Cherry Brook Elementary School
PFAS – Project Update

Presented to the Town of Canton

Presented by:

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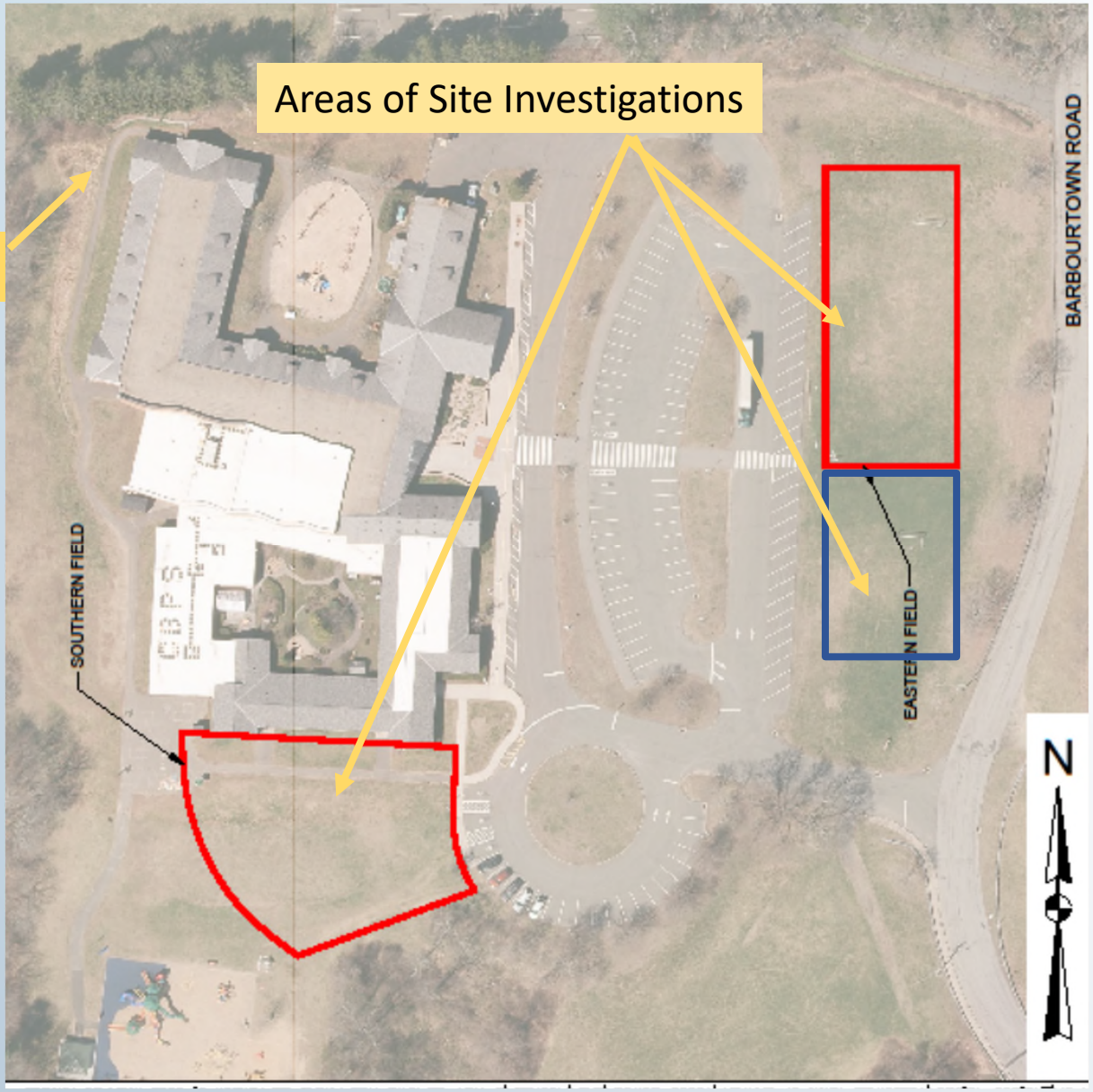
March 22, 2023

Fire Training Areas



Fire Training drills, using Aqueous Film Forming Foam (AFFF), were conducted in 2014 and perhaps in 2007/2008.

General Summary of PFAS Results

Potable Water Supply Wells

- PFAS concentration were not detect in potable water supply wells in 2022.

Soil

- Concentrations of PFAS do not exceed direct (contact) exposure exceedances.
  - Fencing was placed around the release area because of the regulatory uncertainties.
- Concentrations of PFAS have leached to the groundwater.

Groundwater

- Concentration of PFAS are present in groundwater, directly below the Eastern Field.
  - PFAS concentrations have migrated further to the east and south.
- Groundwater PFAS concentrations were reported immediately adjacent to Cherry Brook.

Surface Water

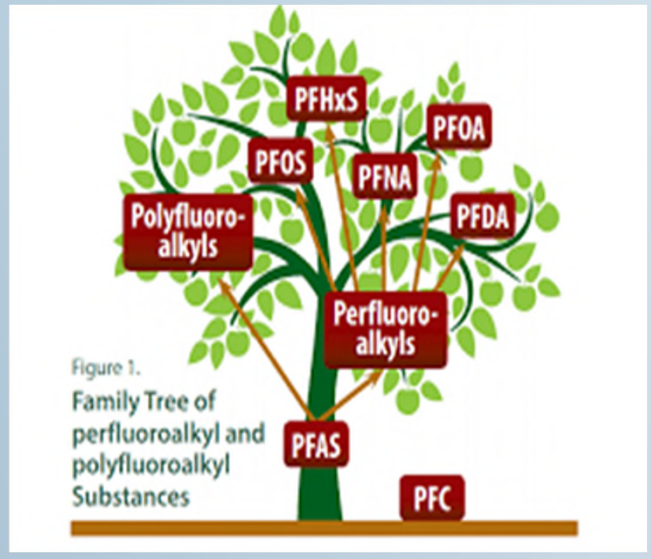
- PFAS concentrations were detected in Cherry Brook.

Regulations

- PFAS regulations are in flux at CTDPH, CTDEEP and at the EPA

What Makes PFAS Different

PFAS = Per- and Poly-Fluoroalkyl Substances



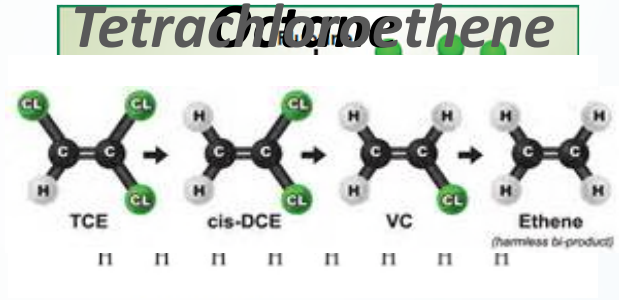
More than 6,000 PFAS compounds
About 40 can be analyzed

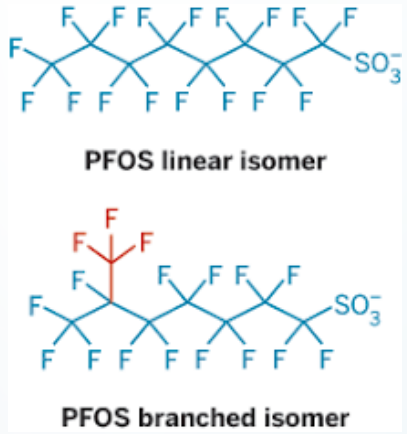
Man-made compounds (multiple C bonds)

- Thermally and chemically stable
  - (strong C - F molecular bond, low/non-reactivity)
  - PFAS does not biodegrade

Persistent in the environment

Worldwide, in all environmental media

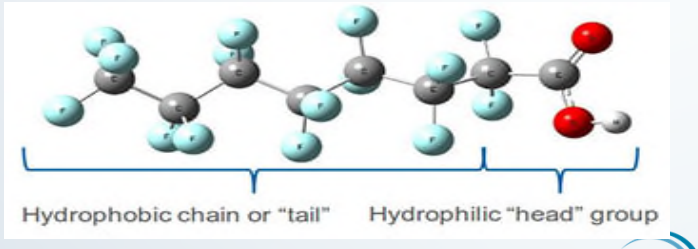




"Tail" end - Repels water (hydrophobic) and oil/fat (lipophobic)

"Head" end - attracts/dissolves - water (hydrophilic)

