

**To: Sherborn Zoning Board of Appeals, ZBA**

**Date: January 12, 2024**

**From: Sherborn Groundwater Protection Committee (GPC)**

**Subject: New Comments for ZBA on the proposed 40B Farm Road Homes**

We would like to provide to the ZBA some additional and pertinent comments from the volunteer Sherborn Groundwater Protection Committee, in addition to the two earlier submittals we made to the ZBA on July 31 and September 13, 2023, on the proposed Farm Road Homes 40B. We have four main points to cover at this time.

**First**, we would like to reinforce the primary concerns previously included in the two GPC comments submittals. Little in the subsequent multiple public ZBA hearings held or in the additional documents posted to the Towns Land Development website for this project (as of today) have answered our many questions and important concerns.

**Second**, our major concerns, focused on preventing groundwater quality and quantity degradation for current and future Sherborn residents, were summarized in our 9/13/23 submittal and are listed again here:

**Summary of GPC requests of the ZBA and peer reviewers on the proposed development:**

1. ZBA to not waive any Sherborn by-laws protective of groundwater, surface water, and stormwater.
2. ZBA to ensure thorough study of all septic plans (including nitrate/nitrite loading), drinking water well plans, and stormwater management plans by experienced peer reviewers.
3. ZBA to keep to a minimum the disruption of undeveloped lands and mature trees on the property.
4. ZBA to consider, if proposed development is to be approved, to condition the project to add protective measures and oversight on design of 8,360 gpd septic as per MA Title V 10,000 gpd regulations.
5. ZBA to require a comprehensive nitrate loading/mass balance study to be performed by the developer on the larger than 2,000 gpd septic system.
6. ZBA to require a professional analysis be undertaken of subsurface conditions by the applicant, to include bedrock geology, with a profile of the depth to top of bedrock at key areas within the property including proposed leach field areas and stormwater management infiltration locations, plus determinations of soil absorptive capacity, leaching capacity, and hydrologic modeling to identify potential fate and transport of septic and stormwater leachate both on- and off-site.
7. ZBA to require extended well pump quantity (flow) testing on the seven new private wells servicing the proposed development, with additional concurrent monitoring at existing abutter wells, by the applicant and overseen by peer reviewers and BOH.
8. ZBA to direct peer reviewer studying site stormwater plans to pay particular attention to current and future abutter and Farm Road flooding issues and impacts.
9. The impacts of increasing severity of future larger storms, higher temperatures, and more frequent droughts (climate change impacts) needs to be fully evaluated by a knowledgeable

peer reviewer to evaluate impacts to groundwater supply (quantity and quality) and stormwater mitigation.

**Third**, we would like to draw particular attention to the need to address much more substantially the project's 8,360 gal/day septic system potential impacts on groundwater quality. Besides the rather late in the hearing process timeline of the submittal of the final septic plans (December 12th submittal versus ZBA hearing start date of August 1st, 2023) to the ZBA, Board of Health, and public at large – the posted septic plan documents do not yet include a nitrogen loading study.

As we have brought to your attention before, MA Title V regulations address nitrate concerns, and recommend for septic systems larger than 2,000 gal/day flows:

*“For design flows of 2000 gpd or greater, the local approving authority or DEP may require a site-specific mass balance analysis for the area of impact. The mass balance analysis must demonstrate that the groundwater quality standard of 10 mg/l total nitrogen and 10 mg/l nitrate nitrogen will be met at the downgradient credit land property boundary, or at the nearest downgradient sensitive receptor.” (Ref: MassDEP GUIDELINES FOR TITLE 5 AGGREGATION OF FLOWS AND NITROGEN LOADING, 310 CMR 15.216).*

We include here as a separate Attachment (pdf file) the pertinent 2016 MassDEP guidance document on this topic. *“Guidelines for Title 5 Aggregation of Flows and Nitrogen Loading 310 CMR 15.216”*. (available also at: <https://www.mass.gov/doc/nitrogen-loading-and-aggregation-of-flows-310-cmr-15216-guidelines-0/download> ).

