

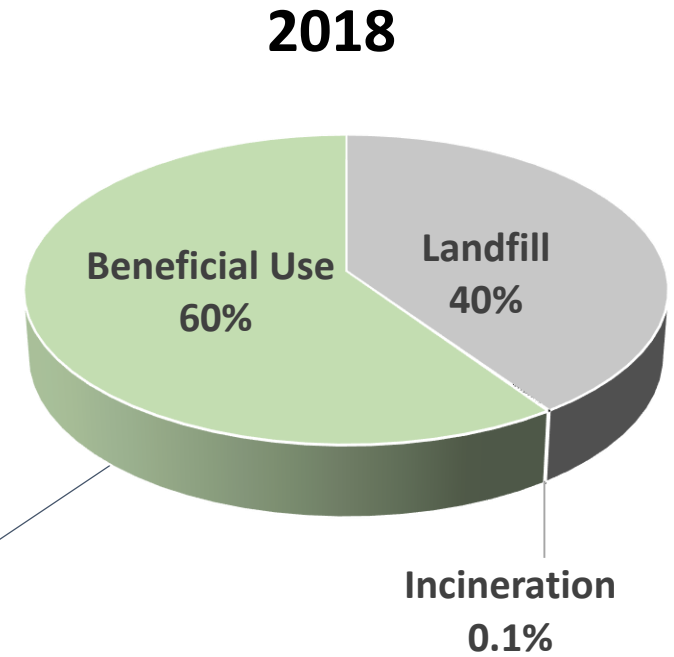
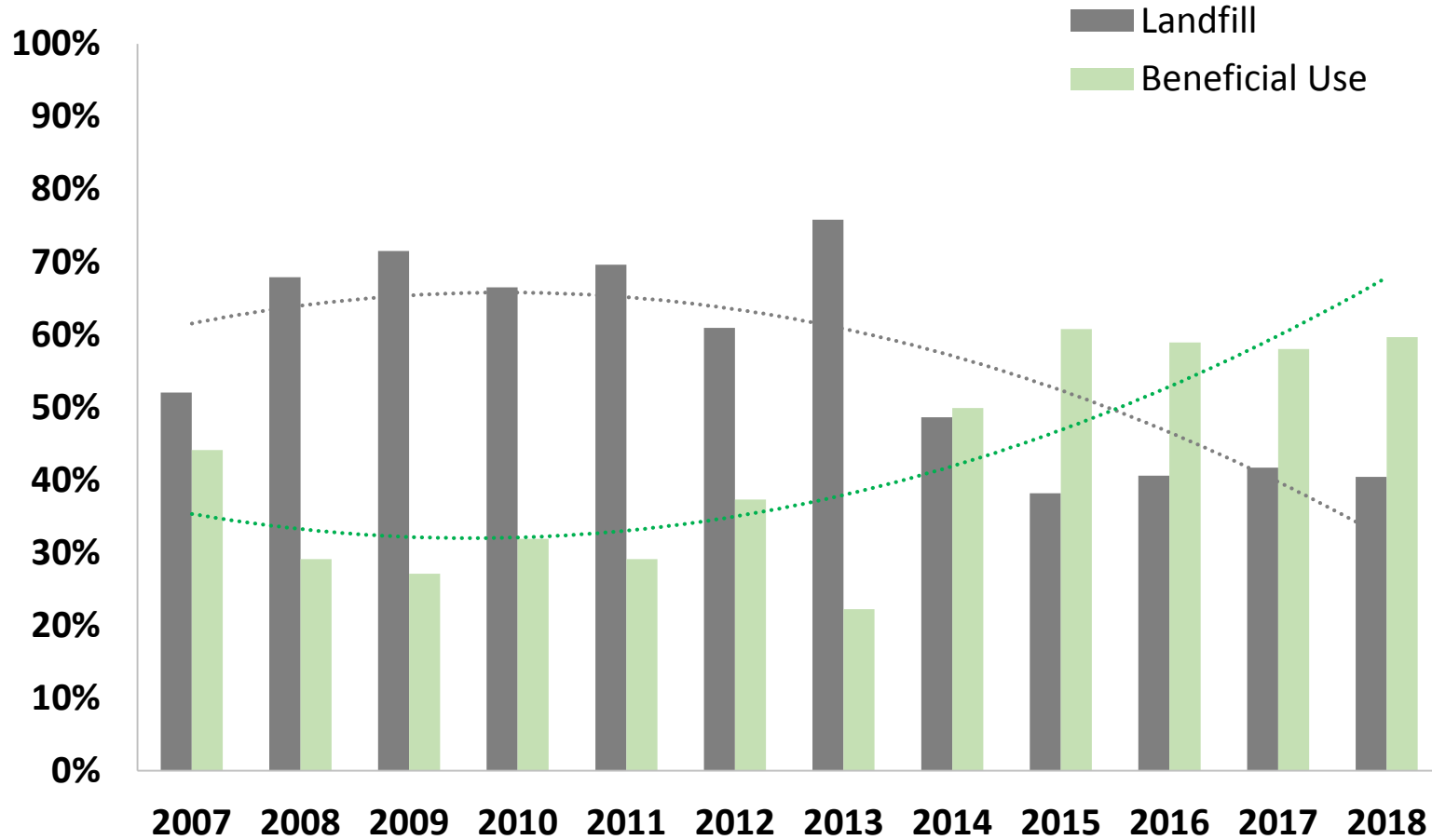