- Nonreactive, non-stick



Regulation Changes

Initial

EPA (Drinking Water)
- PFOS/PFOA = **70 ng/L**

CTDPH (Drinking Water Action Levels)
- Sum of 5PFAS = **70 ng/L**

CTDEEP (Groundwater)
- Sum of 5PFAS = **70 ng/L**

CTDEEP (Soil)
- R-DEC - Sum of 5-PFAS = **1,350 µg/Kg**
- GA-PMC - Sum of 5-PFAS = **1.4 µg/Kg**

CTDEEP (Surface Water)
- Not established

Current

EPA (Drinking Water)
- PFOS/PFOA = **70 ng/L**

CTDPH (Drinking Water Action Levels)
- PFOS = **10 ng/L,** PFNA = **12 ng/L**
- PFOS = **16 ng/L,** PFHxS = **49 ng/L**

CTDEEP (Groundwater)
- Sum of 5-PFAS = **70 ng/L**

CTDEEP (Soil)
- Res - Sum of 5PFAS = **1,350 µg/Kg**
- GA-PMC - Sum of 5-PFAS = **1.4 µg/Kg**

CTDEEP (Surface Water)
- Not established

Proposed

EPA (3/14/2023) as an MCL
- PFOS = **4 ng/L,** PFOA = **4 ng/L**
- PFNA, PFHxS, PFBS, GenX = **1.0 HI**

CTDPH (Drinking Water Action Levels)
- Dependent on EPA's National Primary Water Regulation proposal related to a Maximum Contaminant Level (MCL)

CTDEEP
- Dependent on 1) CTDHP changes in drinking water Action Levels, 2) updated PFAS toxicology and risks.
- Anticipated lower criterion for GW, soil, new surface water

- Sum of 5PFAS include: PFOA,PFOS, PFNA, PFHxS, PFHpA
- ng/L = part per trillion (1-seconds in 31,500 years, or a drop in 500,000 drums)
- µg/Kg = part per billion (1-second in 31.5 years, or a drop in 500 drums)

UNCERTAINTIES

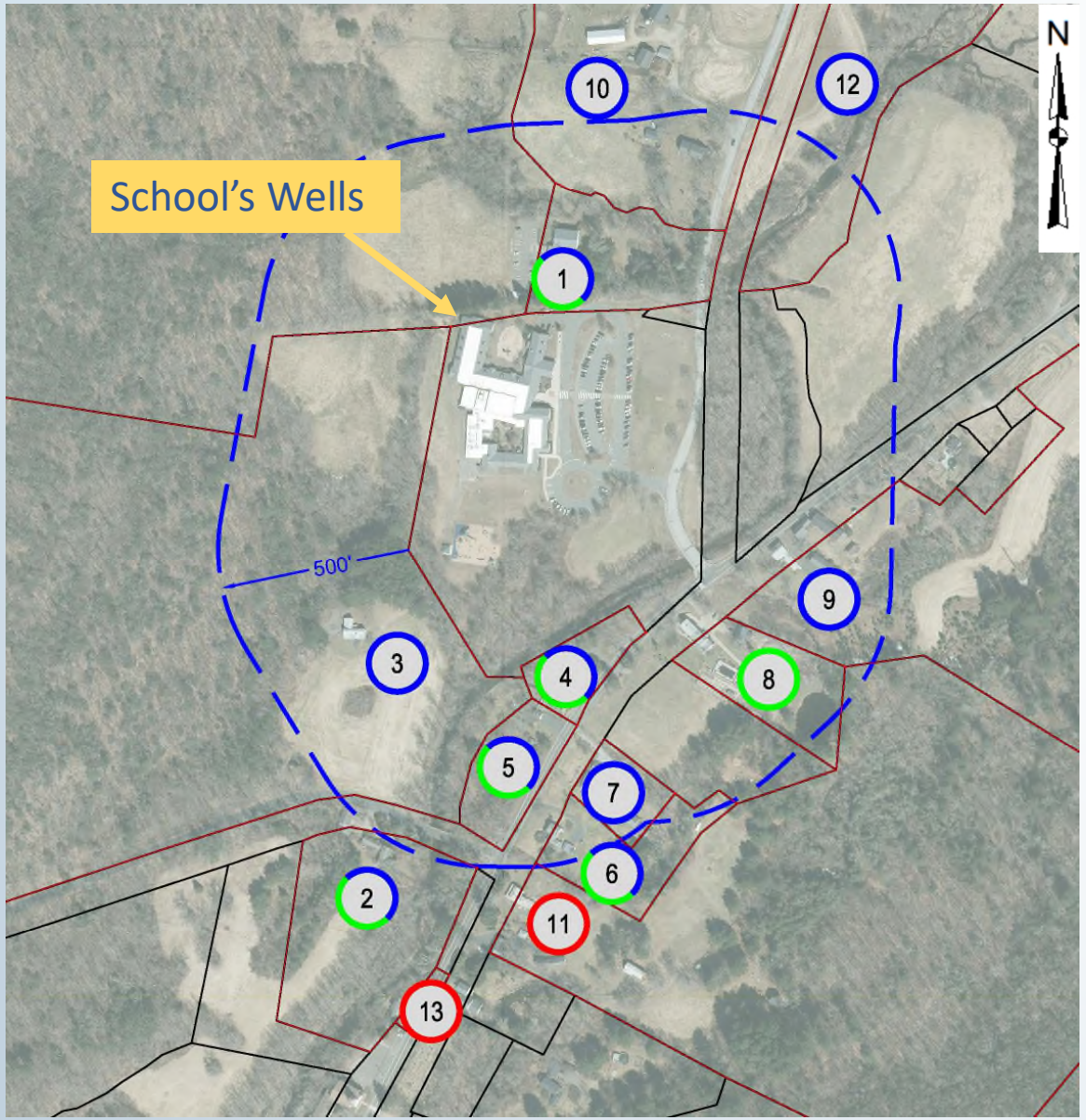
Bedrock Potable Water Supply Wells

Targeted Zone
- 500-foot radius around CBES property line.

Coordination
- Access agreement with individual property owners
- Sampling Coordination
- Not all property owners wanted to participate

Good News
- No PFAS concentrations were detected in 2022

Properties within 500-feet of School



Property ID

Wells sampled in 2020, only

Wells sampled in 2022, only

Wells sampled in 2020 and 2022

Property Owner did not provide access – No sampling data

Summary of Investigations

Activities in 2020/2021

Potable Water Supply Sampling
- Six residential wells

Monitoring Well Installation
- 19 monitoring well over two events (2020 & 2021)
- Surveys well locations

Groundwater Sampling
- 19 groundwater samples after wells were installed in 2020/2021

Soil Sampling
- Collected 113 soil samples at multiple depths.
  - 29 in the Southern Field
  - 84 in the Eastern Field
  - Analyses - total mass and SPLP leaching

Surface water samples in Cherry Brook
- Collected 3 surface water samples
  - One up- and one down-gradient of the plume
  - One at the suspected plume discharge

Installed 3 staff gauges (SG-1, SG-2, SG-3)

Activities in 2022

Potable Water Supply Sampling
- Ten residential wells

Piezometer Installation
- Three piezometers along the bank of Cherry Brook.

