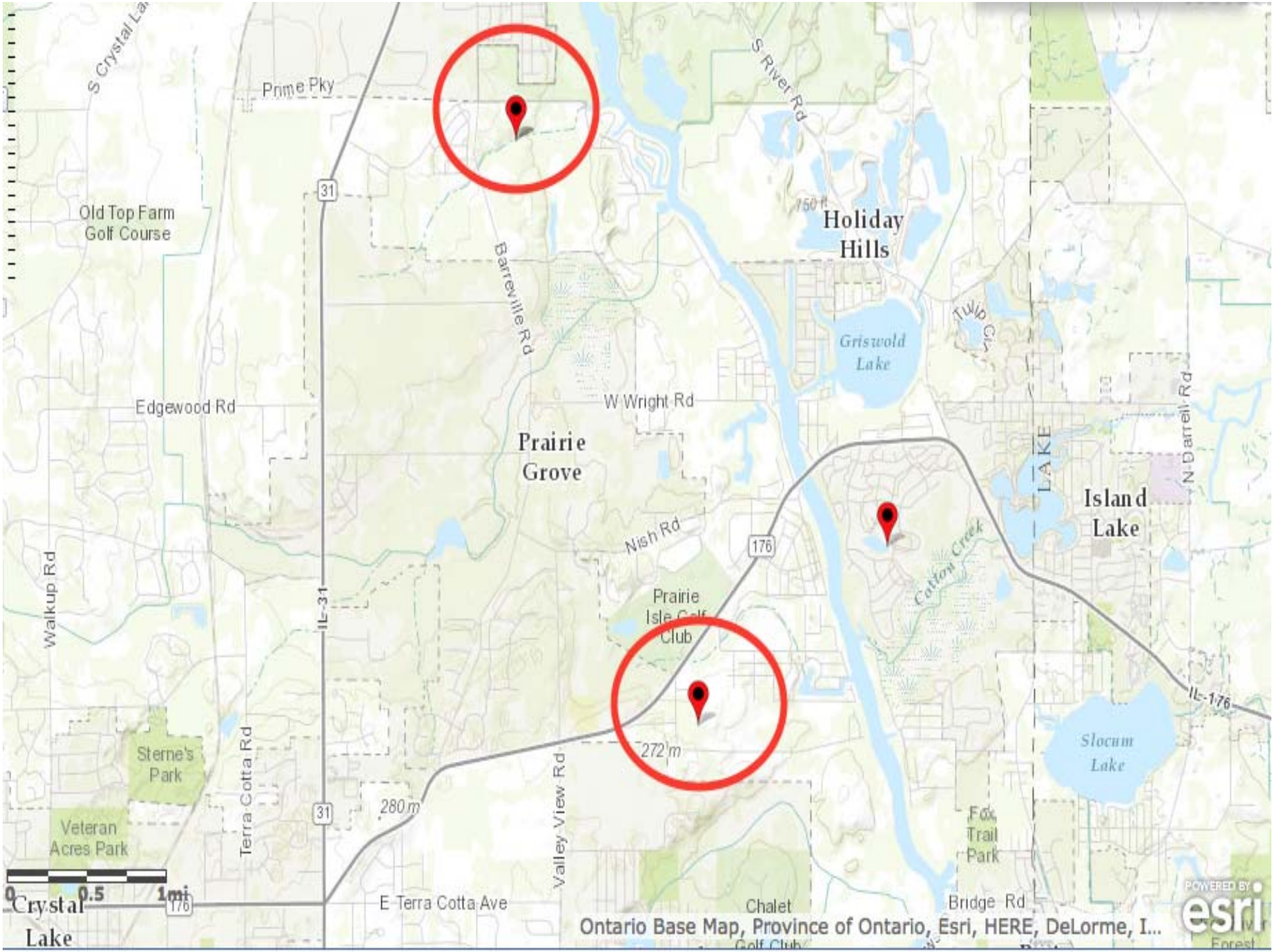
Investigation of Groundwater Flow near Oakwood Hill, Illinois

