

Water Committee Meeting
 Wednesday, January 8, 2025 6:00 PM
 Lower Platte North NRD Office
 P.O. Box 126
 Wahoo, NE 68066

1. UNFINISHED BUSINESS

2. REGULATORY

2.A. GROUND WATER MANAGEMENT AREA

2.A.1. Variance Request in the Hydrologically Connected Area (Limited Development Area)

2.A.2. Variance Requests in the Non-Hydrologically Connected Area (Normal Development Area)

Doug Bartek received an approved expansion of acre variance (LPN-V024-0635 in NHCA area) for 64 acres located in the NE SW 23-16-8E, Saunders County on September 10, 2024. Doug talked to a pivot and well drilling company about installing a pipeline from the existing well. The well driller said that if he plans on running a pipeline for that distance, the pipe will keep coming apart with the amount of pressure within the pipe. The well driller suggested that drilling a well would be more efficient. Doug has applied for a well permit, which will be on Dalton Bartek land. A map is attached showing the proposed location of the well.

A motion is needed to change this variance from expansion to a new well variance, for 64 approved acres.

2.A.3. Variance Requests in the Restricted Development Areas

2.A.4. Well Permit Program

2.A.4.a. Well Permits Approved

The total number of approved permits for 2024 is 36

Location of Approved Well Permits for 2024: Correct as of 1/8/2025.

County	Irrigation - New	Irrigation - Replacement	Stock
Butler	5	1	
Colfax	1		
Dodge	1	2	
Boone	4		

Madison			
Platte	4	5	
Saunders	5	4	
Total	20	12	

2.A.5. Cost Share Programs

2.A.5.a. Flow Meter Maintenance Program

Mark with Tri-City Meters is continuing meter maintenance.

2.A.6. LPNNRD Operator Certification

Attached are upcoming certification classes.

2.B. Phase Area Update

Staff have 2 situations that have arisen on flow meter installations.

1. One producer has an option on his field with an irrigation well for a solar farm, with the intention of the company starting development in the next year. The committee directed staff to allow this producer 1 year to see if this solar farm actually gets developed.

2. A well that irrigates 3 acres and is only used periodically needs a flow meter? Rules from Section G, Rule 5 in Phase Two Groundwater Management. "All operators will submit a Fertilizer Application Report to the District for each field 19 acres in size or larger, at the end of each crop year or by December 15 of each year." The committee felt as this in a water quality area, then delaying the flow meter installation would be appropriated.

Staff continue to receive applications and invoices from the Schuyler/Richland Management area.

Applications that have been received:

Flow Meter Applications:

Thomas Fichtl	\$1,000.00
Thomas Fichtl	\$1,000.00
Thomas Fichtl	\$1,000.00
Thomas Fichtl	\$1,000.00
Jay Kment	\$1,000.00

Jay Kment	\$1,000.00
Beau Klug	\$1,000.00
Gregg Melliger	\$1,000.00
Gregg Melliger	\$1,000.00
Dean Shonka	\$1,000.00
Dean Shonka	\$1,000.00
Tom Svatora	\$1,000.00
Tom Svatora	\$1,000.00
Tom Svatora	\$1,000.00
Midland Land LLC	\$1,000.00
Midland Land LLC	\$1,000.00
Midland Land LLC	\$1,000.00
Trish Vojtech	\$1,000.00
Skytown Properties	\$1,000.00
Lonnie Kitt	\$1,000.00
Bonnie Wolta	\$1,000.00

Cover Crop Applications.

Cover crop applications are \$5/acre over EQIP.

Tom			
Svatara	66 acres	\$ 330.00	Wheat
Lanny			
Schmid	40 acres	\$ 200.00	Rye
Lanny			
schmid	120 acres	\$ 600.00	Rye
Lanny			
schmid	100 acres	\$ 500.00	Rye
Skytown Properties			Rye

Variable Rate Nitrogen Program:

Variable Rate Nitrogen Program is an additional \$10 over EQIP

Trish Vojtech		
ch	80 Acres	\$800.00

Soil Moisture sensors

Jay Kment	\$750.00
Midland Land LLC	\$750.00
Trish Vojtech	\$750.00
Skytown Properties	\$750.00

Invoices Received:

CMC Land Holdings LLC, 1 flow meter for \$1,000.
Big Dog's Properties LLC , 1 Flow Meters. \$1,000
MJM Farms LLC, 2 Flow Meters, \$2,000
Edwin Slavik, 2 Flow Meters, \$2,000.
Calvin and Karen Nelson Trust, 1 Flow Meter, \$1,000
Leamder Rerucha, 1 Flow Meter, \$1,000.
Lost Creek LLC, 1 Flow Meter, \$1,000.
Daniel Zoucha, 1 Flow Meter, \$1,000.

