

3M Settlement Project 1007 Source Assessment and Feasibility Study Findings

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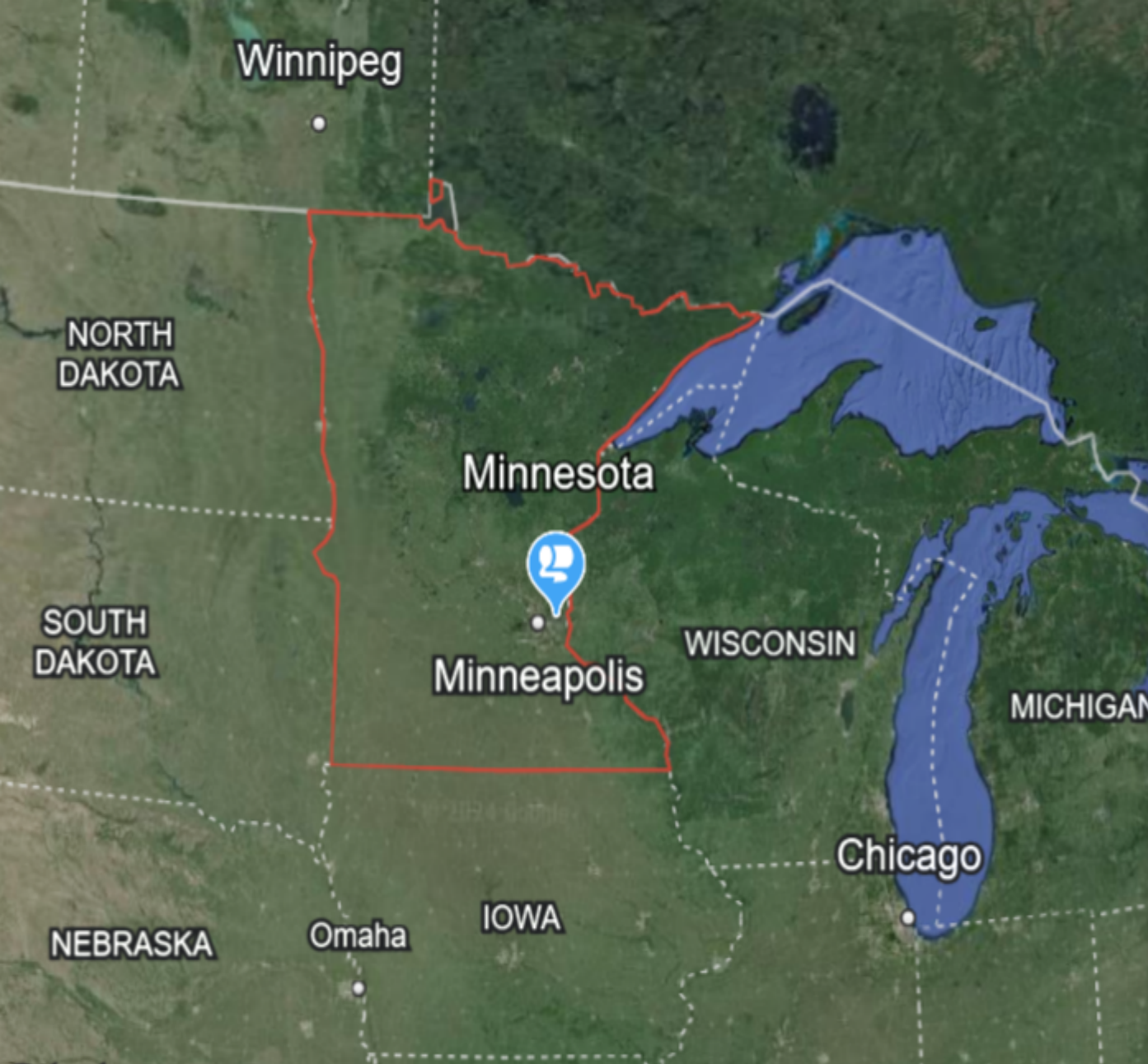
An aerial photograph of a calm lake reflecting a sky filled with soft, white and grey clouds. The shoreline is lined with trees in various shades of autumn, including yellows, oranges, and reds. A small wooden dock with a ramp extends into the water on the left side. In the distance, a city skyline is visible under the hazy sky.

2010 State of Minnesota v. 3M Company

2018 \$850M Settlement

First Priority: Safe and Sustainable Drinking Water Supplies

First Priority: Source Assessment and Feasibility Study for Project 1007



Minnesota



Edit

Source Image: GoogleLandsat / CopernicusData
SIO, NOAA, U.S. Navy, NGA, GEBCOINEGI