Residuals Management & Emerging Contaminants

Eamon Twohig
October 17, 2019

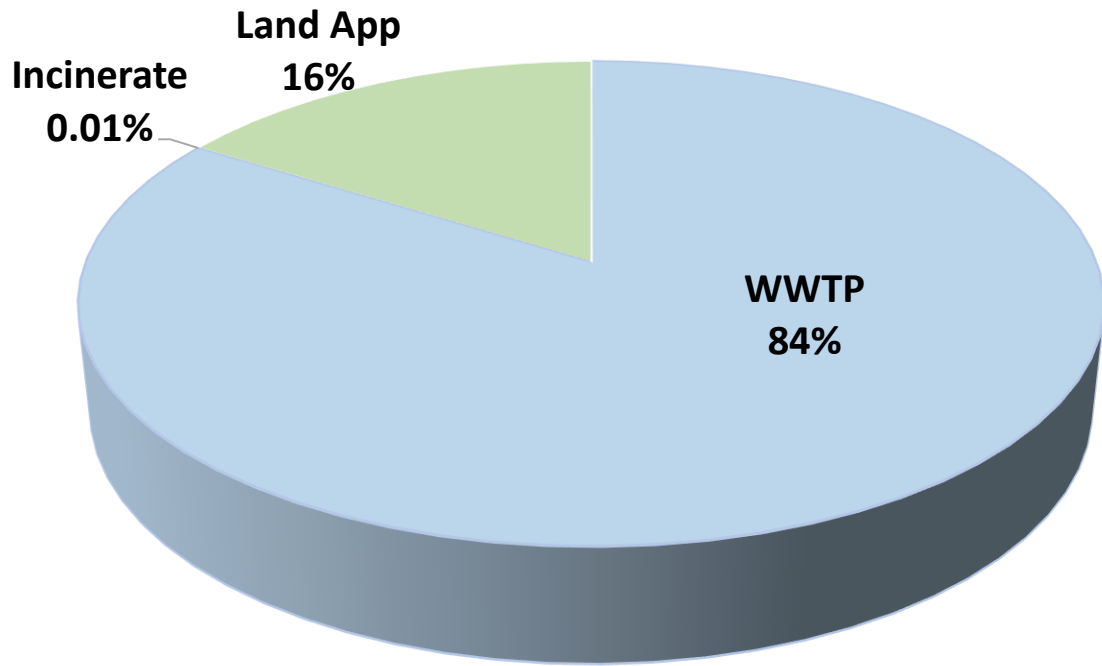


Sludge Management Trends

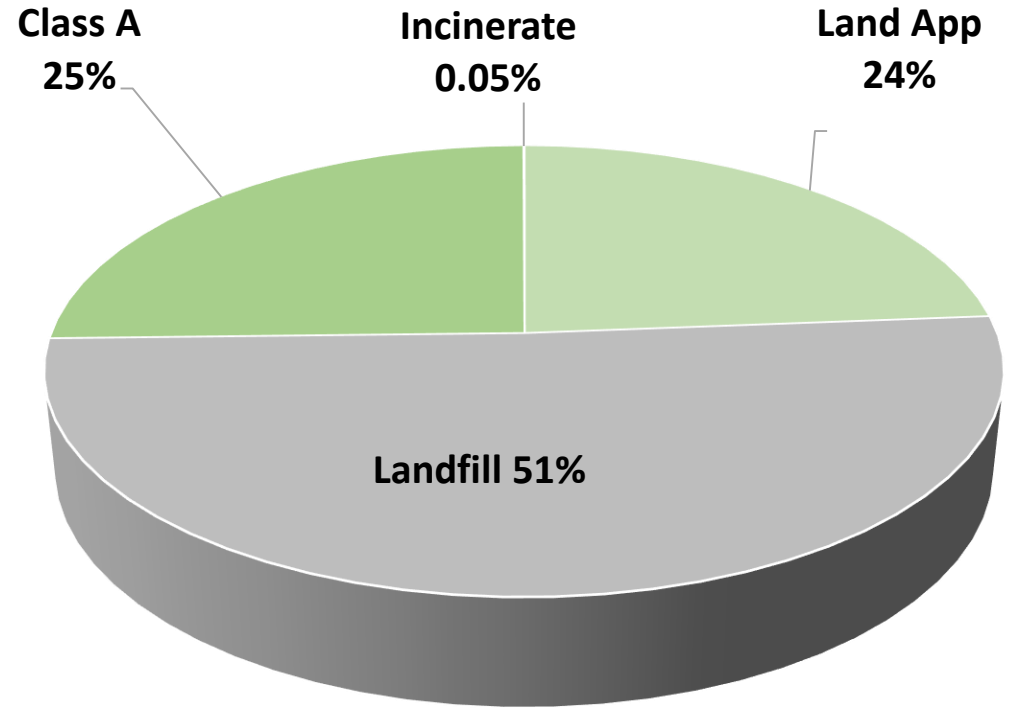


Septage Management in 2018

~39 M Gal



Direct Management



Indirect Management

VT Regulated PFAS	Health Advisory/ MCL (ng/L)	Groundwater Enforcement Std (ng/L)	Residential Soil Dermal Contact (mg/kg)	Recommended Limit for Landfill Leachate to WWTP (ng/L)
PFHxS (C6)	20 ppt (*)	20 ppt (*)	1.22 ppm (sum)	
PFHpA (C7)				
PFOA (C8)				120,000
PFOS (C8)				1000
PFNA (C9)				

(*) = any combination of the 5 compounds



The University of Vermont

SANBORN  HEAD

Per- and Polyfluoroalkyl Substances (PFAS) in Vermont Shallow Soils

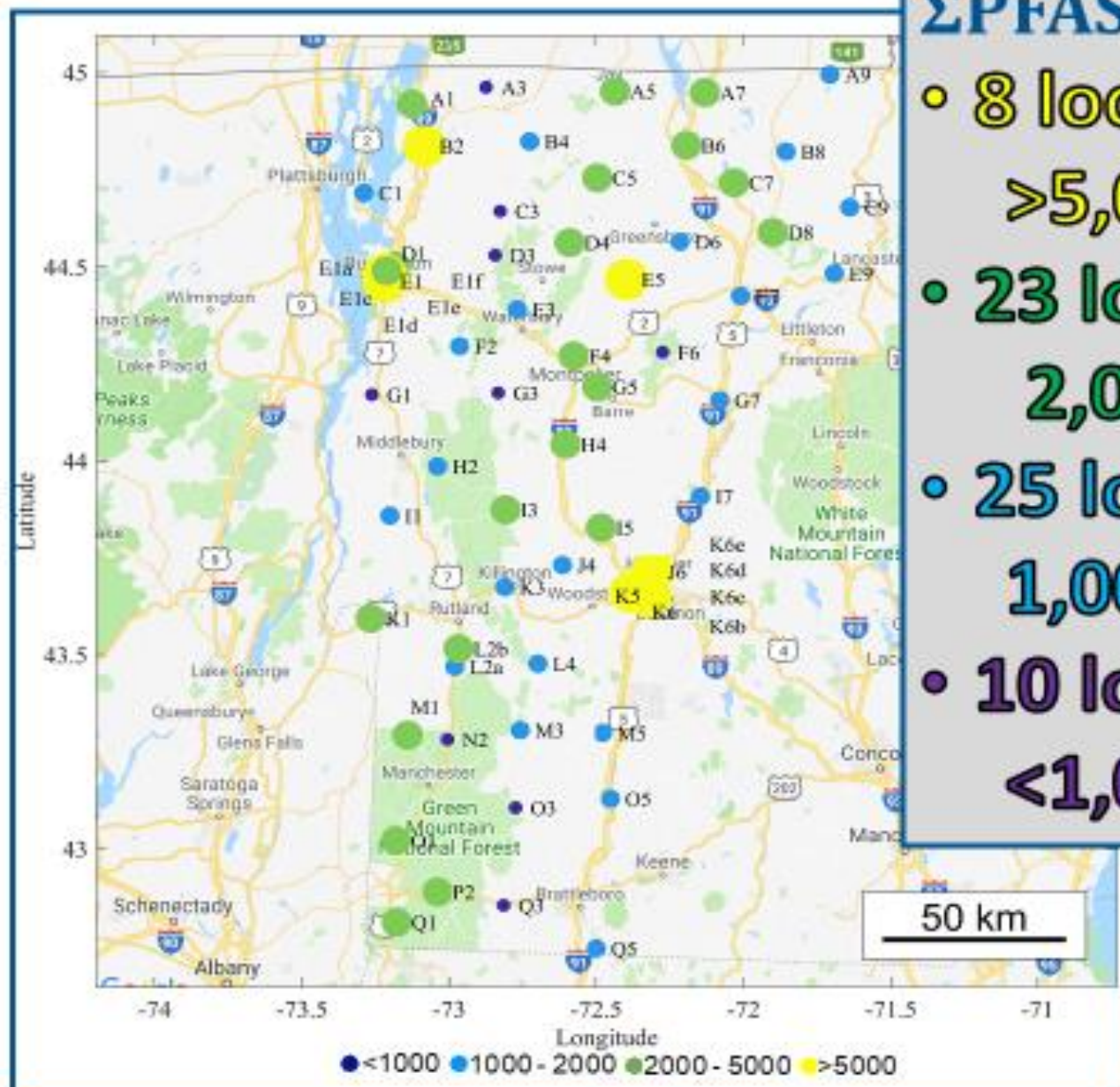
Wenyu Zhu, Ph.D.
Department of Civil and Environmental Engineering
University of Vermont