2.C. Nitrogen Reduction Incentive Program

The Lower Platte North has a contract with NeDNR for \$38,058.73 for the Nitrogen Reduction Incentive Program. Attached is a spreadsheet of applications received for 3,512 acres for a total of \$42,581. Applications have come from Priority A, B and C with utilizing biologicals the practice majority of the producers checked.

Ranking will be conducted with approval at the next Water Committee Meeting.

- Rankings discussed at earlier water committee meetings have A being the top priority, followed by B then C.
- Some of the producers have been using biological for a couple of years. If they are approved, staff feel like they should soil sample and decrease nitrogen application from their recommendations.
- Documentation will include past FSA records, NRD records and/or soil analysis.
- Total acres per producer in B and C will also be considered when ranking the applications.
- Other considerations?

Detailed review will be done at the next Water Committee Meeting.

3. GROUND WATER PROGRAMS

3.A. DECOMMISSIONED WELL PROGRAM

3.A.1. Well Estimates

2 new wells have been reviewed and approved for decommissioning since the last Committee meeting.

Well Owner	Type of Well	NRD Cost Share Estimate	Shell Creek Cost Share
Timothy Mueller	Irrigation	\$1,585.27	528.42
Kern Family Farms LLC	Irrigation	\$752.89	0.00

3.A.2. Plugged Wells

3 wells have been plugged, reviewed, and ready for cost share payment approval this month.

Well Owner	Type of Well	NRD Cost Share Estimate	Shell Creek Cost Share	
Joe, Nick and Harry Schmit	Irrigation	\$1000.00	0	
Tony Meister	Irrigation	\$1288.29	0	
Daryl Sander	Irrigation	\$1375.35	\$458.45	

3.B. LOWER PLATTE NORTH NRD GROUND WATER STUDIES

3.B.1. Water Leaders Academy

At the December Board Meeting, it was recommended that the Water Committee review an option to provide funding for the Water Leaders Academy for residents within the District. Attached is a policy example from UBBNRD. The Committee would like to handle this case by case, for people that are interested in the Water Leader Academy.

4. Groundwater Management Plan

Jon Mohr from LRE presented an overview of the draft GWMP. Discussion with staff and the committee involved confined and unconfined aquifers, aquifer sub-areas, variance scoring sheet and water quality. More in-depth discussion for the Board and Committee will be held at the **Groundwater retreat on Friday, February 7, from 10 to 3**. David Hume - PG from LRE will be in attendance to discuss numerous items on the agenda. Please let staff know if you plan on coming for a food count and if a quorum will be present at the retreat. It is encouraged for other Board members to attend.

Tentative Agenda:

- NRD topics
- Groundwater Basics
- Groundwater Management Plan Review
- Recommendations Discussion
 - Triggers, scoring sheet, observation wells, sub-areas
- Open Groundwater Discussion
- NRD topics/ Discussion

Public meetings are scheduled for January 9 in Wahoo and January 16 in Platte Center. Information gathered from the Board/Committee, staff, stakeholders and the

public will be reviewed and presented at the Water Retreat on February 7. Discussion is needed on the aquifer sub-areas so LRE can finish the graphs of the wells for the sub-areas. Attached are sub-areas, draft GWMP and presentation for review.