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East Metro

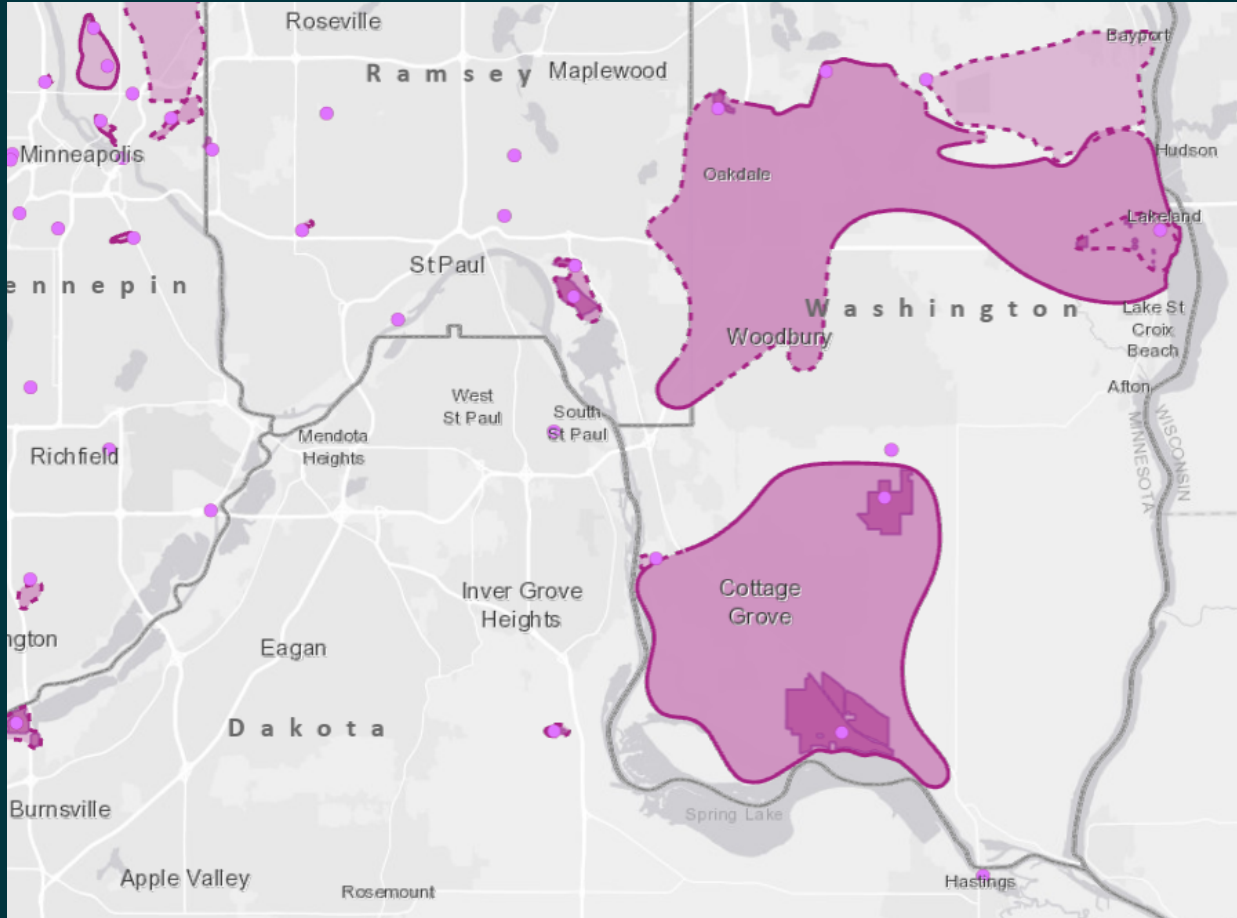


Image Source Credit: MPCA Groundwater Contamination Atlas

Regional Scale Plumes
4 Disposal Sites
50-70+ years ago

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Primary Source Area #1: Oakdale Disposal Site

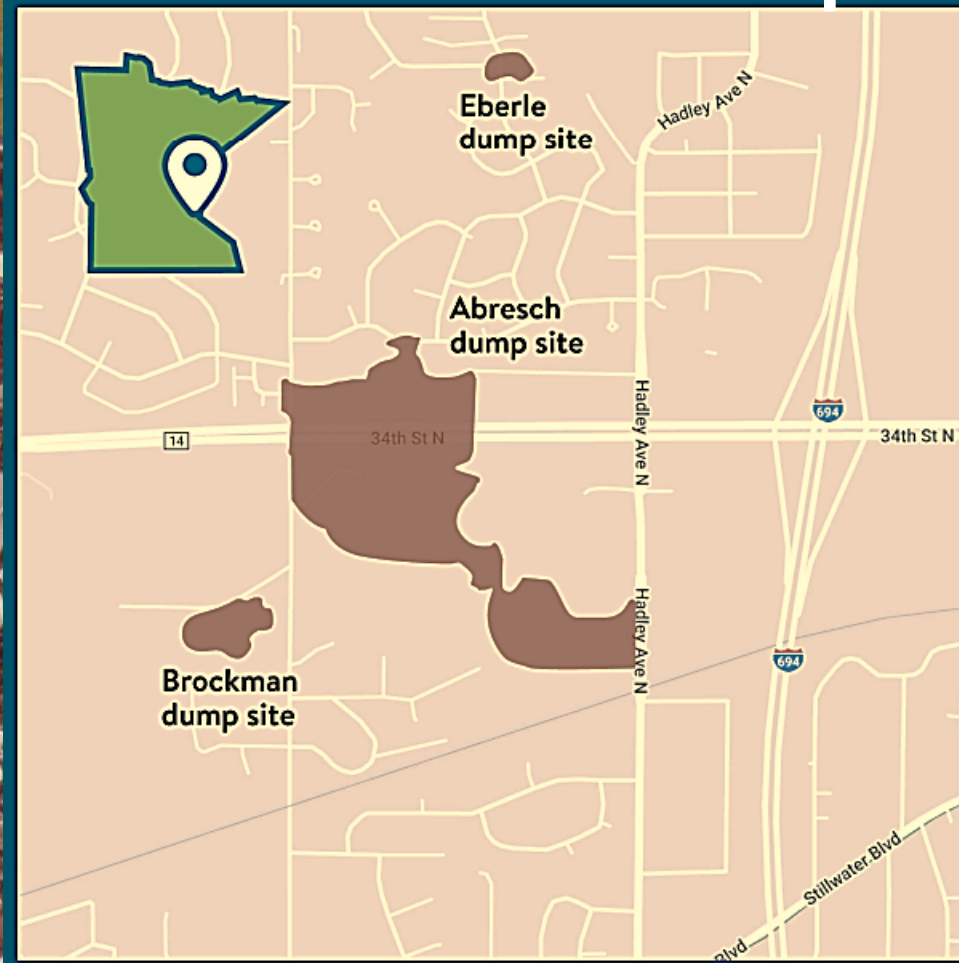


Image Source Credit: MPCA Flickr



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Primary Source Area #2: Washington County Landfill

