Addressing 1-14-21 Administrative Order

PLAINVIEW
MIDDLE OF EVERYWHERE

Tuesday, June 14th , 2022

Miller & Associates
CONSULTING ENGINEERS, P.C.
www.miller-engineers.com

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Nitrate AO

- Levels consistently exceed the maximum contaminant level (MCL) of 10 mg/L

NEBRASKA
Good Life. Great Mission.
DEPT. OF HEALTH AND HUMAN SERVICES

Pete Ricketts, Governor

CERTIFIED MAIL
January 12, 2021

Mr. Mike Holton, Administrator
c/o Ms. Courtney Retzlaff, City Clerk
City of Plainview
205 W Locust
PO Box 757
Plainview, NE 68769

Re: City of Plainview, NE3113902 – Pierce County
Administrative Order – Nitrate Maximum Contaminant Level (MCL)
Effective Date: January 14, 2021

Dear Mr. Holton:

The enclosed Administrative Order is issued to the City of Plainview public water supply system. This order is being issued because nitrate levels in your water system consistently exceed the maximum contaminant level (MCL) of 10 mg/L, as established in Section 002.04A of Nebraska's Department of Health and Human Services Regulations Governing Public Water Supply Systems Title 179 NAC 2. Excessive levels of nitrate in drinking water have caused serious illness and sometimes death in infants under the age of six months. The serious illness can develop rapidly in infants. In most cases, health deteriorates over a period of days.

2

Administrative Order Excerpt

- Step 4: Provide written quarterly reports
- Step 5: Retain services of a registered professional engineer

4. Provide written quarterly reports to the Drinking Water Division within ten (10) days of the end of each calendar quarter (i.e. January 10, April 10, July 10, and October 10). These reports must start the first full quarter after this Administrative Order is issued. These reports must be written and must include: 1) documentation that the actions required in conditions 1 through 3 above are being accomplished; and 2) information about the activities which have been taken to return the system to compliance. A report form is attached, please make copies of this report for subsequent quarters.

5. The system shall retain the services of a registered professional engineer for the purpose of finding and implementing a viable solution. The following requirements and time frames must be met.

   a. Documentation, which certifies that a registered professional engineer has been retained, must be submitted to this office as soon as possible, but no later than April 14, 2021.

   b. A Preliminary Engineering Report (PER), prepared by a Nebraska registered professional engineer, must be submitted to this office discussing alternative methods and estimated costs for returning the System to compliance with the nitrate MCL. The report must be submitted as soon as possible, but no later than July 14, 2022.

   c. A Proposed Final Implementation Plan for achieving compliance with the nitrate MCL, prepared by a registered professional engineer, must be submitted to this office for approval as soon as possible, but no later than July 14, 2023. This plan shall include a date for each of the following:

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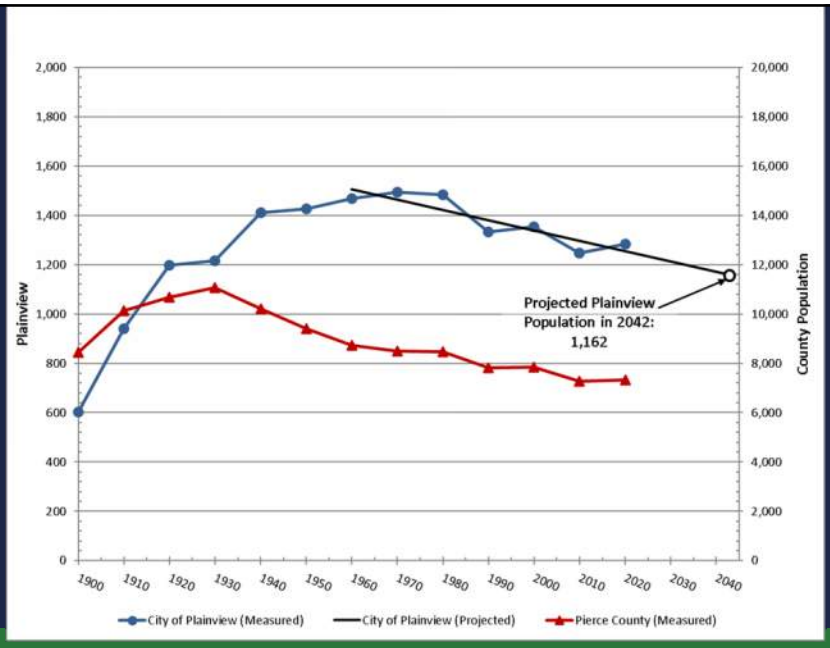

Population

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4

Water System

- 4 Water Supply Wells
- Elevated Water Storage
- Distribution System

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Distribution System

Comments

- Majority of System is 4" piping
  - Min. New Size should be 6"
- Valving and Fire Hydrant Replacement is priority for City
- Included some FH and Valve replacement with all supply options

TABLE 2.6
DISTRIBUTION PIPING SUMMARY

Diameter (in.)	Length (ft.)	Length (mile)	Percentage of Total
2	2,573	0.48	2.95%
3	100	0.02	0.12%
4	46,595	8.82	54.18%
6	30,570	5.79	35.57%
8	6,188	1.17	7.19%
TOTAL	**86,026**	**16.28**	**100%**

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TABLE 2.1

REGISTERED WELL SUMMARY

Common Name	Registered Well Designation	Registration No.	Active	Depth (feet)	Year Constructed	Capacity (gpm)	AGE
School Well (Well #1)	#40-1	G-028160	Emergency	140	1940	600(1)	(82)
Bandshell Well (Well #2)	#54-1	G-028161	Emergency	148	1954	500(2)	(68)
Weisth Well Well #3	#62-1	G-028162	Inactive	162	1962	750(2)	(60)
New Well (Well #4)	#89-1	G-115909	Active	135	1989	530(1)	(33)

(1) Capacity reported based on most recent well efficiency testing
(2) Capacity reported based upon well registration

Registered Well Summary – Plainview, NE

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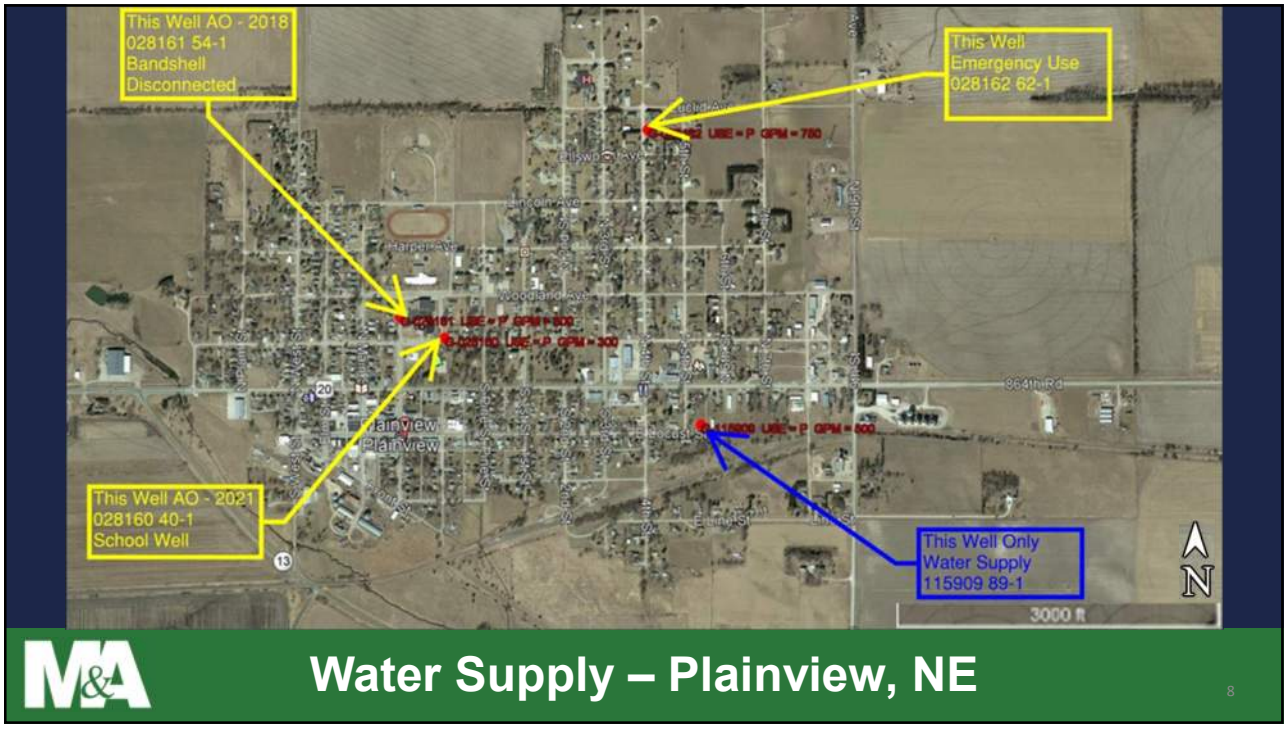