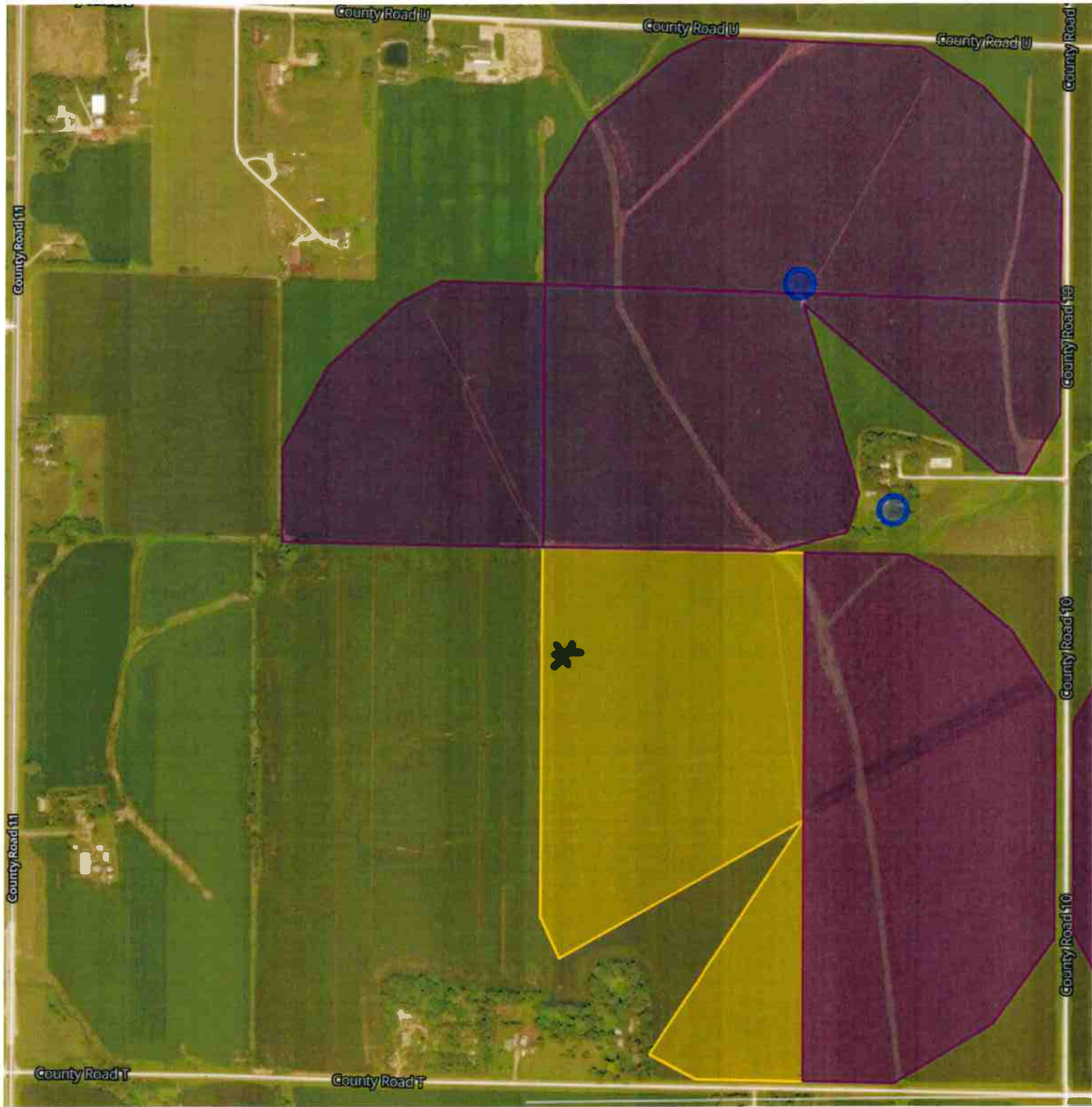
Attached is an invoice for \$2172.75 for November.

5. SURFACE WATER PROGRAMS

5.A. STATE LAKES, FOR THE WEEK OF

6. OTHER

6.A. COMMENTS FROM THE PUBLIC



NW SE 23-16-8E

2025 LPNNRD Certification Classes For Nitrogen and Water Management

<u>Date</u>	<u>Time</u>	<u>Town</u>	<u>Location</u>
Tuesday, January 21, 2025	10:00 AM - 12:00 PM	David City	Highway 92 Building, 3190 N Road
Wednesday, January 22, 2025	6:00 PM - 8:00 PM	Columbus	Ag Park, 822 15th Street
Thursday, February 6, 2025	1:00 PM - 3:00 PM	Ithaca	Eastern Nebraska Research, Extension and Education Center, 1071 County Road G
Thursday, February 13, 2025	10:00 AM - 12:00 PM	Lindsay	Lindsay Community Center, 121 Pine Street
Tuesday, February 18, 2025	6:00 PM - 8:00 PM	Fremont	Dodge County Nebraska Extension Office, 1206 W 23rd Street
Tuesday, March 18, 2025	7:00 PM - 9:00 PM	Ithaca	Eastern Nebraska Research, Extension and Education Center, 1071 County Road G

You are encouraged to collect a water sample from your Domestic well the morning of the class you attend (listed above). The sample should be in a clean, rinsed container (jar or bottle of at least 15 Fluid Ounces) with the time collected identified. Staff of LPNNRD will take the sample to the Nebraska State Laboratory for testing and send the sample result to you.

► UNL Extension Educator classes which fall on the same day as an above class:

Jan 22 – 1:30 PM – Ag Park (Columbus) – Private Pesticide Training - Pre-registration required by calling the Platte County Extension Office at (402) 563-4901

Feb 6 – 9:00 AM – ENREEC (Ithaca) – Private Pesticide Training – Pre-registration required by calling the Saunders County Extension Office at 402-624-8030

Feb 6 – 6:00 PM – ENREEC (Ithaca) – Private Pesticide Training – Pre-registration required by calling the Saunders County Extension Office at 402-624-8030

Mar 18 – 1:00 PM – ENREEC (Ithaca) – **Chemigation** – Pre-registration required by calling the Saunders County Extension Office at 402-624-8030