First Permitted Landfill in MN 1969
Reconstructed 2009-2011

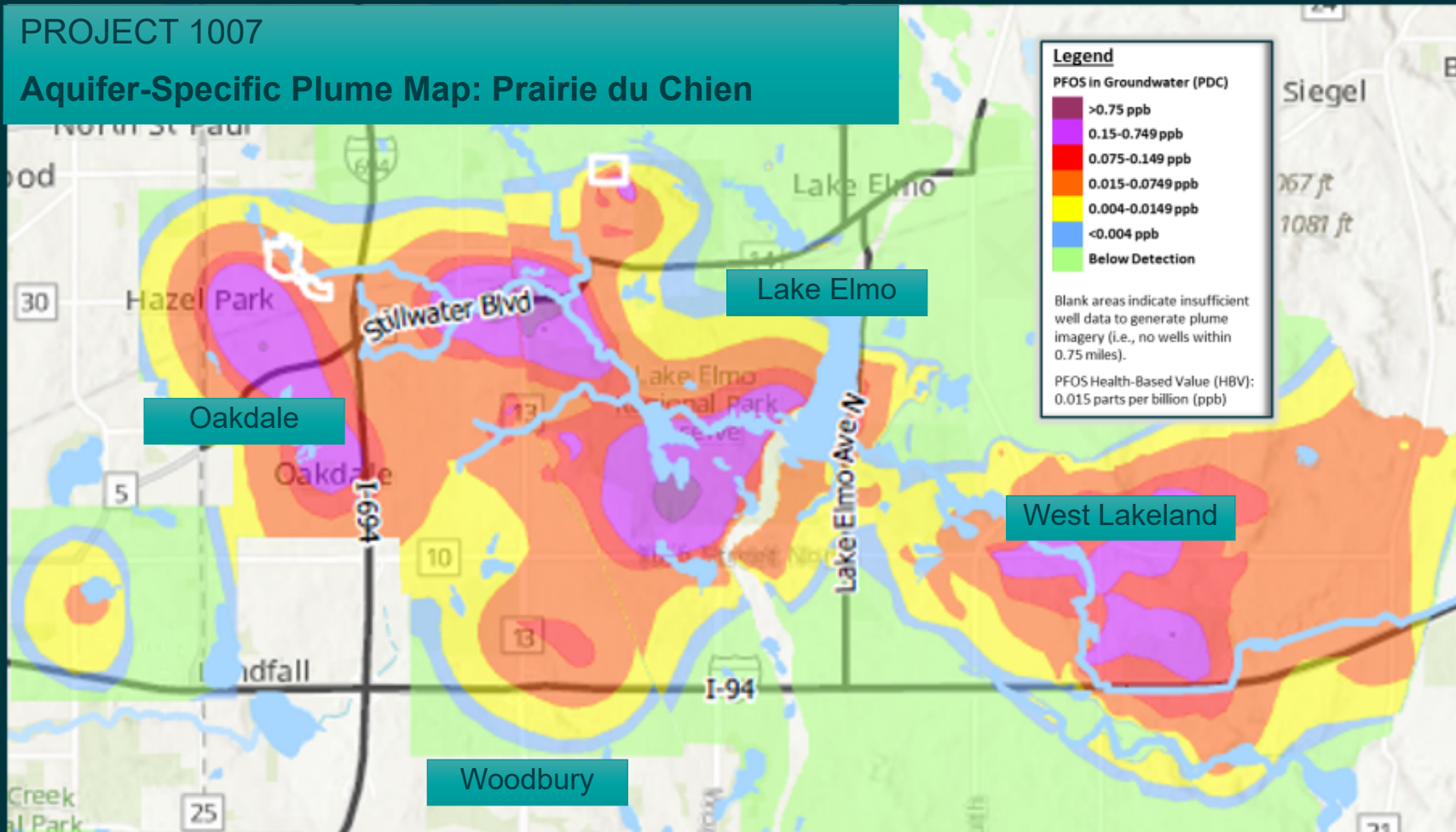
Image Source Credit: MPCA Flickr

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Areas of Concern

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Aquifer-Specific Plume Map: Prairie du Chien



13 AOCs

Surface Water

Sediment

Shallow Groundwater

Deep Groundwater

Remedial Action Objectives: Risk Based Values

PFAS Constituent	Drinking Water HBV/HRLs 2024 ng/L	Surface Water Quality Criteria 2023* ng/L	Site- Specific Sediment Screening Value 2024 ug/kg	Soil Reference Values 2024 mg/kg
PFOA	0.0079	25	0.40	0.00036
PFOS	2.3**	0.05	18	0.013
PFBA	7,000	5,700	120,000	49
PFBS	100	140	1,500	1.1
PFHxA	200	220	2,600	1.9
PFHxS	47	20	170	0.13

Health Based Values/Health
Risk Limits (HBVs/HRLs)

Surface Water Quality Criteria
(SWQC)

Site-Specific Sediment
Screening Values (SDSVs)

Soil Reference Values (SRVs)

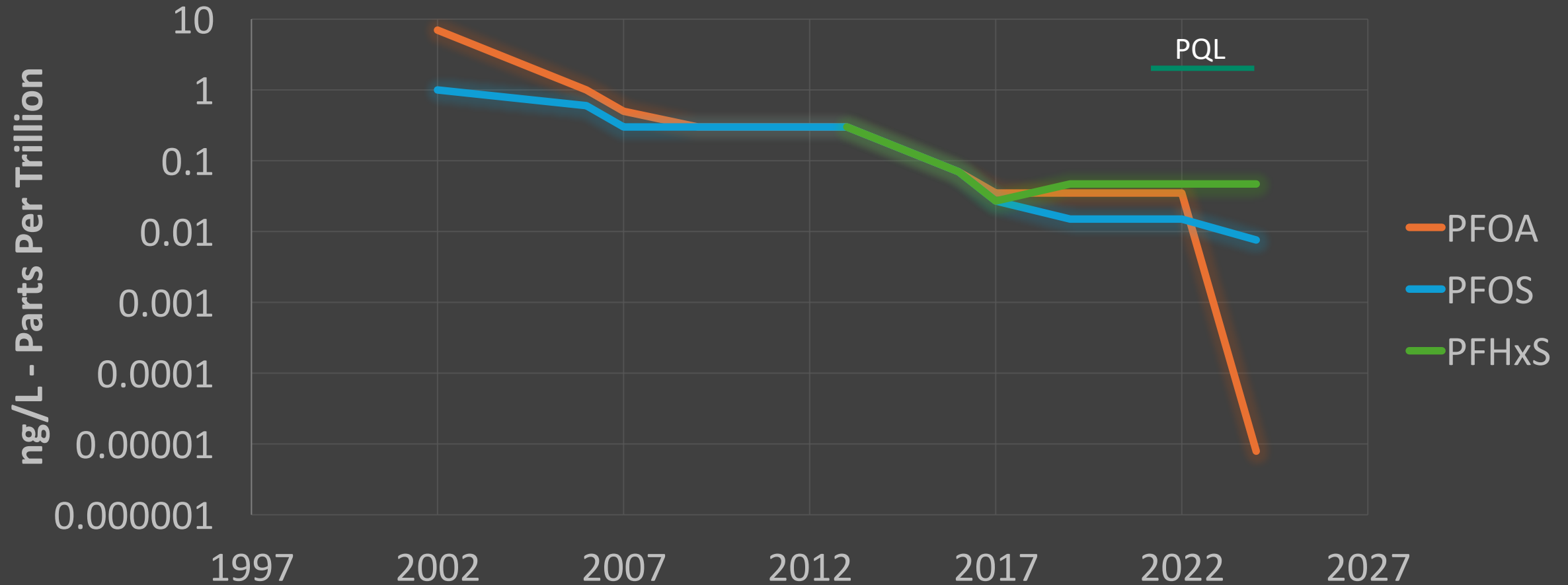
*Class 1/2A or Class 1/2Bd– drinking water, fish consumption and recreational exposure