Water Supply – Plainview, NE

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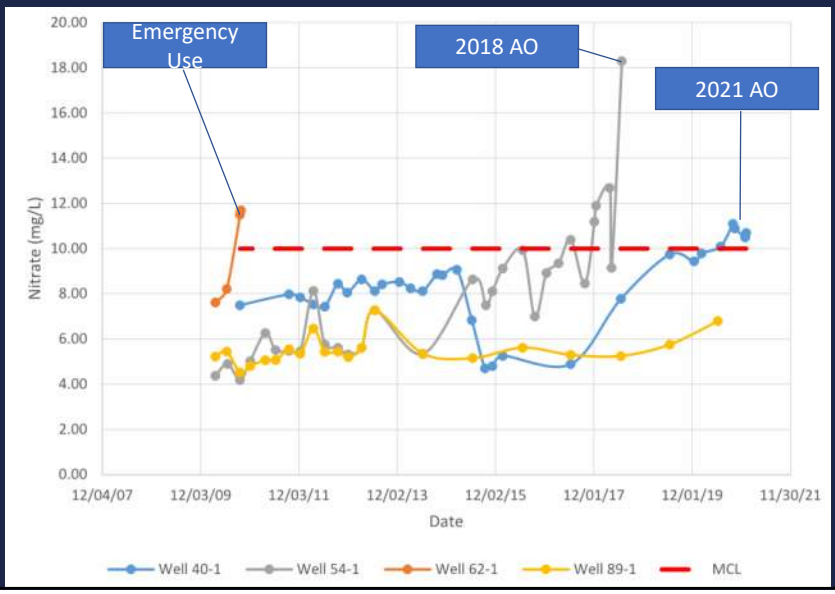
Plainview Nitrate Trends



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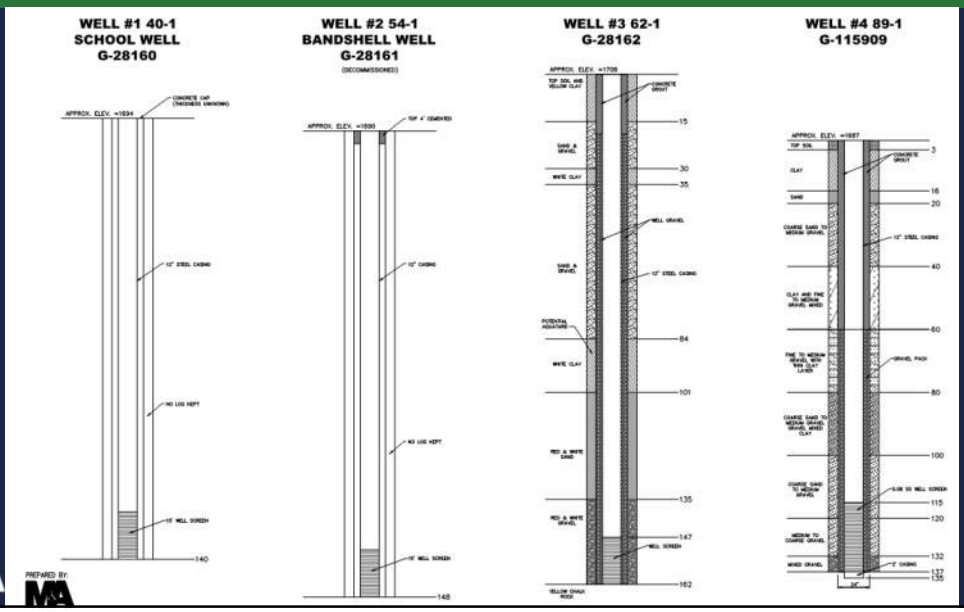
Well Schematics



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Historical Pumping Data

Pumping Year	Annual Pumping (Gallons)	Average Day (GPD)	Average Day (GPM)	Average Day (GPCD)*	Est. Peak Day Gallons**	Est. Peak Day (gpm)
2016	85,939,400	235,450	164	184	941,800	654
2017	102,470,800	280,742	195	219	1,122,968	780
2018	64,003,800	175,353	122	137	701,412	487
2019	69,281,700	189,813	132	148	759,252	527
2020	97,345,900	266,701	185	208	1,066,804	741
2021	99,731,900	273,238	190	213	1,092,952	759
6-yr. Avg.	***86,462,300***	***236,883***	***165***	***185***	***947,531***	***660***

**Calculations based on population of 1,283.*
***Peak Day estimated using a peaking factor of 4.*

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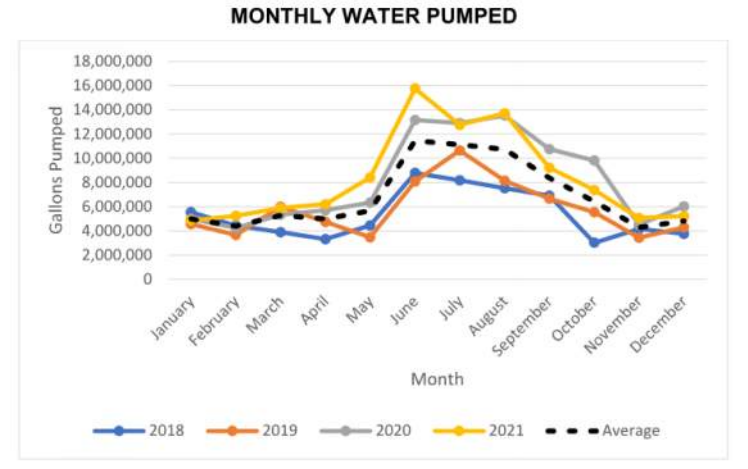

TABLE 2.8

PROJECTED WATER USE - 2042

Parameter	Design Criteria
Design Population	1,283*
Average Daily Per Capita Demand (GPCD)	185
Average Daily Demand (GPM)	165
Average Daily Demand (GPD)	236,900
Maximum Daily Demand (GPM)*	660
Maximum Daily Demand (GPD)*	947,500

**Assumed peaking factor of 4 neglecting Winter peaks*

**Due to declining population current population was selected*

Water Use

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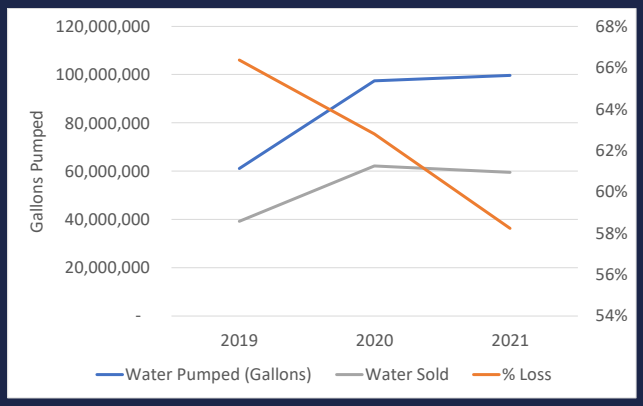

TABLE 2.4
WATER PUMPED VS. WATER SOLD 2019

Month	Water Pumped (Gallons)	Water Sold Gallons	Water Unaccounted For Gallons	% Loss
January	4,574,300	2,795,987	1,778,313	61%
February	3,663,900	2,409,956	1,253,944	66%
March	5,988,200	2,850,025	3,138,175	48%
April	4,743,600	2,011,844	2,731,756	42%
May	3,478,300	2,974,196	504,104	86%
June	8,079,800	3,008,517	5,071,283	37%
July	10,652,300	6,996,174	3,656,126	66%
August	8,148,900	55,002,475	(46,853,575)	(675)%
September	6,655,700	5,892,740	762,960	89%
October	5,553,500	4,123,096	1,430,404	74%
November	3,440,500	3,181,589	258,911	92%
December	4,302,700	2,994,887	1,307,813	70%
TOTAL	**61,132,800***	**38,025,129***	**21,893,789***	**66% (Avg)**

*Does not include August Data

Water Losses

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System Storage

- New Elevated Storage Tank Constructed in 1997
- Capacity is 250,000
- Last Tank Inspection 2021
- Storage is Sufficient

Storage Type	Methods of Determination	Capacity Required (Gallons)
Equalization Storage	20% of Maximum Daily Demand	189,500
Fire Flow Storage	1,000 GPM for 2-Hour Period	120,000
Emergency Storage	50% of Average Daily Demand	118,500
Total Storage		***309,500***

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Options For Compliance

- Blending
  - One Active Well Below MCL – not an option unless drill new well
- Consolidation
  - Plainview Largest Community Around – not Feasible
- New Source
  - Need to Evaluate but surrounded by high nitrate Area
- Well Modification 62-1?
- Treatment – Usually Last Resort due to Operation and Maintenance Cost of Treatment
  - Ion Exchange (IX)
  - Reverse Osmosis (RO)
  - Biological (not evaluated)
- POU/POE Devices
  - EPA does not recommend for over 100-125 connections