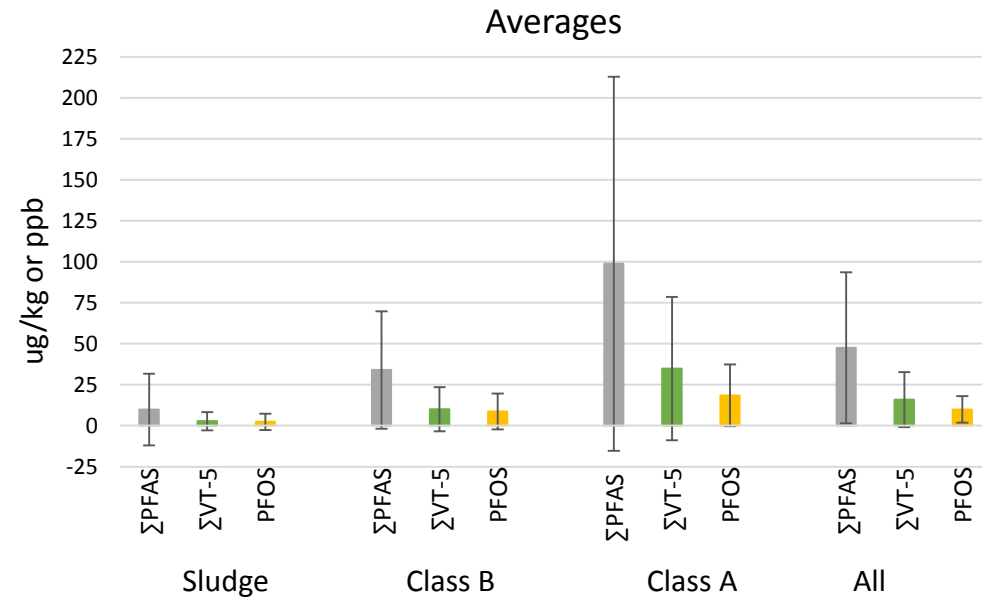
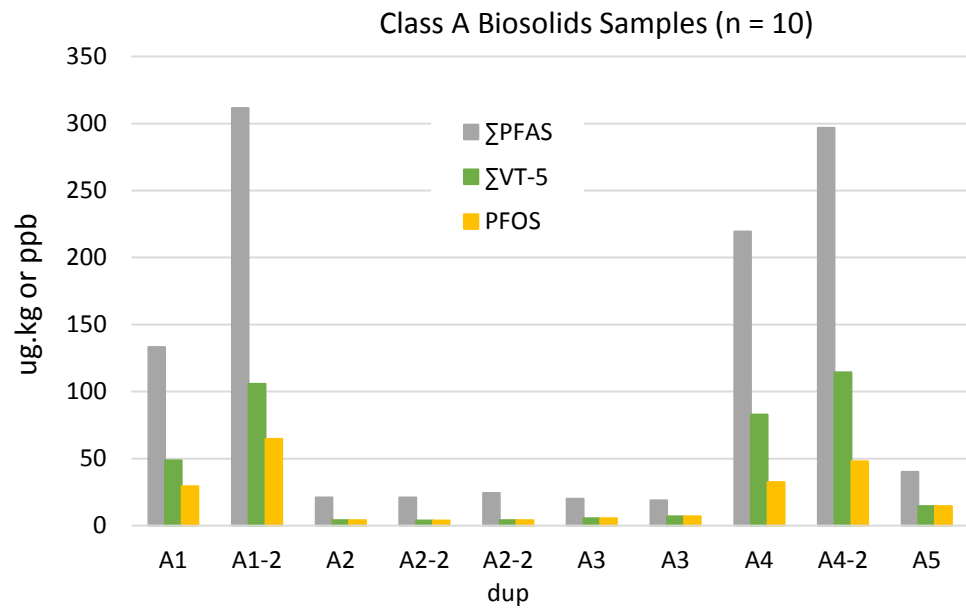
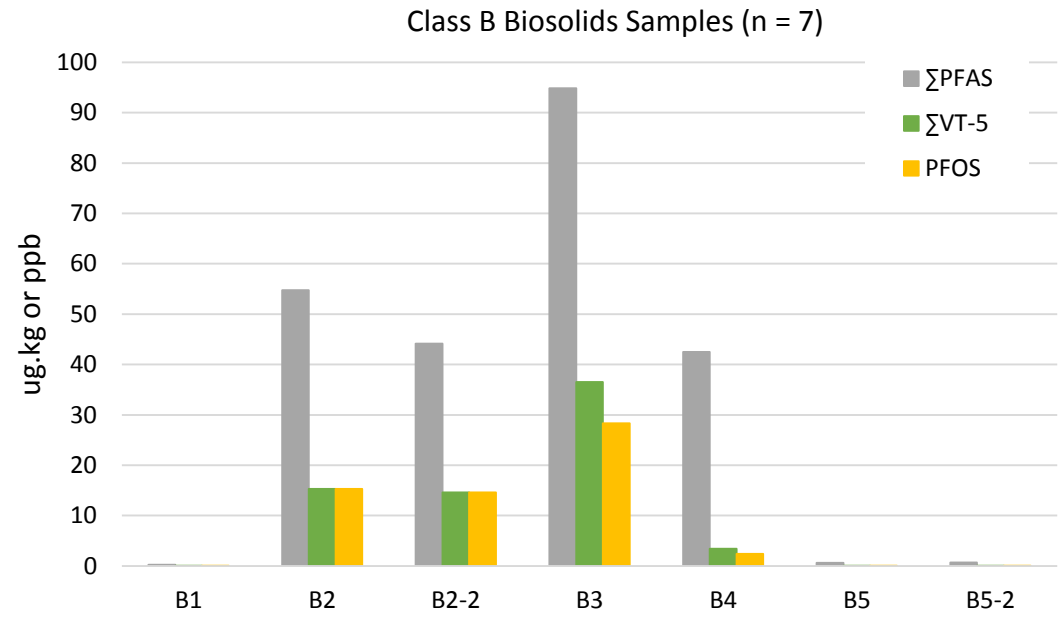
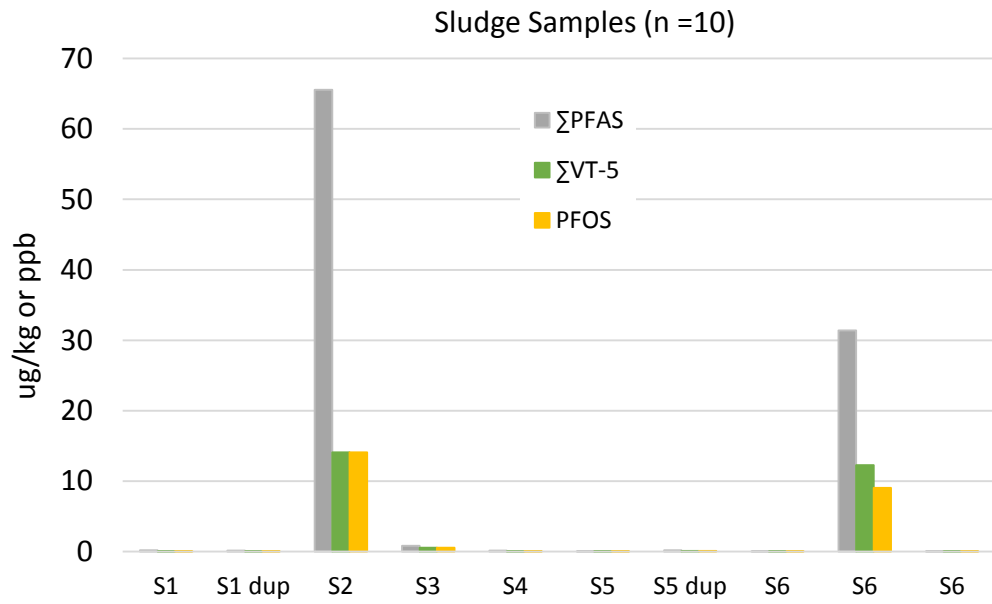
Harrison Roakes, P.E.
Sanborn, Head & Associates