Brad Stiff, McHenry County College
Kate Kramer, McHenry County College, Department of Earth Science

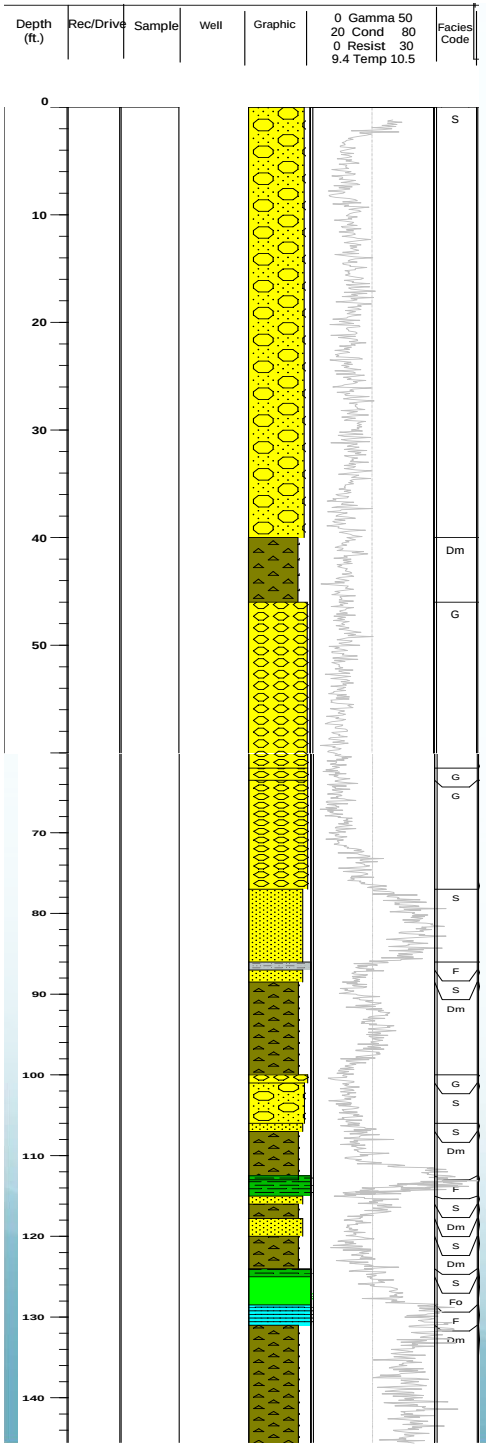
Introduction

- ISGS has been conducting large scale water table observations
  - Helps understand groundwater flow
- In 2008 an observation well was placed near Oakwood Hills at Prairie view Education Center
- Well showed exaggerated spikes in water level
- This study will compare a well in Prairie Grove (PG) to the well in Oakwood Hills (PEC)


Prime Pky
S River Rd
Old Top Farm Golf Course
Barreville Rd
Holiday Hills
Griswold Lake
Edgewood Rd
W Wright Rd
Prairie Grove
Nish Rd
Walkup Rd
IL-31
Prairie Isle Golf Club
Cotton Creek
LAKE
Island Lake
N Darrell Rd
IL-176
Slocum Lake
Sterne's Park
Terra Cotta Rd
Valley View Rd
272 m
280 m
Veteran Acres Park
Fox Trail Park
0 0.5 1mi
Crystal Lake
E Terra Cotta Ave
Chalet
Bridge Rd
Ontario Base Map, Province of Ontario, Esri, HERE, DeLorme, I...
POWERED BY esri

Introduction Cont.