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New Source Consideration

Regional Study Area

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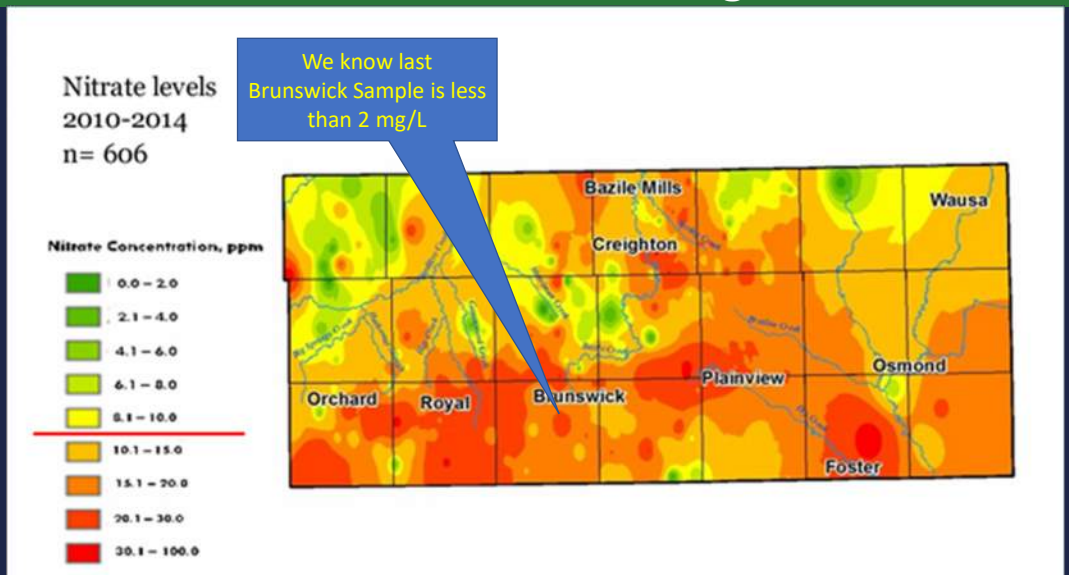
DNR Nitrate Raster Image



Data from the Nebraska Department of Natural Resource's Clearinghouse database

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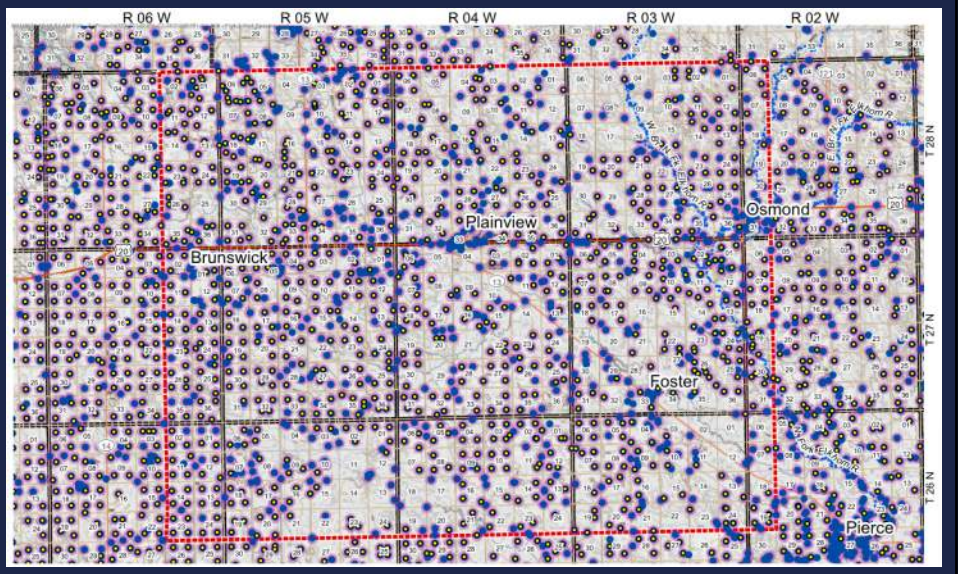
Study Area for New Source

- Study Area 336 Square Miles



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GW Flow Direction

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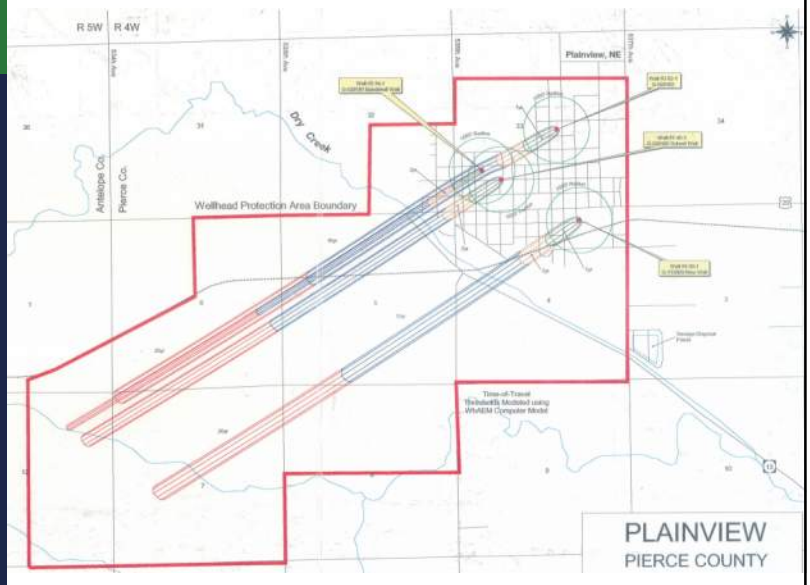
WHPA

- Original developed by NDEE 20 year TOT



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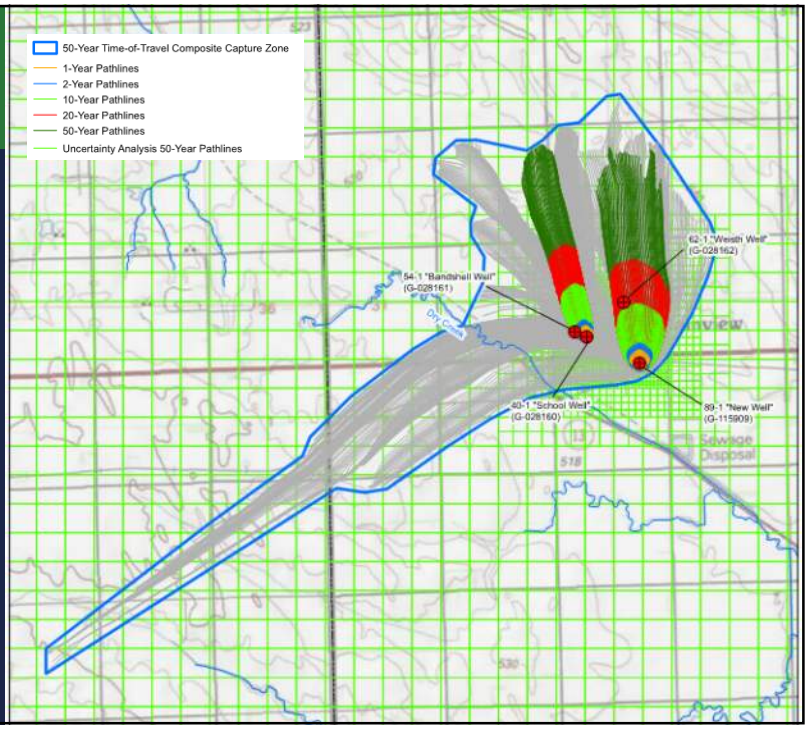
WHPA

- Updated by LRE for 50 year TOT



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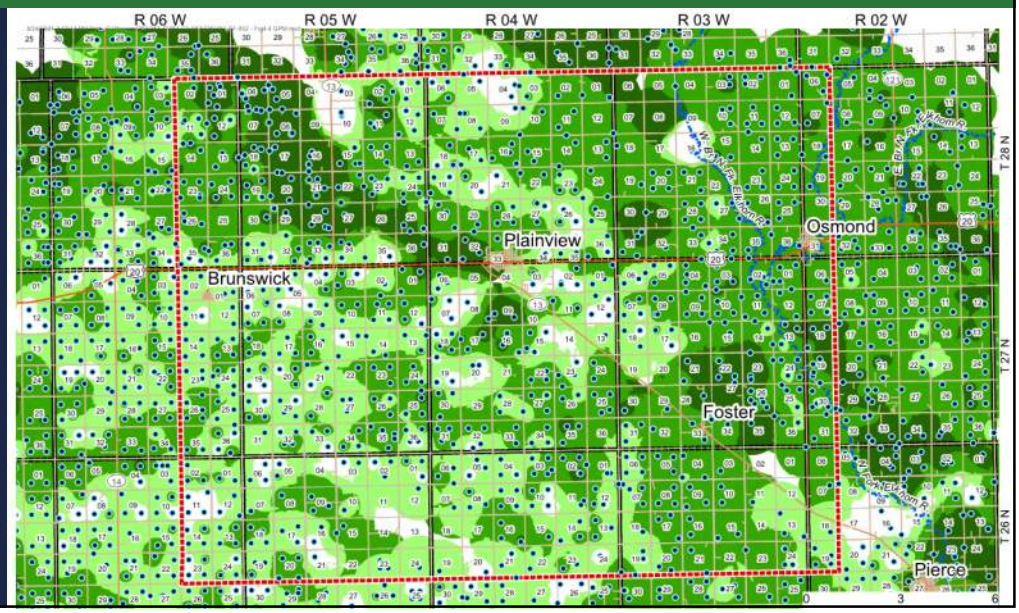
Well Capacity