On the first page it clearly states again:

*“For design flows of 2000 gpd or greater, the local approving authority or DEP may require a site-specific mass balance analysis for the area of impact. The mass balance analysis must demonstrate that the groundwater quality standard of 10 mg/l total nitrogen and 10 mg/l nitrate nitrogen will be met at the downgradient credit land property boundary, or at the nearest downgradient sensitive receptor.”*

We respectfully request the ZBA not make any ruling on the proposed development until such time that a nitrogen loading study is completed, submitted to the ZBA, and reviewed and approved by the Town's Board of Health. Sensitive receptors downgradient of the proposed leach field include at a minimum the private drinking water wells at #'s 49, 53, and 55 Farm Road, and the nearby wetlands.

**Fourth**, and along many of the same lines as the nitrogen loading study above, we would like to update the ZBA and the public with new and germane insights from MassDEP studies reported recently (October 17, 2023) on a positive correlation now found between groundwater drinking water well PFAS (per- and polyfluoroalkyl substances) concentrations and septic system densities (number of private septic systems per known area of land) in our state.

MassDEP conducted a large study of PFAS testing of both public and private water supplies throughout Massachusetts, sampling some 2,444 wells for PFAS. The concentrations of the sum of six specific PFAS chemicals (“MA PFAS6”) were determined and compared to the current Massachusetts Maximum Contaminant Level for PFAS6 (20 ng/L, 20 ppt, 20 parts per trillion), as well as the 2023 US EPA proposed Maximum Contaminant Levels (4 ng/L for PFOS and 4 ng/L for PFOA) in drinking water.

Attached as part of this document, in Appendix I, are seven selected slides from one MassDEP oral presentation covering a portion of this multi-year PFAS study given at a recent conference, the 39th Annual International Conference on Soils, Sediments, Water, and Energy, held at UMASS Amherst, October 16-19, 2023 (see: [www.xcdsystem.com/AEHS/program/I2f7reS/index.cfm](http://www.xcdsystem.com/AEHS/program/I2f7reS/index.cfm) for complete conference program). The presentation was entitled: *“The Occurrence of PFAS in Massachusetts Public Water Supplies”*, although it also included some coverage of PFAS results from private drinking water wells in Massachusetts.

Selected presentation slides we include here (a full copy of the pdf slide set presentation is available on request from the GPC):

1. Slide # 1, Title slide.
2. Slide # 4, regulatory PFAS thresholds, current MassDEP and proposed US EPA 2023.
3. Slide # 6, Map of Massachusetts, with color-coded (by PFAS6 conc ranges) symbols for public water supply wells (PWS), private wells, and surface water sampling points.
4. Slide # 19, Map of Massachusetts, correlation of higher PFAS well concentrations to areas of higher septic system densities (# houses on septic per square kilometer).
5. Slide # 21, Chart indicating septic density surrounding PWS wells is positively correlated in all MA regions.
6. Slide # 22, Takeaways summary.
7. Slide # 23, References.

The “Takeaways” from the MassDEP research were that PFAS groundwater contamination is:

- a. More prevalent in areas of high septic density, and
- b. From many sources of all sizes

And is **not**:

- a. Driven by a few large sources.
- b. Driven by Aqueous Fire Fighting Foam (AFFF)
- c. Limited to industrial/urban areas

The direct correlation between septic density and PFAS concentrations is illustrated on the slide # 19 which maps the number of single-family homes on septic systems per square kilometer along with the public water supply wells that exceeded/did not exceed the current 20 ng/L PFAS6 Massachusetts drinking water standard. We bring this to your attention since this project is proposing a very large increase in septic density - 32 homes on one parcel/one Title V septic system, versus Sherborn’s more protective regulations requiring 1 to 3-acre zoning per each home and septic system.

