

PFAS and Private Water Systems

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Minnesota's Water Well Community

- ▶ Currently there are 545 licensed contractors to install and service water wells in Minnesota
- ▶ Played an integral part in developing the states well construction code
- ▶ The Minnesota Groundwater Contractors regularly churn out national leaders
 - ▶ 7 NGWA presidents, 4 since 2000 – Roger Renner 2000, Jack Henrich 2008, Richard Thron 2014, David Henrich 2018
 - ▶ Three McElhiney lecturers - Peter Cartwright 2016, Dave Kill 2005 (Current AGWT Board chair), Dave Hansen 2003
- ▶ Worked with Rep. McCollum to authorize and fund the National Groundwater Monitoring Network
- ▶ Regularly sponsor and attend Water Festivals around the state
- ▶ Lead countless hours of educational outreach inside and out of the industry



Great Professionals and Standards

- ▶ MN well code statute first adopted in 1974, last revised in 2008, rules continually refined
 - ▶ Statute 4725 is 103 pages, MDH Guide book is 603 pages
 - ▶ Thorough, logical, good enforcement model, 98% compliance
 - ▶ Nationally recognized
 - ▶ Grouting rules improved environmental protection and drinking water quality – Nitrates in SE MN
 - ▶ Eliminated multi-aquifer wells
 - ▶ Annual continuing education, including 2 hours of direct contact from MDH
 - ▶ NSF approved materials
 - ▶ Isolation distances from potential contaminates
 - ▶ Special well construction areas
- ▶ Aggressive well sealing program for non-code and unused wells
 - ▶ Sealed around 300,000 wells
 - ▶ National recognized and awarded effort
- ▶ Bottom Line: Our code is a national leader and our compliance is stellar



Benefits of Private Water Systems

- ▶ Private water systems are the most efficient water delivery mechanism
 - ▶ Low water loss, low energy consumption
- ▶ When paired with a septic system, they are almost a closed loop with near zero loss or gain of water from the ecosystem.
- ▶ When properly installed and maintained, wells and septic systems are very effective in natural water recycling.
- ▶ Water stays in the same water shed (no import or export issues)
- ▶ Private Water Systems have a VERY low "CARBON FOOTPRINT" – private systems use very little electricity and cost about \$0.10 per day to operate.



PFAS and Private Water Systems

- ▶ Currently, ground water imports or exports from private water systems **DO NOT** contribute to changing the speed nor direction of the present PFAS plume.
- ▶ Many types of PFAS can be treated effectively in single family homes. This a current practice and is working well and is (overseen by MDH currently).
- ▶ Whole house treatment systems can be installed for under \$2,000 and serviced for around \$800 per year.
 - ▶ Includes two services
 - ▶ Systems can be configured for multiple water use scenarios



Issues with the alternatives - Disposal

How does one quantify the volume of water needed to service the PFAS area?

- ▶ If we have 100,000 persons and use the ten-state standard for daily needs which is 75 Gallons Per Day, or 7,500,00 gallons per day. 101,388.88 ACRE Inches OR 2,737,500,000 gallons per year.
- ▶ This does not include transient OR business and commercial uses.
- ▶ IF this new import of water is recharged into a top aquafer VIA the drain field, the water influx will could raise 4 to 6 times the actual water displacement when taking into account the geology. EXAMPLE: if you pour 1 vertical foot of water into sand filled space it could be saturate up to 6 feet of height.



More concerns with importing water

- ▶ The regional high-water table in this area is already high and current climate models predict wetter than normal summers for the foreseeable future.
- ▶ Currently MN septic rules under 7080 require 3 or 4 ft of separation above the natural water level.
- ▶ IF we keep adding water to the drain field and shut off the residence well, at some point the Drain field system will not properly treat the wastewater, The denitrification process requires air space between the floor of the drain field and the first water table.
- ▶ The homeowners will need to have their drain fields Re- Designed and likely need mound systems, which in today's dollars equates to \$25K or more, to properly treat and clean the discharge water.
- ▶ The added imported water will raise the regional water table and start pushing the existing PFAS plume faster down gradient and possibly change the direction of the flow.
- ▶ The addition of imported water into the current PFAS footprint will expand the plume size and thus affect even larger area and making the problem even bigger.