- Darker Green less capacity
- White color highest capacity



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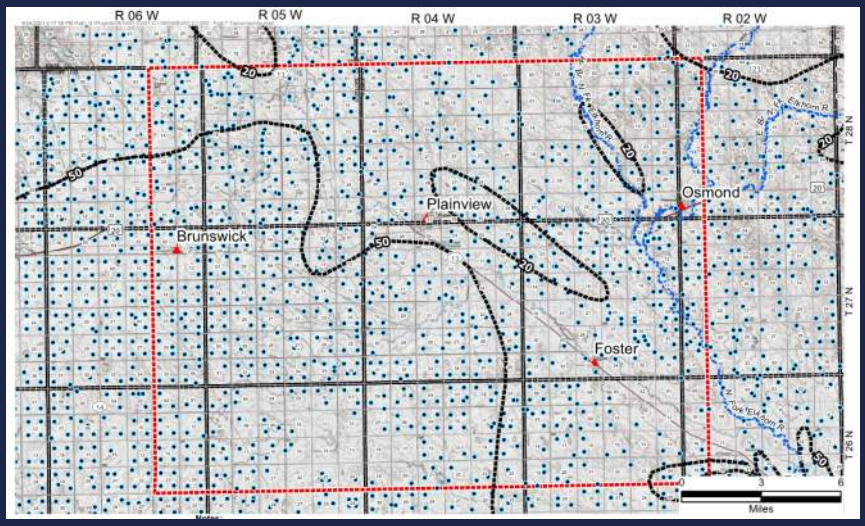
Transmissivity



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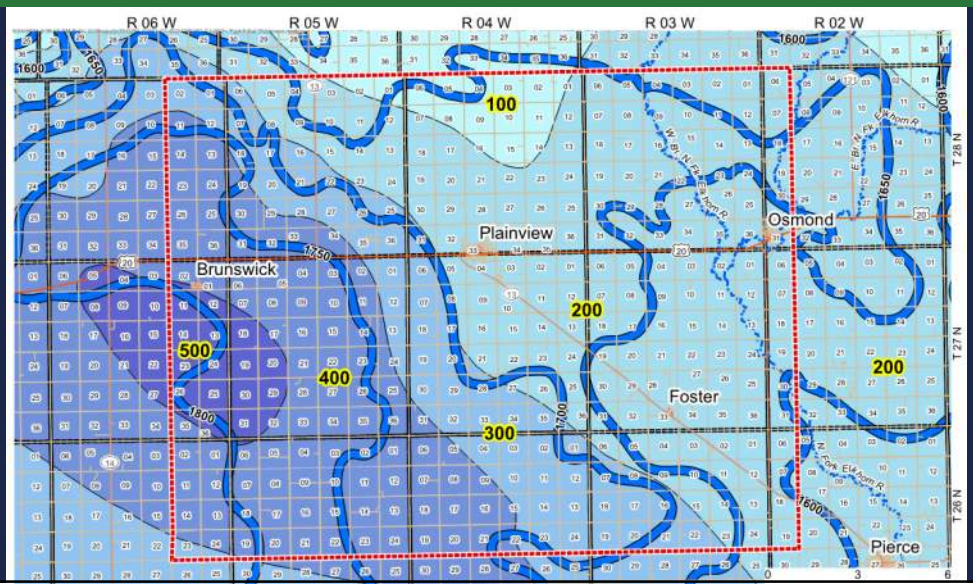
Saturated Thickness and GW flow



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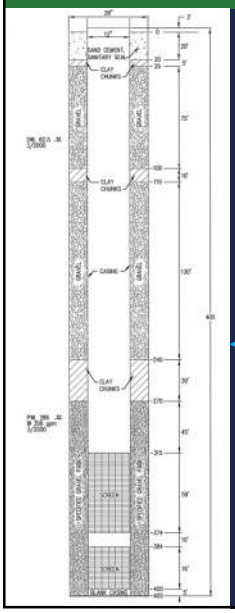
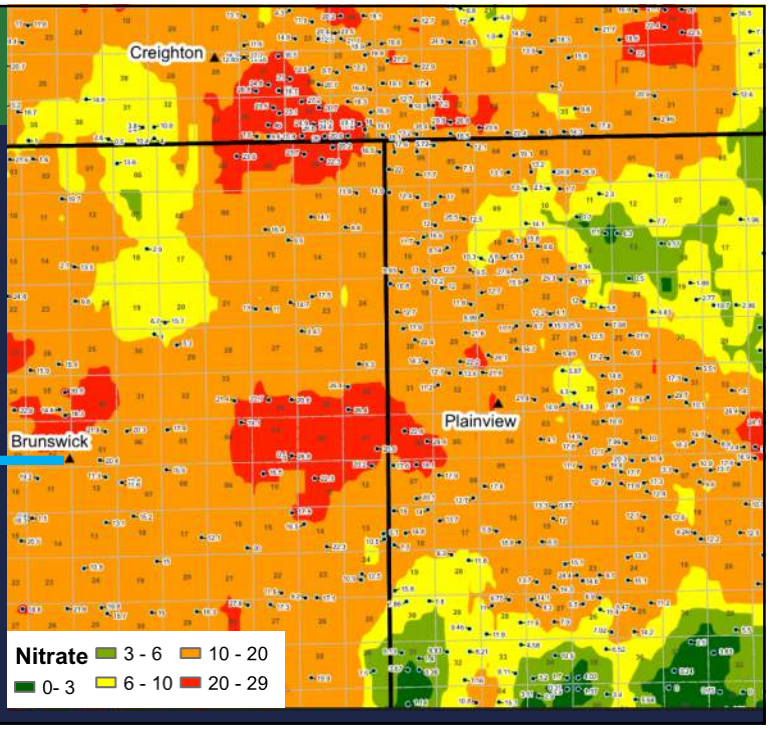
Brunswick Nitrate Data



Screen at 315
400 ft Depth



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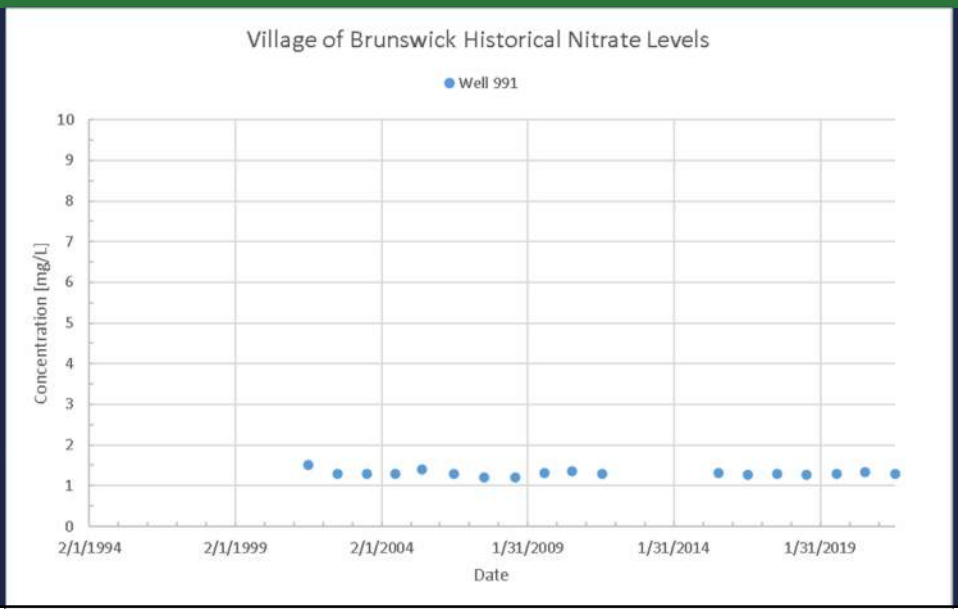
Brunswick Nitrate 2001-2021



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Well Log 4 Miles West Section 3, R5W T27N