- Σ PFAS ranged 0.5 to 9.4 ug/kg
- Σ PFAS max @ 35 ug/kg (outlier)
- PFOA ranged 0.05 to 4.9 ug/kg
- PFOS ranged 0.10 to 9.7 ug/kg
- Correlated to pop density
- No correlation with TOC

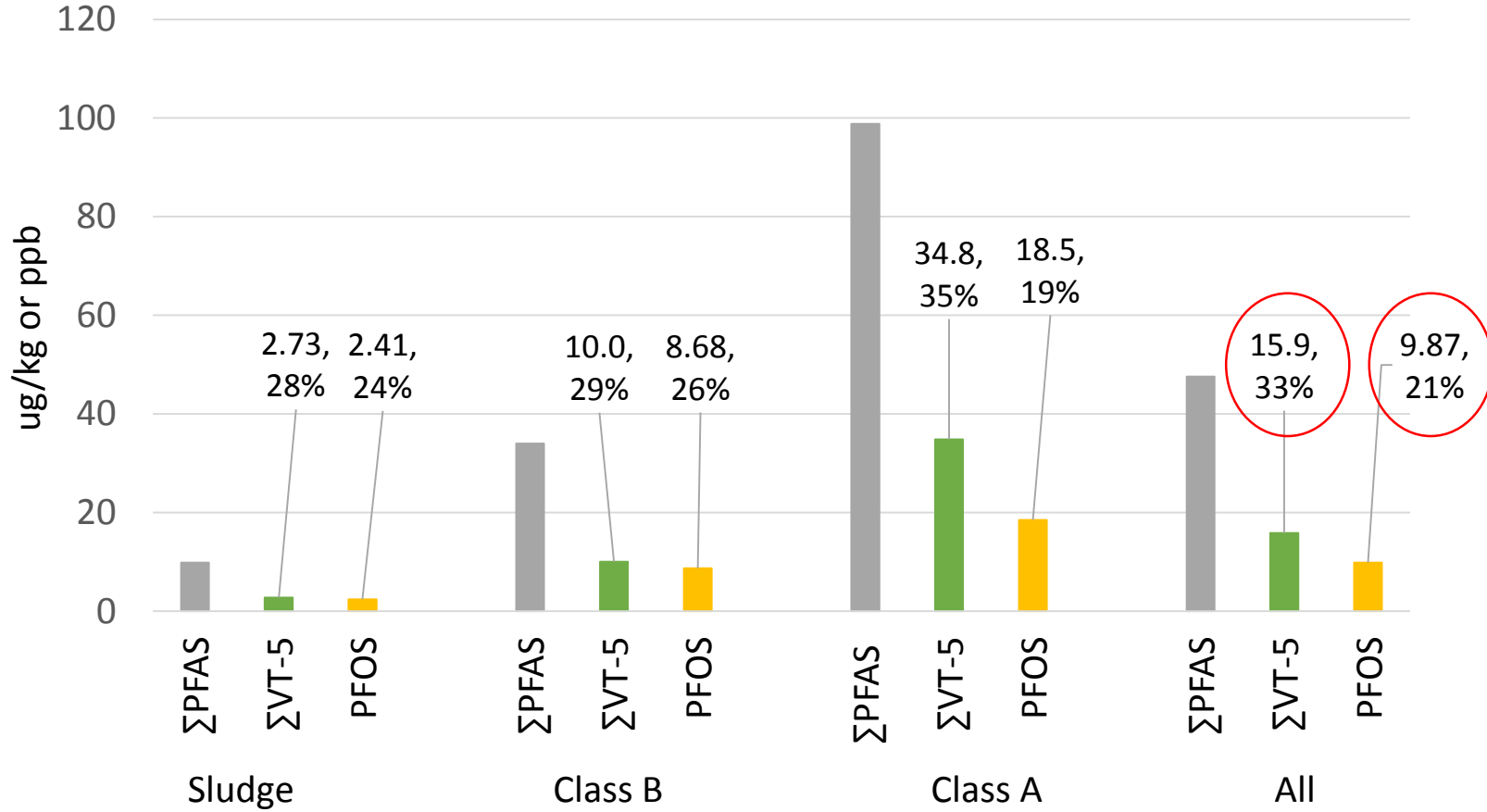
ΣPFAS (n=66)

