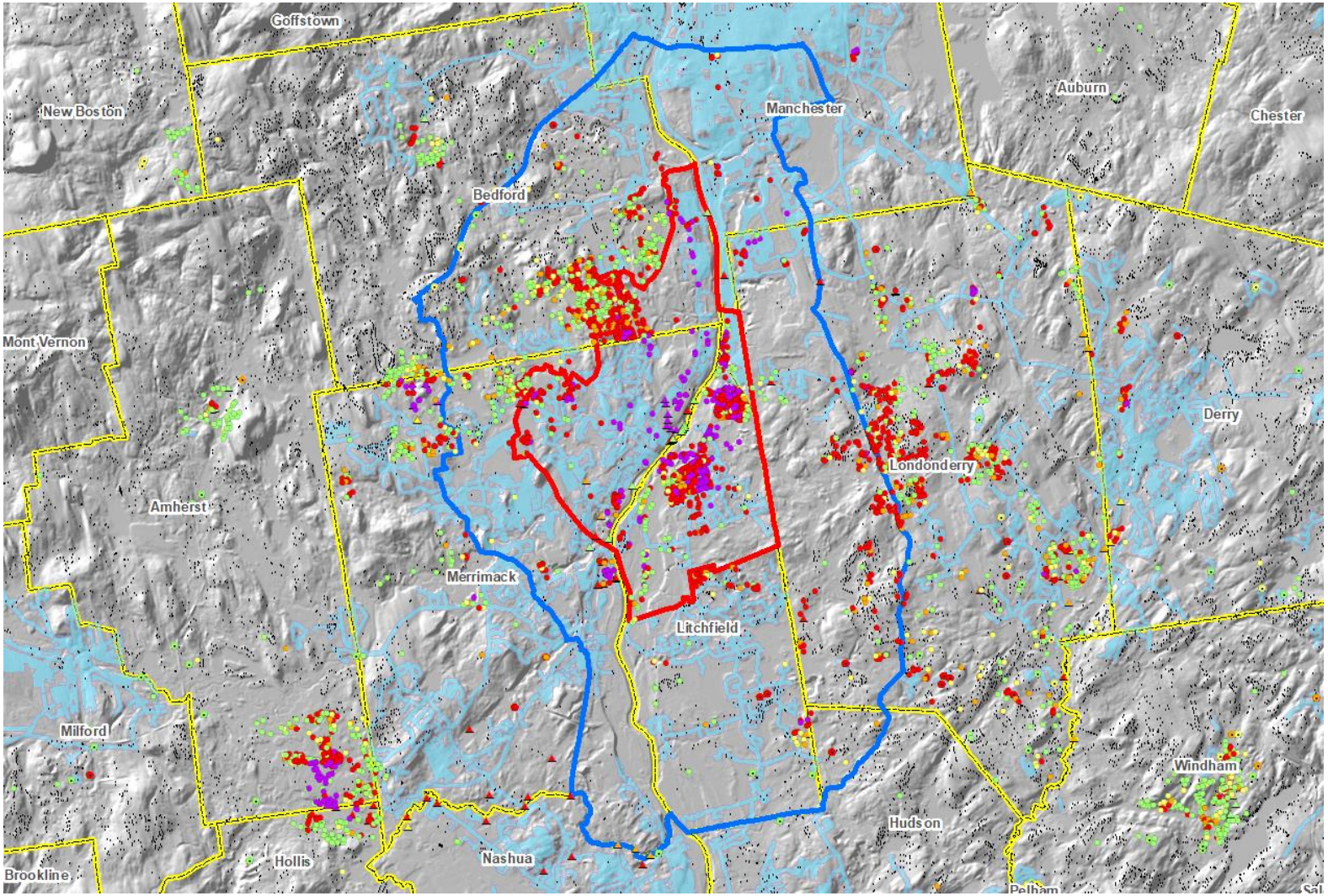
Regional View of Data

This slide illustrates the location of public water mains (light blue lines) and wells that are part of the Water Well Inventory (small black dots). Surface water samples have the same color ramp for PFOA as the groundwater samples but the symbols are triangular.



