

Examining Our Water Supply

Sugar Grove Township

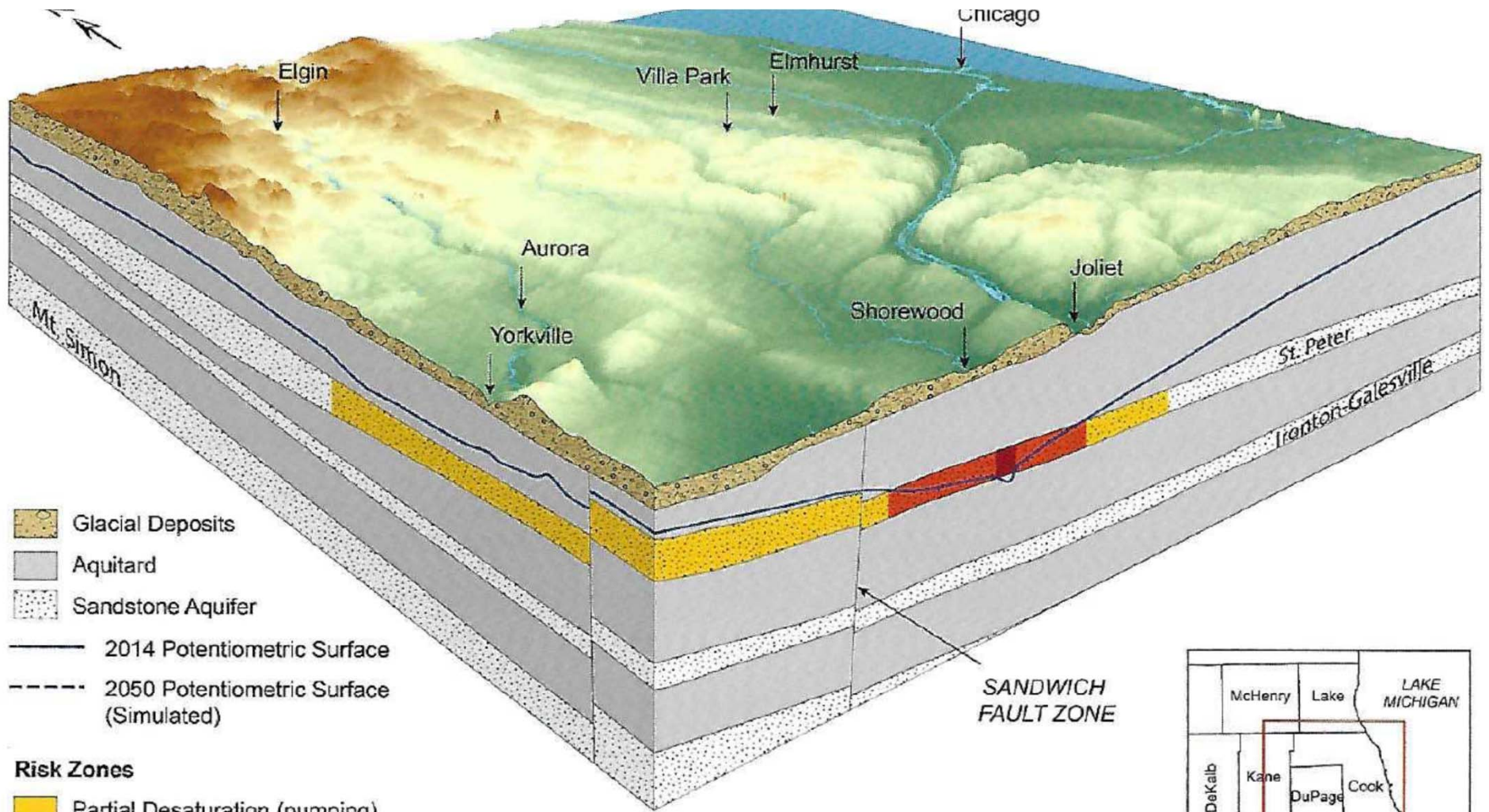
Looking at water availability in our area

- Obviously, water is essential for our personal well being but also as an asset to our properties.
- Sugar Grove Township's water is presently supplied from groundwater aquifers; both shallow and deep wells.
- Question is "How is it being monitored"?
 - Cities formally report water usage and aquifer "Head Levels" once per year
 - Residential well users do not report
 - Kane County and Illinois State Water Survey provide models of estimated ground water availability plus future supply based on current projections of economic and population growth.



Table 4: Northern Illinois 2005 water withdrawals by county (MGD)

County 2005	Reported 2005	Normal 2005
• Boone	9.0	7.2
• Cook	1,024.5	972.8
• DeKalb	15.0	13.8
• DuPage	111.2	101.2
• Grundy	11.2	9.2
• Kane	61.5	52.5
• Kankakee	37.6	33.6
• Kendall	12.0	9.5
• Lake	105.3	91.3
• McHenry	50.6	38.8
• Will	<u>160.2</u>	<u>150.5</u>
• Total	1,598.4	1,480.3




Close to 3 times more than Kane County



-  Glacial Deposits
-  Aquitard
-  Sandstone Aquifer

-  2014 Potentiometric Surface
-  2050 Potentiometric Surface (Simulated)

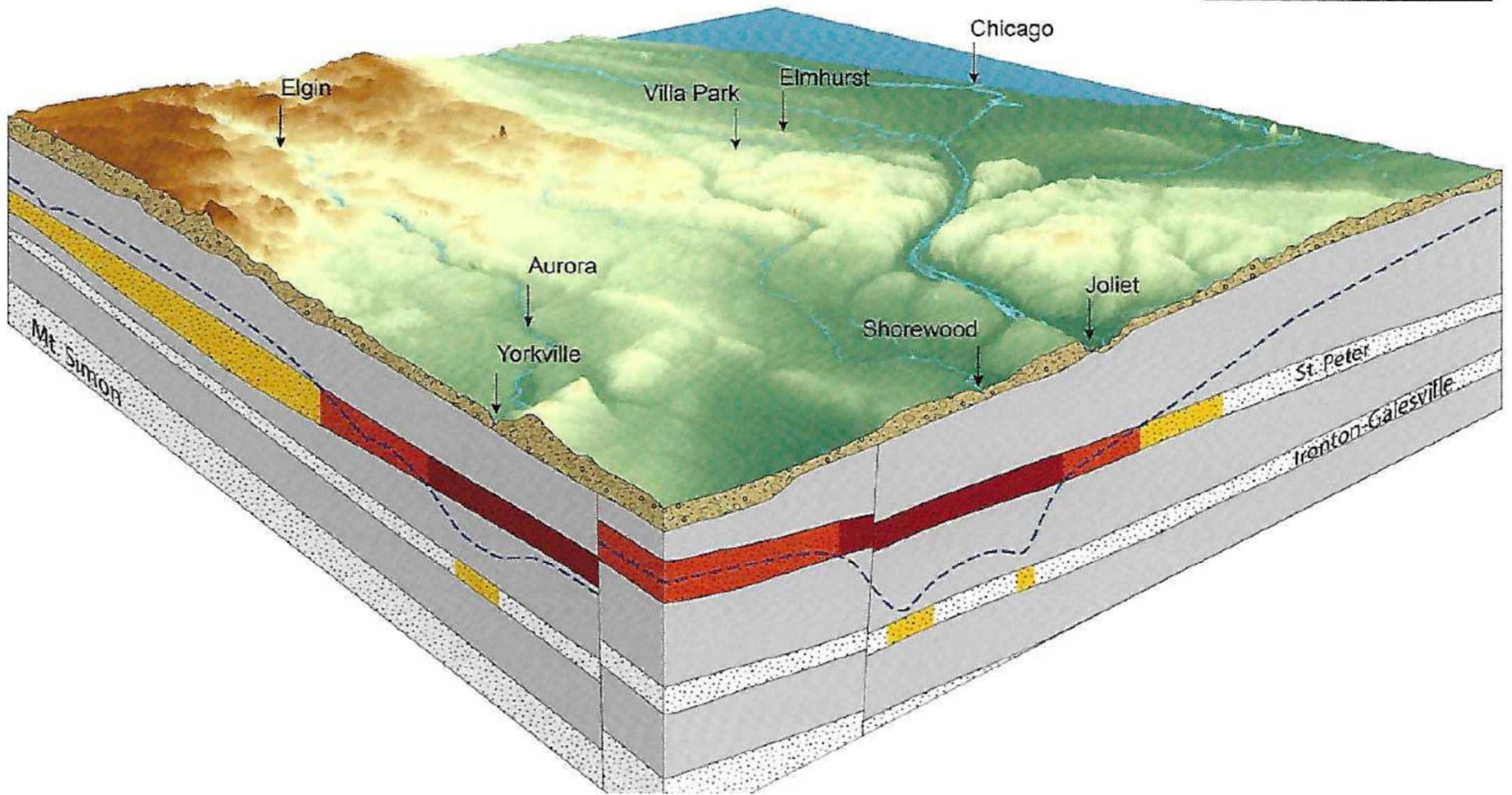
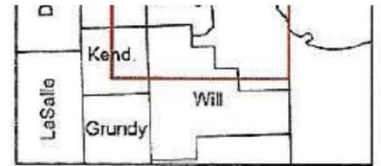
Risk Zones