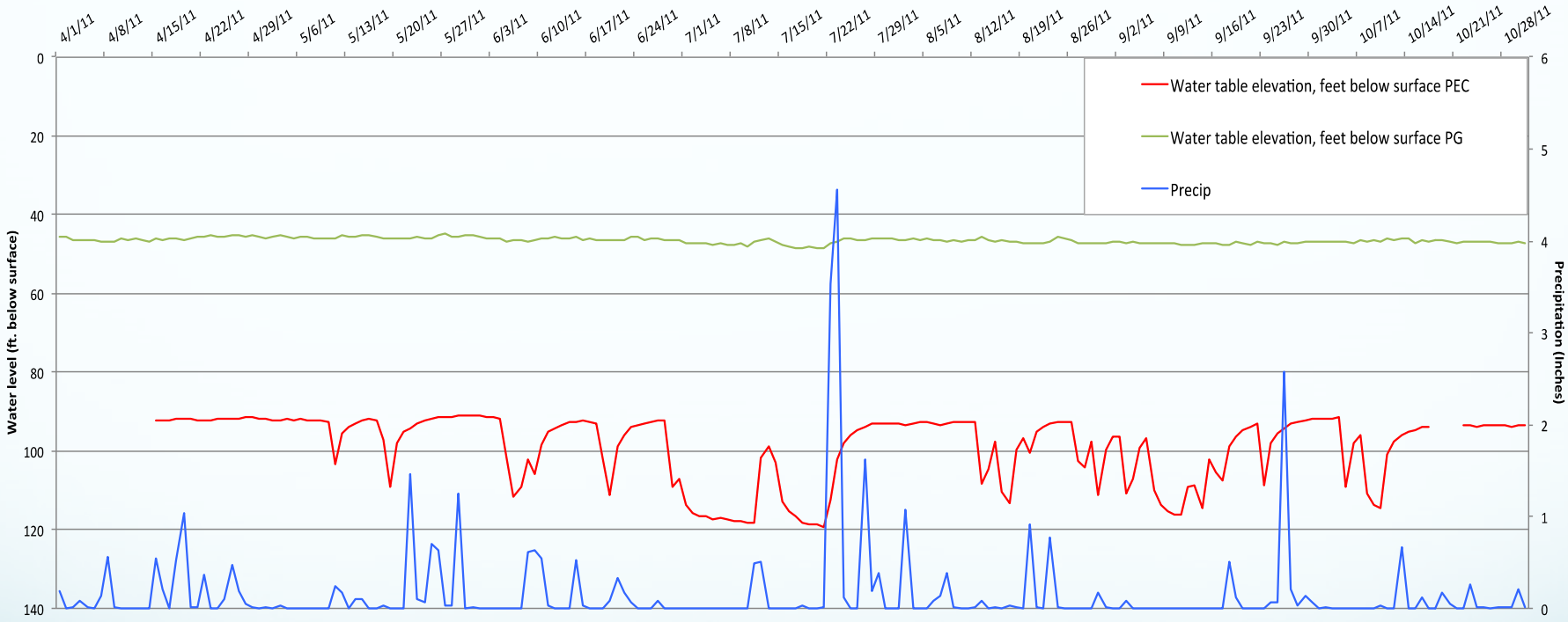
- Both wells screened over the same permeable aquifer
- Soil material suggests that it should not fluctuate as much as it does
- As water penetrates deeper it comes to impermeable layers