**non-cancer health endpoint

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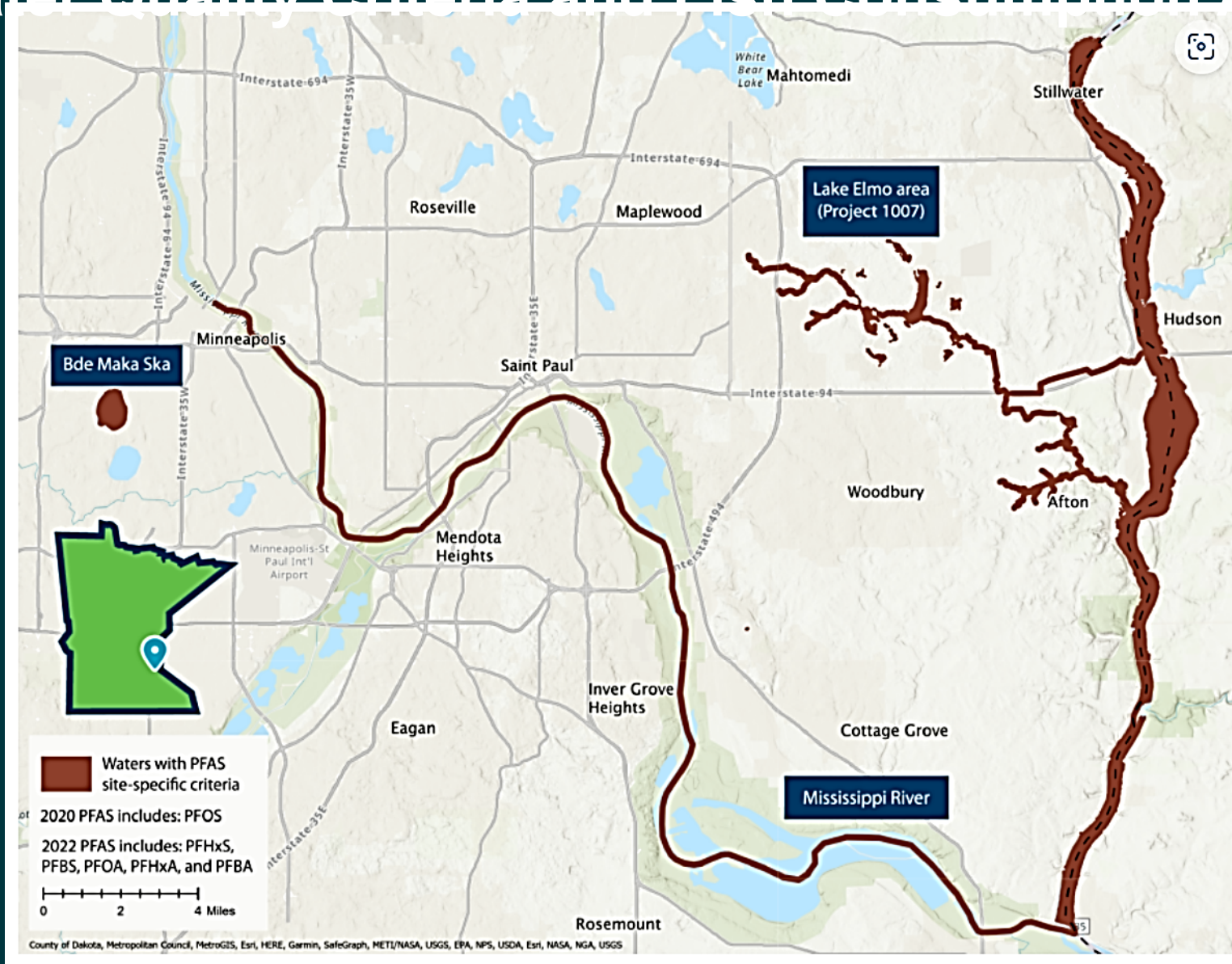
Objectives for Cleanup: Navigating Changing Values

Minnesota PFAS Drinking Water Health Risk Limits Over Time



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Surface Water Quality Criteria and Fish Consumption Advice



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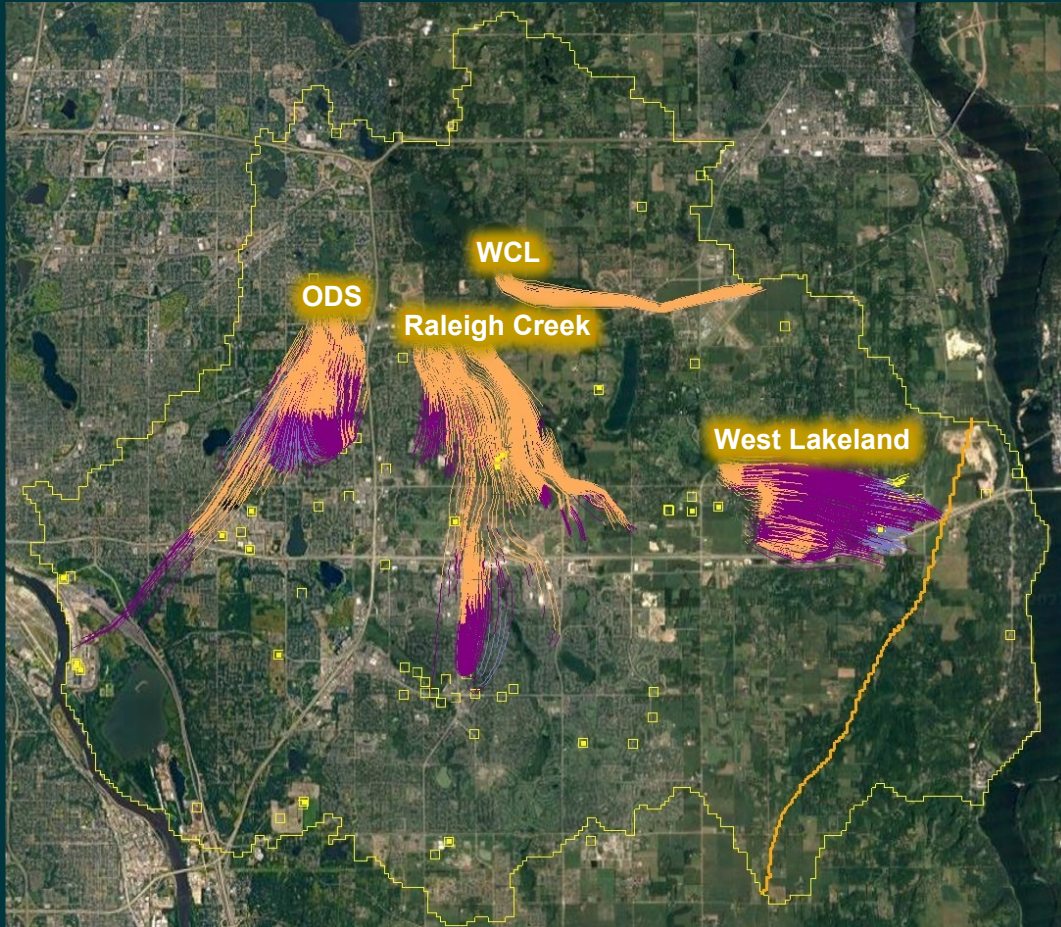
Example Focus Area: West Lakeland Area