As we pointed out in our 9-13-23 submittal, it is important to also note here that both private wells (regulated by the Sherborn BOH) and multiple public water supply wells (PWS, regulated by MassDEP) in Sherborn have been found within the past two years to contain unhealthy levels of PFAS (summary Sherborn PFAS data available from the GPC, and has been previously provided by the GPC to the Select Board and Town Administrator), suggesting that both our current Board of Health by-laws and MA Title V regulations may not be protective enough of groundwater against current and past contamination from “forever chemicals” like PFAS (PFAS and many other synthetic organic compounds are not degraded/destroyed when released in the environment, and pass through intact after “treatment” by

simple Title V septic systems and more advanced treatment technologies like large multi-stage municipal wastewater treatment plants).

We respectfully request that the ZBA not waive any of the Sherborn bylaws protective of groundwater, surface water, and stormwater, so that the ZBA can ensure the new residents of the proposed 32-unit development and all current and future Sherborn residents may continue to enjoy safe and contaminant-free groundwater.

We believe multiple important local health risks are inherent in the proposed development plan, including foremost maintaining clean water standards that serve both the development and surrounding local private and public water supply wells, that are not adequately protected by compliance solely with applicable state standards. Understand that MA Chapter 40B does not override local protection of water resources. (Please see: Reynolds v. Stow Zoning Bd. of Appeals, MA Appeals Court No. 14-P-663, Sept. 15, 2015).

# Occurrence of PFAS in Massachusetts Public Water Supplies

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# Regulatory thresholds

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MassDEP maximum contaminant level (MCL)

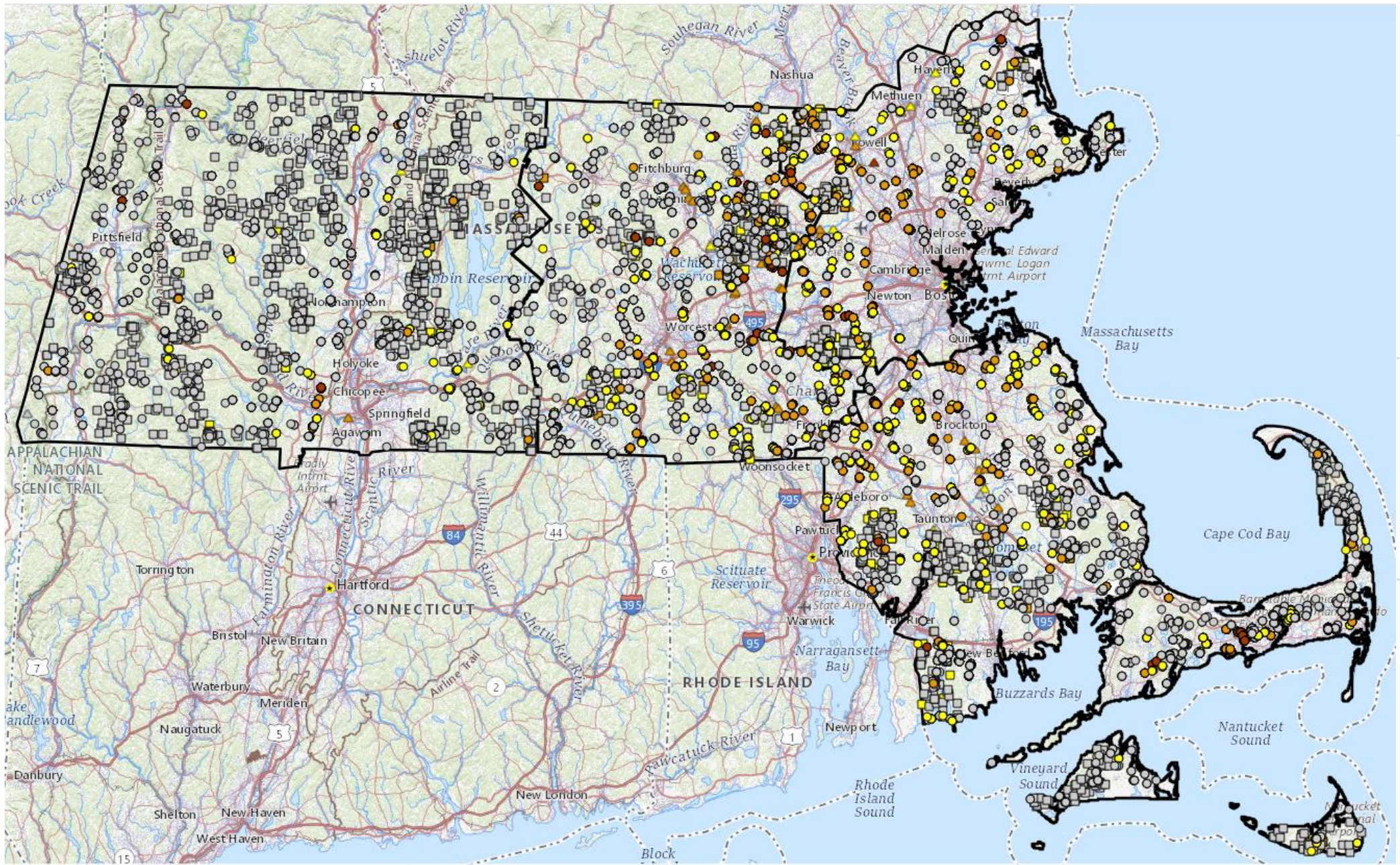
- PFAS6: Sum of PFOS, PFOA, PFHxS, PFNA, PFHpA, PFDA
- PFAS6 cannot exceed 20 ng/L