Lithology

Lithologic Unit	Description	Top (Feet)	Bottom (Feet)	Notes
Soil	silty, clayey, sandy, brown, sand is very fine	.0	1.0	None
Silt	clayey, silty, sandy, dark brown, sand is very fine, soil like below 8 ft	1.0	9.0	None
Silt	very clayey, moderately sandy, brownish gray, sand is very fine to fine	9.0	15.0	None
Sand	silty, olive, sand is very fine to fine	15.0	22.0	None
Clay	slightly sandy, light brown, sand is very fine, grayish brown from 30 to 40 ft, moderately sandy, gray below 40 ft	22.0	45.0	None
Sand	light gray, sand is very fine to medium, little coarse, very fine to very coarse, trace of fine gravel below 55 ft	45.0	65.0	None
Sand	gravelly, fine sand to fine gravel, little medium gravel	65.0	80.0	None
Sand	gravelly, fine sand to medium gravel, some coarse gravel below 120 ft	80.0	126.0	None
Silt	moderately clayey, sandy, light gray to olive gray, sand is very fine	126.0	140.0	None
Sand-sandstone	light gray, sand is very fine, contains rootlets, silty below 183 ft, contains volcanic ash	140.0	195.0	None
Clay	silty, sandy, slightly calcareous, light olive, sand is very fine, moderately calcareous below 210 ft	195.0	214.0	None
Silt	moderately clayey, in part very sandy, light gray to light olive gray, sand is very fine	214.0	230.0	None
Clay	silty, moderately calcareous, light olive gray	230.0	255.0	None
Sand	in part sandstone, light gray and light olive gray, sand is very fine, lime cemented from 270 to 275 ft and from 310 to 320 ft	255.0	329.0	None
Caliche	white, very calcareous	329.0	330.0	None
Shale	clay, very calcareous, yellow, some gray from 335 to 345 ft	330.0	360.0	None

Ground at 1820

Bottom of well 330

74' Sand? Bottom elevation 1490

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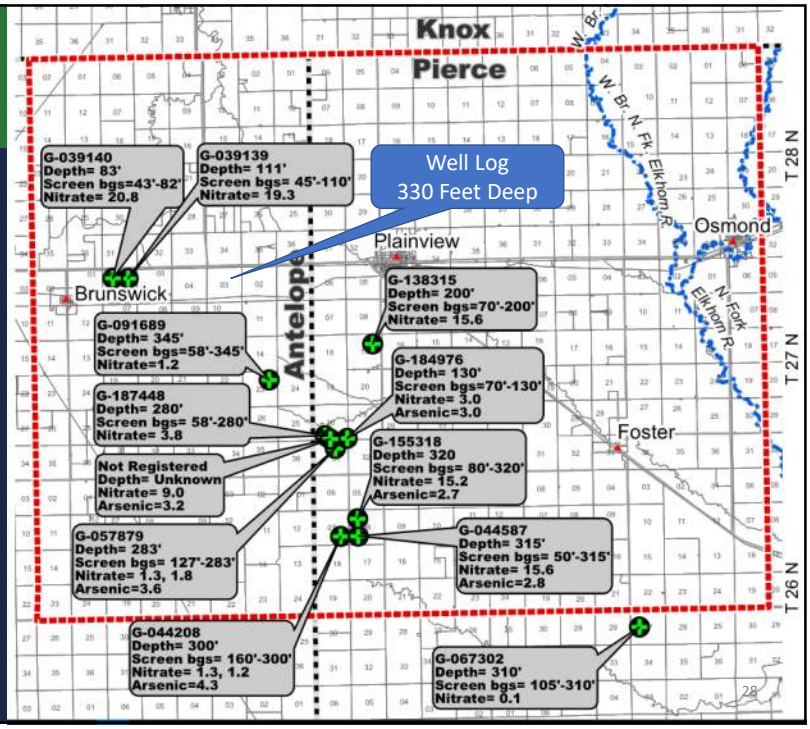
City Sampling

- Generalizations:
  - Deep Screened Wells had lower nitrates
  - Shallow Wells or high screened wells had elevated nitrates
  - Arsenic not an issue based on samples



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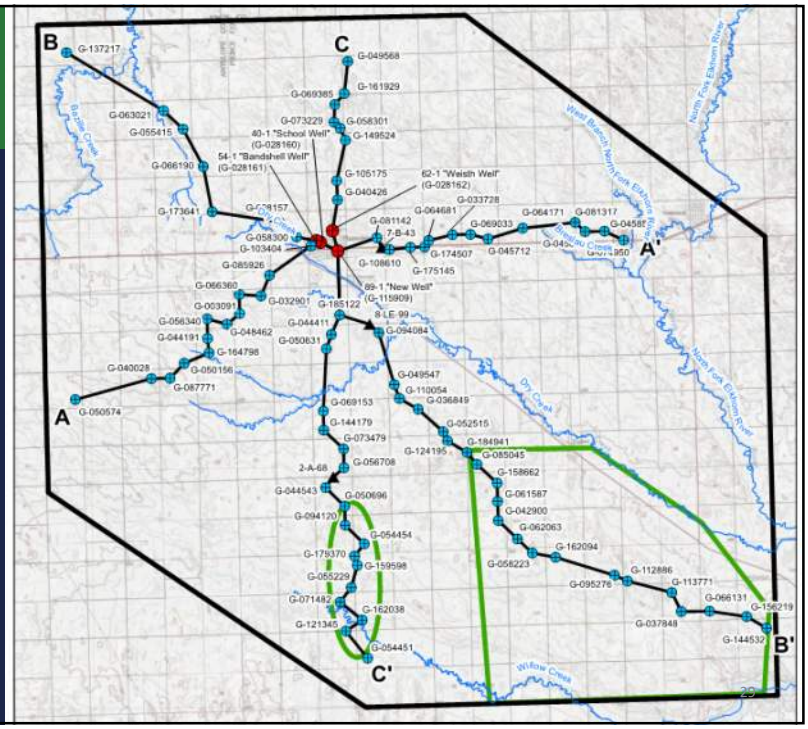
LRE Cross Section Index

- Three Sections Developed
  - A-A' W-E
  - B-B' NW-SE
  - C-C' N-S



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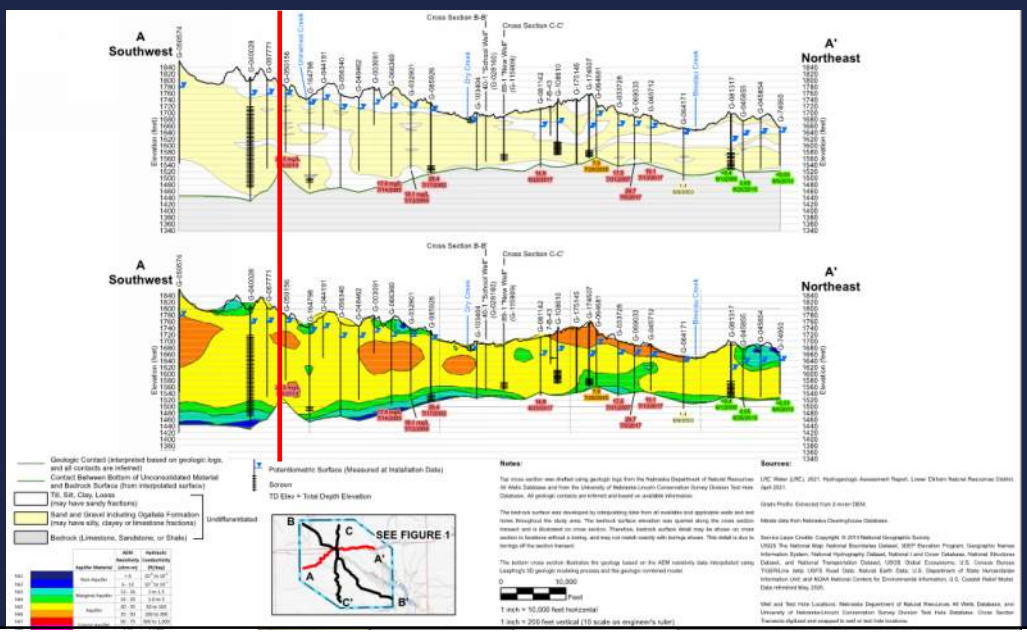
LRE Geologic Cross Section A-A' (W-E)