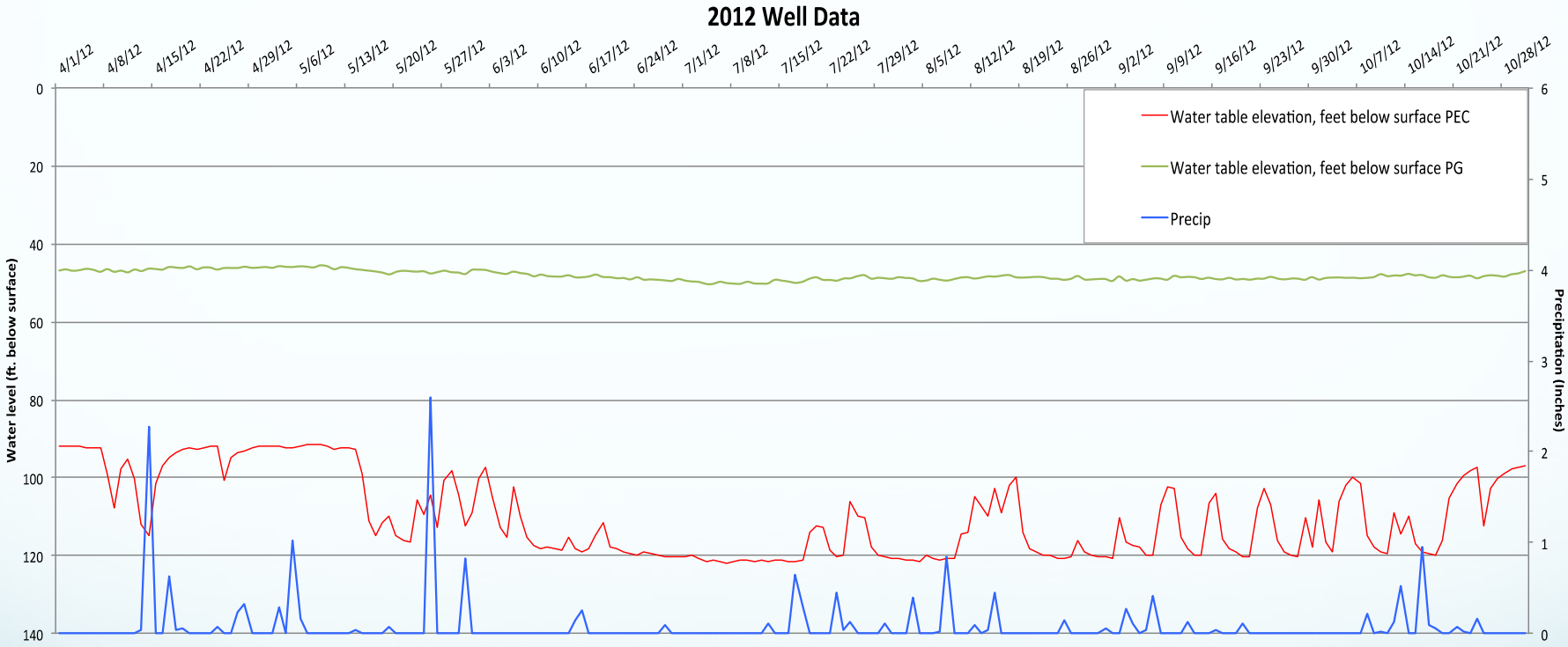


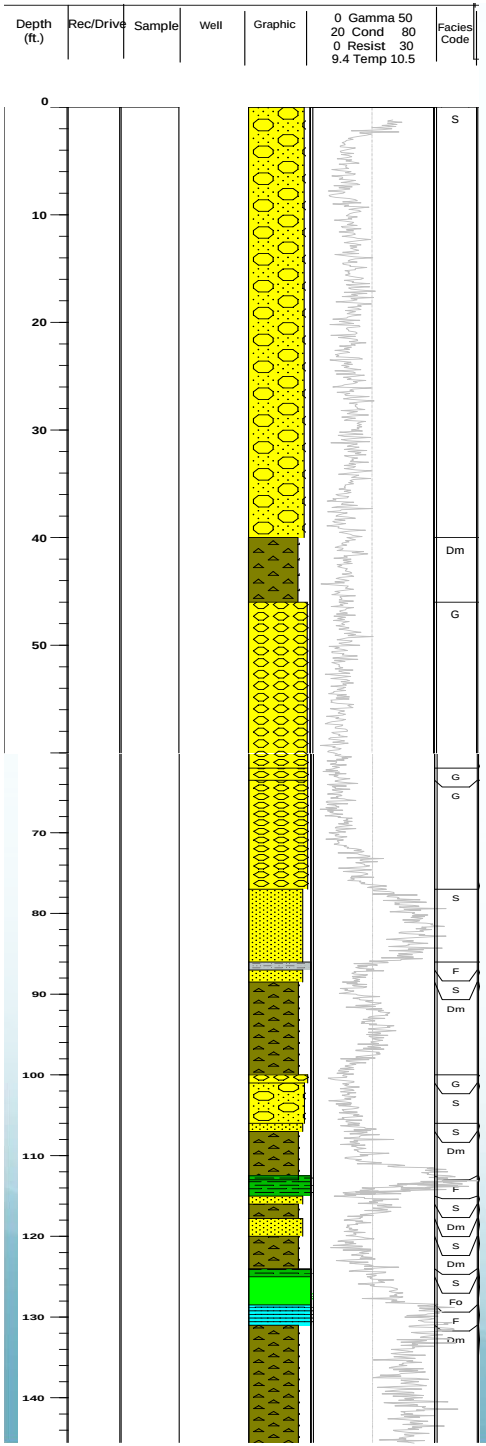
Cross Section

- To the left is the cross section view of the PEC well
- Yellow shows permeable sand and gravel
- Green is diamicton, an impermeable dense layer
- Blue is clay which water can pass through but extremely slow