-  Partial Desaturation (pumping)
-  Partial Desaturation (non-pumping)
-  Complete Desaturation

SANDWICH FAULT ZONE



- Partial Desaturation (pumping)
- Partial Desaturation (non-pumping)
- Complete Desaturation



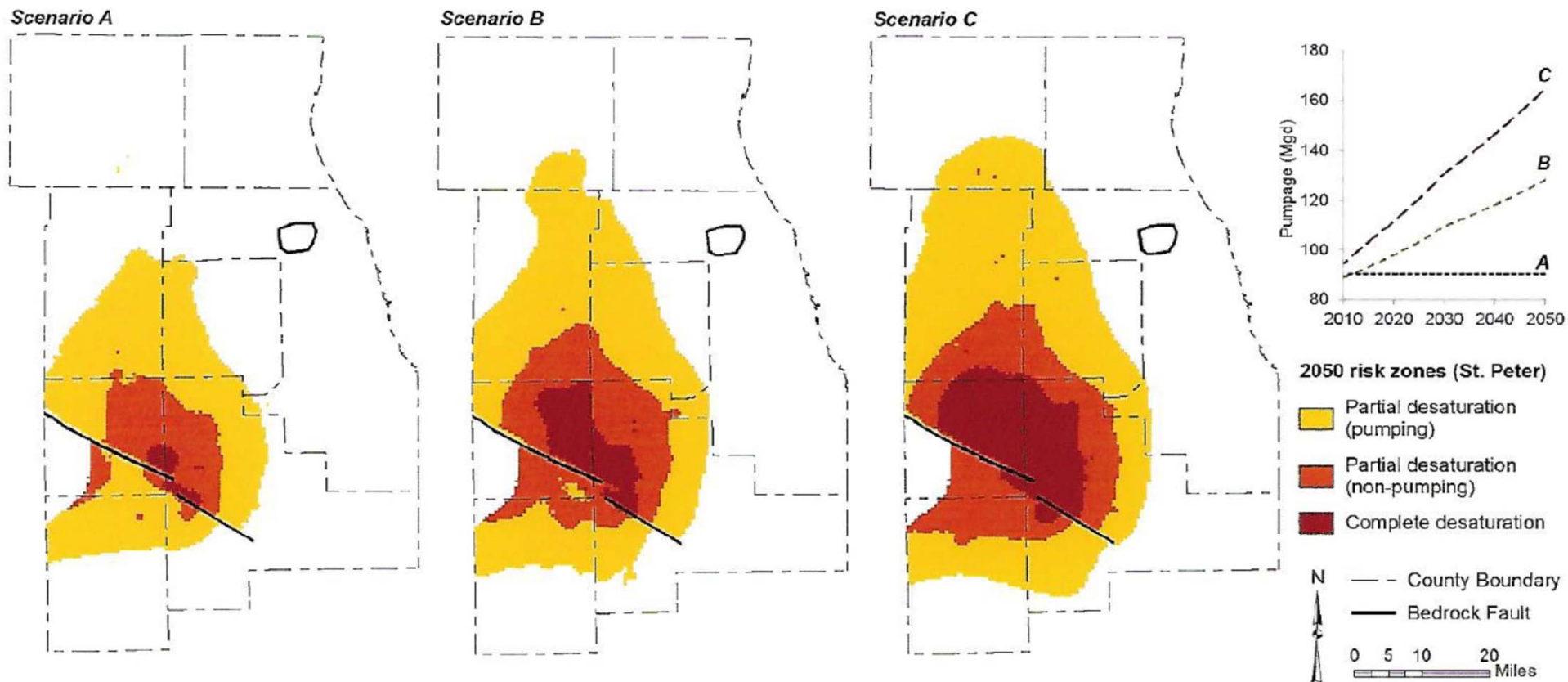


Figure 4: Risk of desaturation of the St. Peter Sandstone projected for 2050 using A) no increase in pumpage, B) a less resource intensive growth scenario, and C) the current trends scenario (Roadcap et al. 2013). The graph highlights total projected sandstone pumpage to 2050 in each scenario for the area shown.