Crop Type	Priority Area	\$/ac	County	Date Received	Acres	Total \$/Field
Corn	A	\$ 15.00	Colfax	1/6/2025	137	\$ 2,055.00
Corn	A	\$ 15.00	Colfax	1/6/2025	100	\$ 1,500.00
Corn	A	\$ 15.00	Colfax	1/6/2025	107	\$ 1,605.00
Corn	A	\$ 15.00	Colfax	1/6/2025	87	\$ 1,305.00
Corn	B	\$ 12.00	Butler	12/31/2024	80	\$ 960.00
Corn	C	\$ 10.00	Saunders	12/30/2024	80	\$ 800.00
Corn	C	\$ 10.00	Saunders	12/30/2024	40	\$ 400.00
Corn	C	\$ 10.00	Saunders	12/30/2024	76	\$ 760.00
Corn	C	\$ 10.00	Saunders	12/20/2024	280	\$ 2,800.00
Corn	B	\$ 12.00		12/20/2024	53	\$ 636.00
Corn	A	\$ 15.00	Colfax	1/3/2025	140	\$ 2,100.00
Corn	C	\$ 10.00	Saunders	12/31/2024	170	\$ 1,700.00
Corn	A	\$ 15.00	Colfax	11/18/2024	120	\$ 1,800.00
Corn	A	\$ 15.00	Colfax	11/18/2024	40	\$ 600.00
Corn	B	\$ 12.00	Colfax	11/18/2024	130	\$ 1,560.00
Corn	C	\$ 10.00	Saunders	1/7/2025	69	\$ 690.00
Corn	C	\$ 10.00	Saunders	1/7/2025	87	\$ 870.00
Corn	C	\$ 10.00	Saunders	1/7/2025	74	\$ 740.00
Corn	B	\$ 12.00		12/5/2024	120	\$ 1,440.00
Corn	A	\$ 15.00	Colfax	12/5/2024	77	\$ 1,155.00
Corn	B	\$ 12.00	Platte	1/7/2025	91	\$ 1,092.00
Corn	B	\$ 12.00	Platte	1/7/2025	54	\$ 648.00
Corn	B	\$ 12.00	Platte	1/7/2025	76	\$ 912.00
Corn	B	\$ 12.00	Platte	1/7/2025	78	\$ 5,736.00
Corn	B	\$ 12.00		11/22/2024	167	\$ 2,004.00
Corn	C	\$ 10.00	Platte	12/17/2024	39	\$ 390.00
Corn	B	\$ 12.00	Platte	12/17/2024	82	\$ 984.00
Corn	C	\$ 10.00	Platte	12/17/2024	51	\$ 510.00
Corn	C	\$ 10.00	Platte	12/17/2024	50	\$ 500.00
Corn	C	\$ 10.00	Platte	12/17/2024	180	\$ 1,800.00
Corn	B	\$ 12.00	Saunders	1/7/2025	114	\$ 1,368.00
Corn	B	\$ 12.00	Saunders	1/7/2025	73	\$ 876.00
Corn	B	\$ 12.00	Saunders	1/7/2025	110	\$ 1,320.00
Corn	B	\$ 12.00	Saunders	1/7/2025	145	\$ 1,740.00
Corn	A	\$ 15.00	Colfax	12/20/2024	135	\$ 2,025.00
					3512	\$42,581.00

Water Leaders Academy Sponsorship

The Upper Big Blue Natural Resources District will sponsor one individual per year to attend the Nebraska Water Leaders Academy. The purpose of this sponsorship is to provide training to those who may eventually serve on the NRD board of directors or in another water leadership capacity.

- The sponsorship will be provided to any district resident (non NRD employee) with interest in attending. It is not restricted to those working in natural resources or land management.
- If there is funding from another source (such as an employer) for a participant, it is recommended that those options be utilized first.
- Each applicant must have a board member recommendation in order to be considered for the sponsorship.
- The application for the Nebraska Water Leaders Academy will also be the application used for the NRD sponsorship (includes a one-page description of why you want to attend the program, a resume, and a letter of recommendation).
- Applications to the Nebraska Water Leaders Academy are due by December 1 (but may be submitted at any time earlier). Early application is preferred as the cohort may fill up. Applications for the NRD sponsorship should be submitted by September 1 so that the candidates may be discussed and voted upon at the September or October executive committee and board meeting. When an applicant has been approved for the sponsorship from the NRD, it is their responsibility to submit their application to the Nebraska Water Leaders Academy. **Approval from the NRD for the sponsorship does not guarantee acceptance into the Water Leaders Academy.**
- For consideration for the NRD sponsorship, please submit your application materials to chouston@upperbigblue.org.

