Groundwater Basics and Issues around Afton
6/16/2016
Groundwater – What’s the big deal?

• Much of the state relies on groundwater for:
  • Private water supply wells
  • Municipal water supply wells
  • Other major water uses: irrigation, industrial users, etc.

Source: https://www.pca.state.mn.us/water/about-groundwater
In Afton, the entire water supply is provided by private drinking water wells (groundwater).
Peak Groundwater Usage Happens in the Summer Months

- The MnDNR estimated in 2007 that on days of average to peak water usage, Minnesota communities use roughly **2.6 times more water during the summer than in the winter**.
- In the Twin Cities, outdoor water use, mostly for lawn watering, accounts for **20 percent to 30 percent of total annual municipal pumping**.
Groundwater Use in the Twin Cities Metro Area

In some areas:

- current approach to water-supply management and development is unsustainable
- aquifer levels are declining
- lakes, streams, and wetlands are impacted
Groundwater often interacts with Surface Waters

Mostly receives groundwater inflow

Mostly loses water as seepage to groundwater

discharge lake/wetland gaining stream

recharge lake/wetland losing stream
flow-through lake/wetland

Groundwater flow both into and out of lake/wetland

disconnected lake/wetland/stream deep water table

Water table far below lake/wetland/stream bottom

disconnected lake/wetland/stream shallow water table

Water table slightly below lake/wetland/stream bottom
non-karst spring

Flow from spring controlled by porous media flow

karst spring

Flow from spring controlled by karst flow and/or low-permeability layers
What is Karst topography?

Source: https://www.pca.state.mn.us/sites/default/files/styles/primary_840px_wide/public/karst2-530.jpg?itok=1ouEM2wN
Much of Southern Washington County is within the Karst Region.

Groundwater Flows Locally and Regionally

(Modified from Alley et al., 1999)
What happens when we pump too much groundwater?

Available data indicate likely not vulnerable to pumping

Available data indicates potentially vulnerable to pumping

Potentially vulnerable with wide littoral zone

Vulnerability of Surface-Water Features to Groundwater Pumping

- Valley Creek
- Lake Elmo
- Lake Edith
- Kelle’s Creek
- Eagle Point Lake
Valley Creek is a groundwater fed trout stream.
Valley Creek – Potential Water Quality Issues Related to Groundwater - Nitrates

- Elevated nitrate levels due to high levels of nitrates in the groundwater – often linked to agricultural sources
- Increasing trend in nitrate concentrations

Source: [http://www.vbwd.org/MetCouncilFactSheet.pdf](http://www.vbwd.org/MetCouncilFactSheet.pdf)
Valley Creek – Potential Water Quality Issues Related to Groundwater – E. coli

Valley Creek – Groundwater Pumping Impacts to Creek Flows
A regional groundwater model domain: the areas of interest

primary area of interest

16 miles

26 miles
Project Conclusions

- Approximately a dozen wells were proposed but only 3 wells could be installed without impacting flows in Valley Creek
  - Woodbury looking to other areas of the city for a new well field
- MnDNR acknowledges that installation of any wells will have at least a theoretical impact
- Established thresholds for wells (appropriations)
  - Will not impact private residences
  - Will impact municipal water supplies and other large users
Stream Water Quality Impairments have been Tied to Groundwater - Kelle’s Creek
One of the major sources of bacteria in Kelle’s Creek is from Failing Septic Systems
The VBWD Kelle’s Creek Voluntary Septic System Inspection Pilot Program

• Voluntary septic inspection program (Kelle’s Creek watershed only)
  • City of Afton is the regulatory authority for septic systems
• Funded by State of Minnesota Clean Water Fund grant and VBWD match funds
  • 2016-2017

• VBWD cost-share program
  • 25% of replacement cost up to $5,000
• Washington County financial assistance program
  • Low Interest Loans and Low Income Grants

For more information:  http://www.vbwd.org/KellesCreek.html
Kelle's Creek Watershed - Septic System Program

Septic Systems
- Parcel - Building/Septic**
- Parcel - No Building/Septic

**Eligible to participate in Kelle's Creek Inspection Program.

Data Source:
- Parcels, Washington County, 2015.
- Septic System inspections, based on parcel and Washington County Septic System database information, 2015.

SEPTIC SYSTEM INSPECTION PROGRAM
Kelle's Creek Watershed