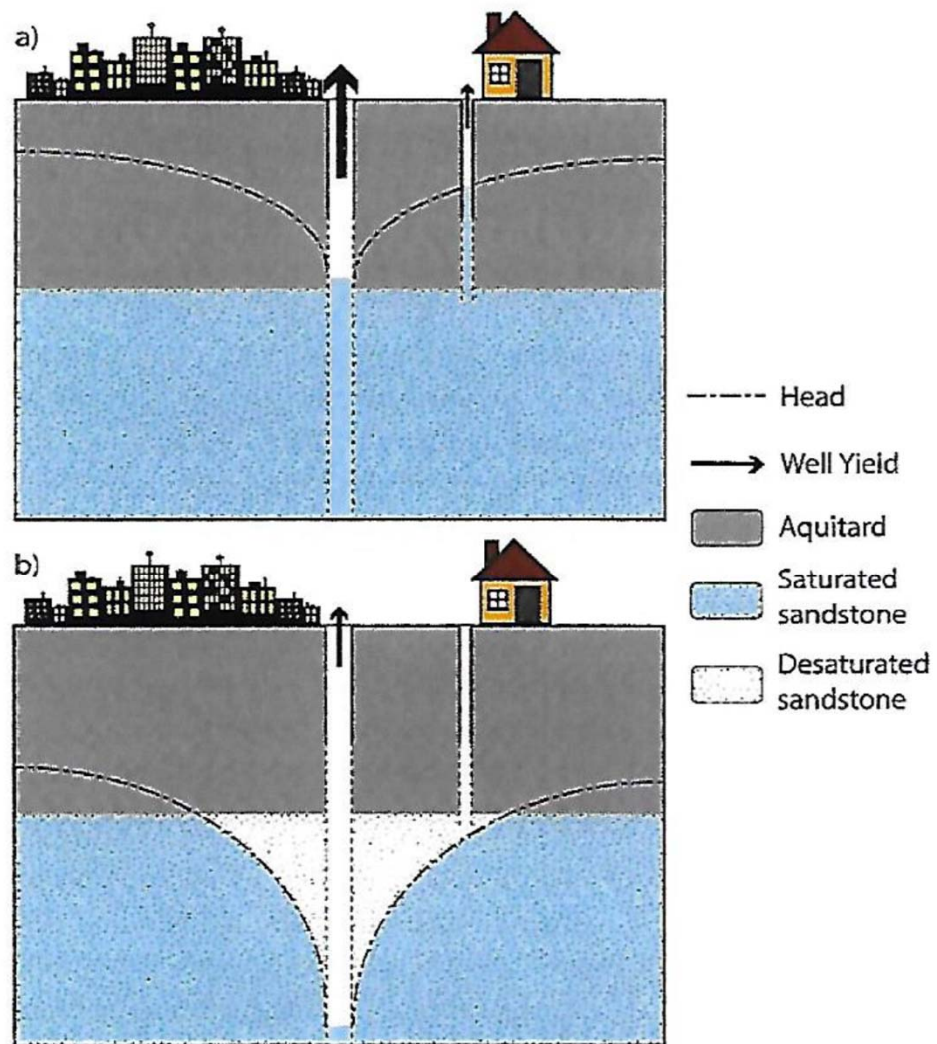


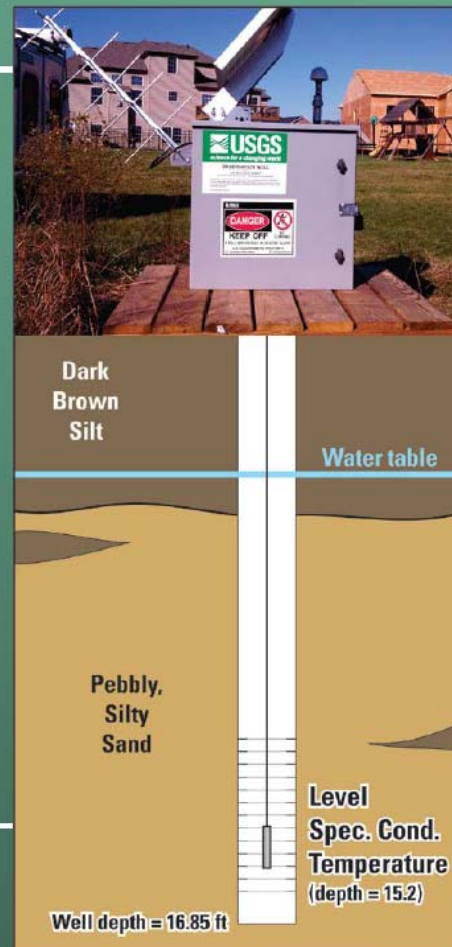
Figure 1: a) Completely saturated sandstone and b) partially desaturated sandstone.

Local Opportunities for water monitoring

- Implement data collection equipment for local measurement of aquifer head levels and possible contaminations.
- Provide timely water feature data to public officials inclusive of home owners. Data feed to public software apps providing charting and analysis trends for significant water changes.
- McHenry County has implemented a Hydrogeological monitoring program that we could potentially model in our township.

McHenry County Groundwater Network

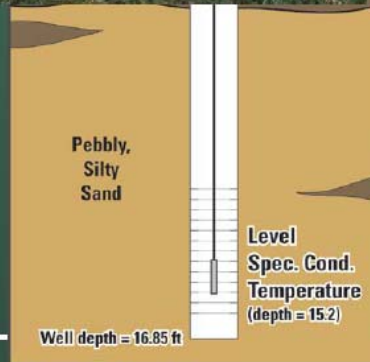
- Collecting water level measurements every 15 minutes since 2009.
- Water-quality sampling of all wells in 2010.
 - 5 wells with high chloride concentrations were equipped with Specific Conductance dataloggers.



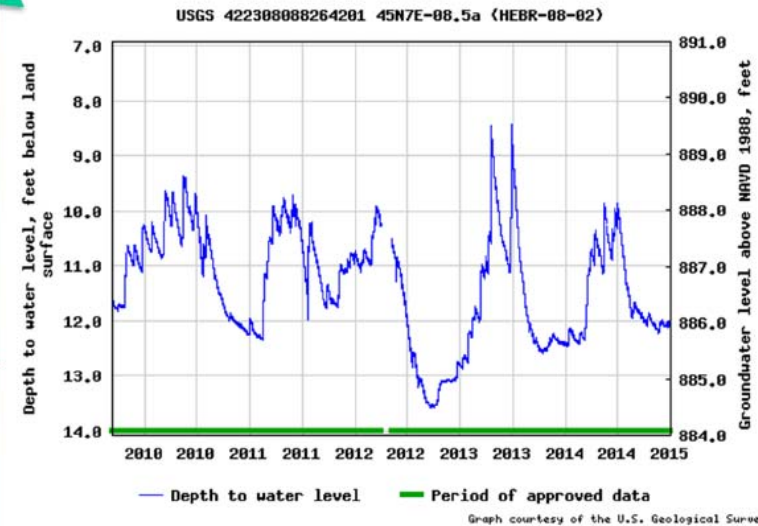
Groundwater Level Data and Hydrographs



GEOS
Satellite

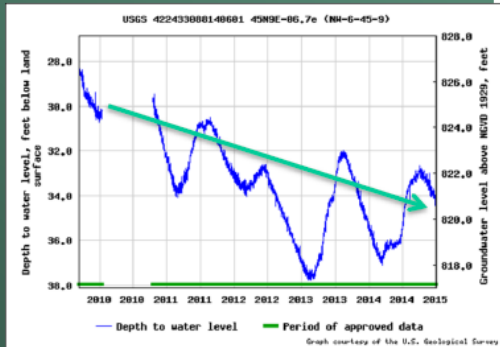


USGS

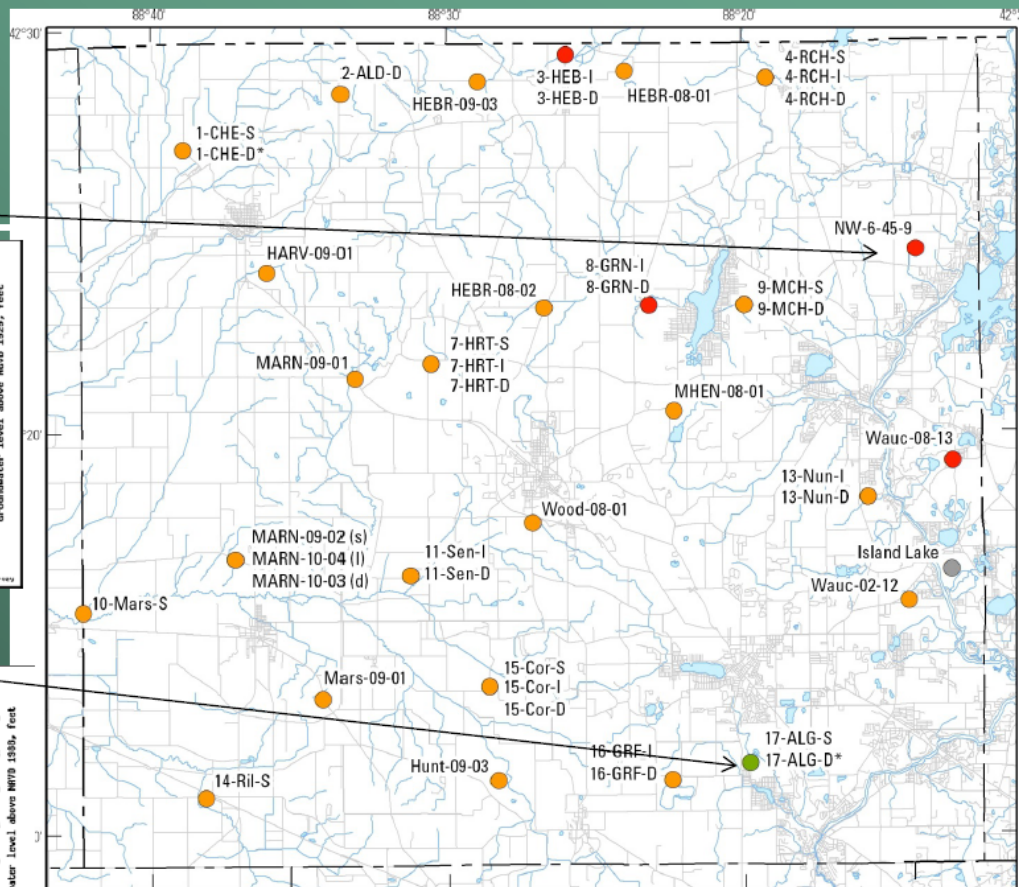
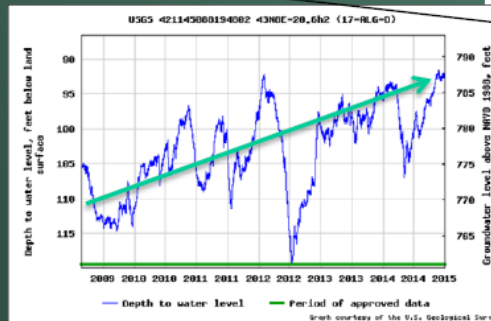