EPA proposed enforceable MCL

- PFOS cannot exceed 4 ng/L
- PFOA cannot exceed 4 ng/L
- Hazard index cannot exceed 1.0

$$\text{Hazard Index} = \left( \frac{[\text{GenX}_{\text{water}}]}{[10 \text{ ppt}]} \right) + \left( \frac{[\text{PFBS}_{\text{water}}]}{[2000 \text{ ppt}]} \right) + \left( \frac{[\text{PFNA}_{\text{water}}]}{[10 \text{ ppt}]} \right) + \left( \frac{[\text{PFHxS}_{\text{water}}]}{[9.0 \text{ ppt}]} \right)$$





### Legend

#### PFAS in PWS Wells

- PFAS6 > 90 ng/L
- PFAS6 > 20 ng/L
- Exceeds Proposed EPA MCL
- No Violation

#### PFAS in Private Wells

- PFAS6 > 90 ng/L
- PFAS6 > 20 ng/L
- Exceeds Proposed EPA MCL
- No Violation

#### PFAS in Surface Water

- ▲ PFAS6 > 90 ng/L
- ▲ PFAS6 > 20 ng/L
- ▲ Exceeds Proposed EPA MCL
- ▲ No Violation



# PFAS and septic density

1990 population and housing data

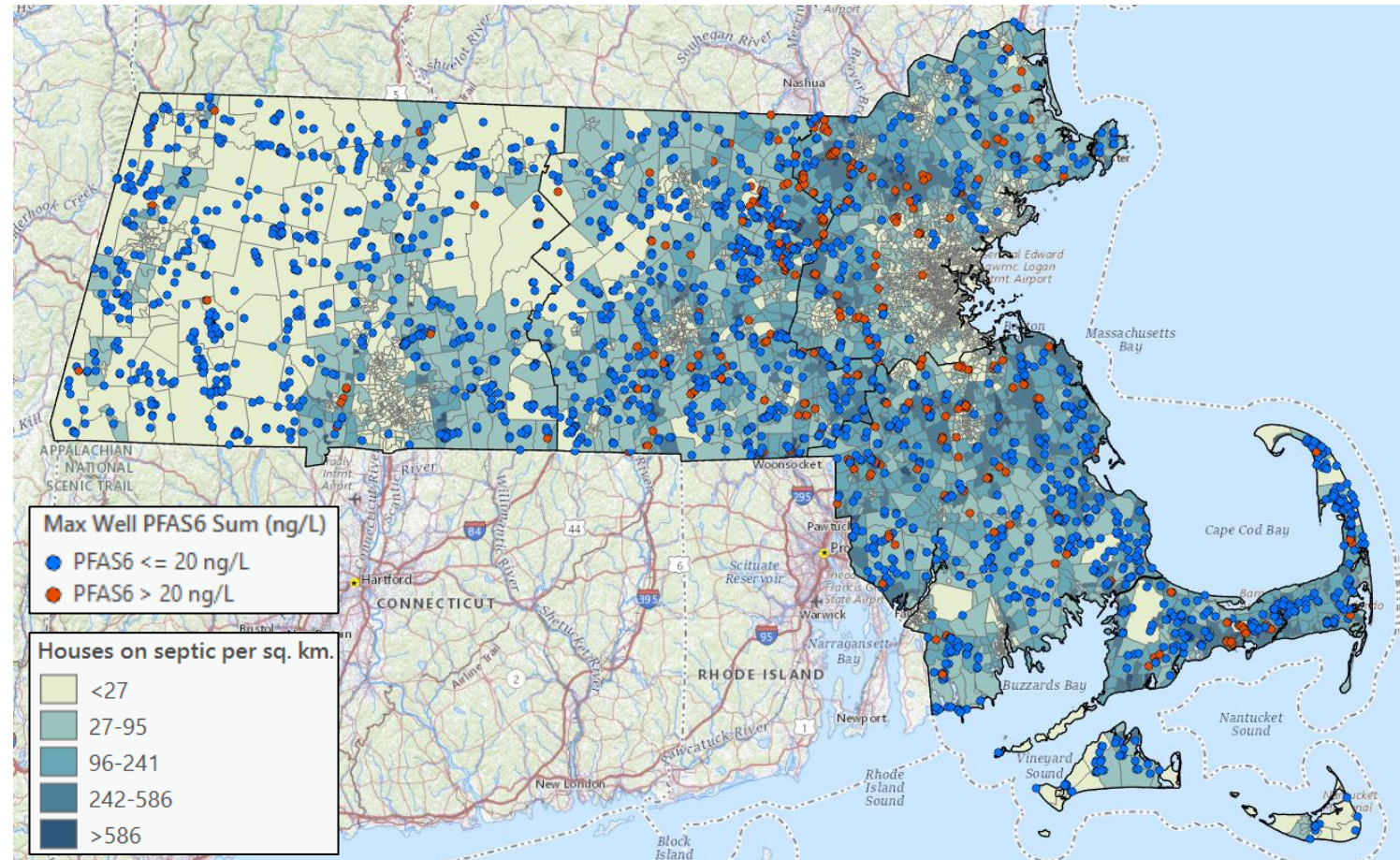
- Census block groups
- Estimated # houses on septic<sup>1</sup>
- Land area

Septic density

- Houses on septic per sq. km.