- 8 locations >5,000 ng/kg
- 23 locations 2,000-5,000 ng/kg
- 25 locations 1,000-2,000 ng/kg
- 10 locations <1,000 ng/kg





Averages (n = 27)



Compared to
2018 Samples (n = 7):

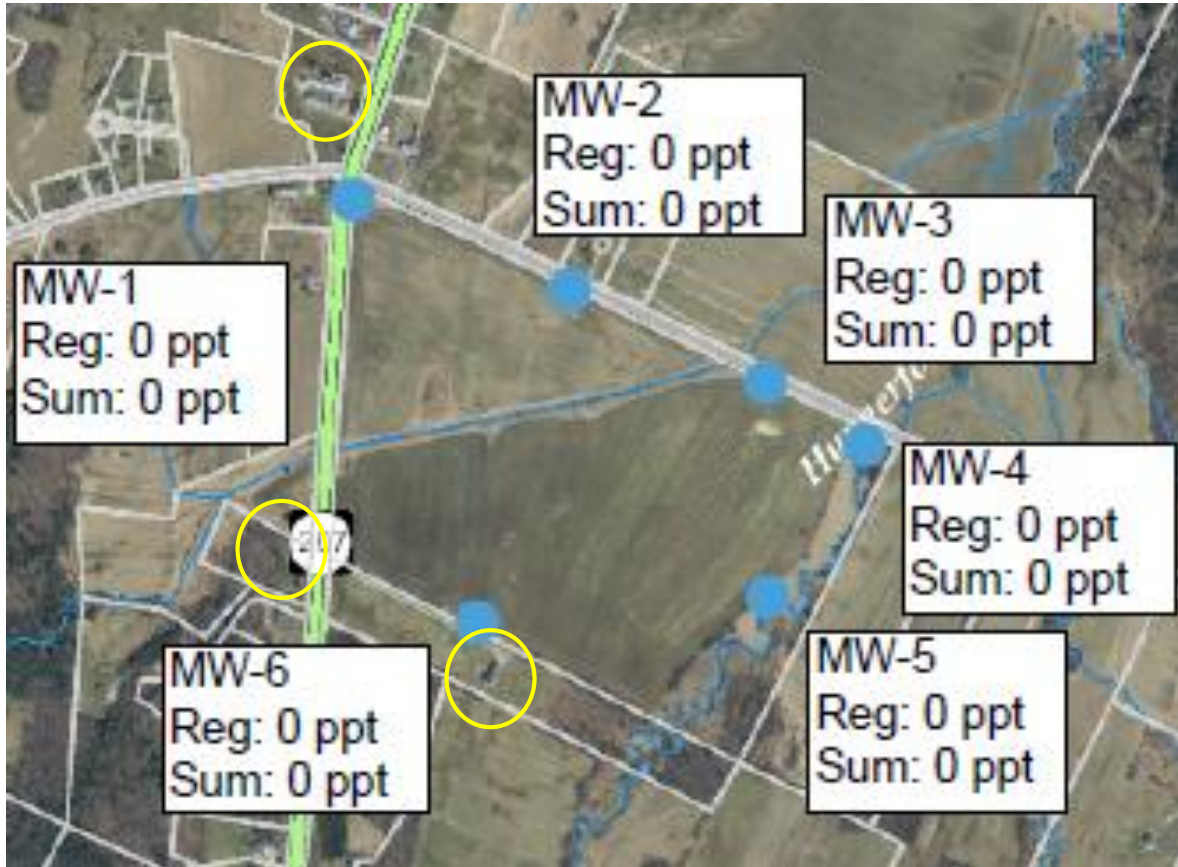
ΣVT-5 = 16.0 ppb
PFOS = 8.01 ppb

DRAFT DATA

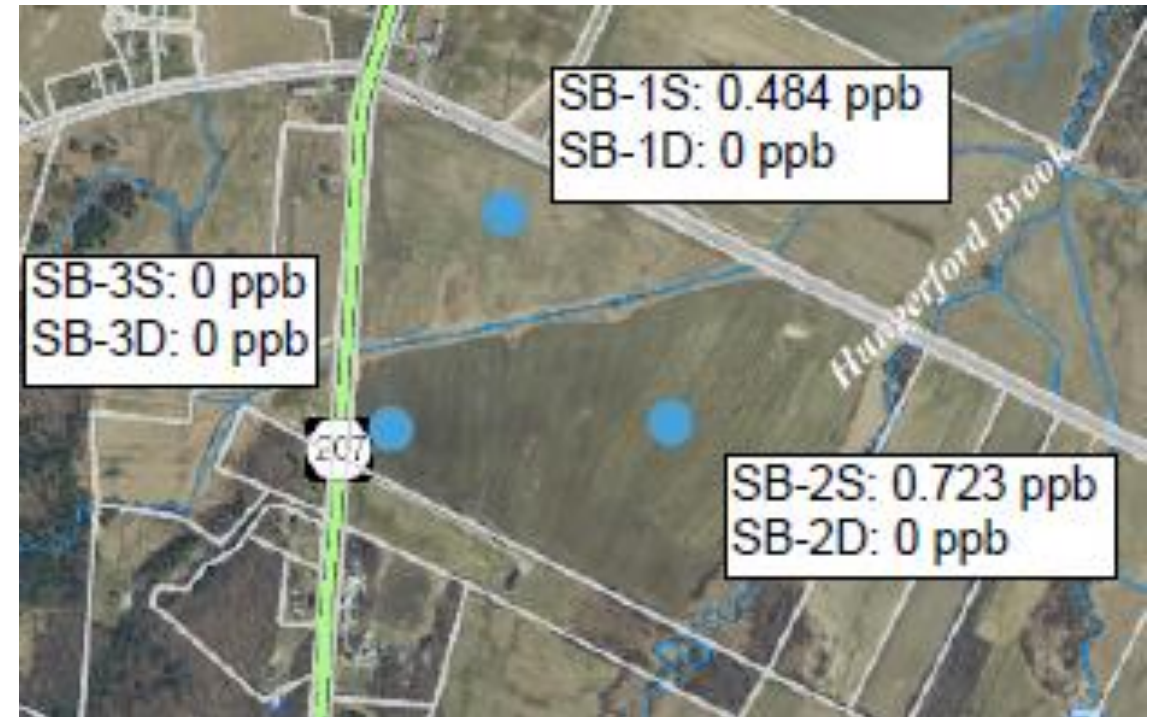


Site 1: Class B Biosolids, lime-stabilized/dewatered, broadcast applied biennially,

