Wastewater Reuse in the NE Metro

Work Group Meeting, White Bear Lake Area Comprehensive Plan

Christopher Larson, PE, SEH, February 4, 2025

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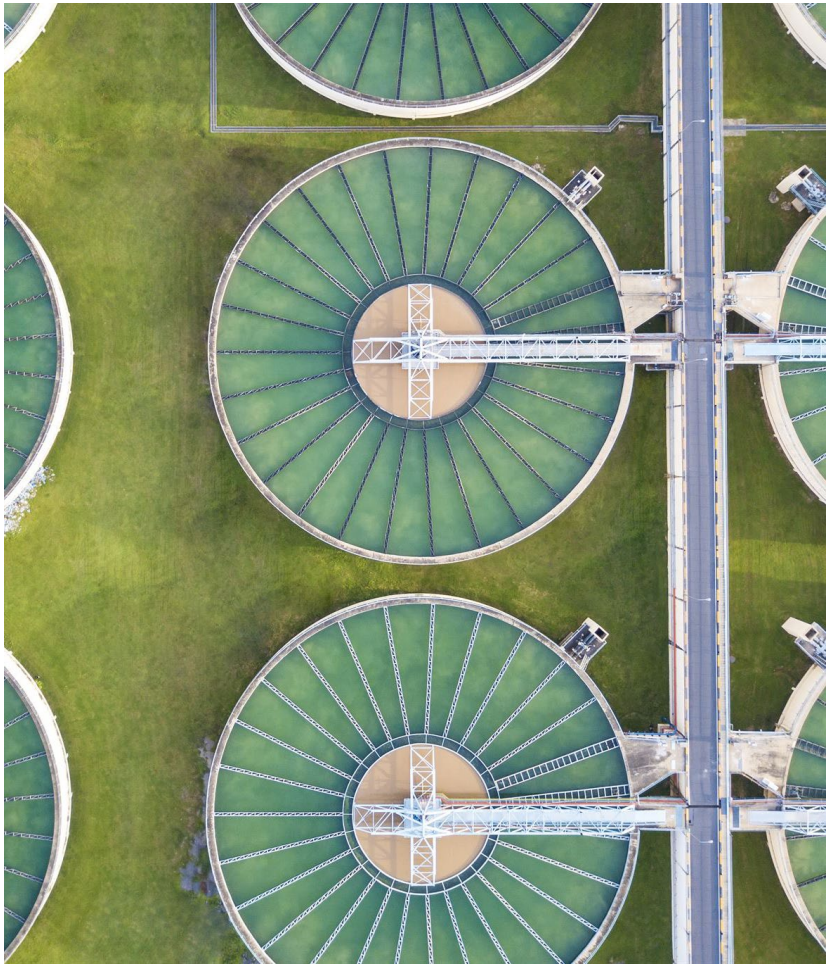
Need for Treating Municipal Wastewater



- Protects public health by removing harmful pathogens.
- Prevents pollution of local water bodies and ecosystems.
  - BOD
  - Nutrients
  - Contaminants
- Wastewater from NE Metro currently treated at Metro Plant in St. Paul
- Potential for wastewater reuse.