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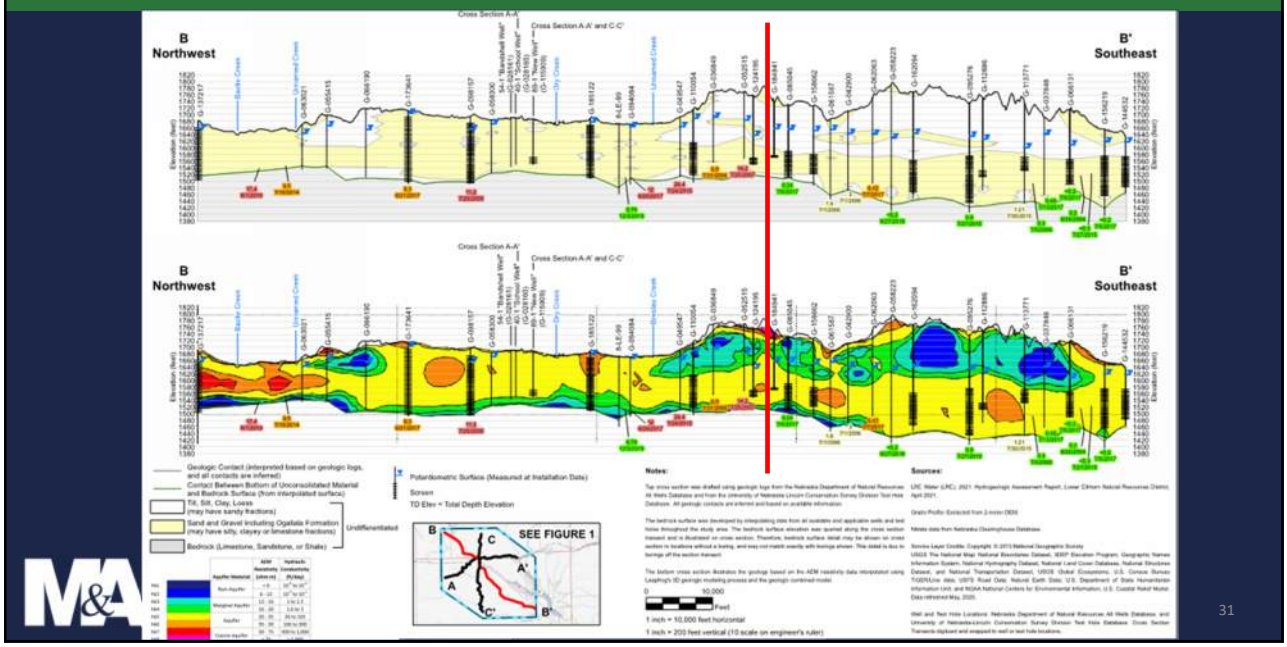
LRE Geologic Cross Section B-B' (NW-SE)



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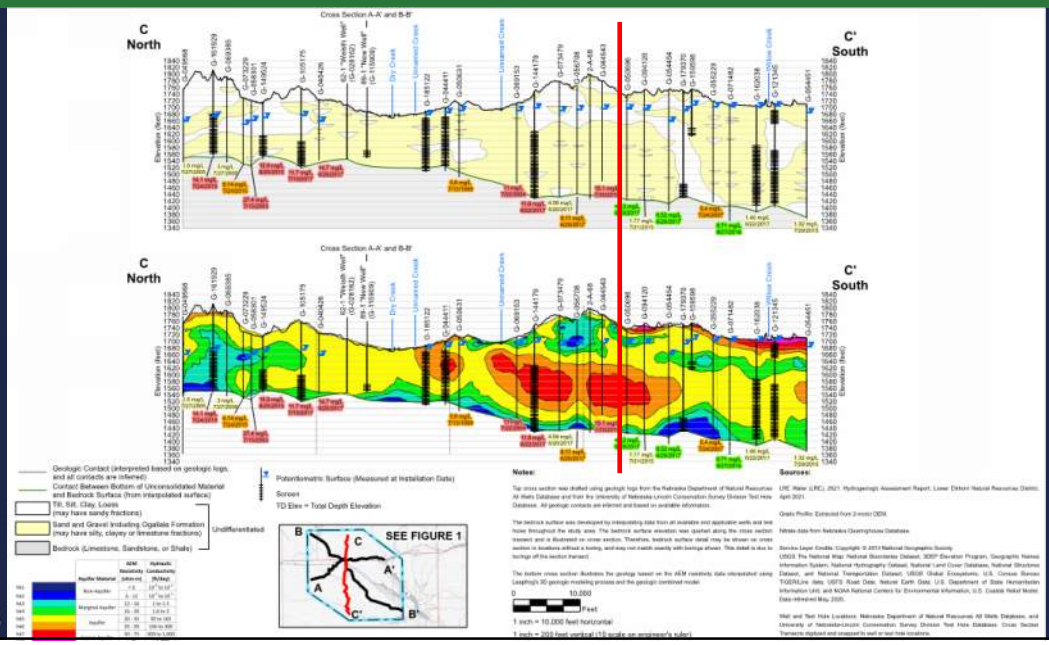
LRE Geologic Cross Section C-C' (N-S)



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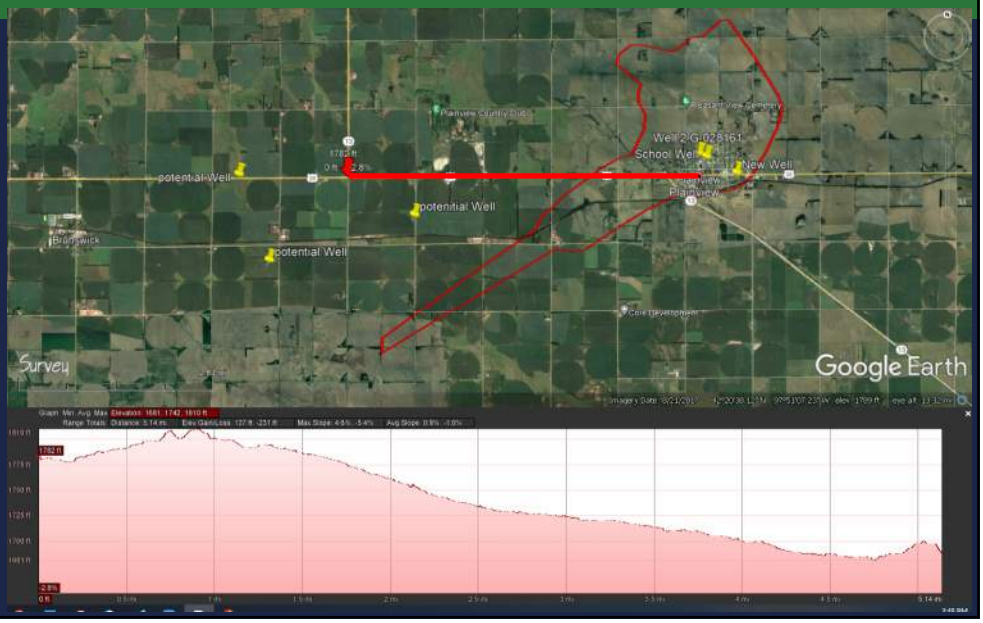
West New Source

- HWL Tank 1857
- Plainview Country Club Ground?



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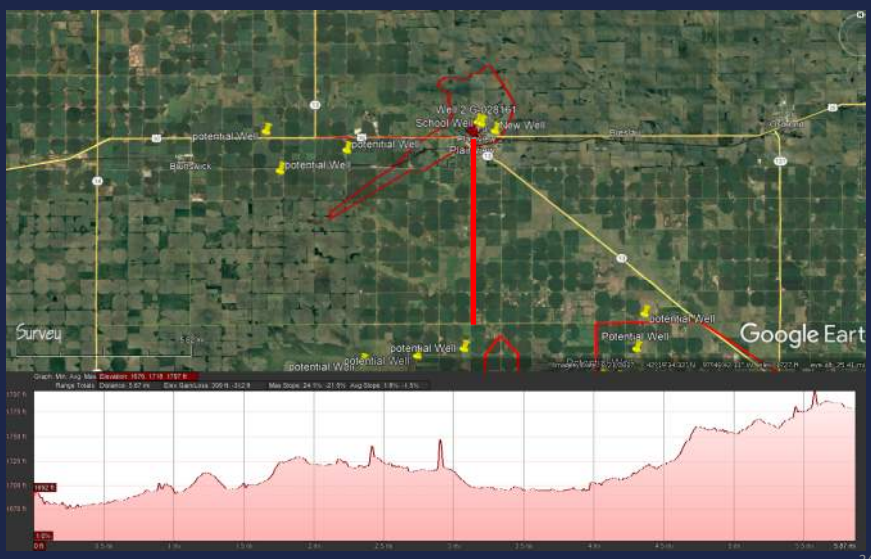
New Source South