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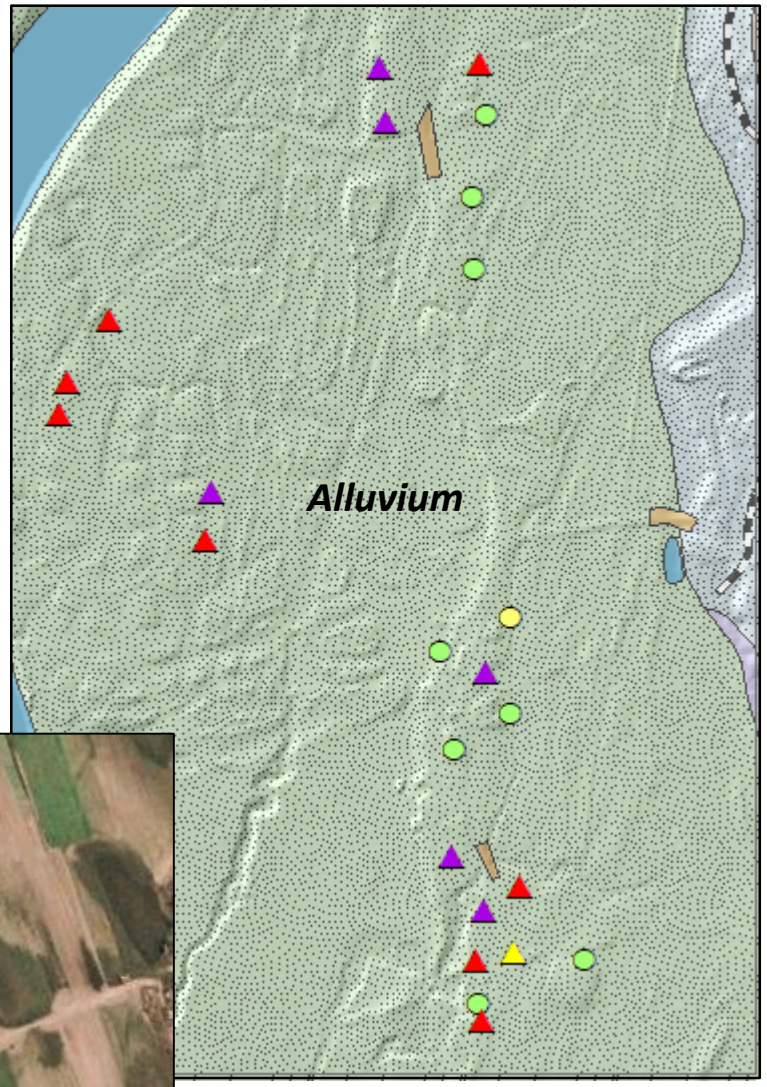
Geologic Factors: Overburden vs. Bedrock

PFOA concentrations in groundwater samples from all nine bedrock wells shown on this slide were less than or equal to 12 ng/L, while 14 out of 15 overburden wells exceeded 12 ng/L. The alluvial deposit in this area consists of fine sand with silt and localized ponding occurs after precipitation (dark patches on the aerial photo). Water well records suggest the alluvial deposit is generally thicker than 20 feet in the vicinity of this terrace. ***One possible explanation for the disparity between the overburden and bedrock PFAS concentrations is that PFAS sorb to the fine-grained alluvial deposits, which "shield" the underlying fractured rock from greater levels of contamination.***



Groundwater PFOA (ng/L)

- 0 - 6
- >6 - 9
- >9 - 12
- >12 - 70
- >70

Well Type

- BEDROCK
- OVERBURDEN

Surficial Geology Credit: Koteff, Carl, 1976, Surficial geologic map of the Nashua North quadrangle, Hillsborough and Rockingham Counties, New Hampshire: U.S. Geological Survey, Geologic Quadrangle Map GQ-1290, scale 1:24,000.