Hydrograph Trends

NW-6-45-9



17-ALG-D



Base from U.S. Geological Survey
1:100,000-scale digital data
Albers Equal-Area Conic projection
Standard parallels 33°N and 45°N,
central meridian 89°W



EXPLANATION

Trend

- Decreasing
- Stable
- Increasing
- NA



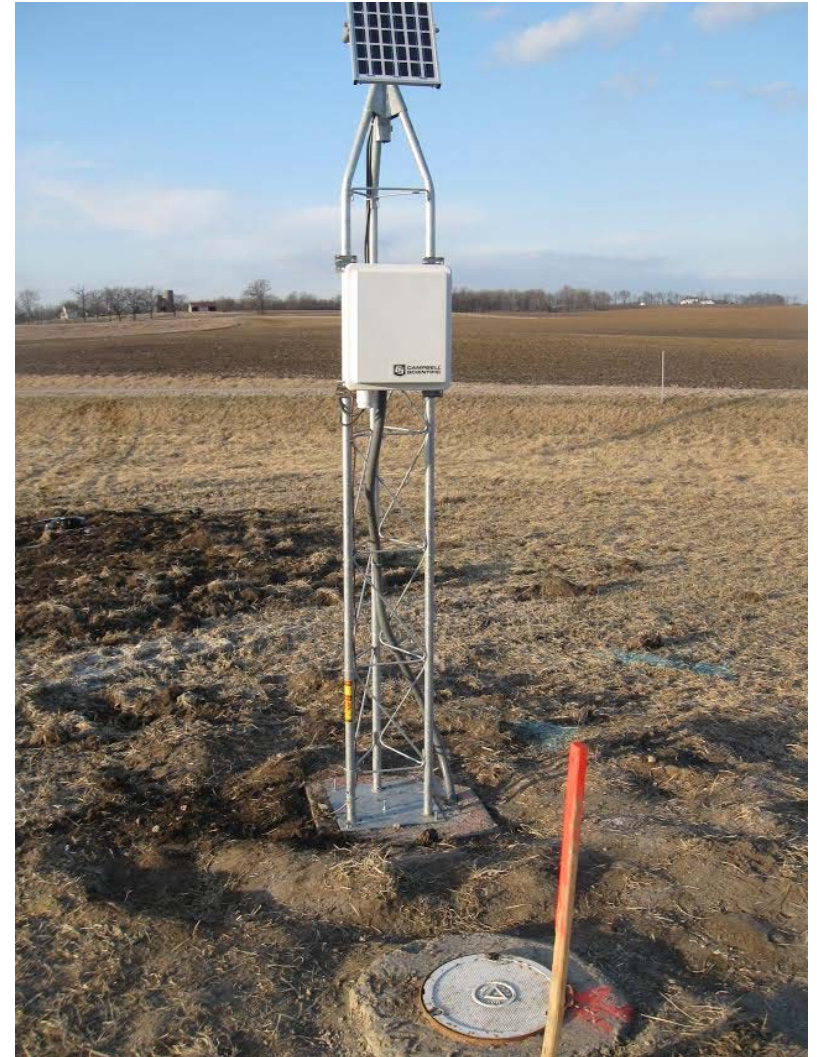
Potential Suppliers of Water Level Monitoring Equipment

- WellIntel, Inc.
 - Milwaukee, Wisconsin 53202
 - Sonar sound retrieval sensor monitors water level
 - Data retrieval in forms of on-site storage to instant feedback via cloud, internet.
 - Data charting to specification request.
 - Provides engineering, product, and service oversight for water monitoring at the well head.
- Campbell Scientific, Inc.
 - Logan, Utah 84321
 - In water pressure probe monitors water level, temperature, chemistry, flow, and etc.
 - Data retrieval in forms of on-site storage to instant feedback via cloud, satellite, internet.
 - Data charting to specification request.

Campbell Scientific, Inc.

McHenry County U.S. Geological Survey equipment is from Campbell Scientific. Cost of that installation is \$20,000 on existing wells. Use of government satellite inflates cost.

The adjacent picture is a Illinois State Water Survey installation at Newark, Illinois. Cost was \$3,000. Data retrieval is hourly.



WellIntel Systems Milwaukee, Wis.

The WellIntel Gateway is designed to connect WellIntel Sensors to the Internet using nearby wired Internet access.

Sonar sound pulse sensors above water level.

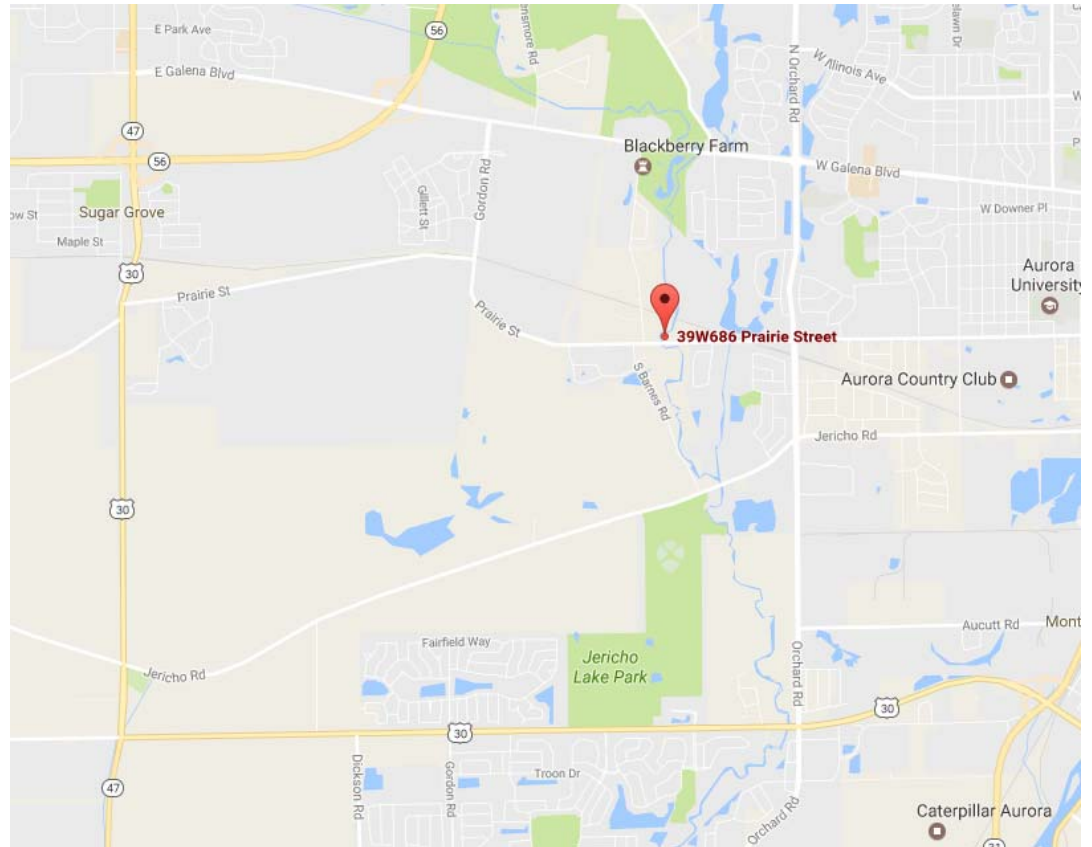
Cost was \$660.

