

Lewis & Clark NET Project Observation Well Network

A Good Start at Defining the District's Hydrogeology

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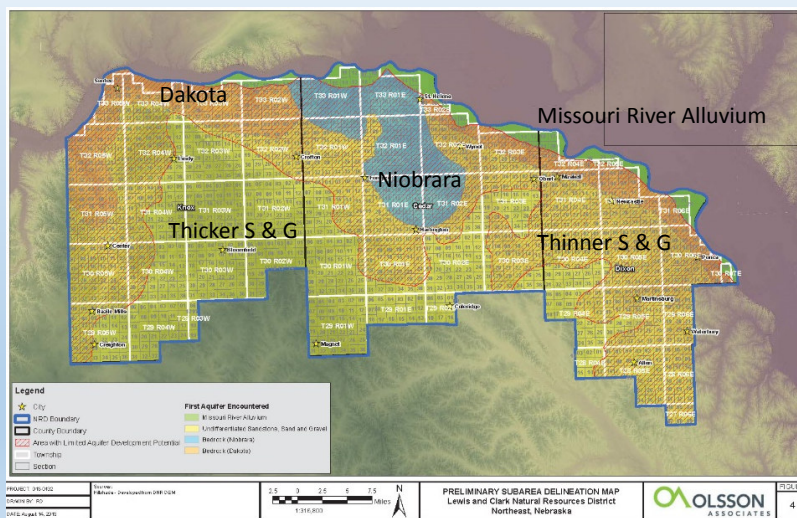
Presentation Outline

- Developing an observation well network.
- Monitoring program: Groundwater data
- Progress of the NET Project and 2016 plan
- Hydrogeology of the L&C NRD: Status July 2016
- Hydrogeology of the L&C NRD: Path Forward

Process – Observation Well Networks

- Targets: Aquifer Types & Documented Problems
- Preliminary Target Hydrogeology
- TH Drilling, Sampling, & Geophysical Logging
- Well Design & Construction

Targets: Aquifer Types



Targets: Problem Areas

- Water Quality: Defined by the NRD well sampling program.
- Well Interference: Defined by documented calls to the NRD in 2012.
- Areas with little to no subsurface data—or areas of complex/unique geology.

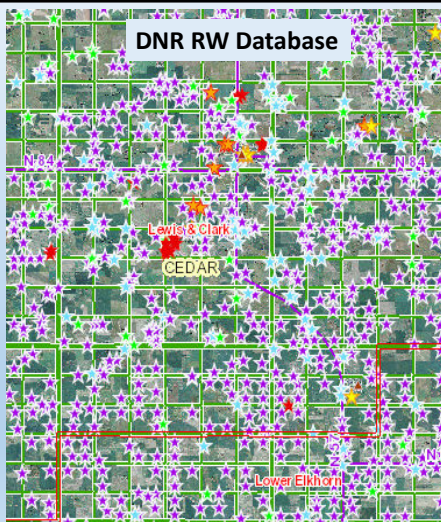
ACCESS: Willing landowner

Preliminary Hydrogeology

WISCONSIN DEPARTMENT OF NATURAL RESOURCES
 WISCONSIN WATER SURVEY - FIELD LOG

Report No. 01-16-14 T.D. 790 Date 4/23/14
 County CEDAR Loc. NW 1/4 Sec. 25, T. 30N, R. 1E
 Well No. 55
 Well Depth 127.26 ft
 Well Type 1
 Well Status 1
 Well Construction 1
 Well Completion 1
 Well Construction Date 12/15/14
 Well Completion Date 12/15/14
 Well Construction Material 1
 Well Completion Material 1
 Well Construction Method 1
 Well Completion Method 1
 Well Construction Notes 1
 Well Completion Notes 1
 Well Construction Date 12/15/14
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 Well Completion Method 1
 Well Construction Notes 1
 Well Completion Notes 1

DEPTH	TIME	TEMP	WATER	REMARKS
0	1			TOP SOIL BROWN
1	5			SILT, NO SAND
5	10			DO, silty sdy, 18
10	12			DO, sand sdy
12	15			SD, silty sdy med
15	20			DO, silty sdy
20	25			DO, silty sdy
25	31			DO, silty sdy
31	40			DO, silty sdy
40	44			DO, silty sdy
44	51			DO, silty sdy
51	55			DO, silty sdy
55	57			DO, silty sdy
57	62			DO, silty sdy
62	65			DO, silty sdy
65	70			DO, silty sdy
70	75			DO, silty sdy
75	80			NO SAMPLE - LOSS OF SAMPLE