Cost and Responsibilities

- The total tuition for attendance of the Water Leaders Academy includes lodging and meals. The first \$500 associated with tuition is the responsibility of the applicant. This is considered an application fee.
- NRD scholarship will cover full tuition cost minus \$500. Additional costs (travel cost, incidentals, etc.) are not covered by scholarship and are the responsibility of the applicant.
- The program includes six 1.5-day sessions in a variety of locations across the state. To receive the NRD sponsorship funds, the selected applicant must attend at least five of the sessions.
- The NRD sponsorship funds will be available as a reimbursement at the completion of the program.
- The selected applicant is expected to give a brief presentation to the board upon completing the Water Leaders Academy.

- If the Nebraska Water Leaders Academy class is full, the applicant may be asked to delay entry until the following year. The NRD sponsorship would remain available to the candidate for a later entry.



LOWER PLATTE NORTH
Natural Resources District



Water Committee

Wednesday, January 8, 6:00PM

LPNNRD Office

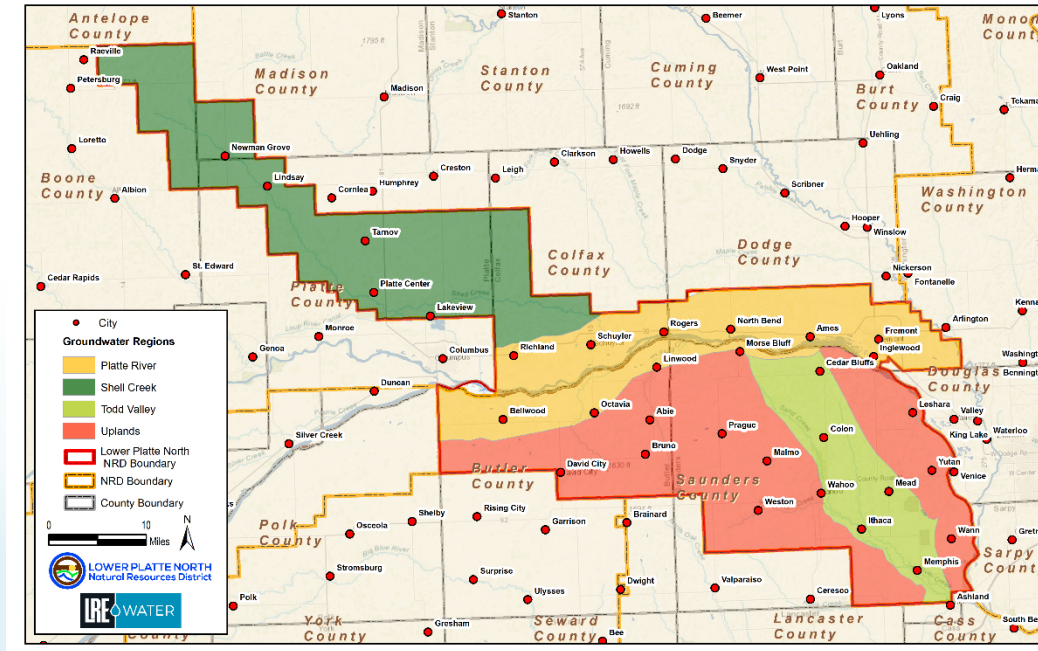
GROUNDWATER MANAGEMENT PLAN & RECOMMENDATIONS UPDATE

LREWATER.COM

ROCKY MOUNTAIN | MIDWEST | SOUTHWEST | TEXAS

AGENDA

1. Groundwater Management Plan Status
2. Subareas
3. Hydrographs
4. Quantity Triggers
5. Scoring Sheet
6. Quality Triggers
7. Retreat Agenda
8. GWMP Schedule