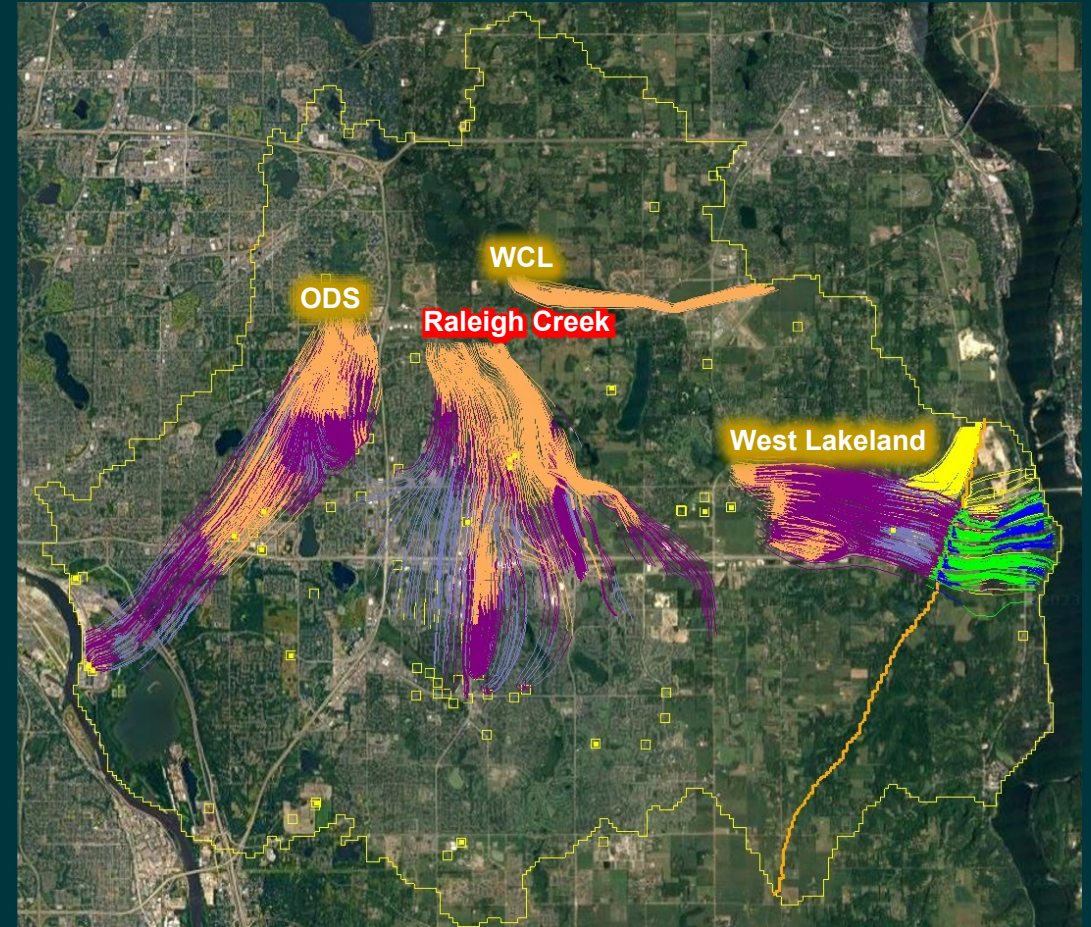
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Particle Tracking from Prairie du Chien Aquifer

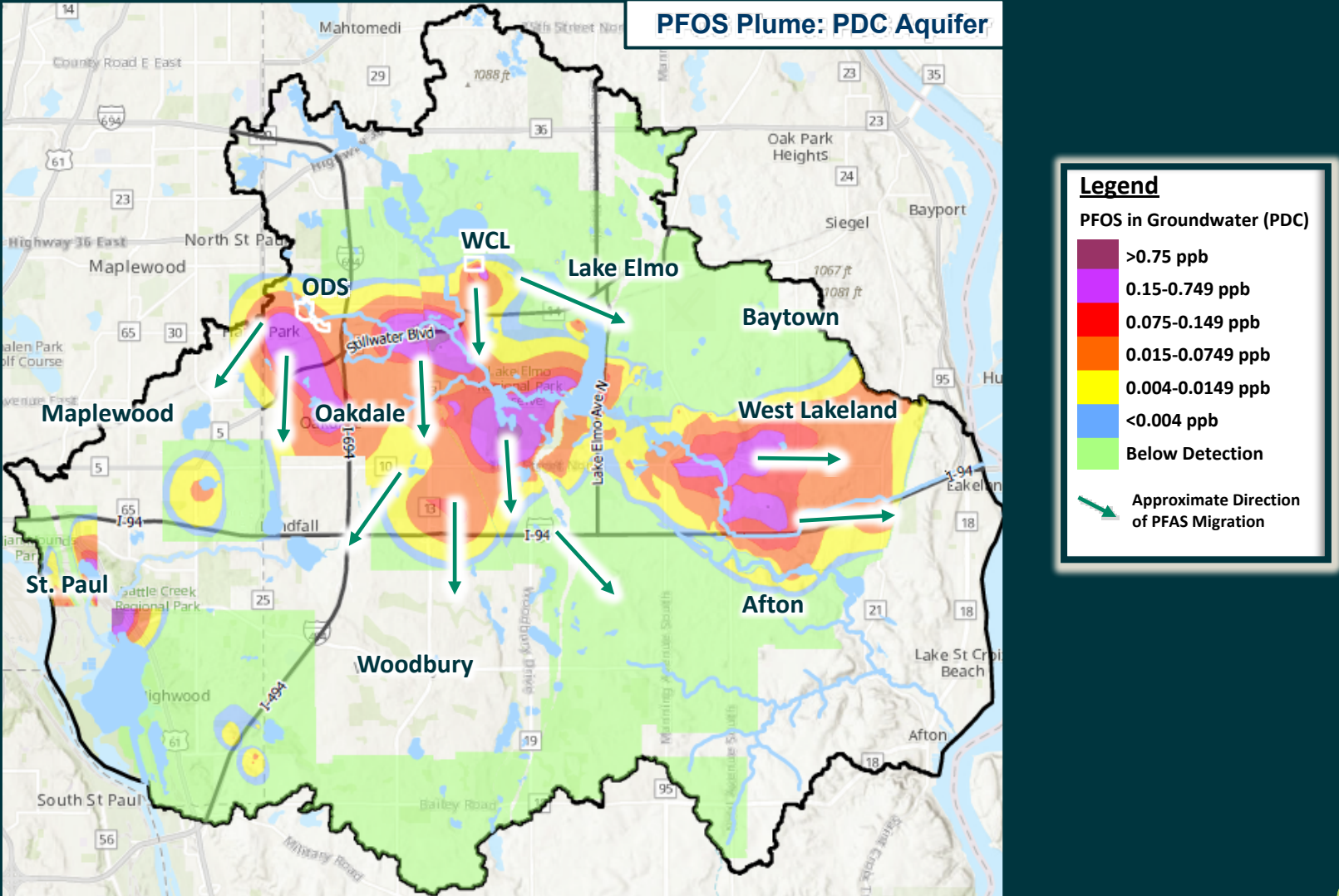
Groundwater Flow: **50 Years** into Future