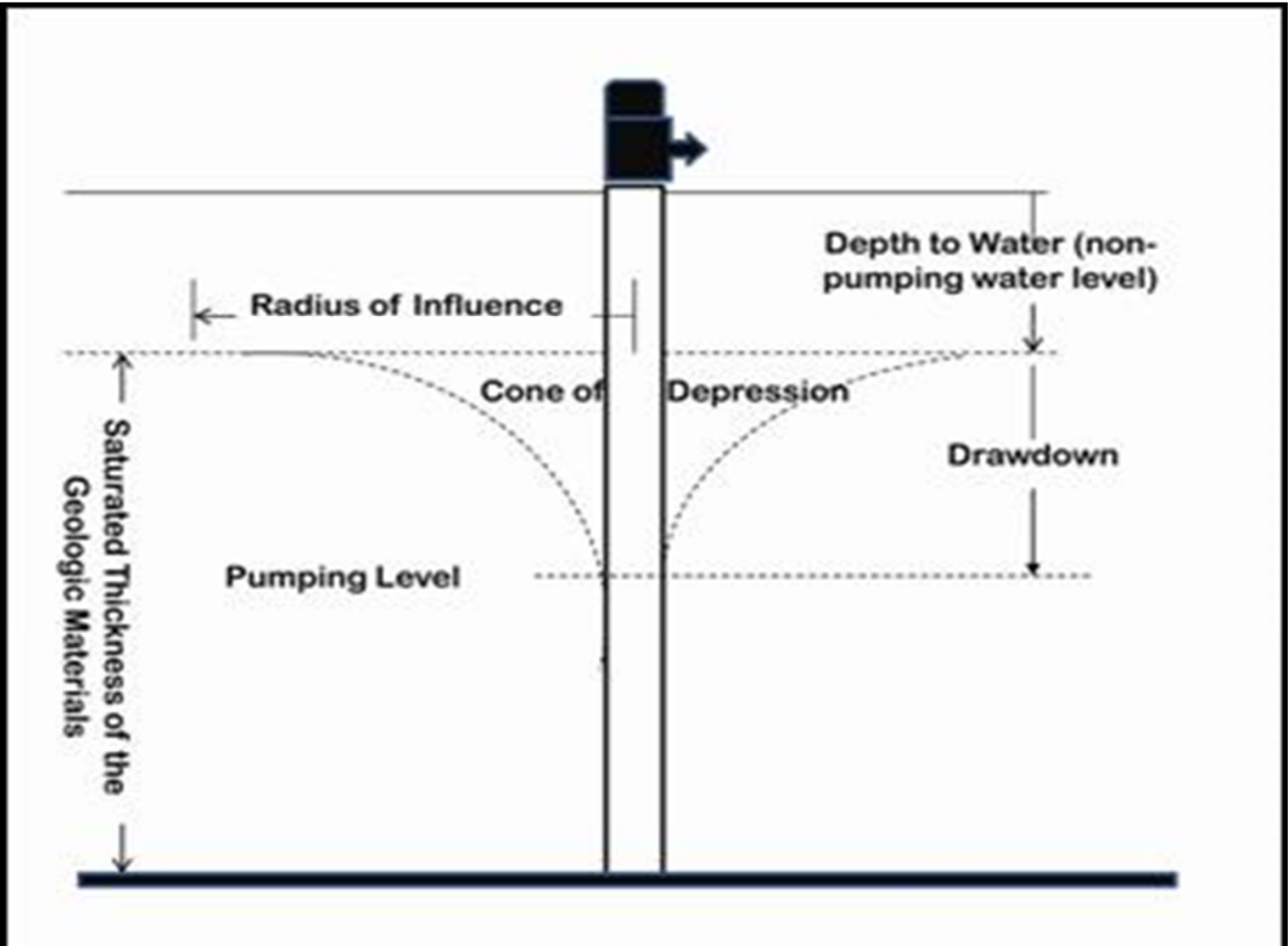
Cases of sensor deterioration due to high humidity contamination in shallow head level application.



Prairie Street well monitor

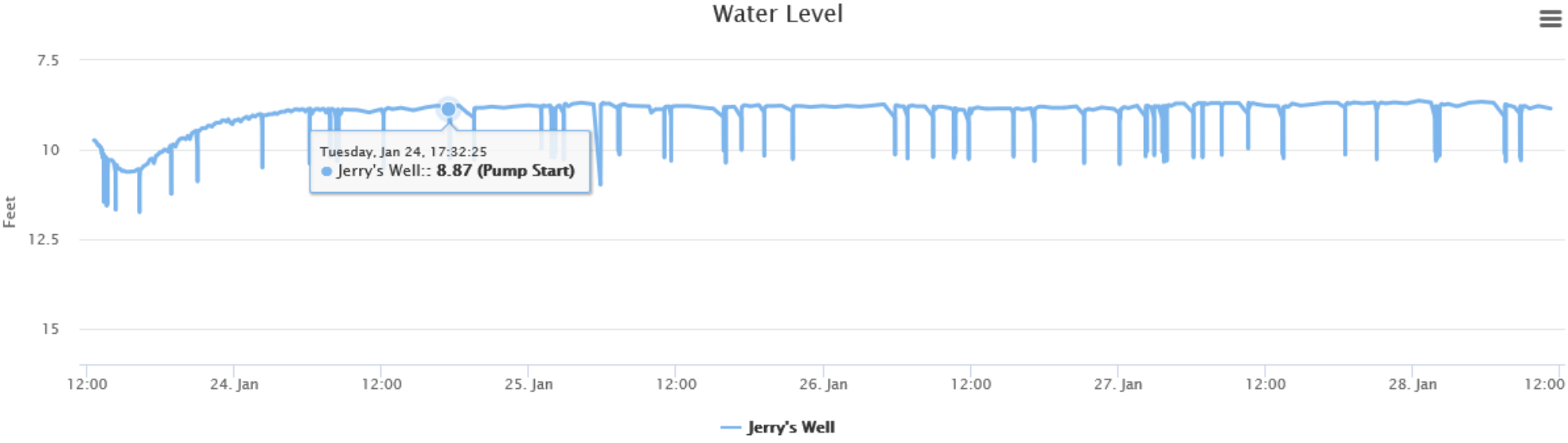
WellIntel Home and Pump sensor system was installed at this location on January 12, 2017. The system monitors: height of static aquifer head level, pumping minutes, draw down level during pumping, draw down recovery period, power supply (battery) voltage usage during pumping.