GROUNDWATER MANAGEMENT PLAN STATUS

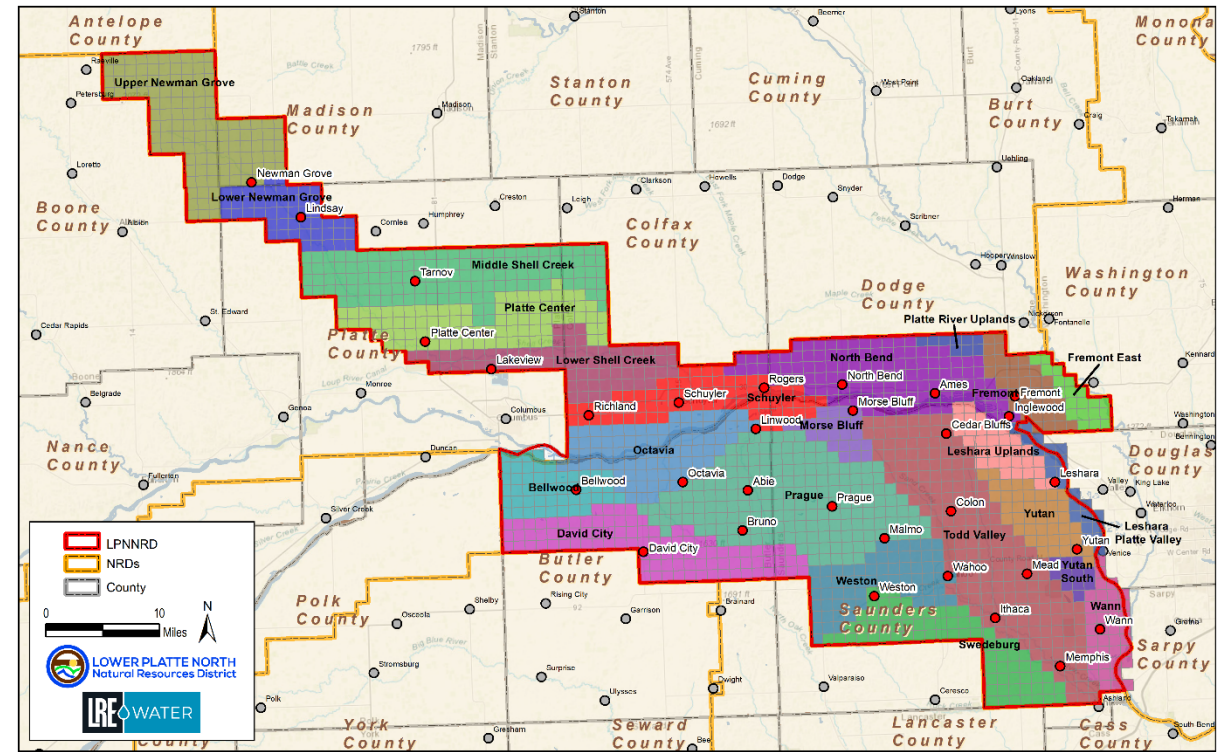
GROUNDWATER MANAGEMENT PLAN

- Original draft shared with staff November 2024
- Technical discussions Nov. 18 & Dec. 31
- Second draft (v. 5.0) completed Jan. 2 and will be used for Stakeholders, Board, public review
- Recommendations Memo from LRE provided Jan. 6 – intended to start a discussion

SUBAREAS

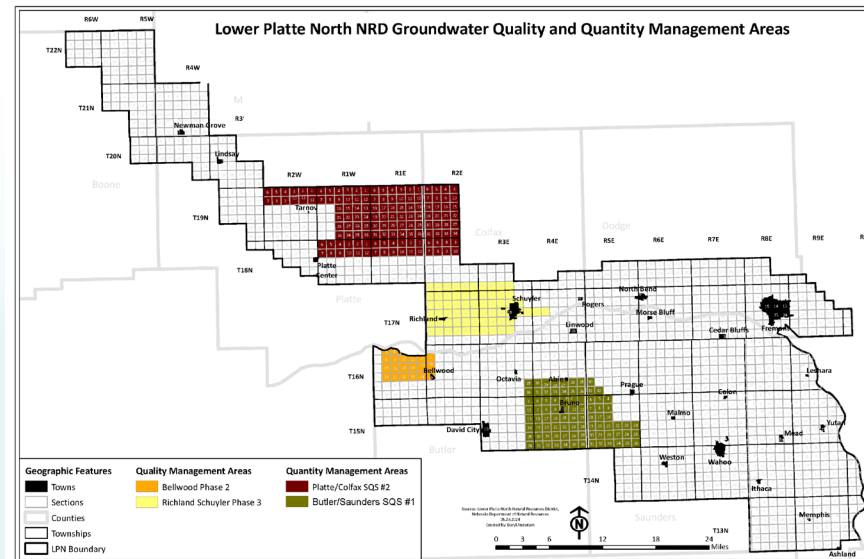
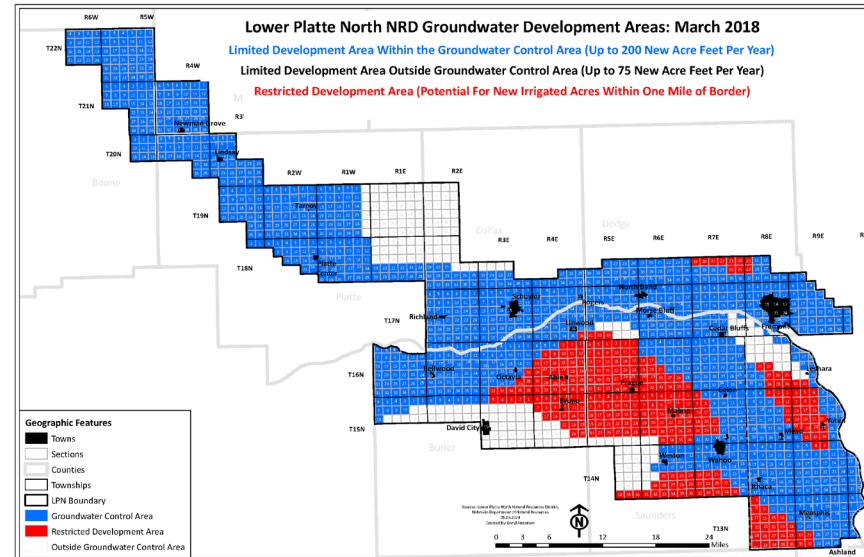
SUBAREAS