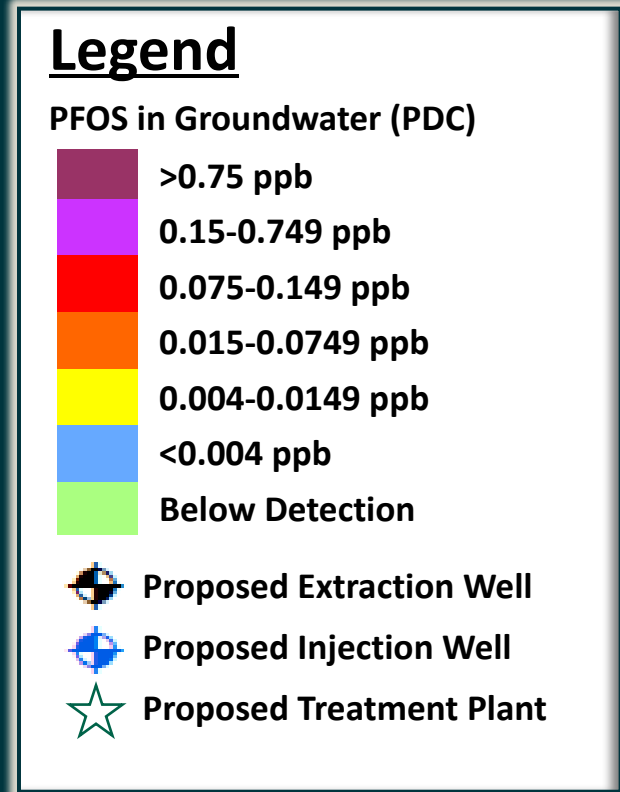
Groundwater Flow: **100 Years** into Future



Particle Tracking: What Does this Mean?



Remedial Option: Multi-Benefit Well Array (MBWA)



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Current and Future Objectives Flexibility



Are RAOs going to be nimble enough to flex at the rate of threshold changes?



Will technology selections continue to aim for zero in anticipation of more, low-to-nondetect values?

Planning for zero ⇔ Cost ⇔ Future Characterization

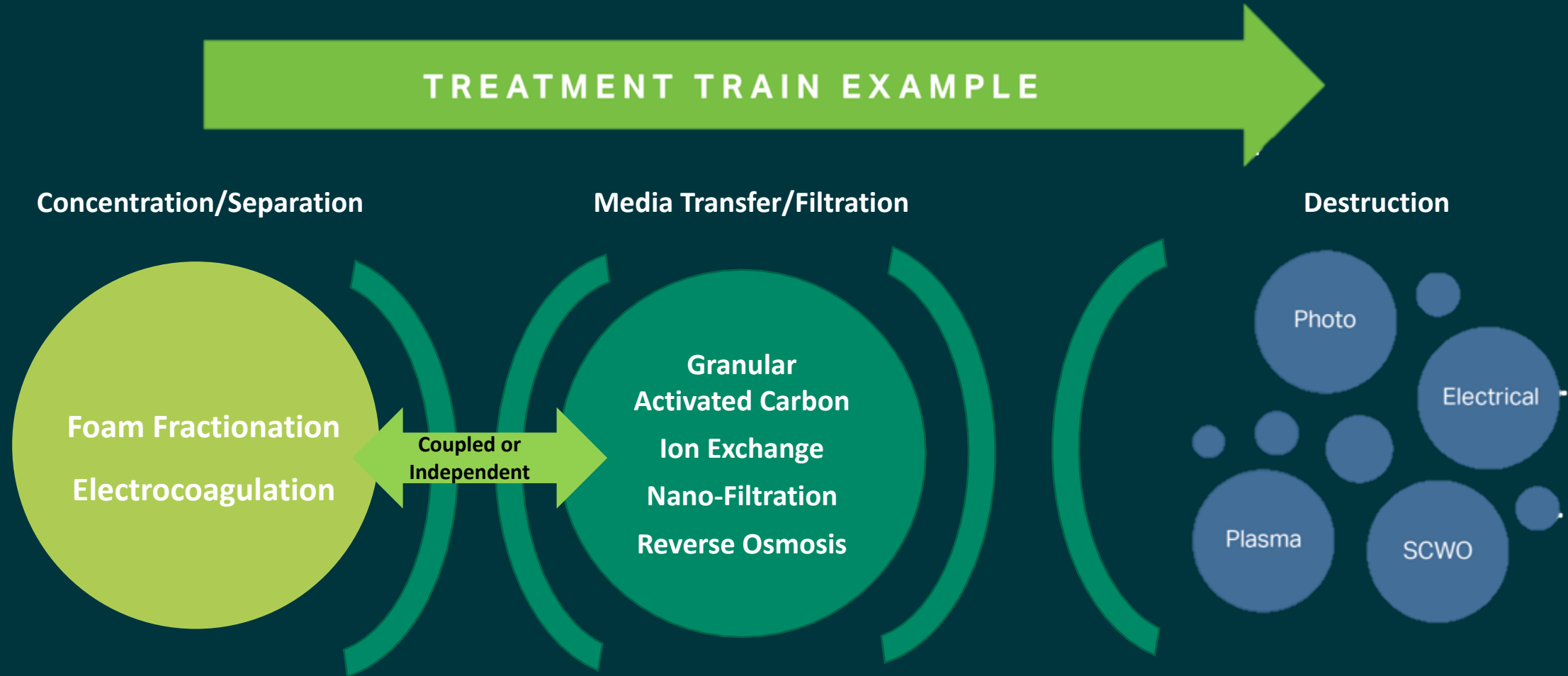
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Pilot Studies

Completed SAFF Pilot Study
In-Progress evaluation of Destruction Tech
Forward-Looking Extraction & Injection Well Array Pilot