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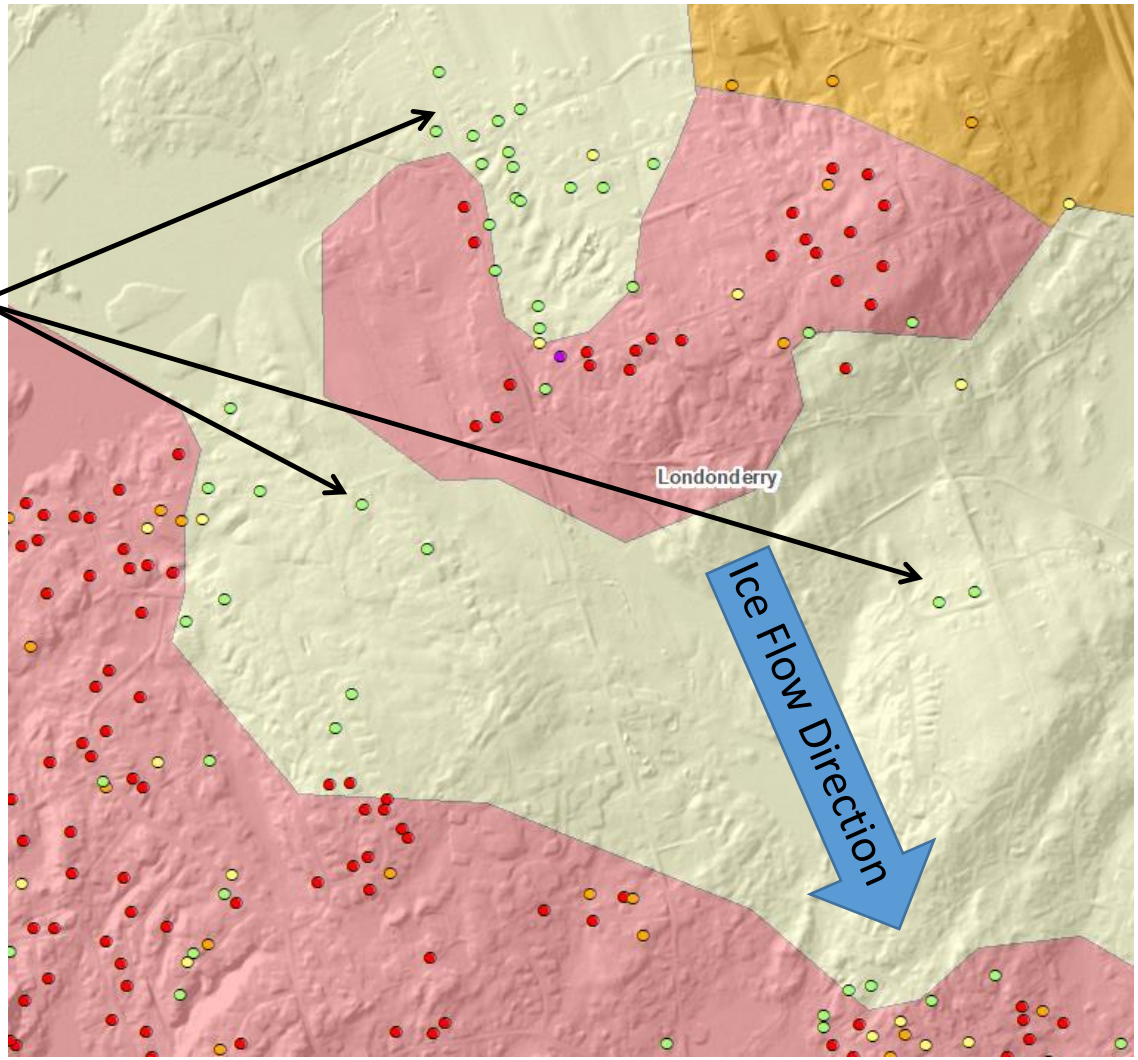
Spatial Patterns in Londonderry: Till Deposits?