2011 Well Data



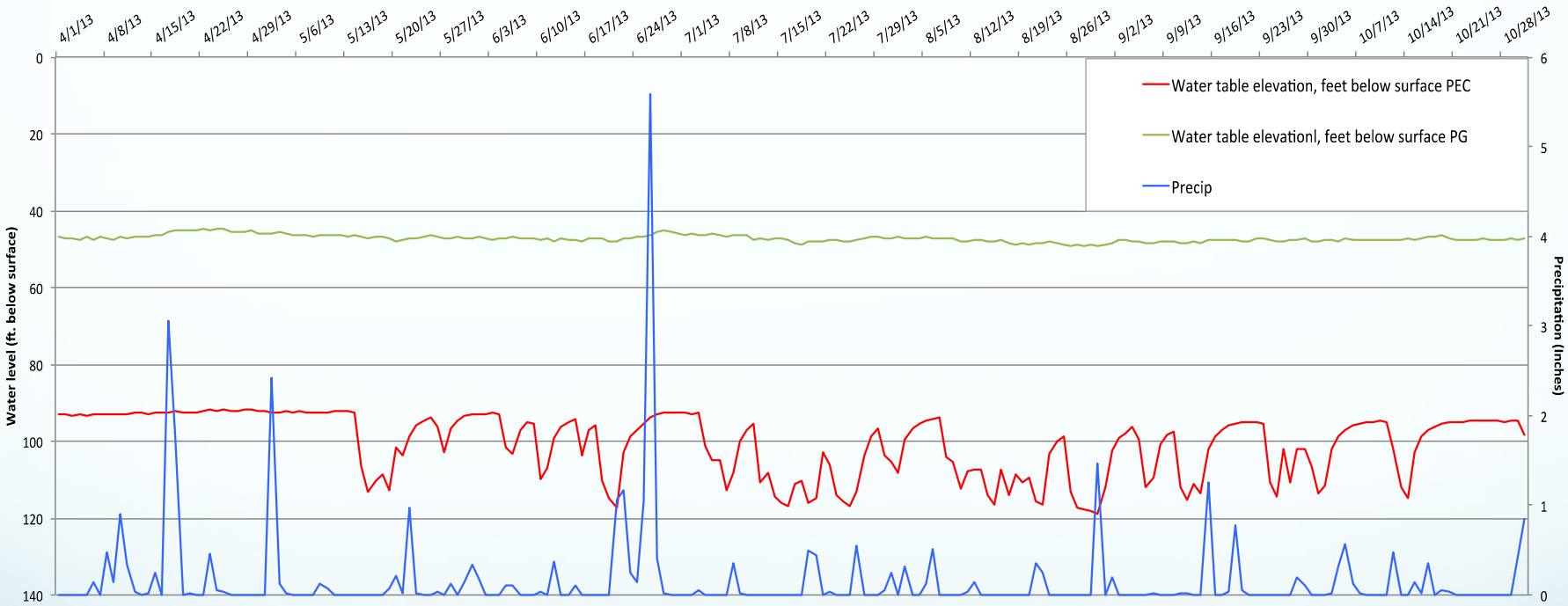

2012 Well Data
4/1/12
4/8/12
4/15/12
4/22/12
4/29/12
5/6/12
5/13/12
5/20/12
5/27/12
6/3/12
6/10/12
6/17/12
6/24/12
7/1/12
7/8/12
7/15/12
7/22/12
7/29/12
8/5/12
8/12/12
8/19/12
8/26/12
9/2/12
9/9/12
9/16/12
9/23/12
9/30/12
10/7/12
10/14/12
10/21/12
10/28/12
0
20
40
60
80
100
120
140
Water level (ft. below surface)
6
5
4
3
2
1
0