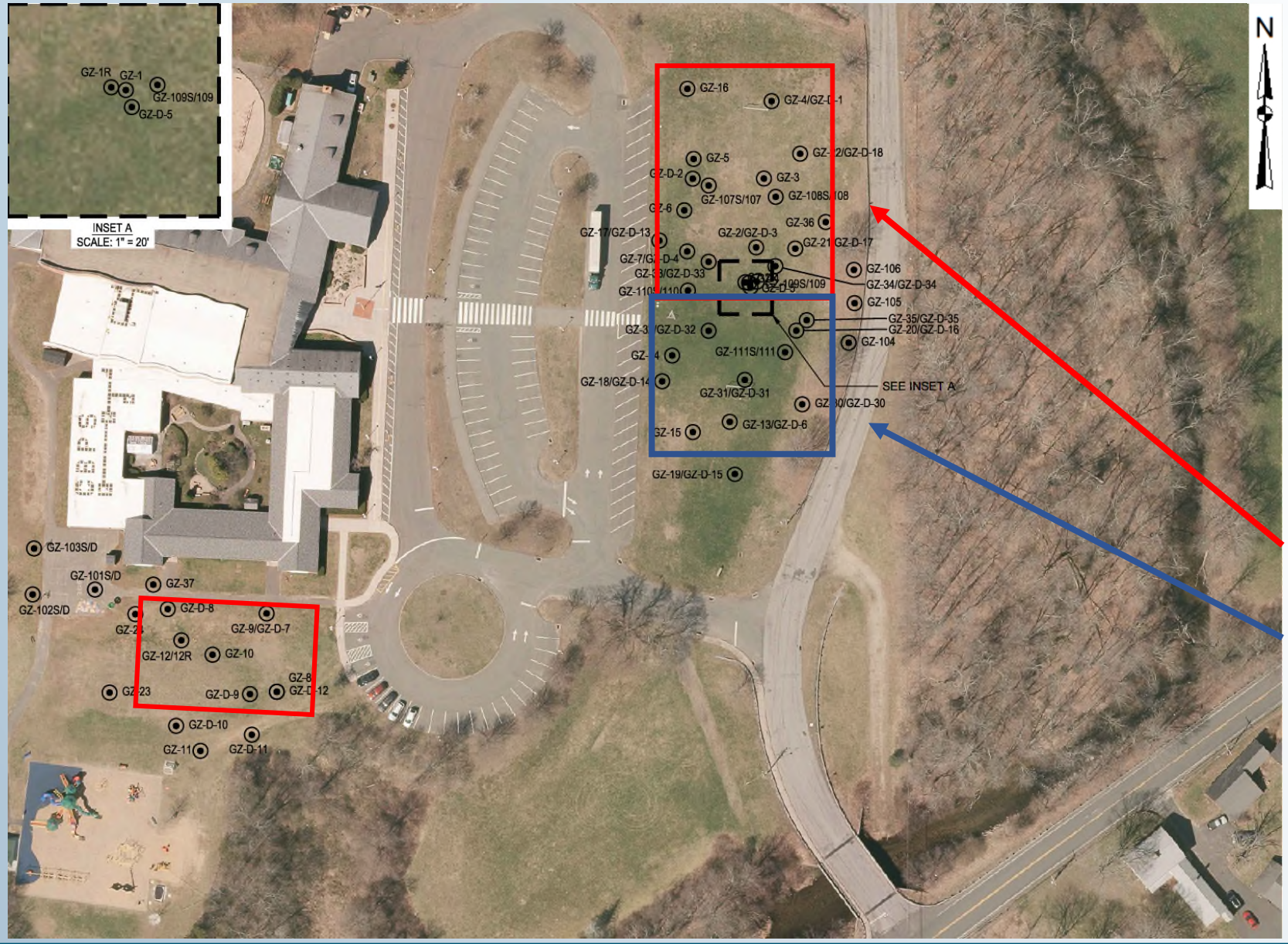
Groundwater Sampling
- 19 groundwater samples from existing monitoring wells
- Three samples from piezometers
- Sampled during drought conditions

Soil Sampling
- No additional samples

Surface water samples in Cherry Brook
- Collected 5 surface water samples, during drought.
- Samples collected downgradient where the plume would discharge into Cherry Brook