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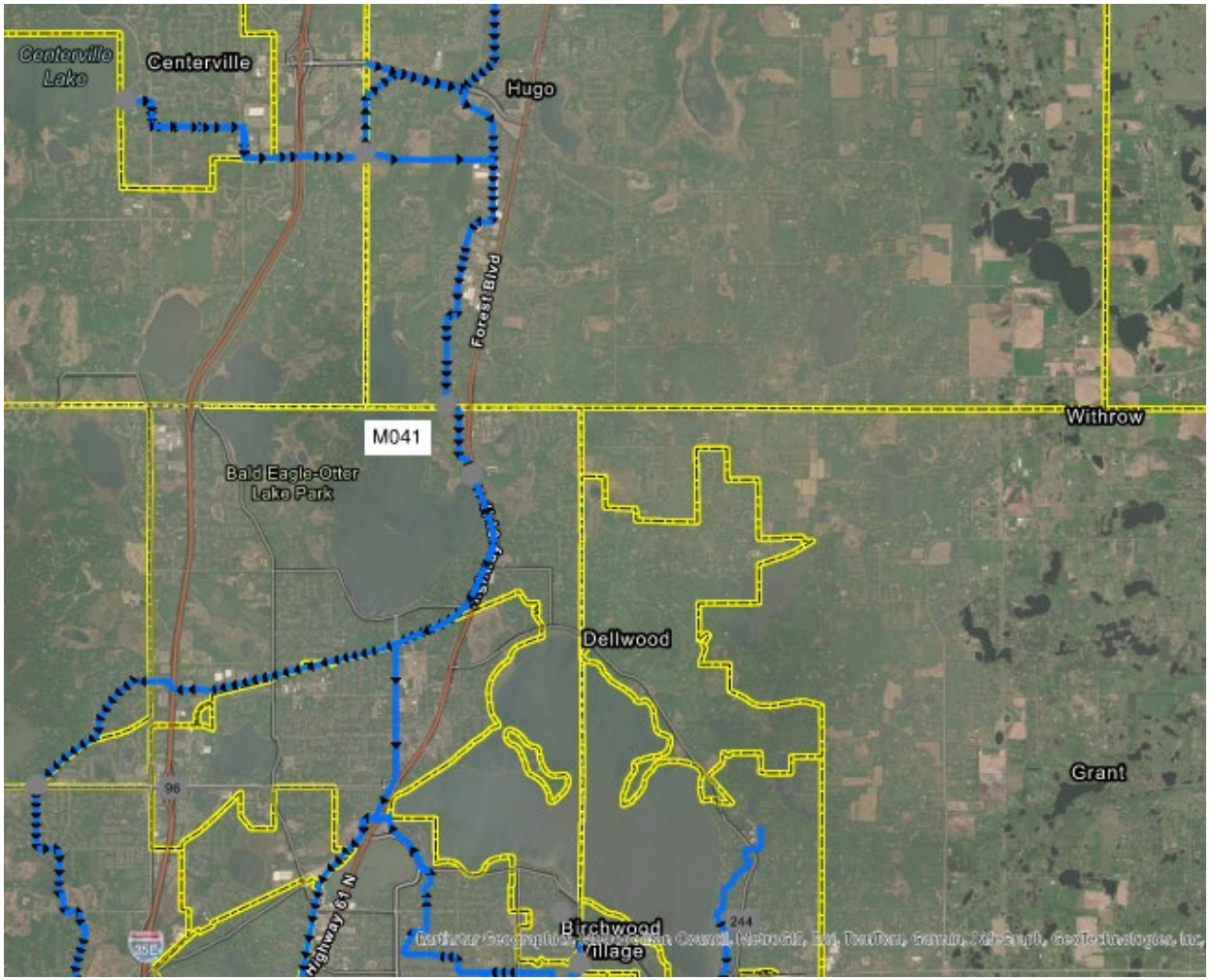
Types of Wastewater Reuse

- Non-potable reuse is used for applications like toilet flushing, landscape irrigation, and industrial processes.
- Indirect reuse incorporates treated wastewater into groundwater or surface water systems.
- Potable reuse is the treatment of wastewater to drinking water standards.
- Each type of reuse has unique treatment requirements and regulatory considerations.

Sewer Interceptors in NE Metro



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Wastewater Flows

- If wastewater reuse is feasible, how much flow is available?
  - 2.5 - 2.8 MGD at M041
- For comparison, City of White Bear Lake uses approx. 2.5 MGD of water per day
- Growth in Hugo, Forest Lake

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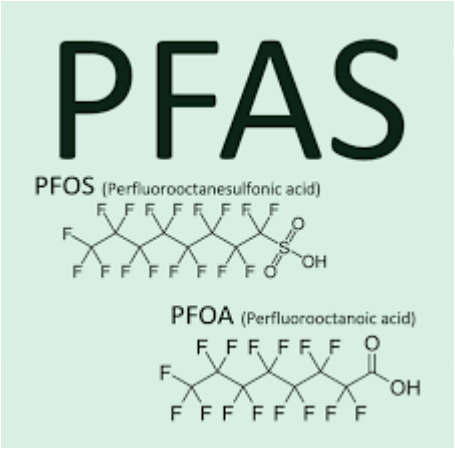
Raw Wastewater - Water Quality



- 250 mg/L BOD
- 250 mg/L TSS
- 7 mg/L Phosphorus
- 40 mg/L Total Nitrogen
- 500 mg/L Chloride
- PFAS

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Reclaimed Wastewater – Regulatory Requirements