- HWL Elevated Tank 1857



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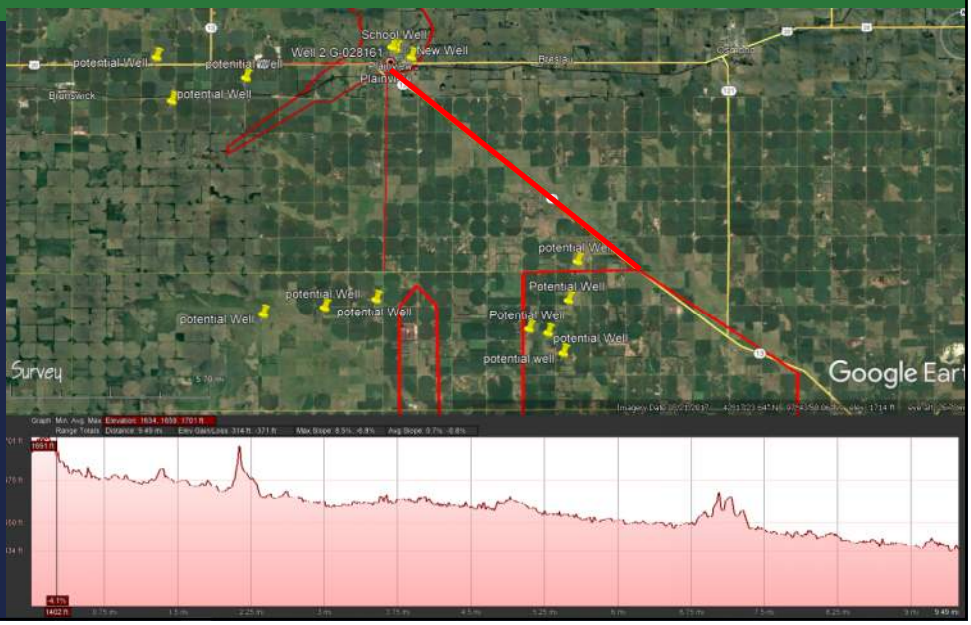
New Source Foster Area

- HWL Elevated Tank 1857
- Pumping Uphill



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New Source Cost

- Capital Cost for new Source 5 miles Piping and Two new Wells
  - $4,816,00
  - Principal and Interest Payment Assuming No Grants (20 years/2%)
    - $294,500/year
    - Approximately $37.12 per user per month at 661 Users
    - No Grant is unlikely – more like 50/50
    - Current Monthly User Base Rate = $32.00/month with $2.00/1,000 gallons on usage
    - Would put base rate at around $69.12/user + Usage at 2.25/1000 gallons w/o grant or around $51 with grants

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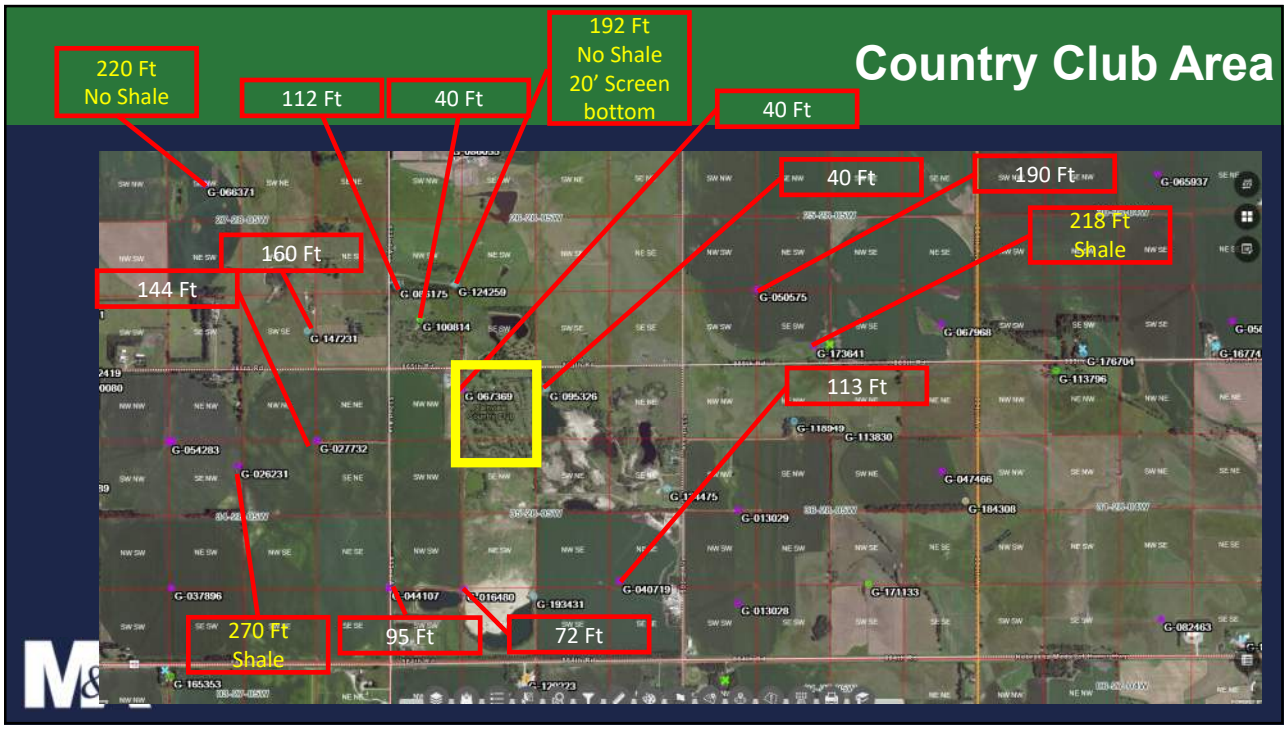
Country Club Area
220 Ft
No Shale
112 Ft
40 Ft
192 Ft
No Shale
20' Screen
bottom
40 Ft
40 Ft
190 Ft
218 Ft
Shale
160 Ft
144 Ft
113 Ft
270 Ft
Shale
95 Ft
72 Ft

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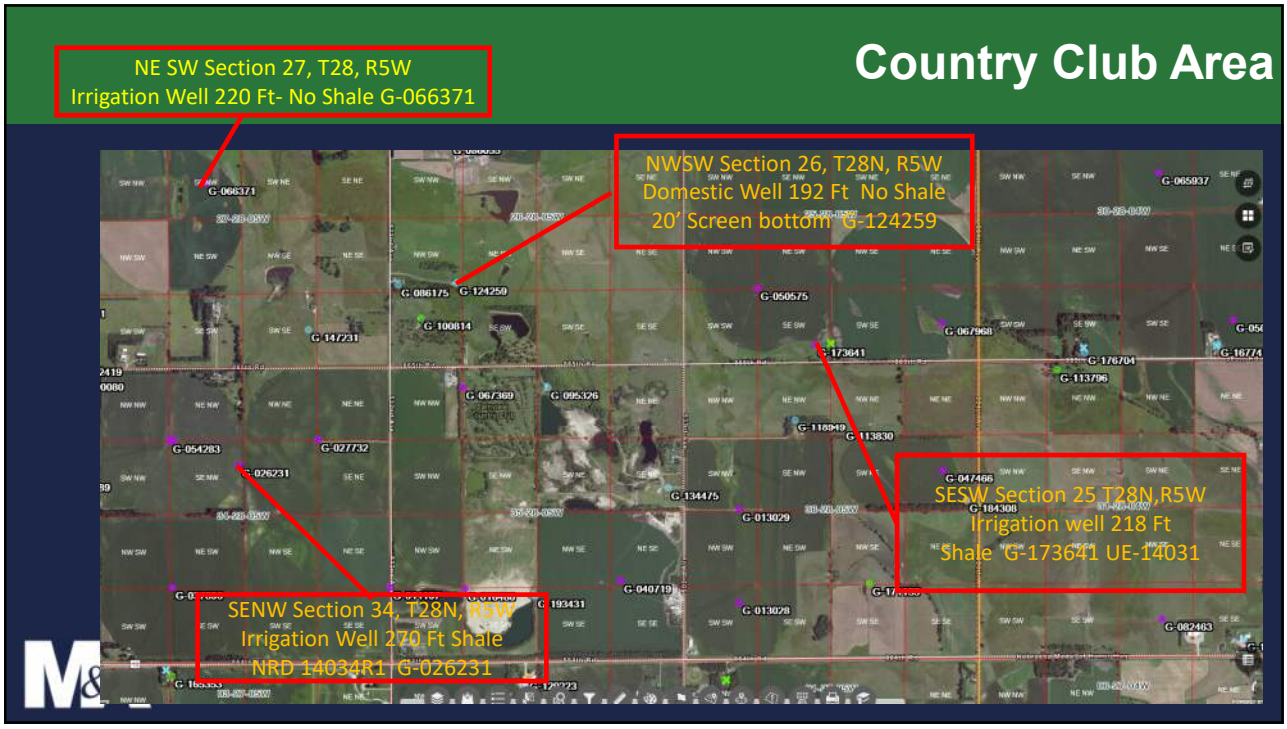
Country Club Area
NE SW Section 27, T28, R5W
Irrigation Well 220 Ft- No Shale G-066371
NWSW Section 26, T28N, R5W
Domestic Well 192 Ft No Shale
20' Screen bottom G-124259
SESW Section 25 T28N R5W
Irrigation well 218 Ft
Shale G-173641 UE-14031
SENW Section 34, T28N, R5W
Irrigation Well 270 Ft Shale
NRD 14034R1 G-026231