Precipitation (inches)
Water table elevation, feet below surface PEC
Water table elevation, feet below surface PG
Precip



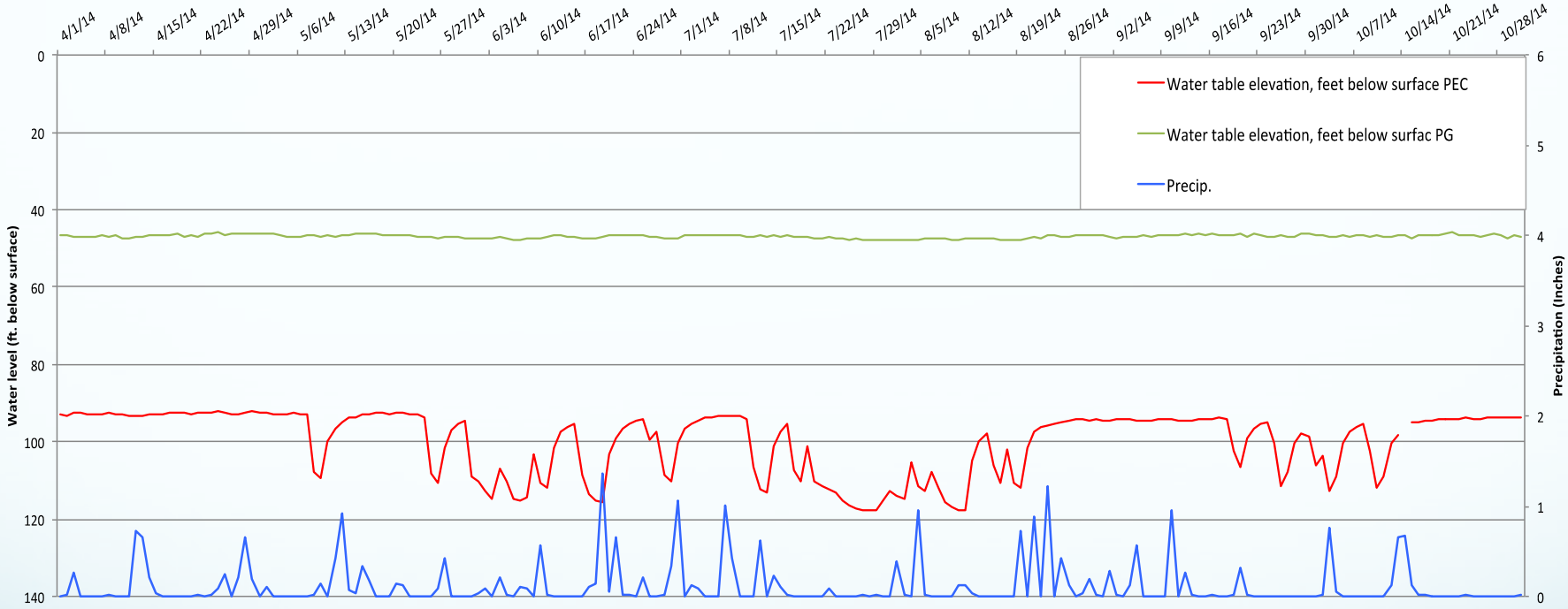
Cross Section

- To the left is the cross section view of the PEC well
- Yellow shows permeable sand and gravel
- Green is diamicton, an impermeable dense layer
- Blue is clay which water can pass through but extremely slow