- Localized management
- Tailored solutions to hydrogeologic conditions
 - Saturated sand/gravel thickness
 - Topography
- Efficient resource allocation
- Enhance monitoring and data collection
- Community involvement



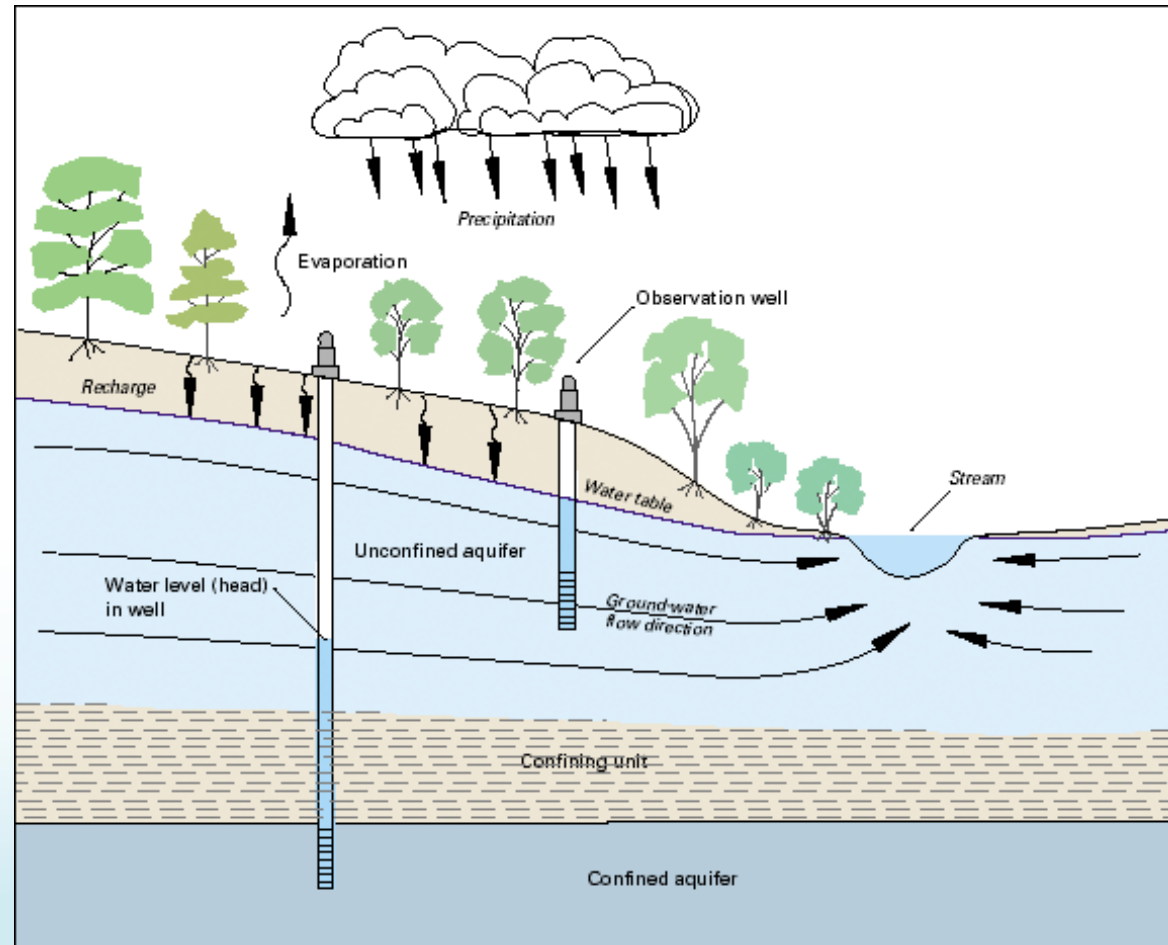
SUBAREAS

- Quality and Quantity Groundwater Management Areas (GWMAs) will not change
- Future GWMAs could include only parts of a subarea, or cross boundaries of multiple subareas