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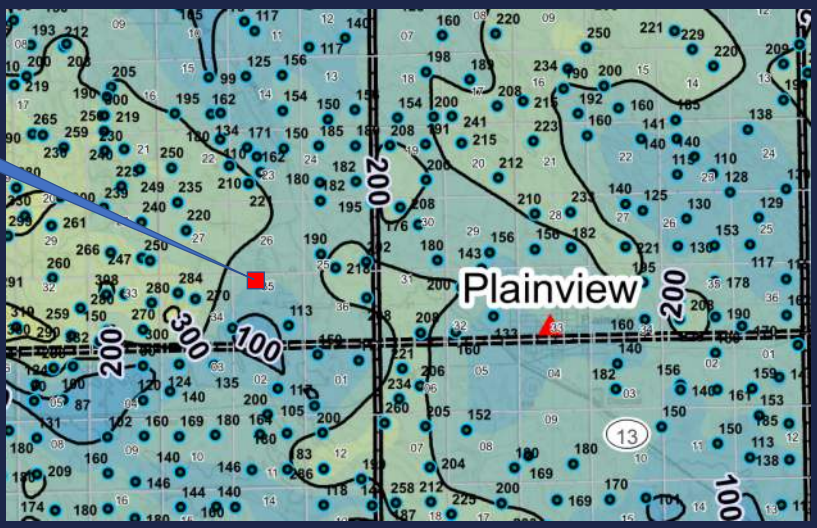
Well Depths



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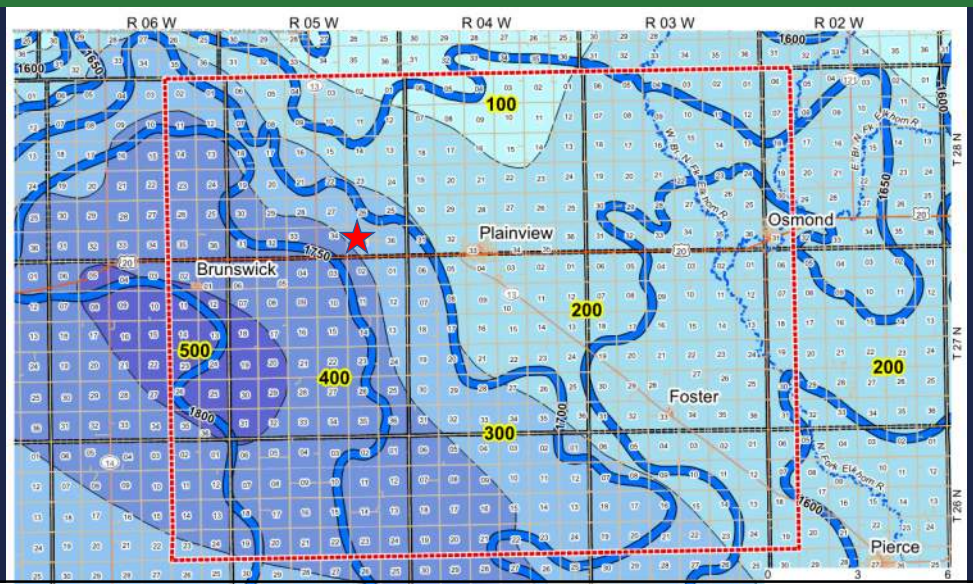
Saturated Thickness and GW flow



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Treatment Option

Additional Cost Items

- Need to provide dedicated piping to dedicated treatment site
- Need to address disposal
  - WWTF under Administrative Order for Capacity issues
- Grant Funds are for capital cost but do not cover O&M

Treatment Options

- Ion Exchange
  - Uses brine to regenerate media
- Reverse Osmosis
  - Disposal potential easier
  - Large volume waste

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RO Pictures

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IX Pictures

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Treatment Options

- Phased Approach?
- Start with 62-1?
- Add 89-1 if needed in future
- Preference of Location?

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2018 EPA Report

- On average Plainview uses 0.237 MGD.
- Cost do not include lagoons expansion or dedicated transmission line
- RO is more expensive but disposal is key to actual cost

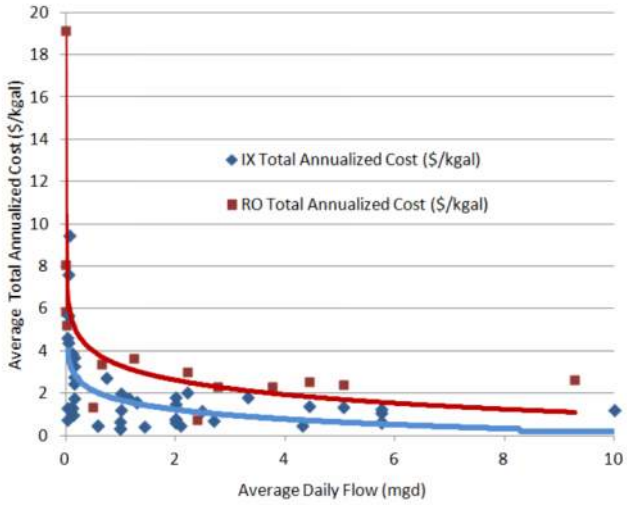

Figure 35. Cost curve of IX (blue) and RO (red) for nitrate removal.

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Summary Annual Equivalent Cost (AEC)

	New Source	RO Both	RO 62-1	IX Both	IX 62-1
Capital	$4,815,800	$7,206,760	$5,669,800	$7,166,350	$5,656,275
P&I Payment	$294,519	$440,742	$346,746	$438,270	$345,919
O&M	$13,190	$255,860	$183,030	$231,400	$178,500
AEC	$307,709	$696,602	$529,776	$669,670	$524,419

Based on 20-year term at 2%
LB1014e released today provides for 2.8M in grant funds for RO treatment for Nitrates
Applications are Due by September 30, 2022
LB1014e can be used with DWSRF funds which you qualify for 50% loan forgiveness

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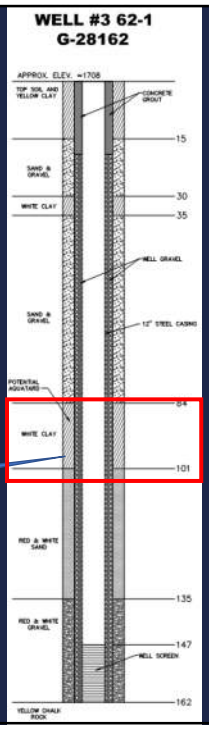
First Phase?

- Try to Seal Well 62-1
  - Seal Annulus and see if nitrates lower
- Total expenditures is less than $300,000 to renovate
- Renovate in Phases?



Seal this area from above gravels

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The Plan

- Seal Off Upper Layer Part A
- See if nitrates lower
- If "yes" then complete Part B
- *Less Expensive New Well*

Item	Units	Quantity	Unit Cost	Total Cost
Initial Capital Expenditures				
Well #62-1 Improvements				
Pull Pump and CCTV Casing to check for integrity	LS	1	$10,000	$10,000
Drill Casing and Seal Well Annulus	LS	1	$65,000	$65,000
Reset Pump	LS	1	$6,000	$6,000
NDHHS Submittals/Engineering	LS	1	$4,000	$4,000
			Subtotal Part A	$85,000
New Pump/Column/VFD	LS	1	$75,000	$75,000
Update Electrical	LS	1	$15,000	$15,000
SCADA Upgrades	LS	1	$10,000	$10,000
Update Piping/Flow Meter/Valves	LS	1	$25,000	$25,000
Portable/Stationary Generator	LS	1	$40,000	$40,000
			Subtotal Part B	$165,000
Contingency	LS	1	10%	$16,500
Design and Construction Services (10%)				$16,500
			Estimated Total Capital Costs	$283,000

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Phased Approach

- In next Year….Possible Steps if not decided tonight
  - Discussion on Application for LB1014e Due 9/30/22
  - Sample and verify nitrate concentration at County Club and Well 62-1
  - Decide if renovate Well 62-1
  - Decide if Proceed Central Treatment or New Source
- Submit Implementation Schedule to NDHHS by no later than July 14, 2023
  - If decision is known, we can provide with PER submission 6/30/22

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Closing Comments

- **AO requires you to perform a PER by July 14, 2022 to select the best long-term solution for Plainview**
  - **Blending**
  - **Well 62-1 Renovations**
  - **New Source**
  - **Consolidation**
  - **Treatment**
- **The PER is due to the State by June 30th for reimbursement**
  - **Guidance on City preference to Finish PER**
- **We have until July 2023 to submit a final compliance schedule to NDHHS**
- ***Our Goal is to have Council Authorize City Administrator to sign necessary documents and submit to WWAC by June 30th.***

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Comments/Questions
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