Test-Hole Drilling



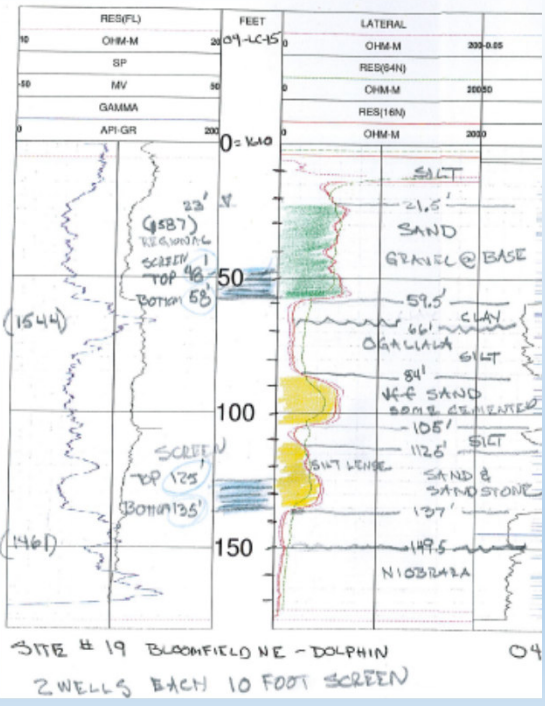
Test-Hole Sampling



Geophysical Logging



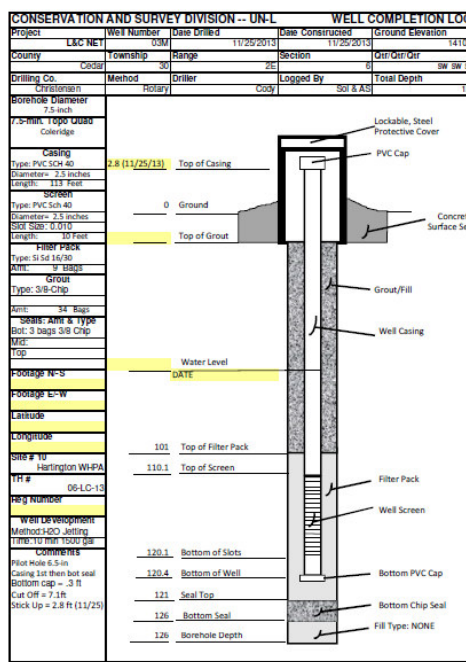
Observation Well Design



Well Construction



Well Construction



Monitoring Program Groundwater Data

- Monitoring Equipment Design
- Placement of Equipment
- Monitoring Schedule
- Data Collection
- Data Organization & Analysis

Groundwater Monitoring Equipment

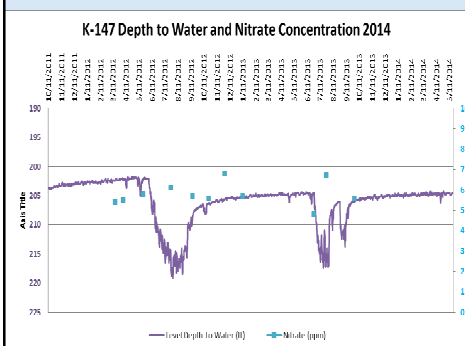
- Pumps to obtain groundwater samples for laboratory testing.
Monthly for 1st year
- Pressure transducers to monitor long-term & seasonal water level changes.
Readings every 8 hours