2013 Well Data



2014 Well Data



Conclusion

- Over exaggerated recharge suggests that water is getting to the watertable faster than normal
- The impermeable units could be fractured
  - allowing faster water flow and bigger recharge event

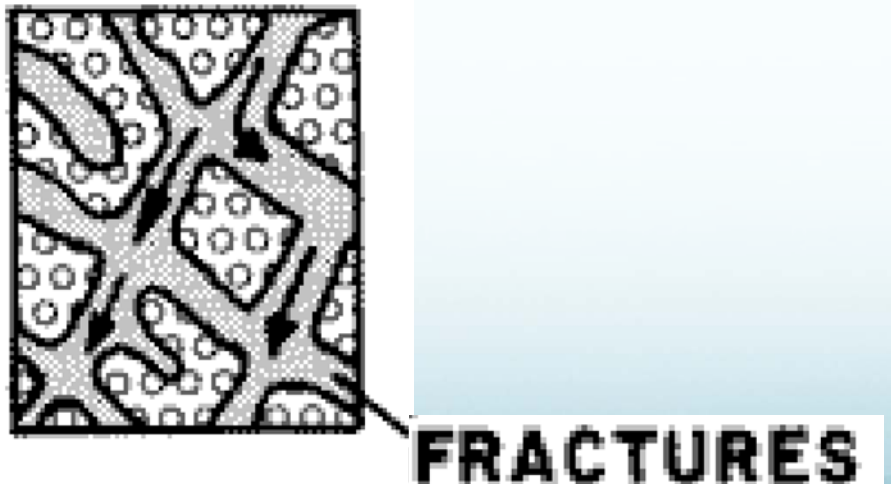


Figure 3: Water flow through fractured medium (USGS)

Purpose

- McHenry county is a very water rich area
  - Urban sprawl has big effect on water supply and demand
  - Take it for granted
  - Deeper wells
- Groundwater pollution is a main concern
  - Fractures act as easy pathways to groundwater
- Helps us understand groundwater movement, recharge and subsurface material
- Subsurface material determines where structures can be built and where wells should be drilled

Future Study

- Further examination of well
- Filming the well could show fractures in material
- Reviewing other wells in McHenry County can show if these fluctuations are seen anywhere else
- Tracer tests can show how water is flowing though these fractures

Acknowledgements

We extend a special thanks to

- Paul Hamill, Instructor of Astronomy and Meteorology at MCC, Crystal Lake Illinois
- Jason F. Thomason, Associate Geologist at Illinois State Geologic Survey, Champaign Urbana Illinois
- We would also like to thank all of the faculty in the career center for enabling us to conduct this research study

References

- USGS website, "http://pubs.usgs.gov/of/1993/ofr93-643/images/fracandp.gif"
- PEC well data, "http://waterdata.usgs.gov/nwis/uv/?site_no=421547088142301&PARAmeter_cd=72019,72020,62611"
- PG well data, " http://waterdata.usgs.gov/nwis/uv/?site_no=421820088154501&PARAmeter_cd=72019,72020,62611"
- Williams, H. B. Summary of the Geology of the Chicago Area. Urbana, IL: Illinois State Geological Survey Circulation, 1971. Print.
- Anderson, Richard C., and Douglas A. Block. *Sand and Gravel Resources of McHenry County, Illinois*. Urbana, IL: Illinois State Geological Survey Circulation, 1962. Print.
- Meyer, Scott C., Yu-Feng Lin, Daniel B. Abrams, and George S. Roadcap. *Groundwater Simulation Modeling and Potentiometric Surface Mapping, McHenry County, Illinois*. Rep. Urbana, IL: Illinois State Water Survey. Prairie Research Institute, 2013. Print.