PFOA concentrations in groundwater samples tend to be less than or equal to 12 ng/L in the portions of this figure exhibiting a smooth, fluted texture in the LiDAR imagery. Presumably, the smooth fluted texture is indicative of basal till that was deposited at the base of flowing glaciers. ***One possible explanation for the variable spatial distribution of PFOA is that PFAS sorb to the (thicker?) basal till deposits preventing migration of greater levels of contamination into the underlying fractured rock.***



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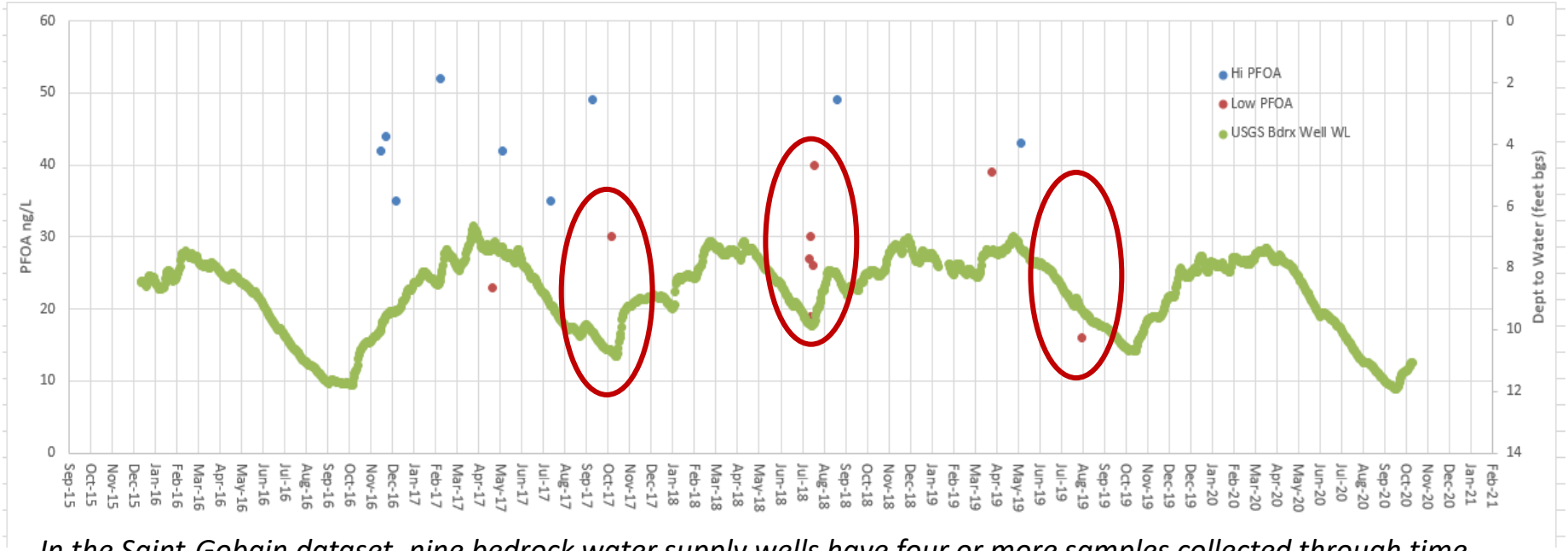
Temporal Variability in Bedrock Water Supply Wells – Bedford / Merrimack



In the Saint-Gobain dataset, nine bedrock water supply wells have four or more samples collected through time. This plot shows the highest concentration (blue) and the lowest (red) concentration of PFOA plotted through time. Water level data from a USGS bedrock monitoring well in Pembroke is plotted on the right Y-axis as a proxy for climatic factors influencing groundwater fluctuations in the bedrock aquifer in the Southern New Hampshire area. Seven of the nine samples with the lowest PFOA concentrations (red ovals) were collected when the groundwater levels were receding or at the lowest seasonal point in the Pembroke well, suggesting seasonal factors influence PFAS concentration in some bedrock wells.