PWS wells

- Mapped to census block groups
- Exceed 20 ng/L PFAS6



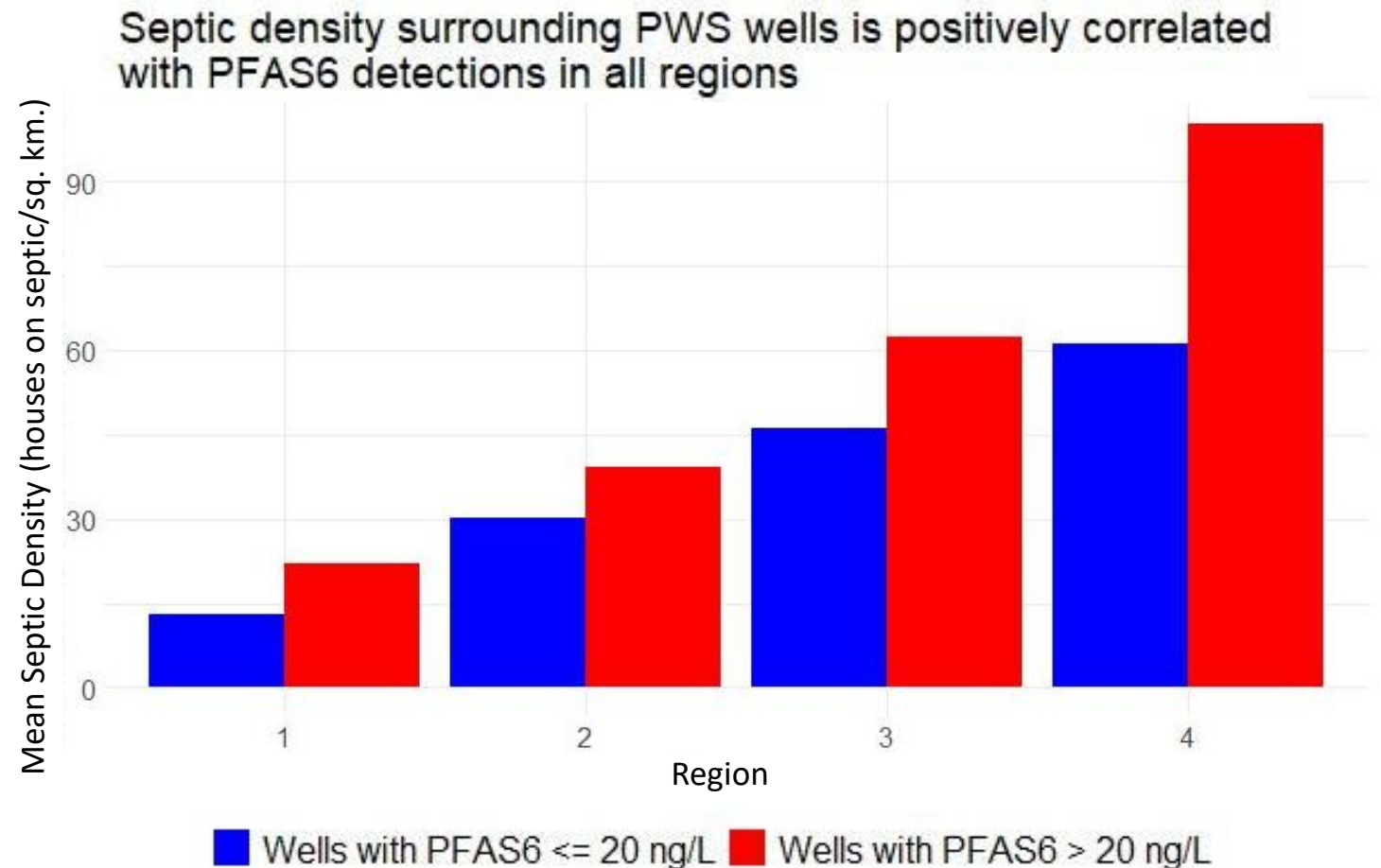


# Wastewater discharge as a PFAS source

Septic density indicative of non-sewered connections for industrial, commercial, and residential sources

- Wastewater discharged directly into the environment
- Wastewater contains PFAS

PFAS are in a large variety of industrial and consumer products



# Takeaways

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## PFAS contamination **is not**...

- Driven by a few large sources
- Driven by PFOS-based AFFF
- Chemically consistent
- Limited to industrial/urban areas
- Widespread in rural areas

## PFAS contamination **is**...

- More prevalent in areas of high septic density
- From many sources of all sizes

# References

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EPA, 2023, Understanding the PFAS National Primary Drinking Water Proposal Hazard Index.  
[https://www.epa.gov/system/files/documents/2023-03/How%20do%20I%20calculate%20the%20Hazard%20Index. 3.14.23.pdf](https://www.epa.gov/system/files/documents/2023-03/How%20do%20I%20calculate%20the%20Hazard%20Index.3.14.23.pdf)

LaMotte, A.E., 2018, Estimated nitrogen from septic for the conterminous United States, 2010 (SepN\_CONUS\_bg\_2010): U.S. Geological Survey data release,  
<https://doi.org/10.5066/P9QTGSI7>.

Massachusetts Executive Office of Energy and Environmental Affairs, Drinking Water Data Portal.  
<https://eeaonline.eea.state.ma.us/portal#!/search/drinking-water>

Massachusetts Water Resources Authority, How the MWRA Water System Works, MWRA Online. <https://www.mwra.com/04water/html/watsys.htm>.