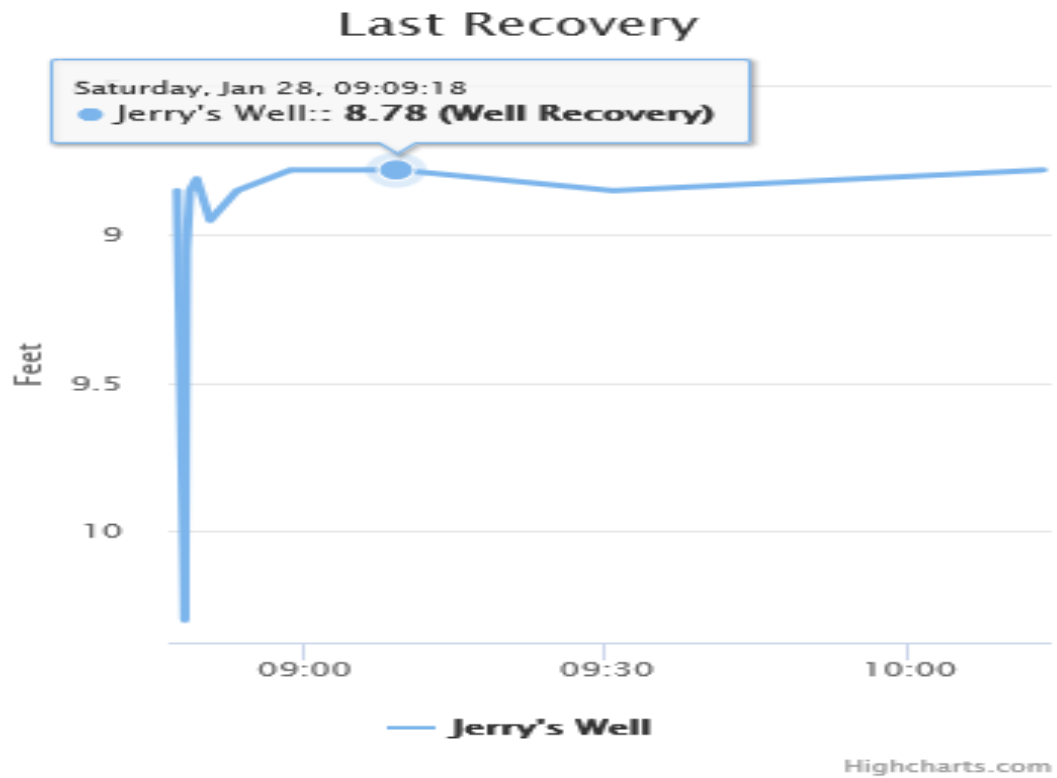
Prairie Street Well

WellIntel Equipment



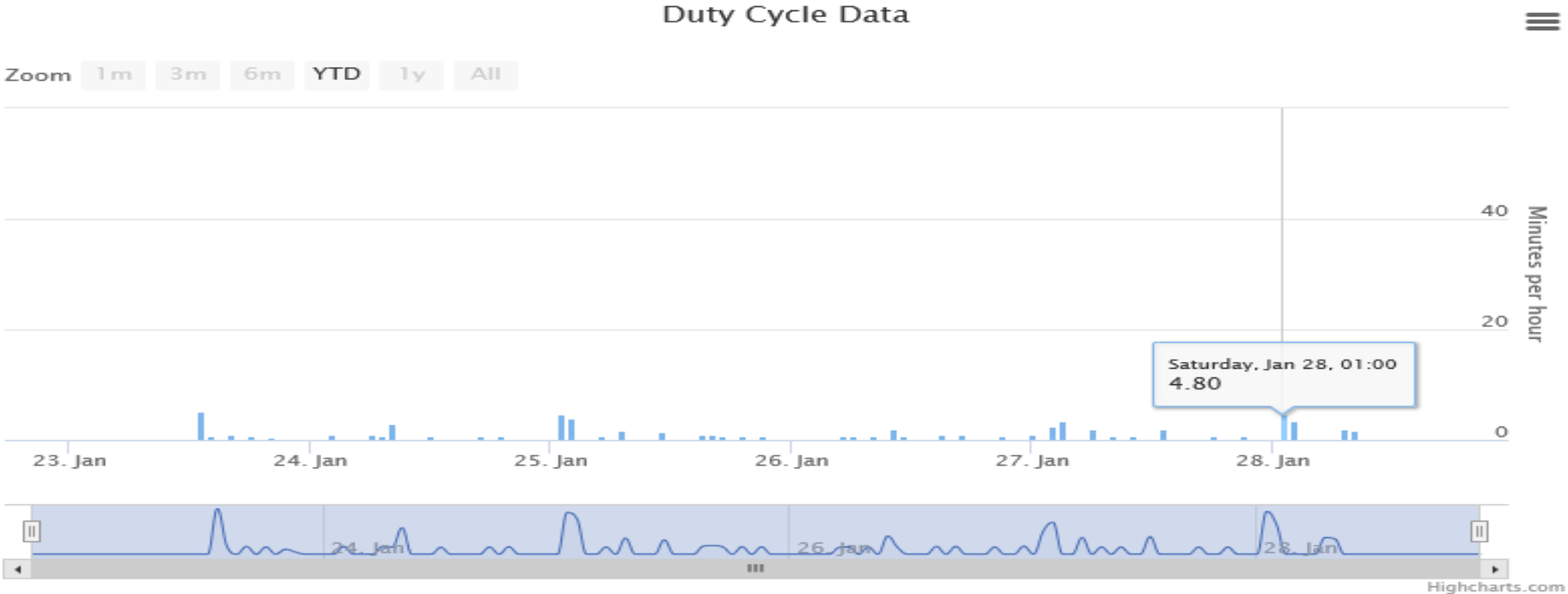
Prairie Street Well

WellIntel Equipment – Feature highlight capability

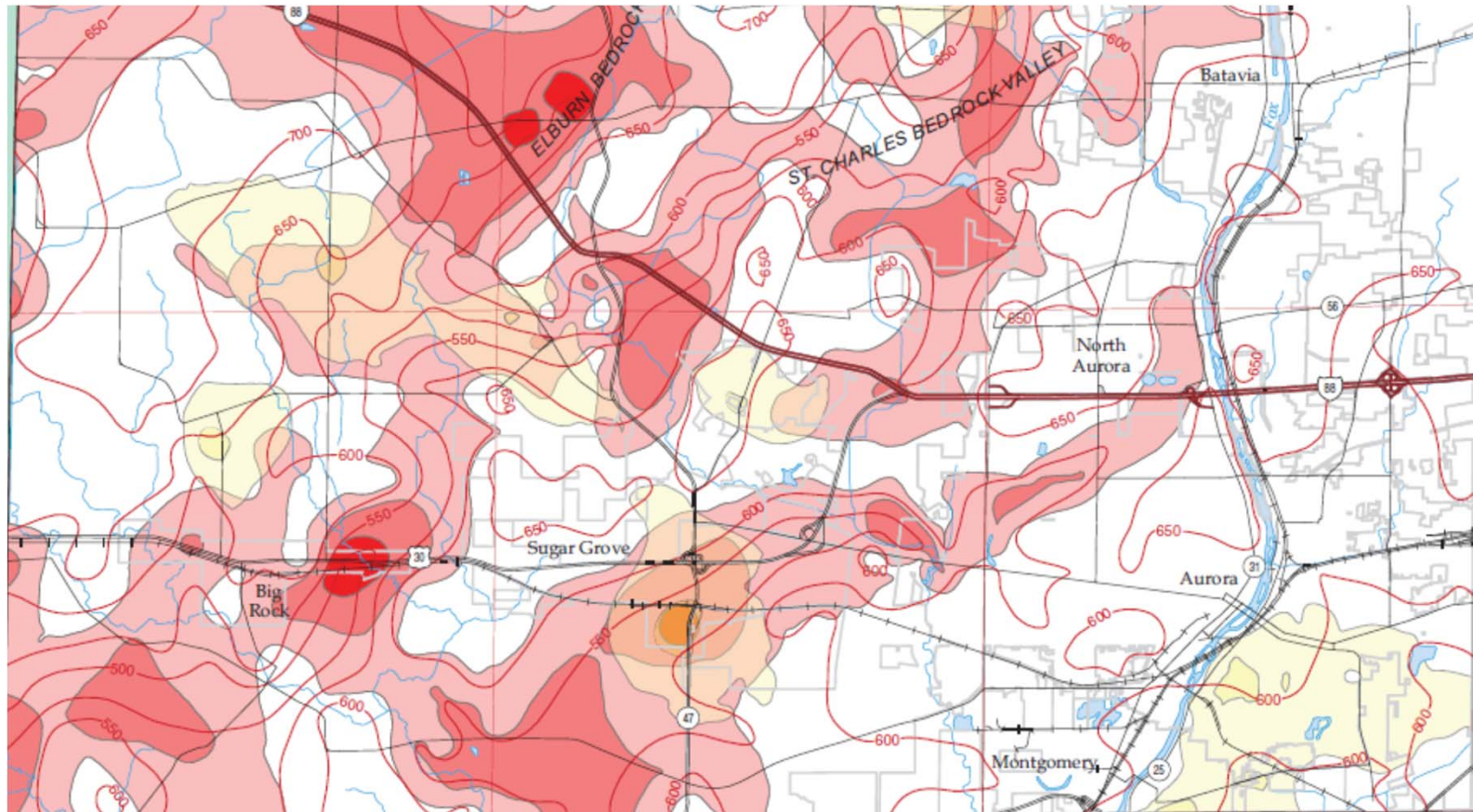


Prairie Street Well

WellIntel Equipment – Pump runtime chart



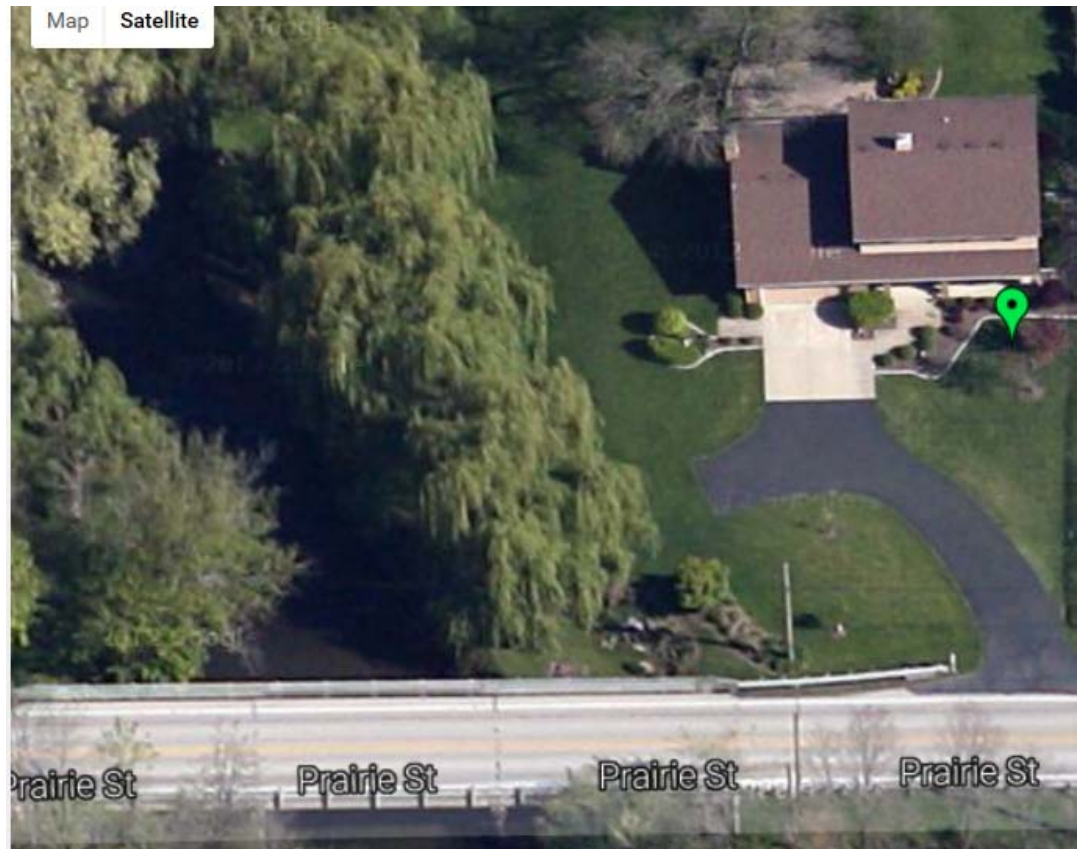
1. The St. Charles aquifer, named for the St. Charles Bedrock Valley, is located in the valley and its tributaries in eastern and southern Kane County. Most residential 100 foot wells in Sugar Grove Township are pumping from this aquifer.



More Opportunity Offered by Blackberry Creek Watershed

Our team has decided to look at possibilities of simultaneous monitoring of the local aquifer change as water levels in the Blackberry Creek change with weather events. Also, is the potential of monitoring surface water traveling into ground water and vise-versa.