- MPCA – Guidance for Disinfected Tertiary Reuse Water
- Industrial process, cooling, irrigation, food crops
- Secondary treatment process and tertiary filtration; 2.2 MPN/100ml
- Membrane filtration; 0.2 NTU
- Meeting MPCA requirements may not meet end user needs

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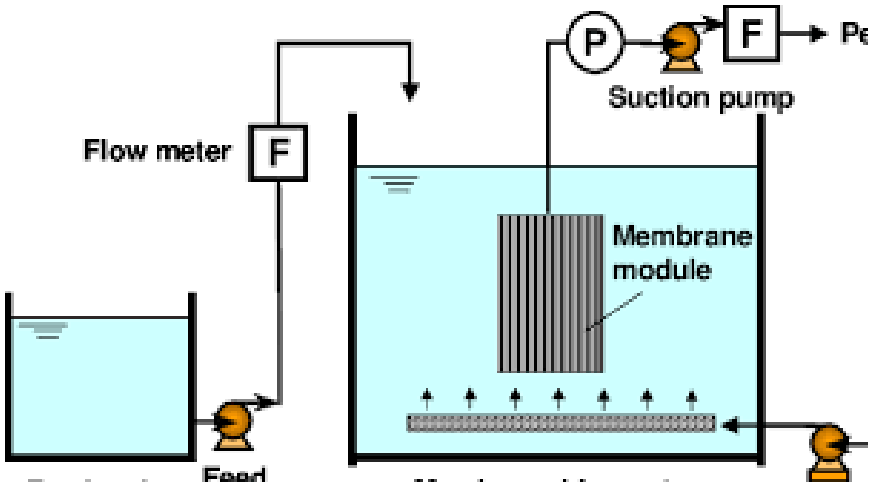
Wastewater Reuse Treatment Process



- Pretreatment
- Activated Sludge
- Membrane Bioreactors (MBR)
- Solids Treatment
- Advantages of MBR
  - Small Footprint
  - Best Water Quality

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Reuse WWTP Land Needs

Project	Process	Design Year ADF (AWW) (mgd)	Site Acreage	Acre/mgd	Full Biosolids Treatment/Storage
Detroit Lakes	MBR	1.9 (2.2)	5.7	3.0	Y
Babbitt	MBR	0.3 (0.5)	2.5	8.3	Y
MCES East Bethel	MBR	0.4	3.2	8.0	No
Glencoe	CAS	1.2 (6)	3.7	3.1	Y
Little Falls	OxDitch	1.1 (2.4)	4.7	4.3	Y
MCES St. Croix	CAS	4.5	5.9	1.1	No
MCES Hastings	RBC	2.3	3.7	1.6	No
MCES Metro	CAS	172	144	0.8	Y
MCES Seneca	CAS	34	23	0.7	Y
MCES Blue Lake	CAS	27	54	2.0	Y
MCES Empire	CAS	24	37	1.5	Y