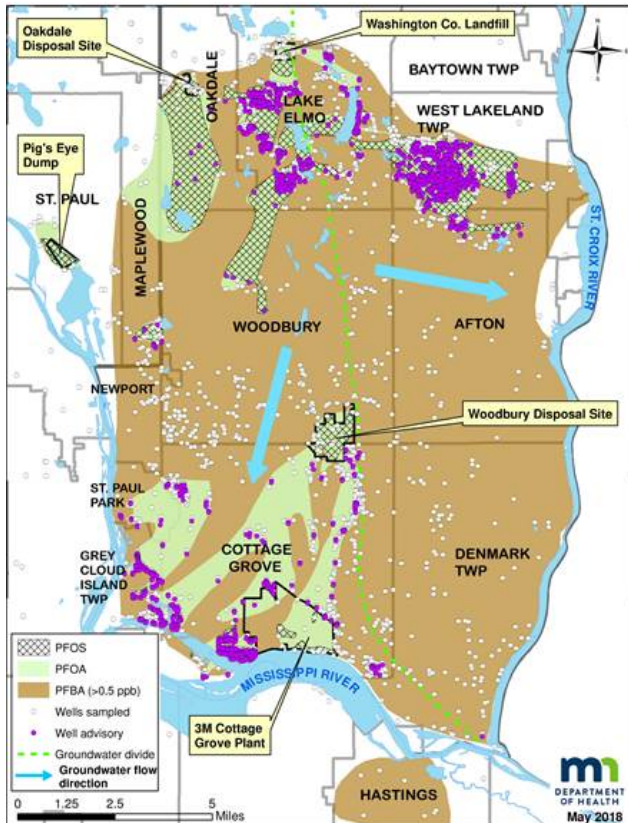


Installing more high cap wells

- ▶ Certain lakes have natural connections to aquifers and high capacity wells have been shown to be a contributing factor in lake water level declines during drought seasons.
- ▶ High Capacity Municipal type of pumping in specific areas will change the flow of the aquifers, along with the contamination
- ▶ Overall treatment area of the PFAS contamination MAY be lower
- ▶ If we apply current municipal infrastructure practices, more groundwater will be discharged to rivers and streams instead of recharging aquifers.



Case Study – Cottage Grove



- ▶ 3M settlement money was used to connect 139 homes to municipal water supply at a cost of \$9.1 Million.
- ▶ \$9.1 Million dollars could have easily provided 79 years of treatment on those private water systems.
 - ▶ $139 \text{ homes} \times \$2,000 \text{ install cost} = \$278,000$
 - ▶ $139 \text{ homes} \times \$800/\text{year service} \times 79 \text{ years} = \$8,784,800$
 - ▶ Treatment investment outlives infrastructure investment
- ▶ With thousands of homes to go, the cost to connect every home will be astronomical.

Bottom line: We can't afford to connect every home; we need to focus on private water treatment solutions and start applying them.