Drum Removal
- Sampling/analysis and removal of soil and groundwater drums

Soil Borings



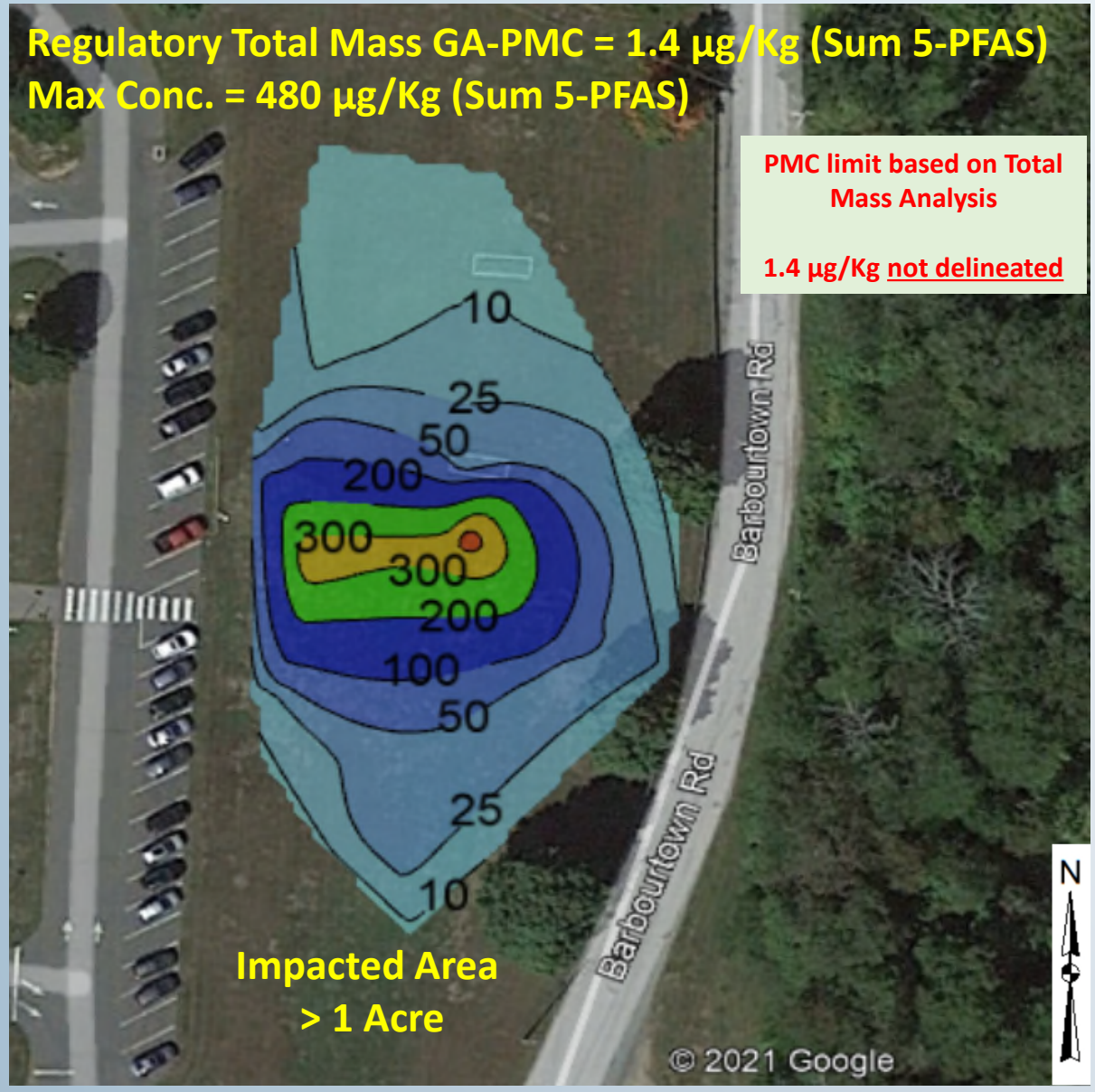
Targeted Zone

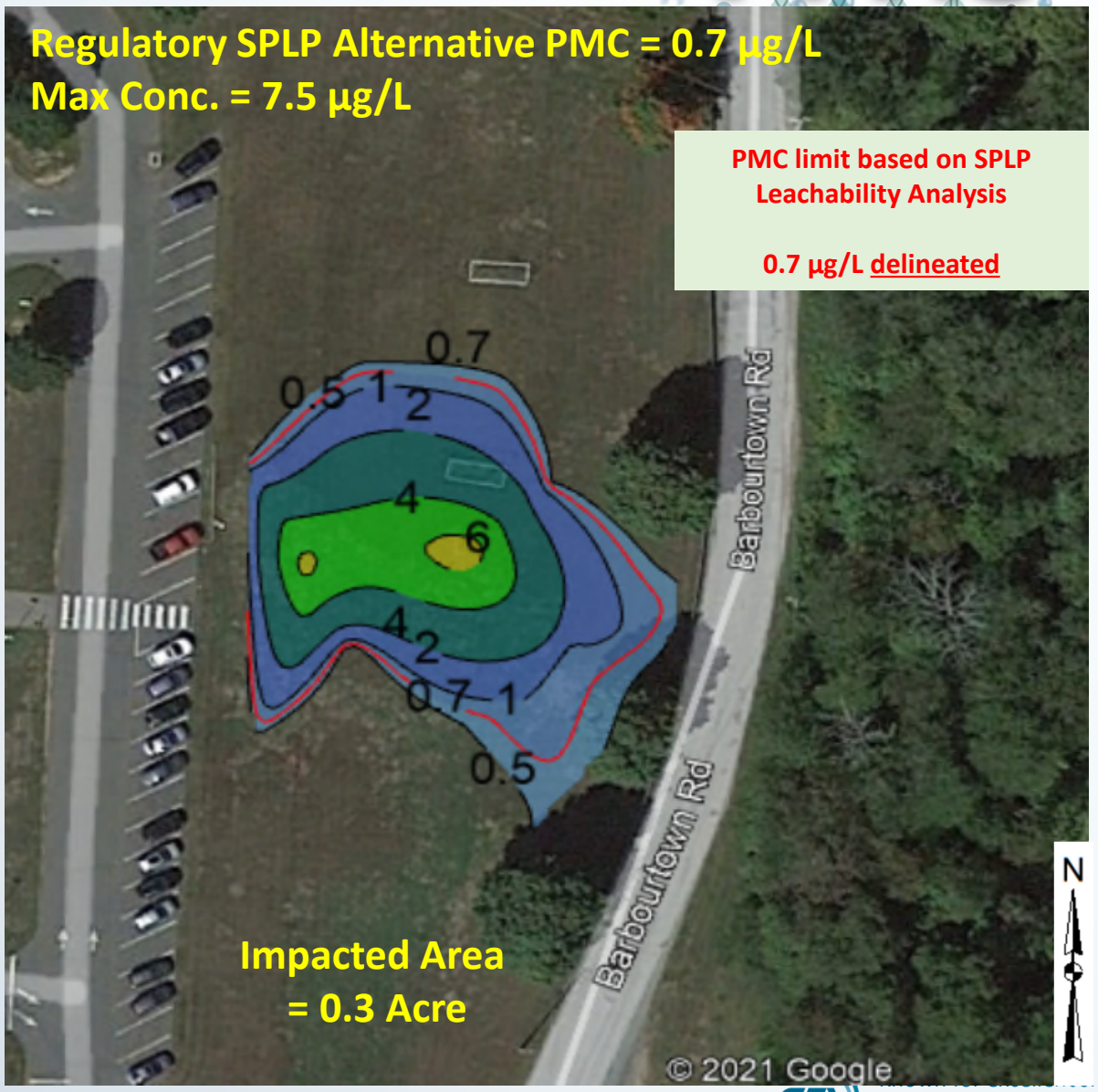
- 0-0.5 feet (playground)
- Upper 3 feet (unsaturated)
- Lower 3 feet (seasonally wet)

Iterative Process

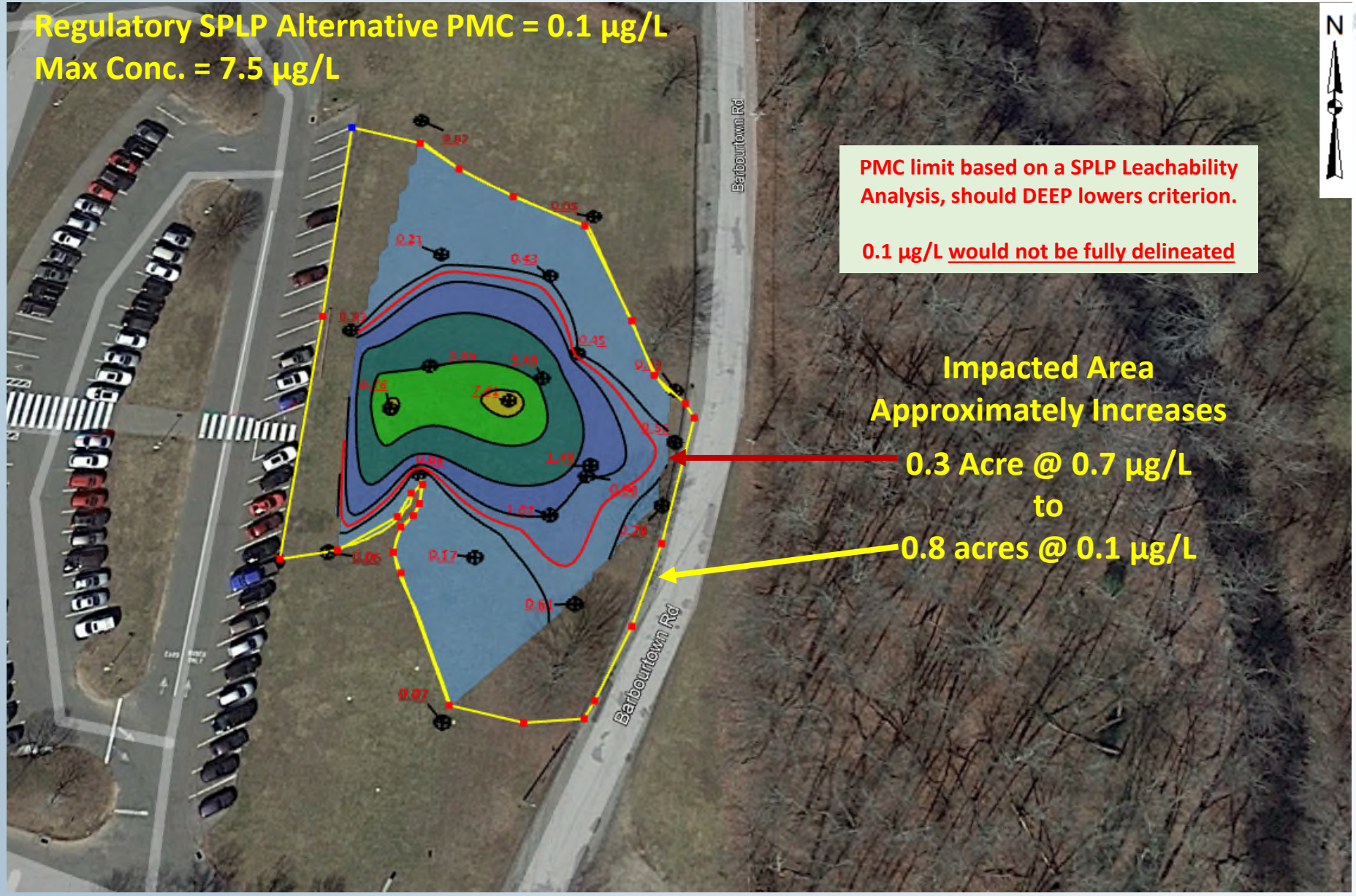
- Initial sampling in area identified as AFFF training
- Expanded limits based upon data results

Soil Concentration Results (GA-PMC)