Groundwater, Σ VT-5 PFAS (GES = 20ppt any combo)



Soils @ 0-6" and 24", Σ PFAS



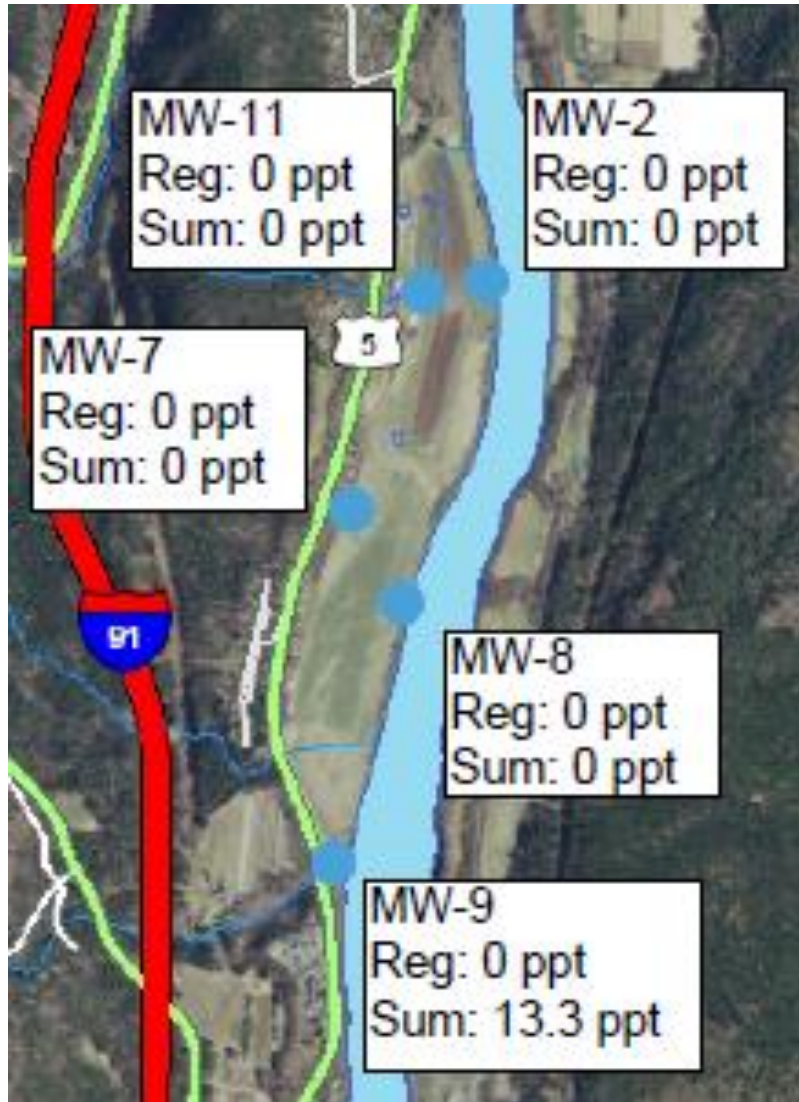
Also tested 7 residential water supplies w/in .25 miles of site
One residence w/ 3.86 PFHxA; 4.04 PFBS, others ND

DRAFT DATA

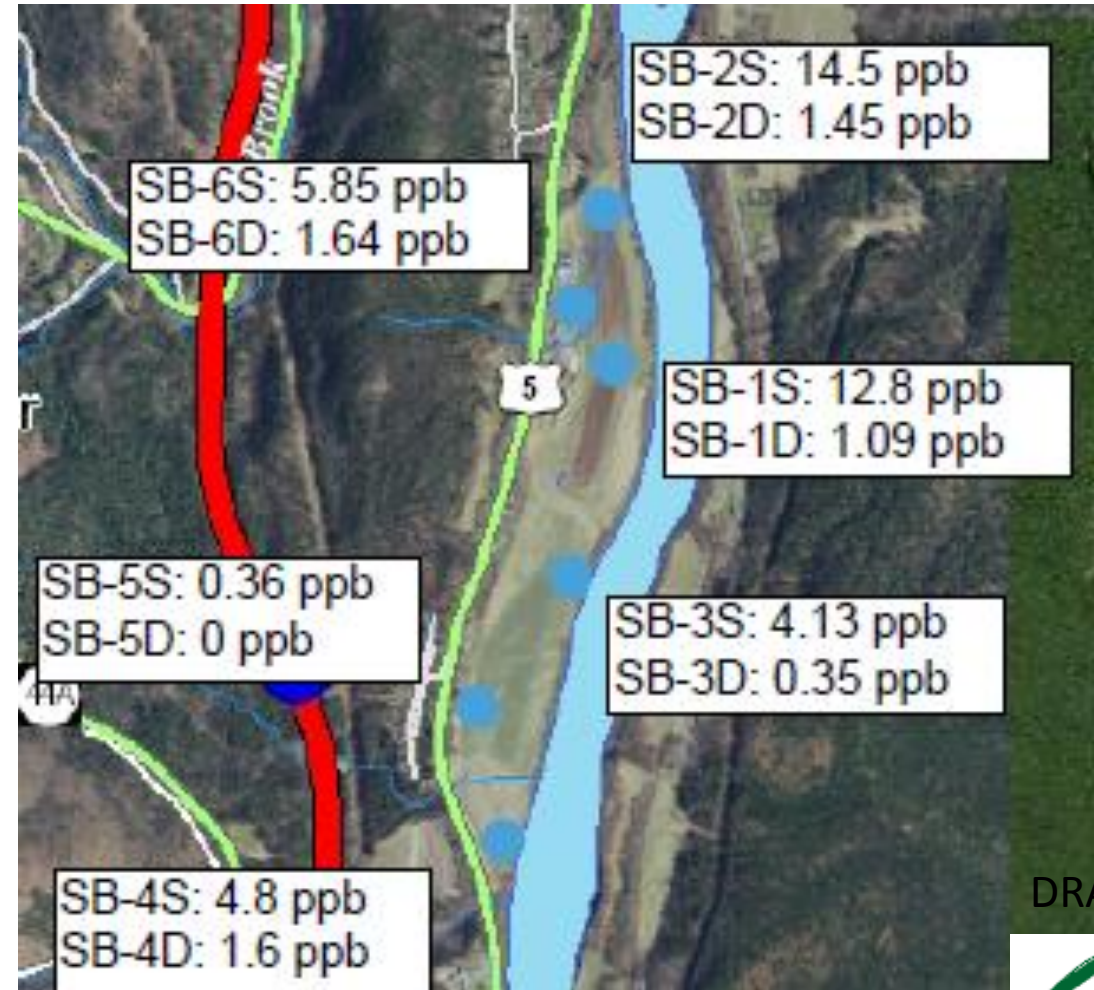


Site 2: Class B Biosolids, Anaerobically Digested/dewatered, broadcast applied annually, Windsor soils