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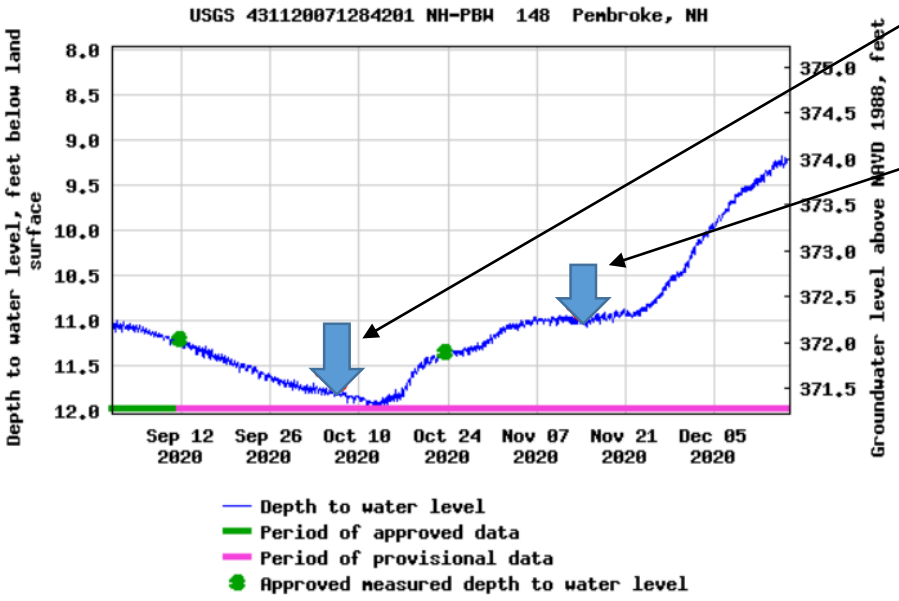
Water level Data from USGS Well NH-PWB 148:
https://groundwaterwatch.usgs.gov/AWLSites.asp?mt=g&S=431120071284201&ncd=awl

Temporal Variability in Bedrock Water Supply Wells – Londonderry

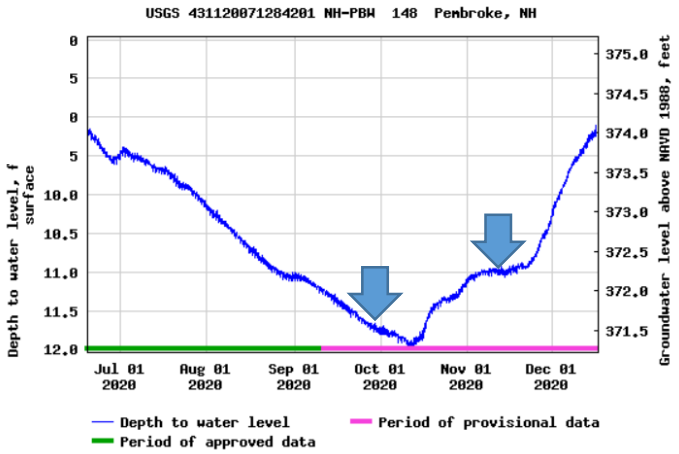
Depth to water level, feet below land surface
Most recent instantaneous value: 9.22 12-16-2020 13:00 EST



PFOA 29.7 ng/L on 10/7/20

PFOA 48 ng/L on 11/17/20

ater level, feet below land surface
cent instantaneous value: 9.12 12-17-2020 08:00 EST