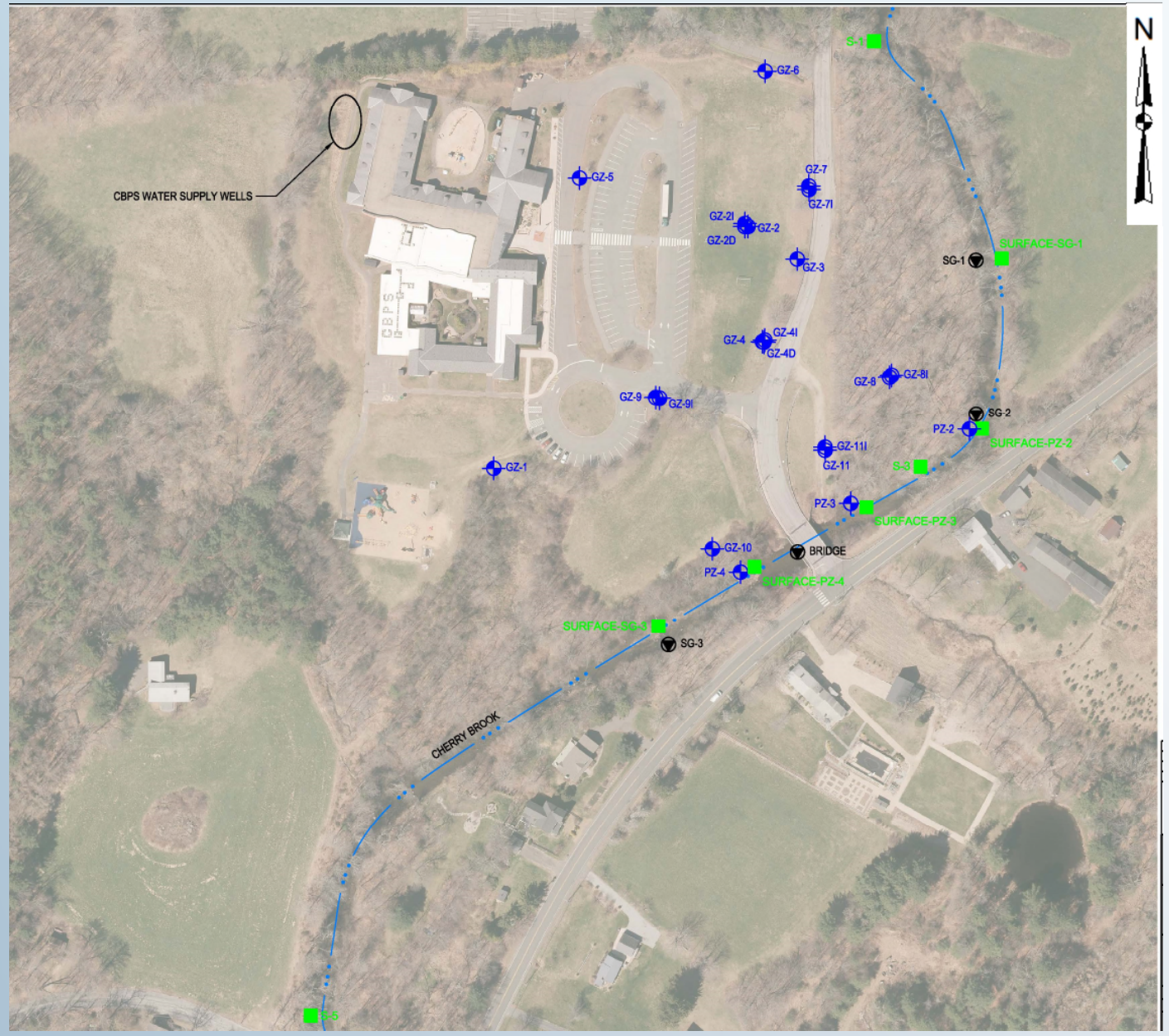




Impacts if CTDEEP Changes the GWPC to 0.01 µg/L (PFOS)



Sampling Locations



Monitoring Well & Piezometer

- Water Table
- Bank of Cherry Brook
- On top of bedrock
- In bedrock

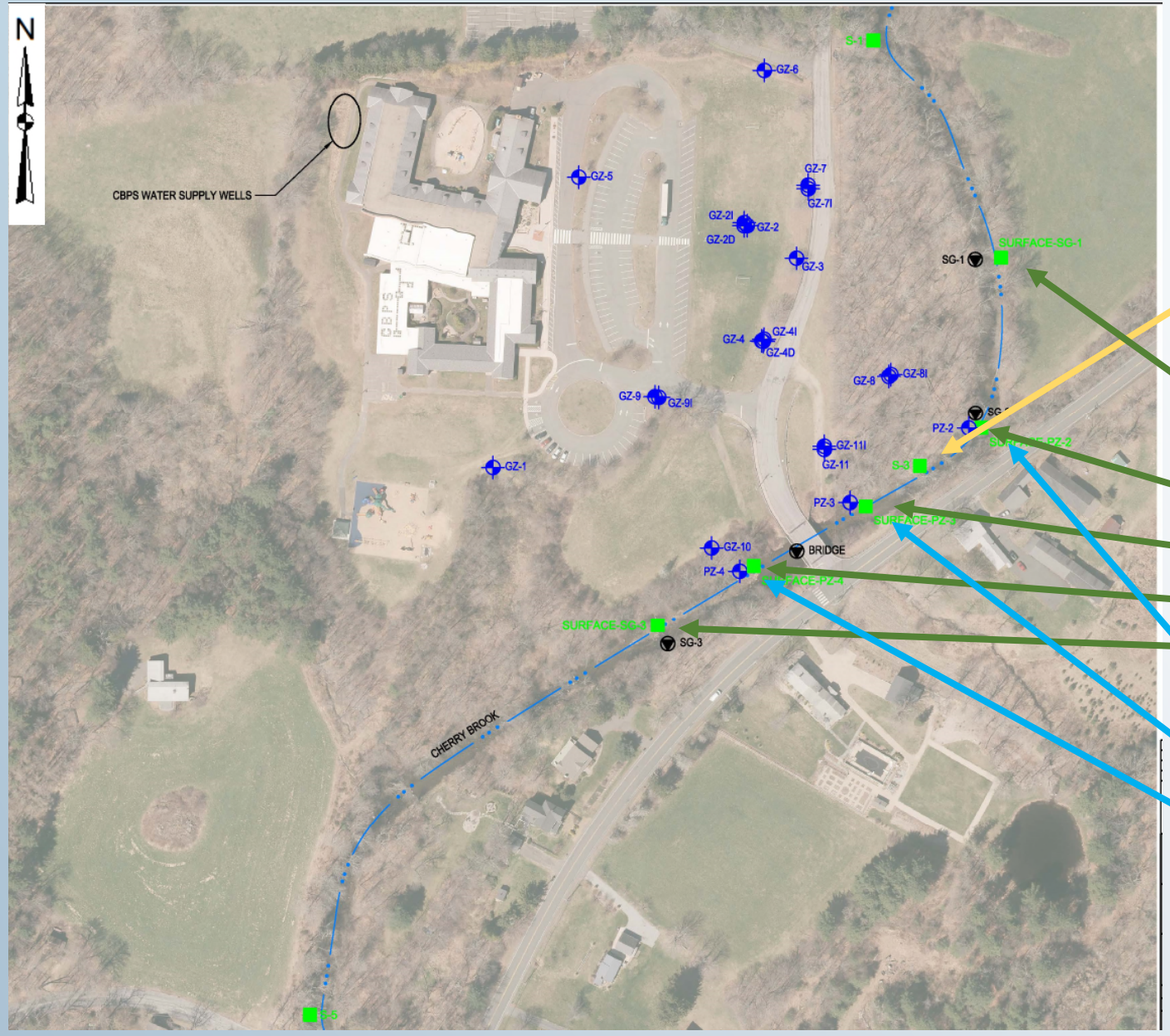
Cherry Brook

- S-1, S-3 and S-5 (2021).
- SG-1, SG-3, PZ-2, PZ-3, and PZ-4 (2022).

Issues

- Any work in wetlands or wetland review zone would require Permit
- Limiting access/disturbance in wetlands
- Piezometers installed by hand

Surface Water and Piezometer Sampling Results



2021 (Cherry Brook– non drought)

- Sum 5-PFAS
  - Only detection at S-3 = 1.4 ng/L
  - Detection limit = 1.4 ng/L

2022 (Cherry Brook-drought)

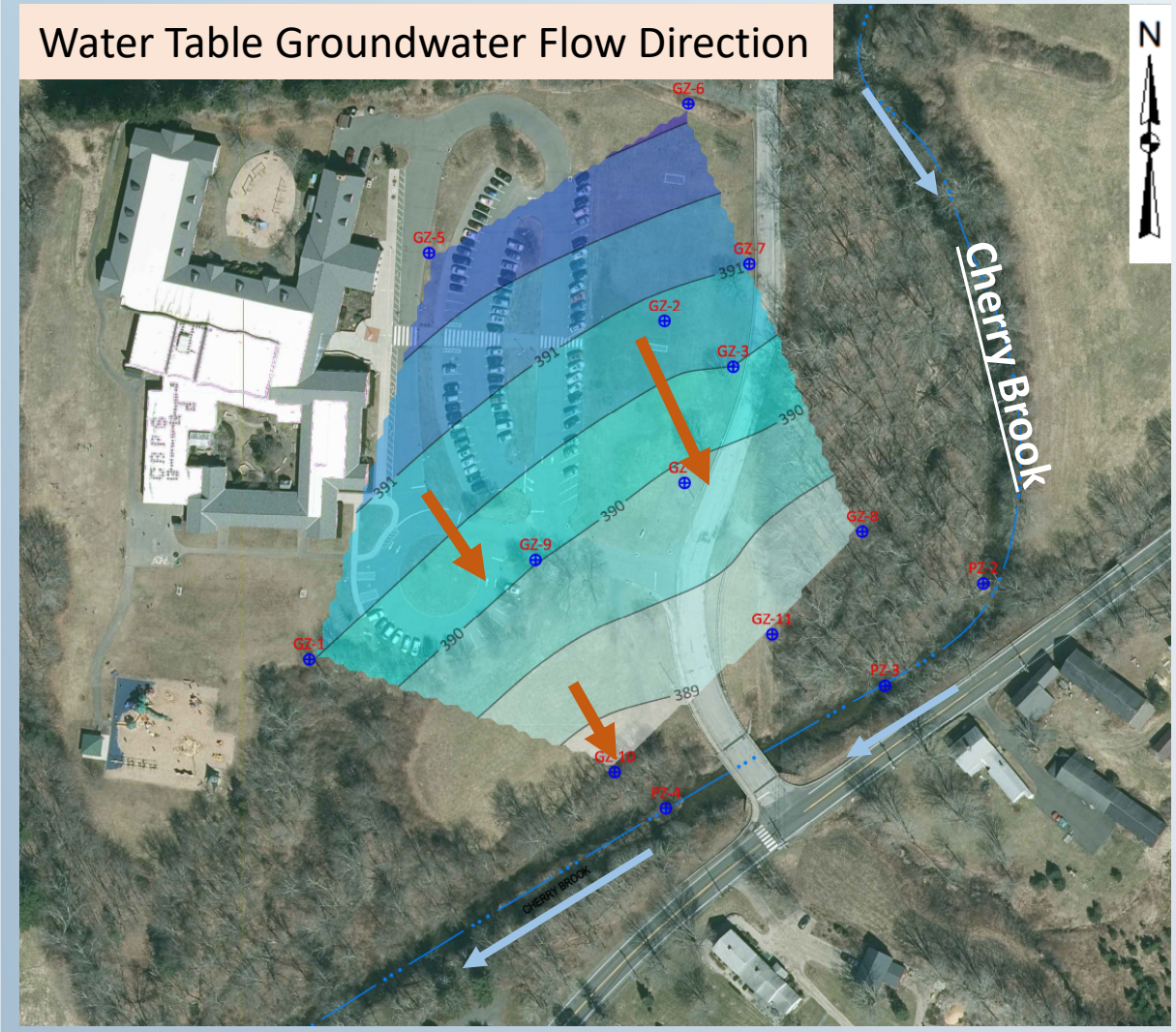
- Sum 5-PFAS
  - SG-1 = 2 ng/L
  - Surface PZ-2 = 25 ng/L
  - Surface PZ-3 = 4 ng/L
  - Surface PZ-4 = 4 ng/L
  - SG-3 = 36 ng/L