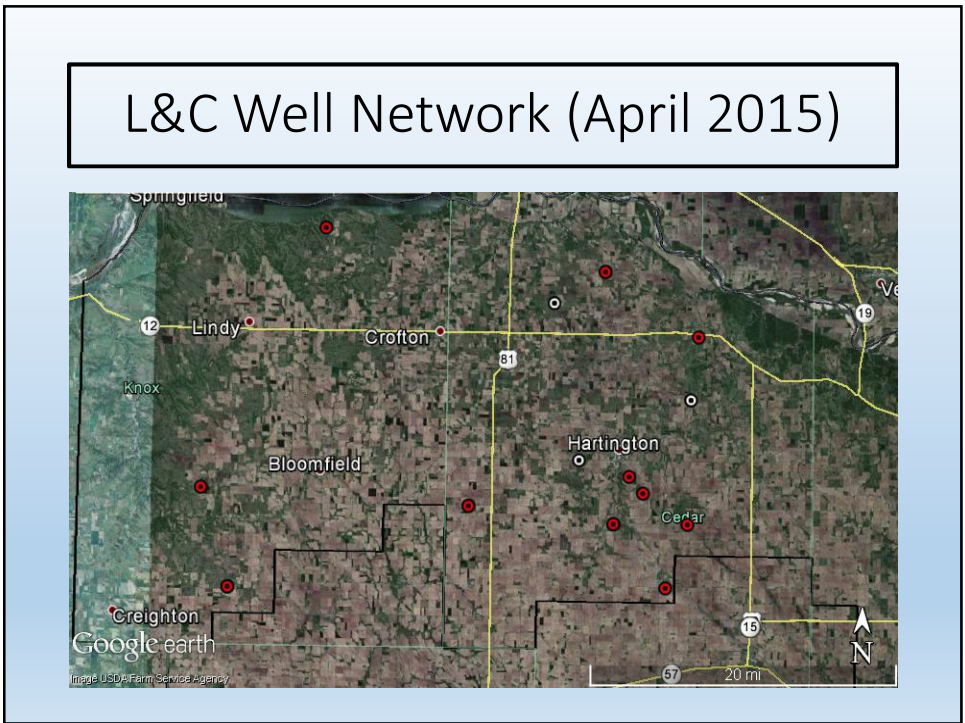
Groundwater Data Collection



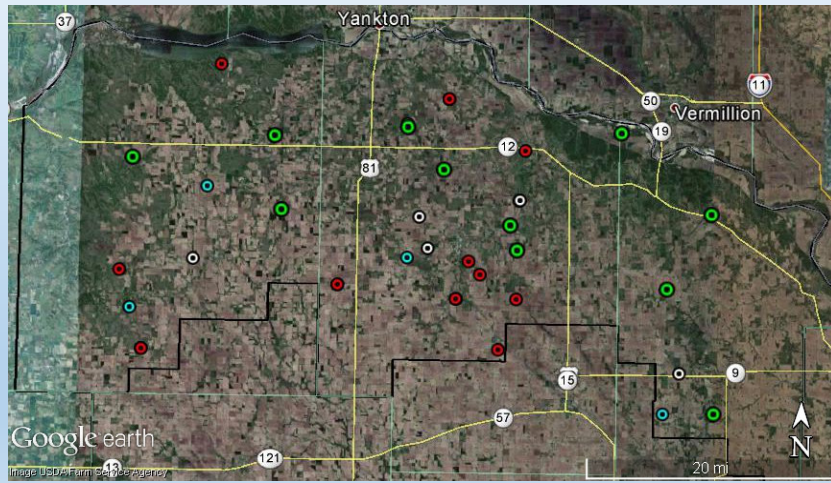
Groundwater Data Organization & Analysis



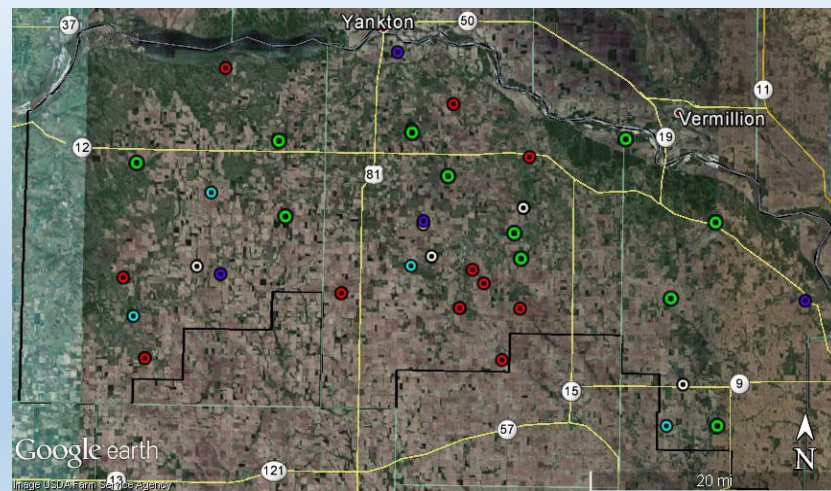
- On-going process
- Functional spreadsheets or better yet databases
- DO NOT get behind – suggest annual QA/QC
- Present graphical results to Board & tax payers OFTEN
- When hydrogeological analysis complete – NRD Web Site



L&C Well Network (October 2015)



L&C Well Network (July 2016)



Hydrogeology of the L&C NRD Status -- July 2016

- 33 New Test Holes (78 Historical CSD Test Holes)
 - 28 - NET 2013 to 2016
 - 4 - DEQ 2014
 - 1 - ELM 2008
- 44 New Wells (Creighton Study: Spalding)
 - 32 - NET 2013-2016
 - 3 - DEQ
 - 4 - NRD Prior Funds
 - 5 - NRD Potential New Funds

- 6 - Surficial Geologic 7.5-minute quadrangles and associated CSD test holes.
- 111 - locations with quality controlled geologic data.
- 30 - sites with access to discrete intervals of the groundwater flow system and local hydrogeology completed. (Also - Creighton Study: Lackey, 1992)
- **XX** - Registered wells with drillers' logs.
- AEM survey lines (ENWRA & Creighton Area).



Hydrogeology of the L&C NRD Path Forward

- Groundwater Data Collection and Initial Analysis
- Initial Hydrogeological Analysis
- Mass Water Level Readings (Spring)
- **AEM Surveys (Example):** 3-Mile Grid with Local Higher Density
- Definition of Aquifers x, y, & z. (County Atlases)
- Quantified Aquifer Parameters and Correlation to AEM Survey Results (Aquifer and Slug Tests)