- 2 acres per MGD treatment
- 5 acre minimum

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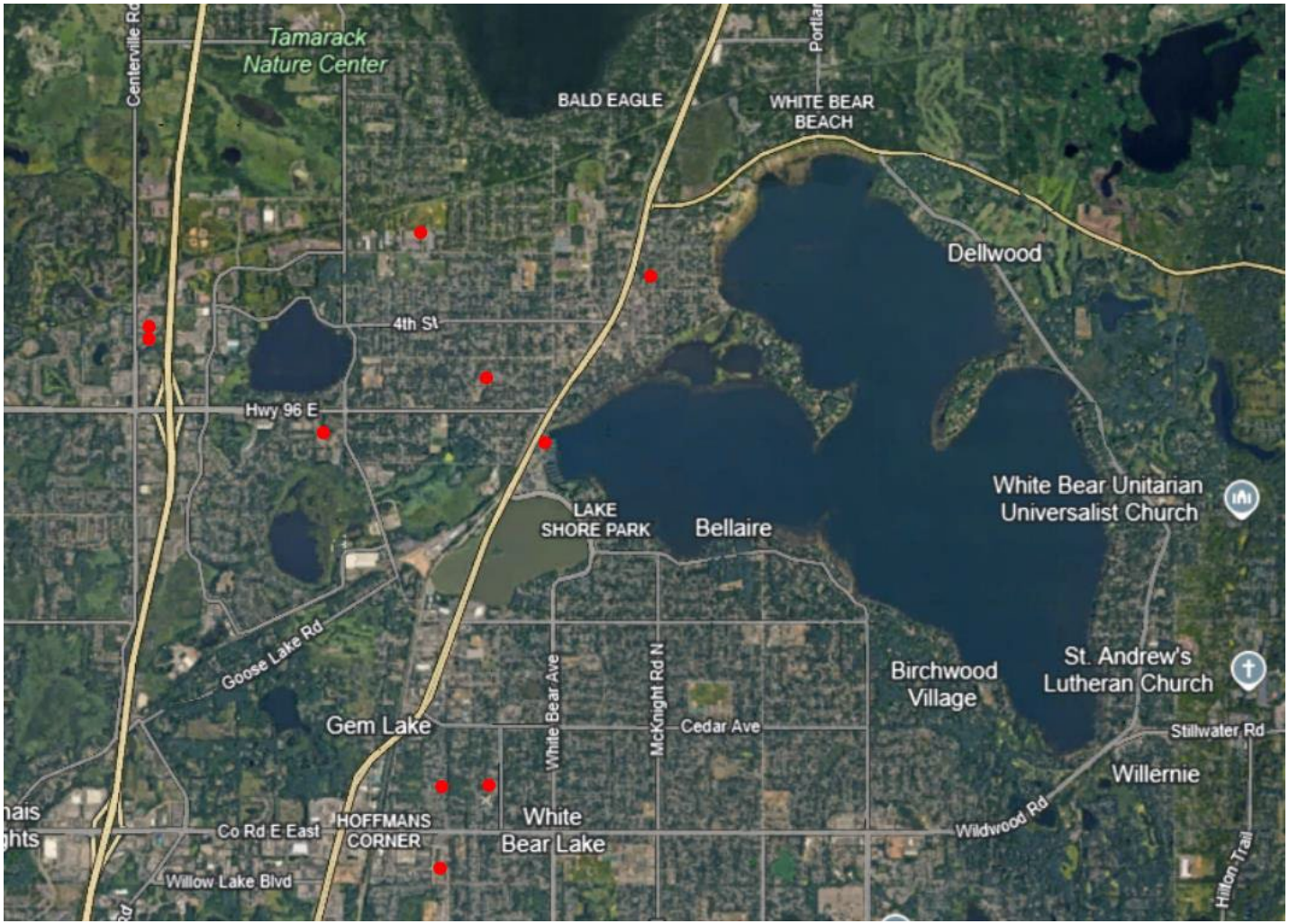
Potential Reuse Customers

- High volume industrial or commercial water users
- Golf courses or commercial irrigation - seasonal
- Review top water users in region