2022 (Piezometers)

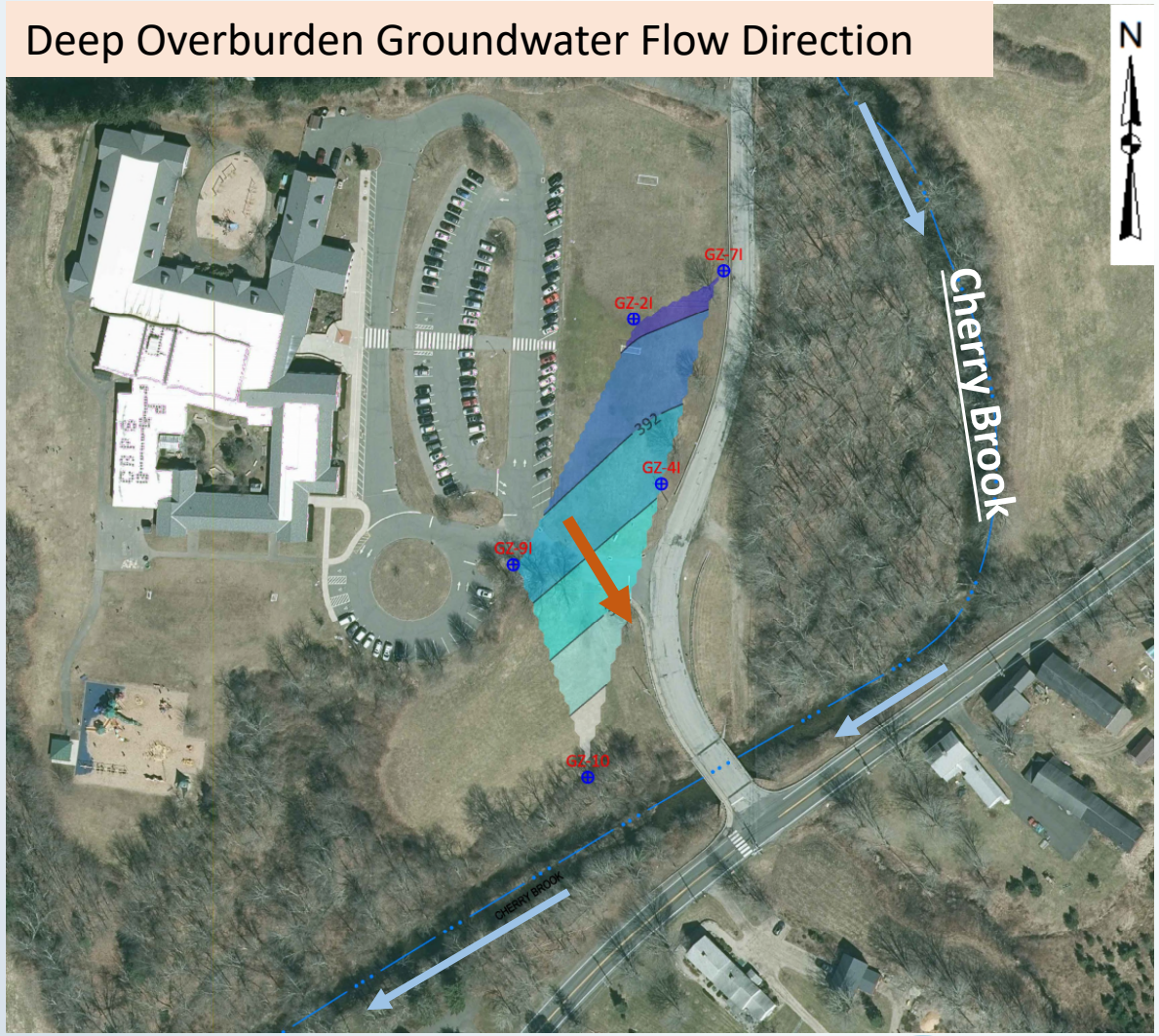
- Sum 5-PFAS
  - PZ-2 = 479 ng/L
  - PZ-3 = 16 ng/L
  - PZ-4 = 3 ng/L