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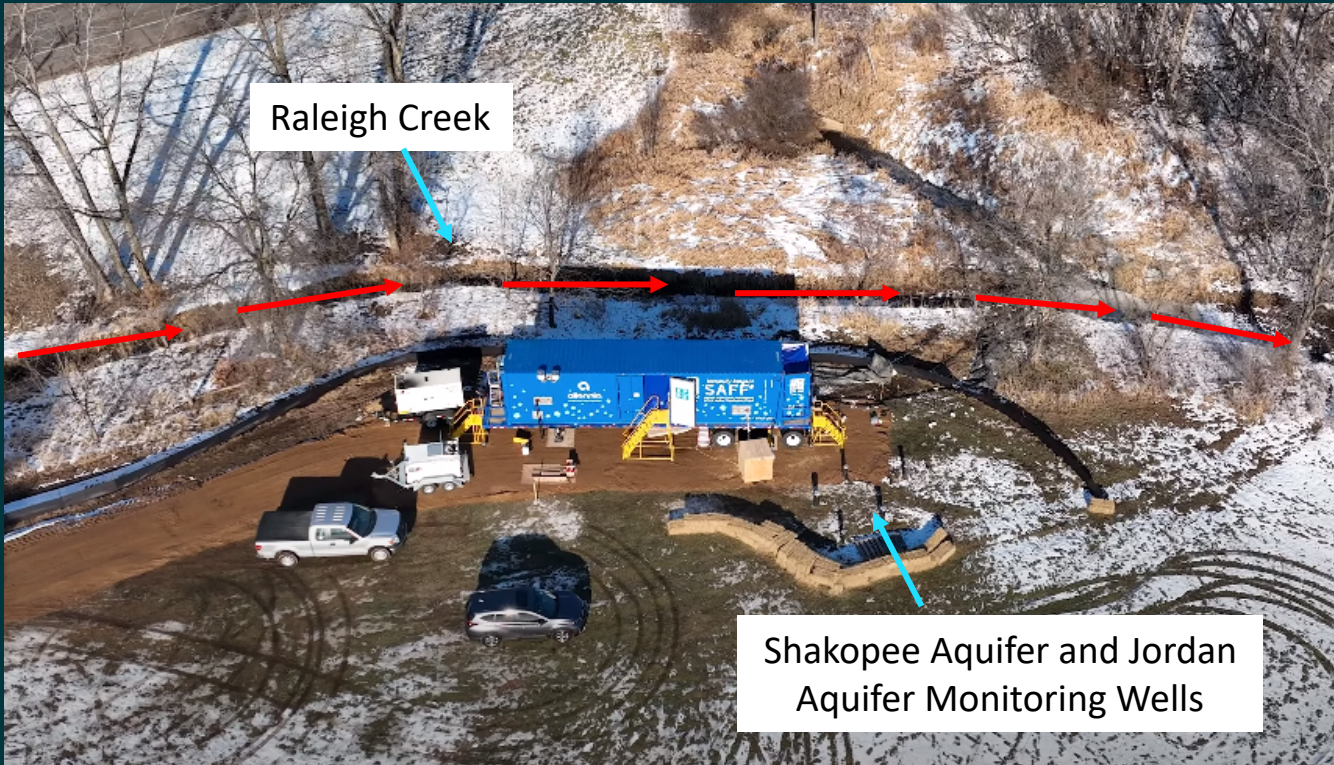
Remedial Treatment Train Example



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SAFF Pilot Study

Site selected because of access to impacted surface water and two impacted aquifers



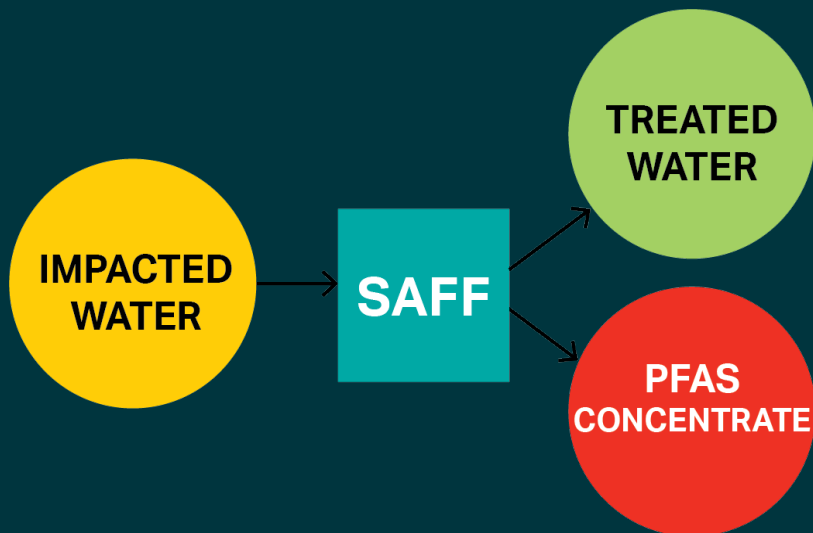
	PFOS	PFOA	Total Organic Carbon	Hardness
Raleigh Creek	2,000-3,000 ng/L	700-900 ng/L	6.5 mg/L	190 mg/L
Shakopee Aquifer	950 ng/L	330 ng/L	<0.5 mg/L	300 mg/L
Jordan Aquifer	1 ng/L	22 ng/L	<0.5 mg/L	200 mg/L



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SAFF Pilot Study Results Summary

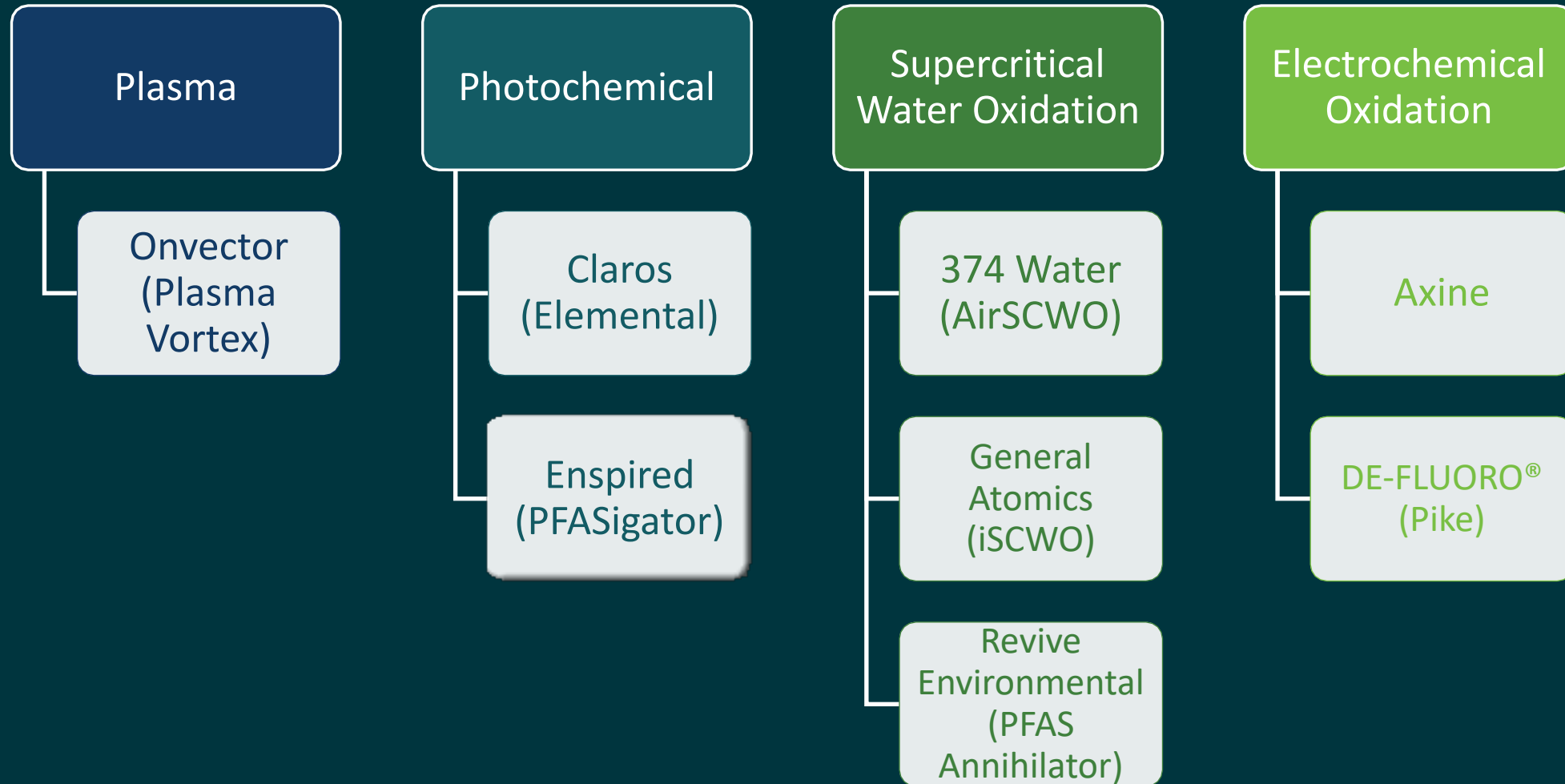
Water Source	Influent PFOS (ng/L)	Effluent PFOS (ng/L) (% Removal)	Concentrate PFOS (ng/L)	Influent PFOA (ng/L) (% Removal)	Effluent PFOA (ng/L) (% Removal)	Concentrate PFOA (ng/L)
Raleigh Creek	2,940	2.9 (99.9)	6,540,000	903	0.836 (99.9)	2,440,000
Shakopee Aquifer	1,340	1.42 (99.9)		392	3.57 (99.1)	
Jordan Aquifer	0.92	Below Detection		26.5	4.95 (81.3)	