Groundwater, Σ VT-5 PFAS (Reg: 20 ppt)



Soils @ 0-6" and 24", Σ PFAS

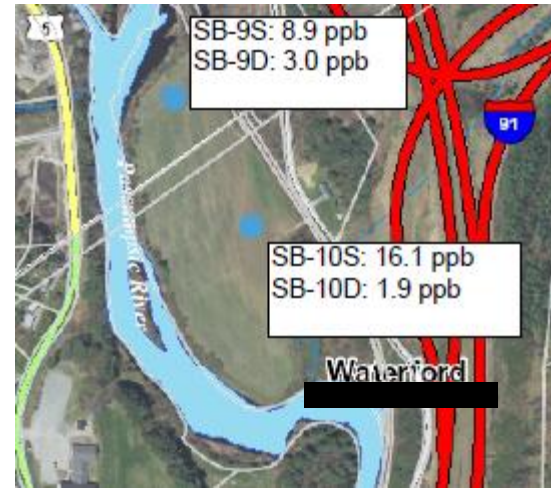
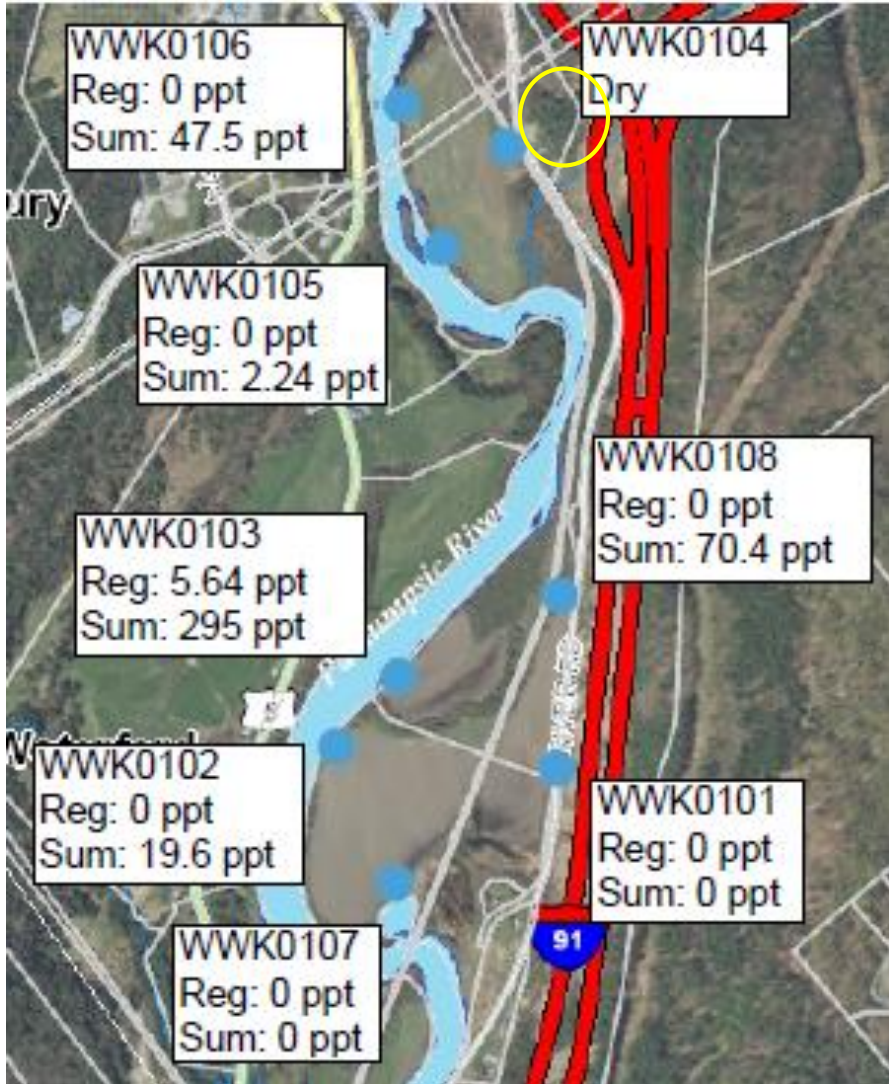


DRAFT DATA

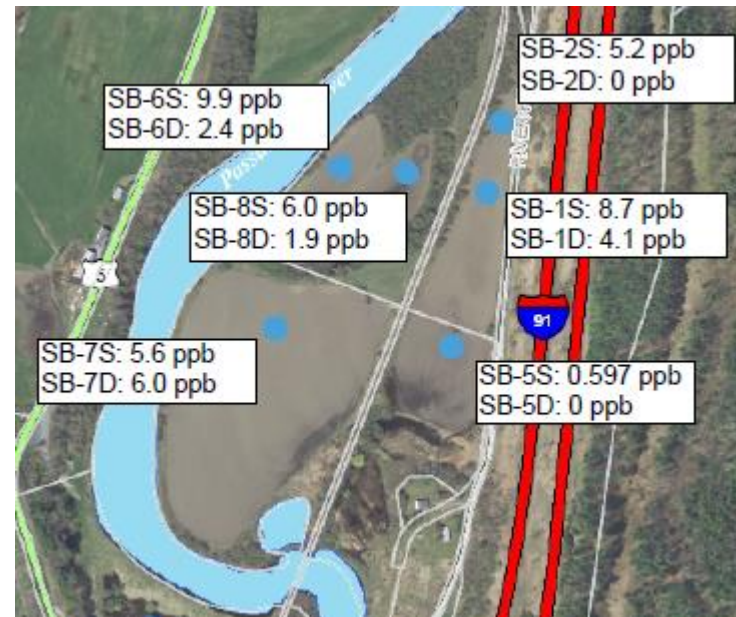


Site 3: Class B Biosolids, anaerobically digested, liquid, injected, annually

Groundwater, Σ VT-5 PFAS (GES = 20ppt any combo)