Groundwater Flow Direction

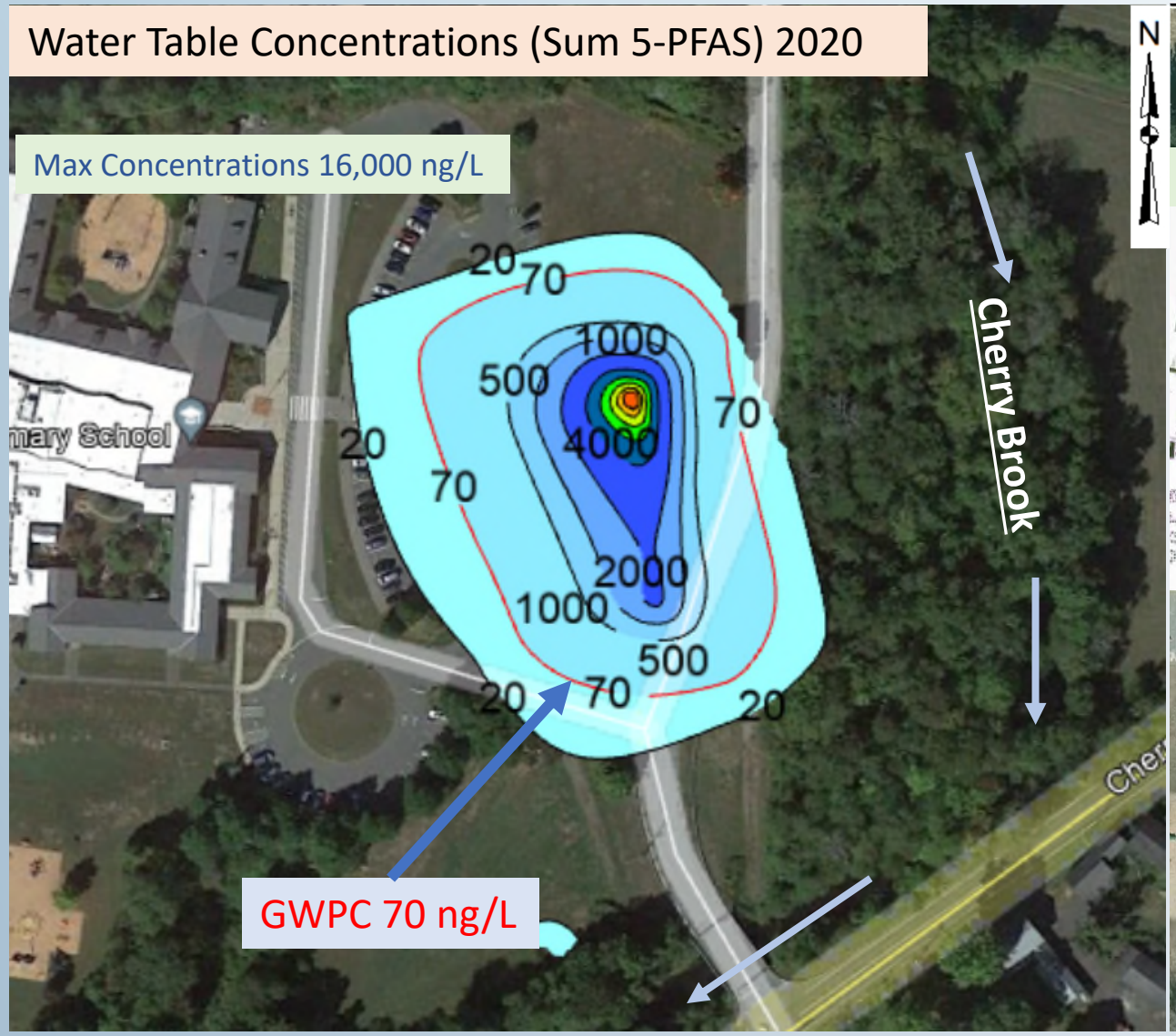
Water Table Groundwater Flow Direction

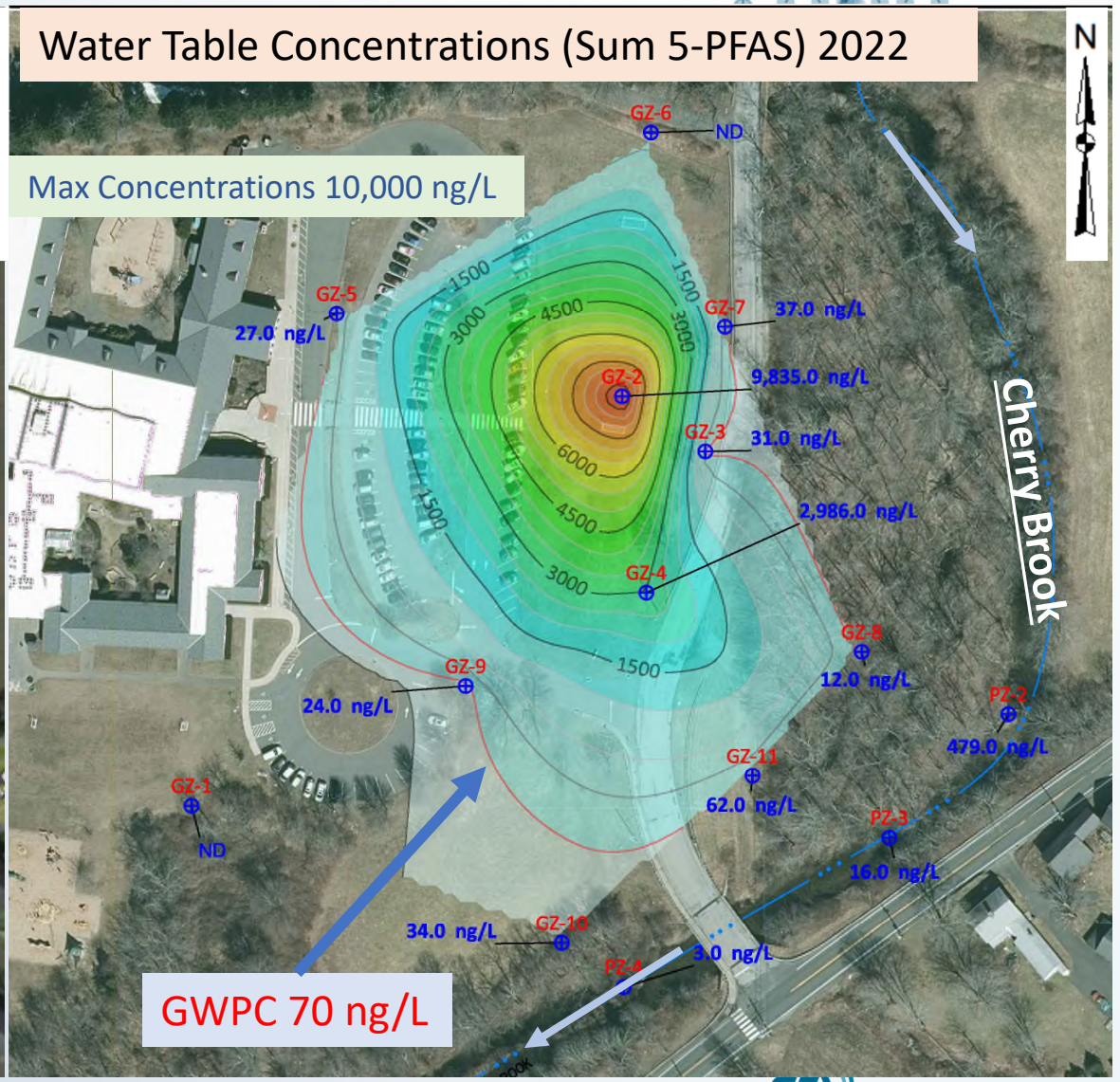


Deep Overburden Groundwater Flow Direction



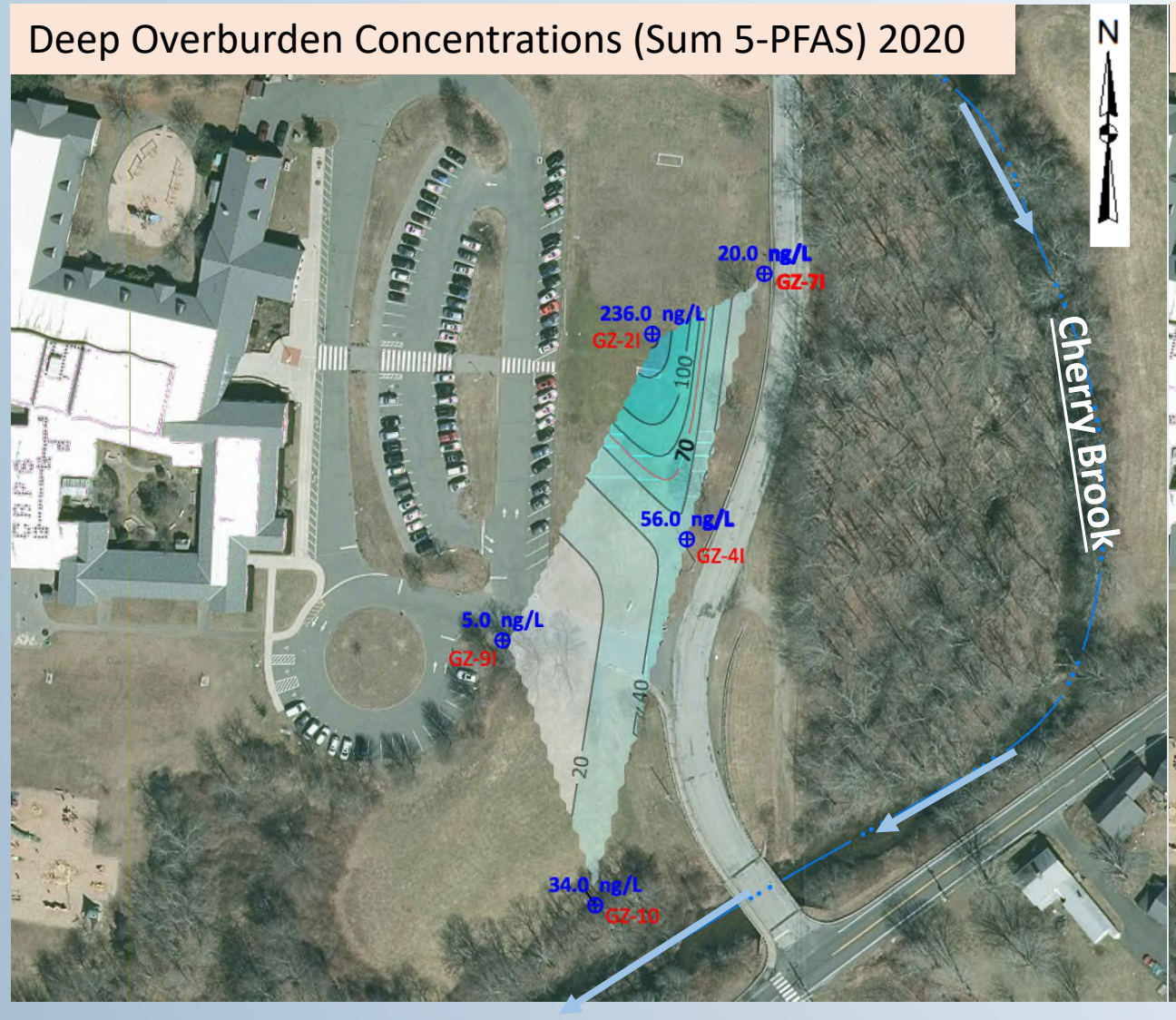
PFAS Concentrations in Groundwater



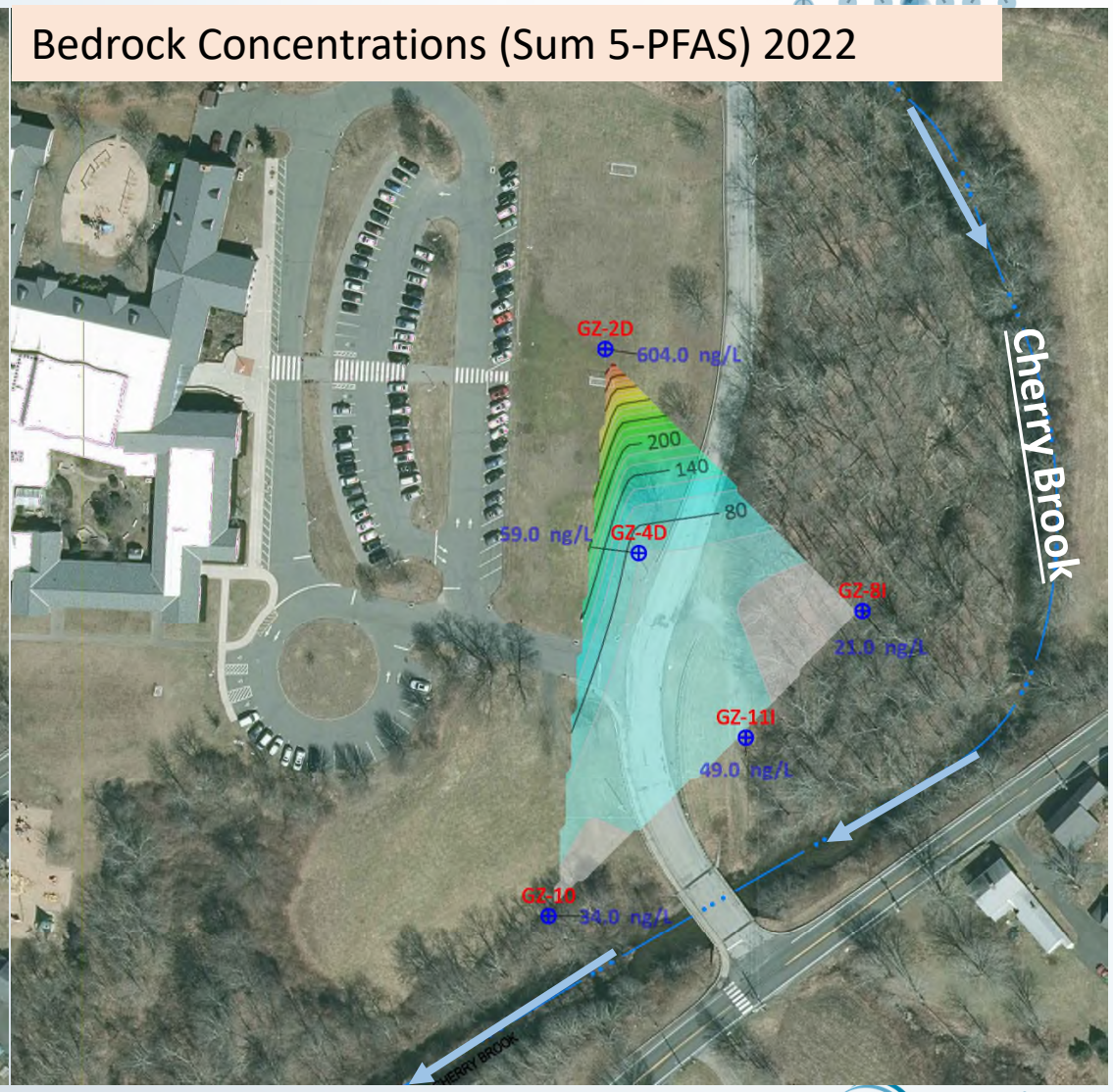


PFAS Concentrations in Groundwater

Deep Overburden Concentrations (Sum 5-PFAS) 2020



Bedrock Concentrations (Sum 5-PFAS) 2022



Summary from 2022 Results

Potable Water Supply Wells

- PFAS concentration were not detect in 2022, a trace concentration, at one well, in 2020/2021.

Groundwater

- Concentration in groundwater, directly below the release.
  - Decreased from 16,810 ng/L to 9,835 ng/L at GZ-2, for the sum of 5-PFAS.
- The extent of PFAS concentrations within the plume have increased in area.
  - Further to the east and south of the release.
- Concentrations immediately at Cherry Brook indicate that PFAS is discharging into Cherry Brook.

Soil

- There were no direct exposure exceedances.
  - Fencing was placed around the release area because of the regulatory uncertainties.
- The limits of the GA-PMC was delineated based upon existing DEEP criterion.
  - Should DEEP lower their criteria, additional delineation will be required to define remediation limits.

Cherry Brook

- Concentrations have increased from 1.4 ng/L (detection limit) to 4 to 36 ng/L.

Proposed Next Steps

- **Discuss findings with DEEP**
  - Assess the impacts to remediation from the new lower criteria, when issued.
  - Discuss sample frequency of potable water supply wells.
  - Changes in regulations will impact remedial strategies and costs.

- **Remedial Design Characterization**
  - Groundwater – to define the limits of the plume, based upon new criterion.
    - ✓ This will involve actions in the wetland to install additional monitoring wells and piezometers.
  - Soil – define the limits of soil impacts (R-DEC and/or GA-PMC), based upon new criterion.
    - ✓ This may involve sampling east of Barbourtown Road.
  - Surface water – evaluate seasonal changes in surface water concentration based upon the plume discharge into Cherry Brook.