Key Takeaway
High PFOS and PFOA removal
was achieved even with low
foaming groundwater

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Destructive Technologies Pilot Study with SAFF Concentrate

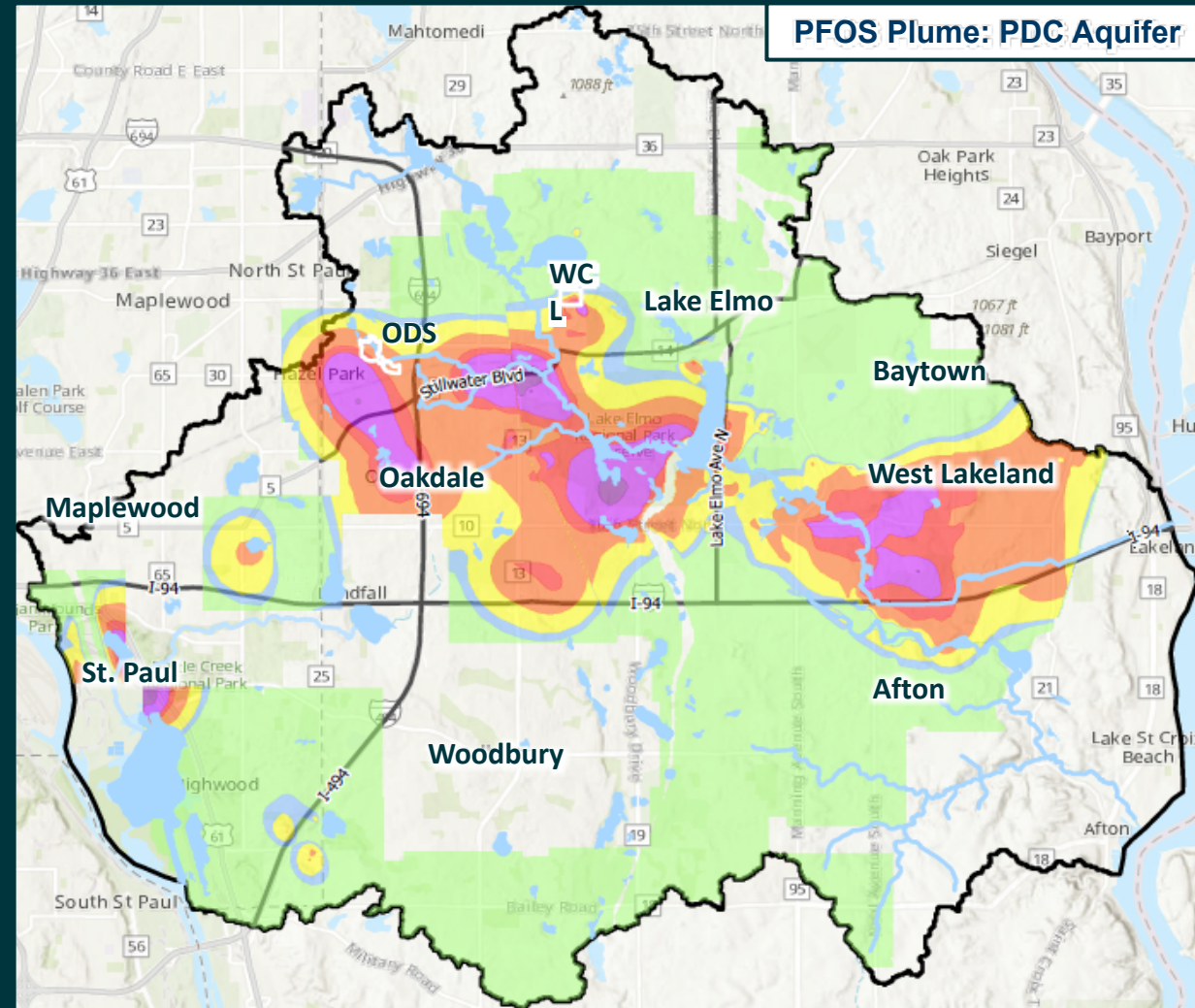


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Feasibility Study = Solutions Limiting PFAS Spread

Completion of the Feasibility Study and implementation of selected remedial actions are intended to:

- Aid in the long-term reduction of PFAS in the East Metro
- Reduce the continued spread of PFAS in surface water and groundwater
- Provide long term protection to drinking water supplies



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Feasibility Study Process & Status



✓ **Source Assessment (2019-2023)**

❑ **Feasibility Study (2023-2024)**

❑ **Post-Feasibility Study (2024+)**

- ✓ Conceptual Site Model
- ✓ Areas of Concern
- ✓ Remedial Action Objectives
- ✓ Remedial Technology Evaluation and Screening
- ❑ Pilot/Treatability Studies
- ❑ Remedy Alternatives

- ❑ Proposed Plan for Remedial Actions
- ❑ Remedial Design
- ❑ Remedial Action/Clean-up
- ❑ Additional Pilot Studies

Feasibility Study: Solutions Limiting PFAS Spread

Sustainability Factors and Weight in Remedy Selection

Best Available Technologies

Settlement Funding Limits and Priorities

Reality: Removals, Reductions and Research

THANK YOU!

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