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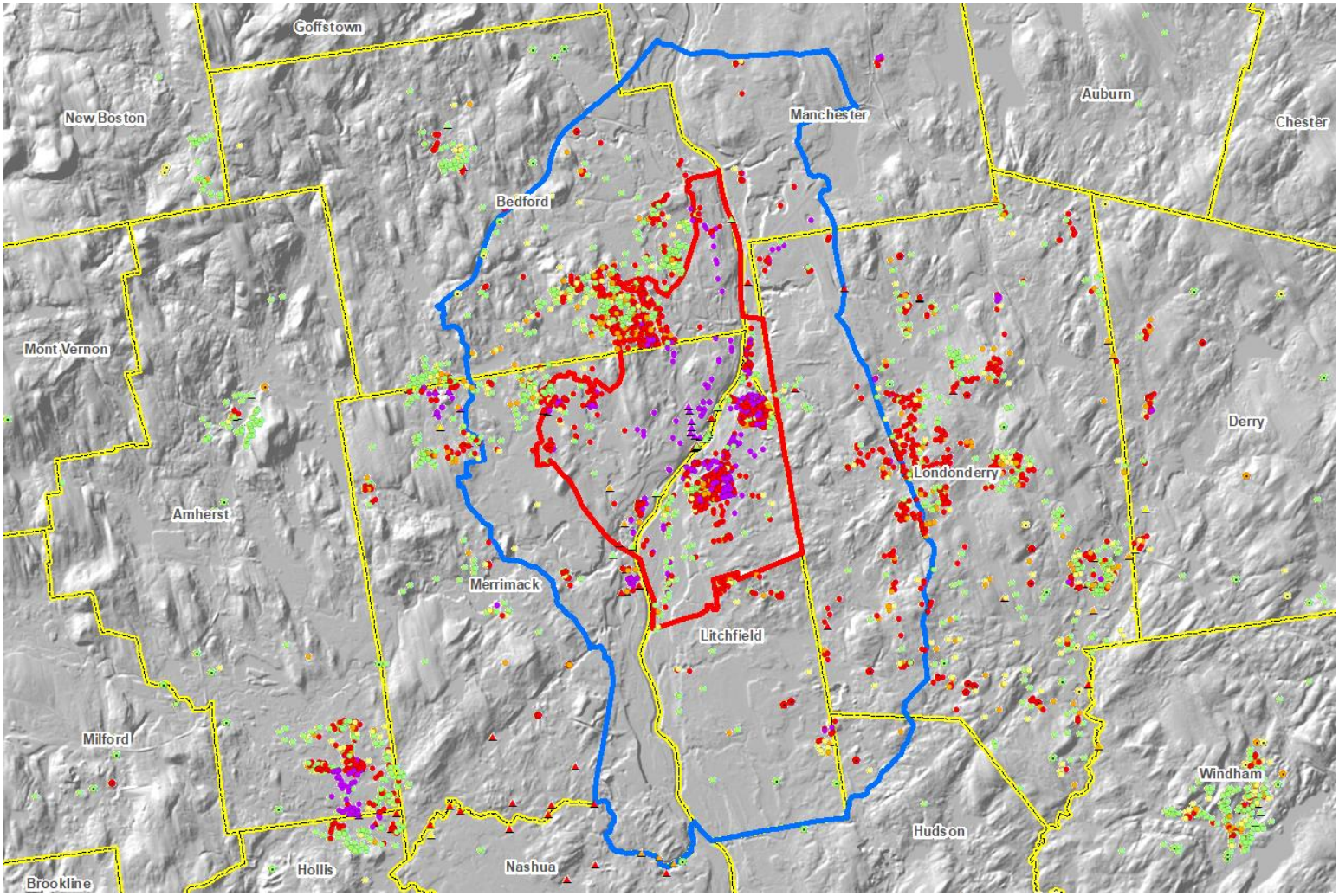
Thank You – Questions?



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