    - ✓ During low stream flow, groundwater discharges to Cherry Brook, whereas during high stream flow, Cherry Brook may recharge the surround groundwater.

- **PFAS treatment technologies.**

Remedial Technology Assessment Under Consideration

Soil excavation

- Dig up the PFAS contaminated soil over an area of approximately 1-acre to a depth of 6.5 feet.
  - Estimated volume 10,500 cubic yards or 14,000 tons.
    - Disposed at a landfill (out-of-state) that would accept PFAS contaminated soil.
    - EPA may designate PFOS/PFOA as a hazardous substance under CERCLA.
  - EPA is considering designating PFOS/PFOA as hazardous substance.
    - May open future CERCLA liability for the Town.
  - Soil washing and management of wash water. Still requires excavation and wash water management.

Non-toxic Soil Amendments (soil mixing/stabilization technologies)

- Adding the amendment to the PFAS contaminated soil.
  - Effectively, preventing the leaching/transport of the PFAS compounds from the soil to the groundwater.
  - The amendment would bind the PAFS within the in-situ soil.
  - Several amendments could be added through excavation and ex-situ mixing or in-situ mixing.
  - Others through injection of a slurry.

Groundwater

- Groundwater extraction, treatment and discharge.
- Injection of amendment to sequester the PFAS plume in-situ.

Engineering control - Soil Capping

Potential Funding

❑ Connecticut

- SB 100 AN ACT ESTABLISHING AN ACCOUNT IN THE GENERAL FUND TO PROVIDE GRANTS TO TOWNS THAT NEED PFAS TESTING AND REMEDIATION (may be with Appropriations now)
- HB 5250 AN ACT ESTABLISHING A GRANT PROGRAM TO REIMBURSE MUNICIPALITIES FOR COSTS RELATED TO REMOVAL OF PFAS FROM FIRE APPARATUS. (with Appropriations)

❑ Congress

- Oct. 2018 - Passage of the American Water Infrastructure Act
- August 2021 –***Infrastructure Investment and Jobs Act (FY 2022-2026),*** appropriates $10 Billion to the EPA Water Infrastructure.

❑ EPA

- Additional funding may become available as a result of the proposed PFAS MCL.

Q & A

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