We would attach a monitor tube to the bridge in some way.





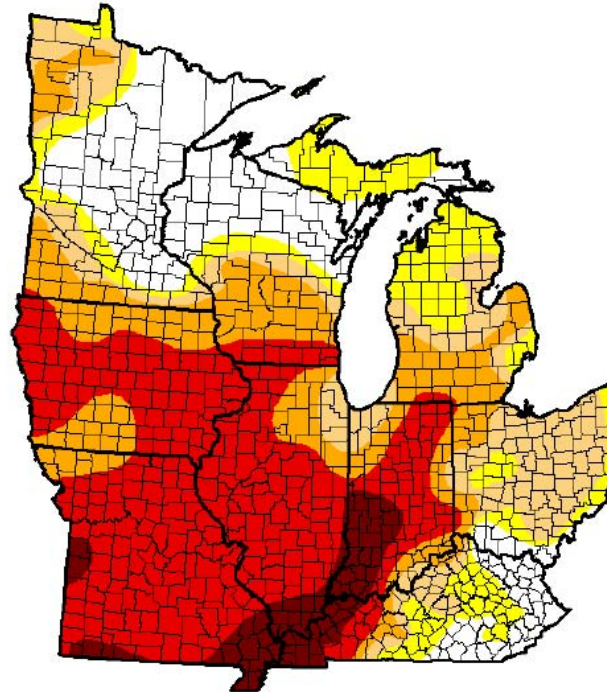
Drought Conditions in 2012

U.S. Drought Monitor Midwest

August 7, 2012

(Released Thursday, Aug. 9, 2012)

Valid 7 a.m. EST



Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	18.58	81.42	69.11	55.13	38.19	5.78
Last Week 7/31/2012	17.22	82.78	71.01	55.41	31.80	4.90
3 Months Ago 5/8/2012	58.76	31.24	5.80	0.18	0.00	0.00
Start of Calendar Year 1/2/2012	71.84	28.16	13.47	0.80	0.00	0.00
Start of Water Year 9/27/2011	58.85	41.15	14.01	5.03	0.00	0.00
One Year Ago 8/9/2011	62.00	38.00	10.05	0.52	0.00	0.00

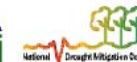
Intensity:

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:

Mark Svoboda
National Drought Mitigation Center

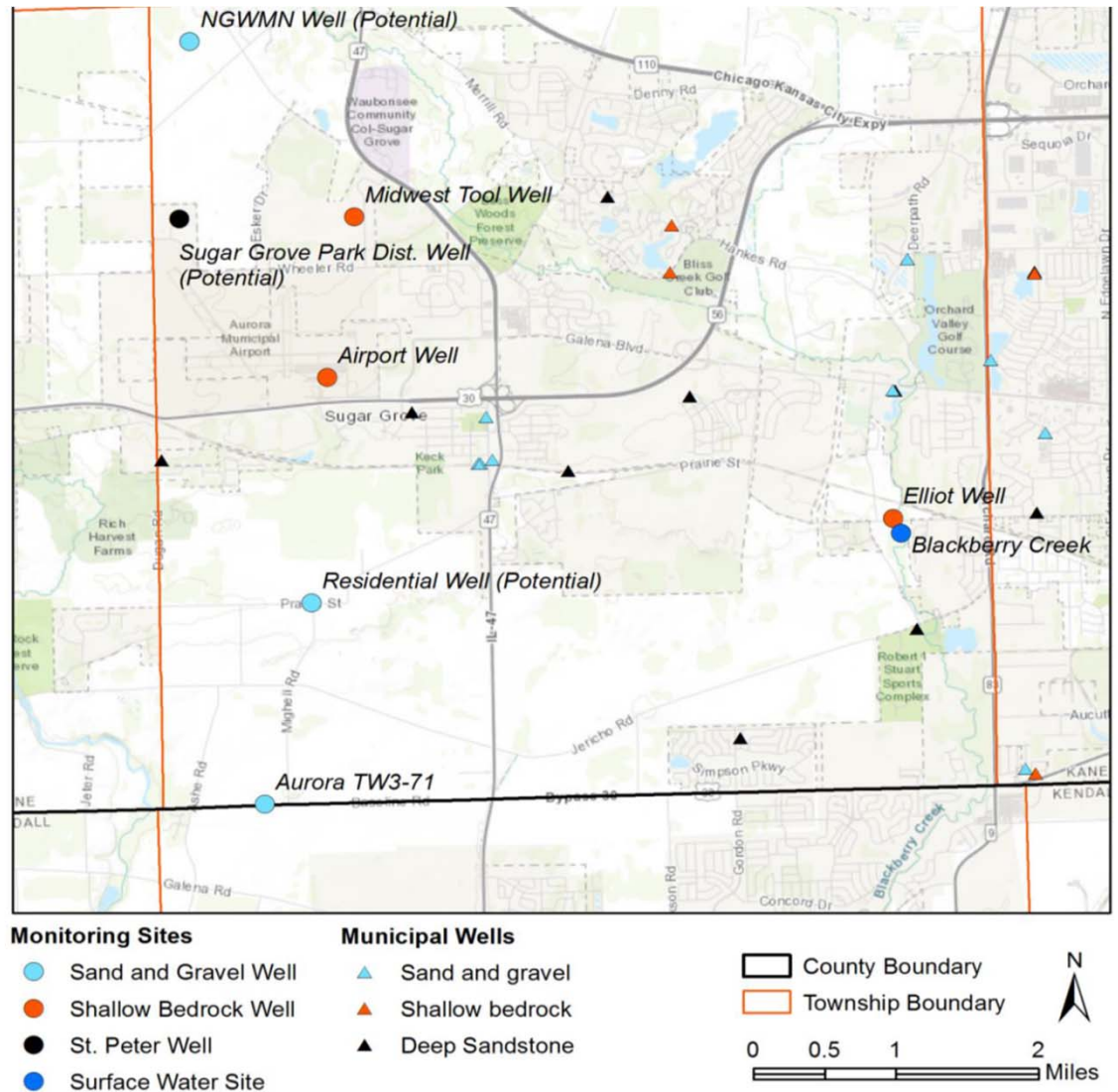


<http://droughtmonitor.unl.edu/>



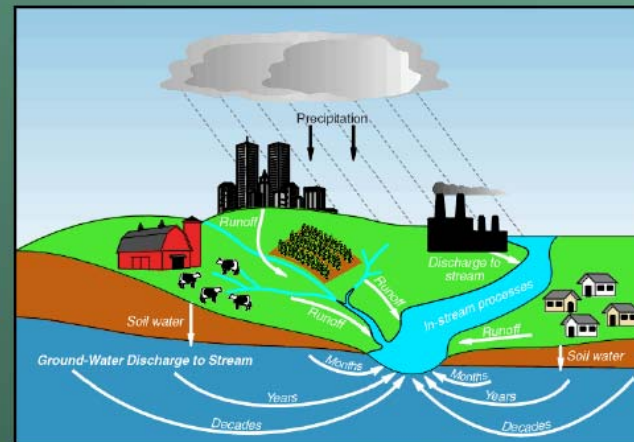
Sugar Grove Township

Figure 5. Map of planned and potential monitoring sites in Sugar Grove Township. Also shown are Sugar Grove and Aurora municipal wells where additional water level data can be collected.

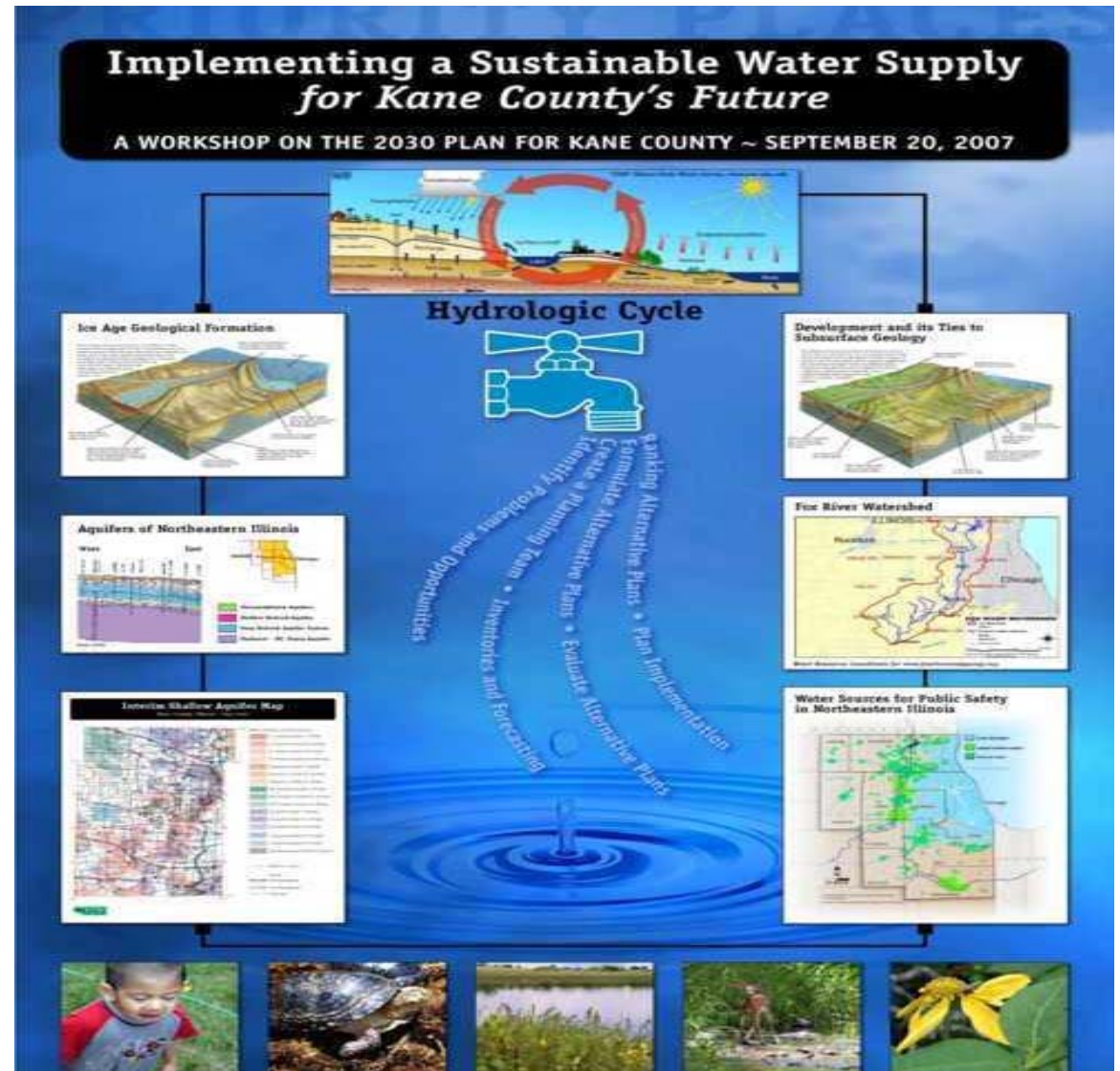


US EPA Water -Quality Criteria: Chlorides

- Acute toxicity to aquatic life: 860 mg/L
- Chronic toxicity to aquatic life: 230 mg/L
- Drinking Water Secondary MCL: 250 mg/L



A “Thank You” to the following study group for providing an economical and professional service to our local homeowners for monitoring their personal water supply. It is an honor to be associated with this global effort.



Sugar Grove Township study group

Participants:

Illinois State Water Survey

Kane County Water Resources

Northwest Water Planning Alliance

Sugar Grove Township

Sugar Grove Water Authority

Barrington Area Council of Governments

WellIntel, Inc.