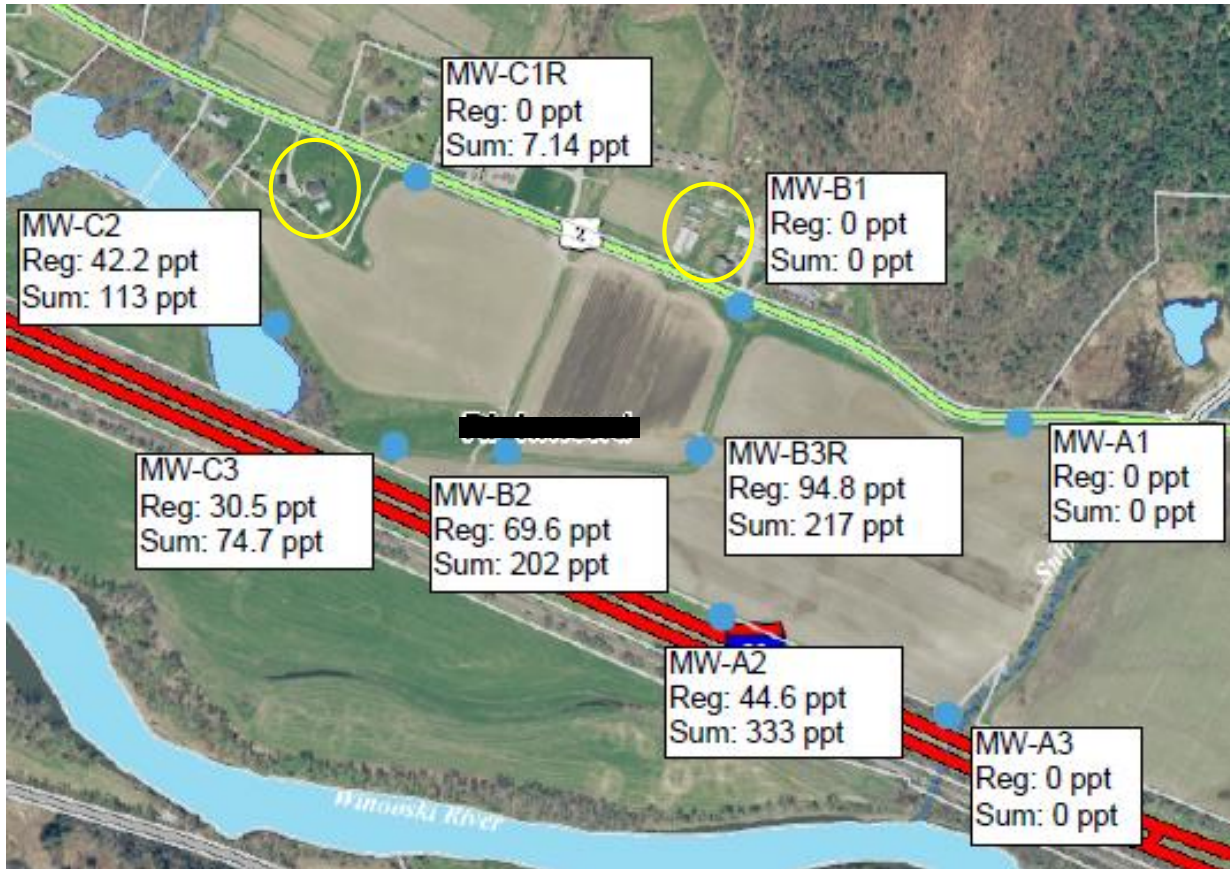
Soils @ 0-6" and 24", Σ PFAS



1 residential water supplies w/in .25 miles of site = ND

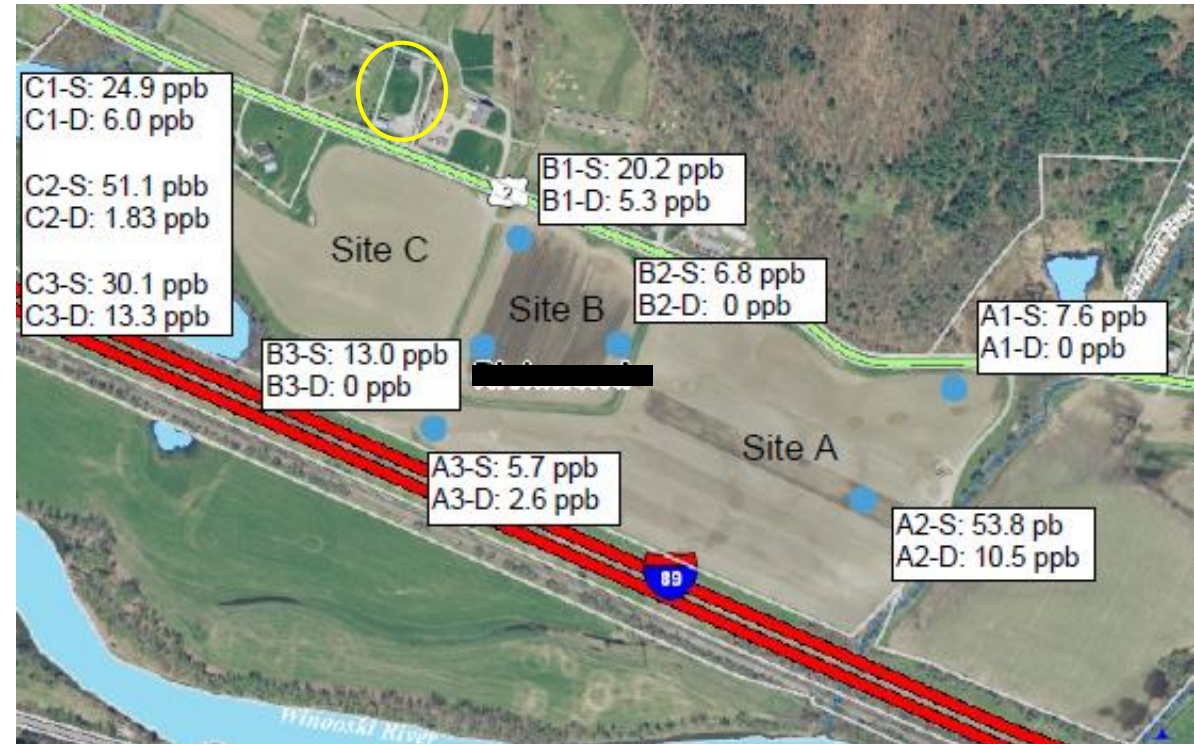
- Site 4: Field A - stabilized septage, broadcast, routinely during growing season
- Field B - stabilized Septage, occasional class B biosolids (lime stabilized), biannually
- Field C - stabilized septage/class B biosolids (lime stabilized), broadcast, biannually

Groundwater, Σ VT-5 PFAS (GES = 20ppt any combo)



4 residential water supplies w/in .25 miles of site = all ND

Soils @ 0-6" and 24", Σ PFAS



DRAFT DATA



Perfluoroalkyl
Substances
(PFAS)
Statewide Sampling
Plan

J U N E 2 0 1 9

<https://dec.vermont.gov/pfas/pfoa>



Thank you!

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Vermont Department of Environmental Conservation
Waste Management & Prevention Division
Residual Management & Emerging Contaminants Program