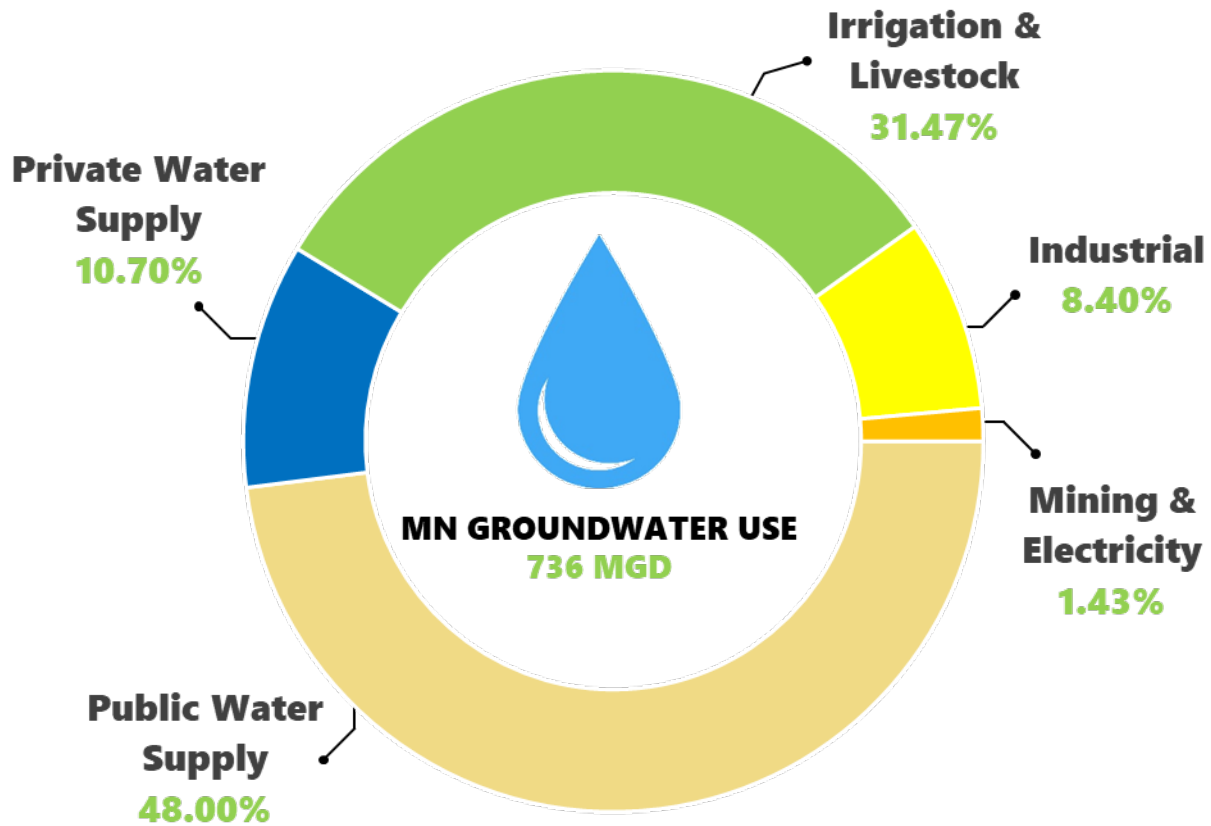
SMART Water Policy

- ▶ MN has riparian rights and operates under reasonable use doctrine as defined under State statute 103A-1
- ▶ Use the appropriate resource for the appropriate purpose
- ▶ Keep infrastructure manageable
- ▶ Focus on land use and aquifer recharge
- ▶ Mandatory water testing at property transfer