Potential Reuse Customers- Large Volume Water Users



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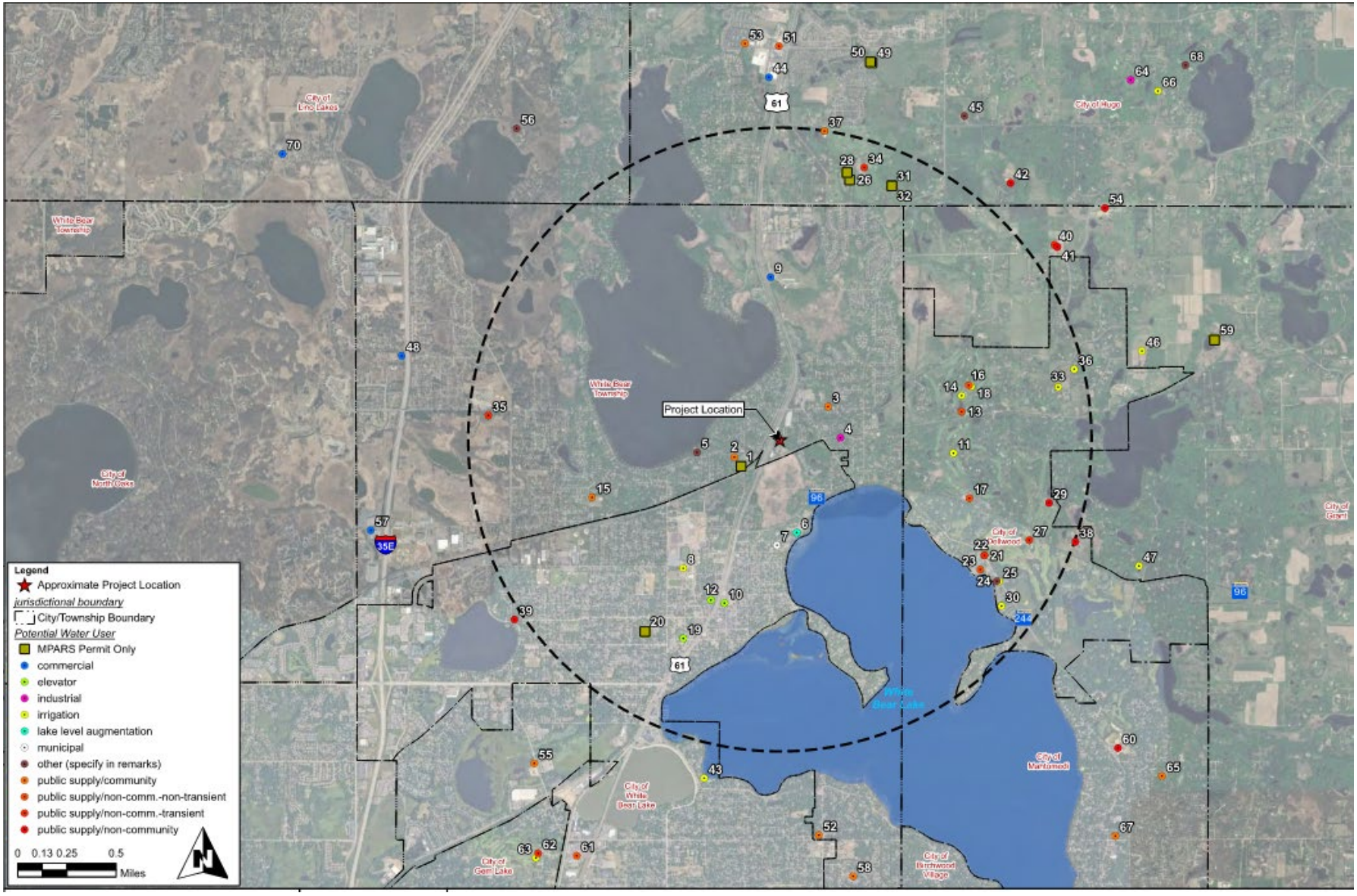
Potential Reuse Customers – Private High Water Use Wells



Additional Treatment Required

- Chloride Concentrations (CSU)
  - <70 mg/L : Safe for most plants
  - 70-140 mg/L : Sensitive Plants show injury
  - 141-350 mg/L : Moderately tolerant plans show injury
  - > 350 mg/L : Can cause severe problems
- NE Metro chloride concentration likely 500 mg/L or higher
- PFAS, pharmaceuticals
- Reverse osmosis treatment likely required

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Wastewater Reuse Components

- Wastewater Diversion
- Raw wastewater equalization
- Treatment
  - WWTP followed by RO
- Treated wastewater equalization/storage
- Pumping
- Conveyance

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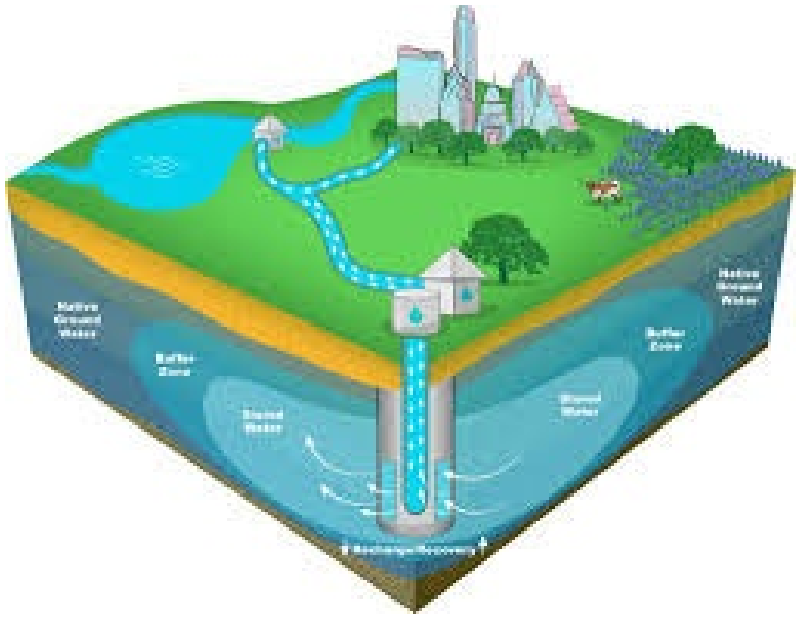
Aquifer Recharge



- Groundwater use has an effect on White Bear Lake water levels
- Could use treated wastewater to recharge aquifer
- Indirect Reuse
- MN Rules, Chapter 4725 prohibits injection wells
- EPA Region 5 considers ASR to be a Class V injection well

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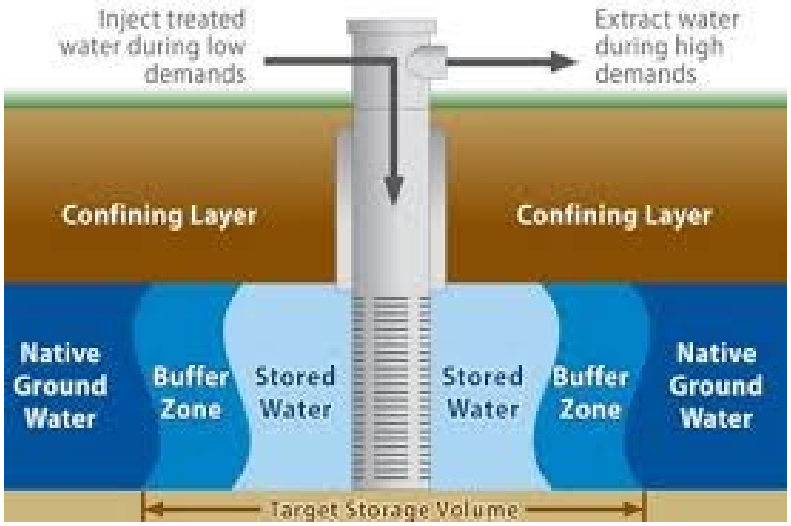
Aquifer Storage and Recovery – Case Study (1 of 2)



- Joint Powers Water Board started ASR process in 2005
- Goal to inject treated drinking water into Mt. Simon aquifer during periods of low demand to recover during periods of high demand
- Demonstration and testing plan, pilot testing

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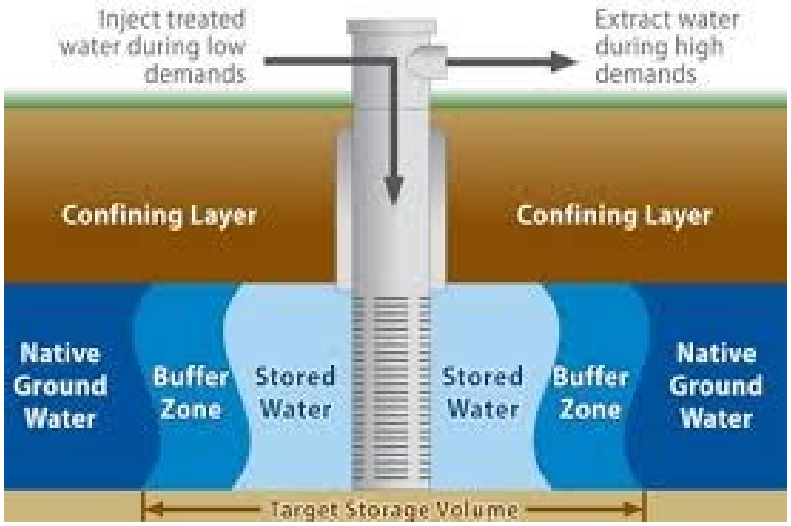
Aquifer Storage and Recovery – Case Study (2 of 2)



- ASR process needs to displace iron, manganese, and radium
- Joint Powers received USEPA injection well permit in 2012
- Injecting 100,000,000 gallons of water in winter, recovering 90% in summer
- Annual testing/reporting

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Wastewater Reuse and Aquifer Recharge Summary

- Wastewater reuse or aquifer recharge will likely require WWTP followed by RO
- Location of WWTP would need to be identified
- Cost

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Next Steps

- What will this study accomplish?
  - Determine and estimate the net benefit to White Bear Lake water elevations by serving local, private, high water users with treated wastewater
  - Provide treatment goals
  - Provide concept level treatment components
  - Identify necessary infrastructure
  - Develop concept level cost opinions
  - Determine how much water use could be offset by wastewater reuse
- What this study will not do:
  - Select specific treatment sites

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Questions?

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