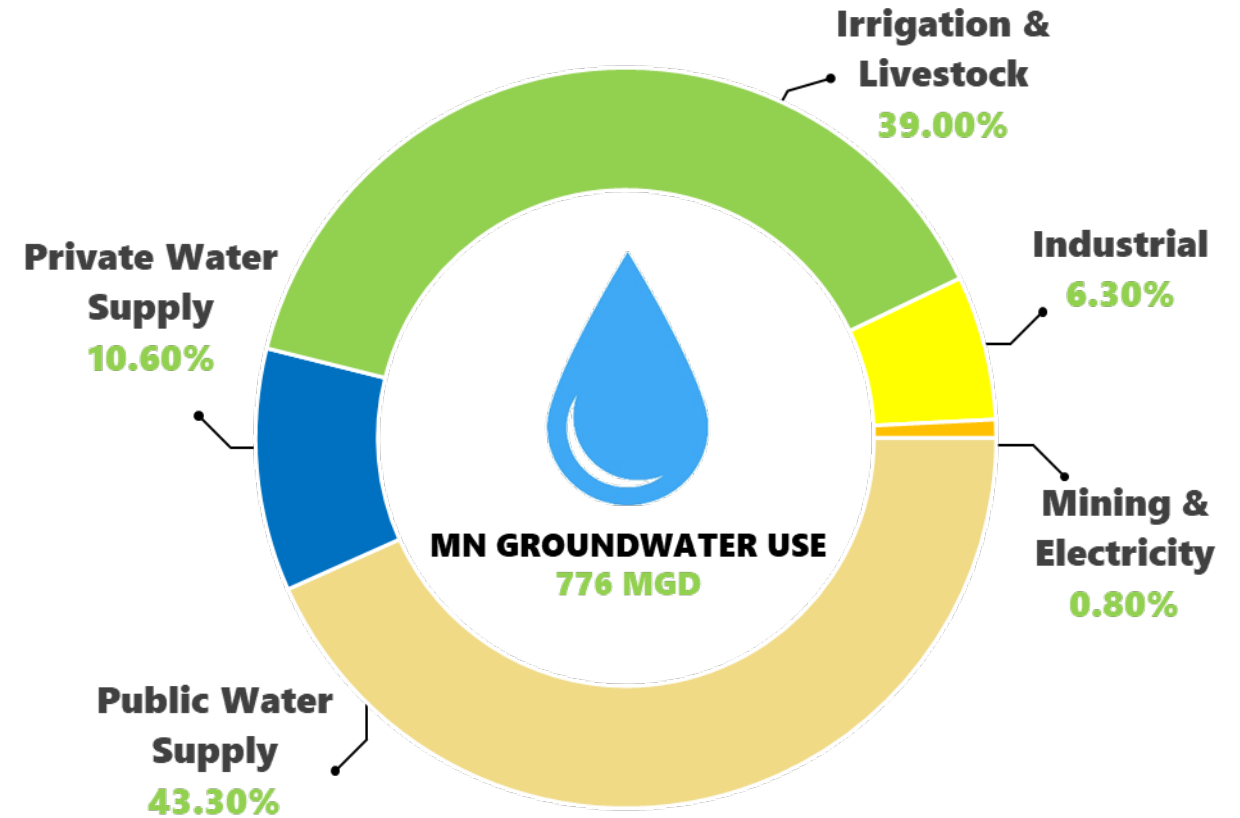


Groundwater by the Numbers

Groundwater use - MN 2010



Groundwater use - MN 2015



Source: USGS Survey – 2010, 2015 provided by NGWA

Groundwater by the Numbers

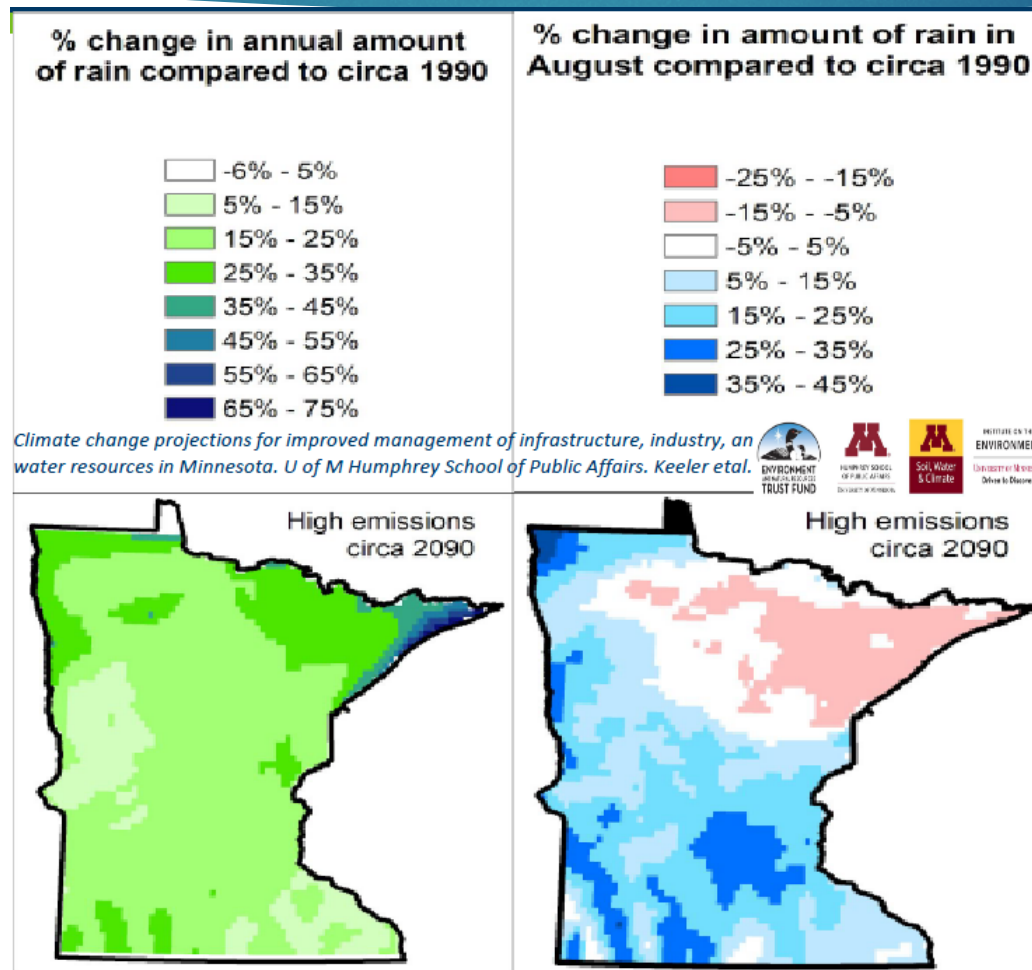
2010 – MN Population 5.29 Million

- ▶ Population served by groundwater: 4.1 Million
- ▶ Public and private water: 432 mgd
 - ▶ Consumption per capita: 105.4 gal/day
- ▶ Agricultural consumption: 231.6 mgd
- ▶ Private water systems: 78.8 mgd
 - ▶ Consumption per capita: 66.8 gal/day
- ▶ Public water systems: 353.2 mgd
 - ▶ Consumption per capita: 118 gal/day

2015 – MN Population 5.48 Million

- ▶ Population served by groundwater: 4.2 Million
- ▶ Public and private water: 418.3 mgd
 - ▶ Consumption per capita: 99.5 gal/day
- ▶ Agricultural consumption: 302.6 mgd
- ▶ Private water systems: 82.3 mgd
 - ▶ Consumption per capita: 66.8 gal/day (Approx)
- ▶ Public water systems: 336 mgd
 - ▶ Consumption per capita: 112.2 gal/day

Groundwater looking forward



Conclusions

- ▶ Private wells have smaller ecological and carbon impacts
- ▶ Treatment options exist for whole house solutions
- ▶ Minnesota has one of the most comprehensive well management systems in the country
 - ▶ Private and public
- ▶ Wells constructed to Minnesota's standards are not contamination sources
- ▶ Private water systems are the most efficient water delivery systems in Minnesota
- ▶ The well contracting industry didn't contribute to this situation, if we are not considered as part of the solution process, we will become an economic casualty.
- ▶ More treatment options will become available as we learn more and find even more advance remedies.