HYDROGRAPHS

CONFINED VS. UNCONFINED

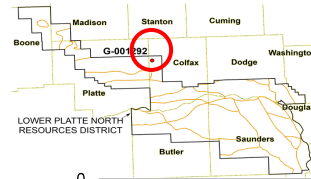


HYDROGRAPHS

- LRE created three templates based upon well depth
 - 0 to 100 ft
 - 0 to 250 ft
 - 0 to 500 ft
- Well location, depth, top/bottom of screen, well density, subarea, legal, reg. name, and lithological description
- Creating hydrographs for all spring/fall wells (~200) after subareas are finalized

HYDROGRAPHS (0 TO 250 FT)

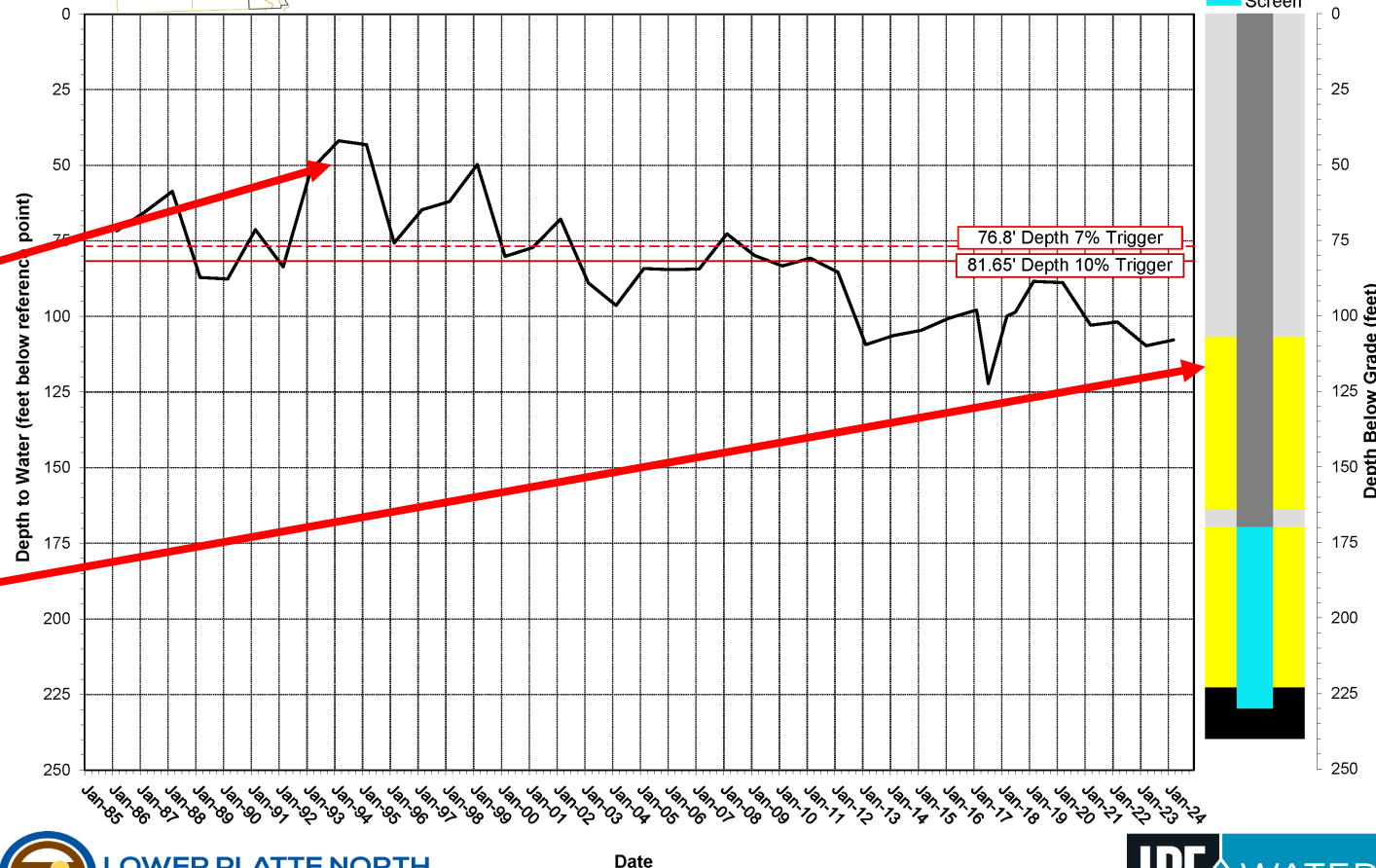
- Platte/Colfax SQS
- Well was confined, now is nearing unconfined conditions
- Improvements in 2016



LOWER PLATTE NORTH NATURAL RESOURCES DISTRICT
 G-001292/SC-44A
 SUB AREA: PRAGUE
 SPRING LEVELS DEPTH TO WATER VS. TIME
 NE 1/4 Se 1/4 SEC 7, T19N, 2E
 JANUARY 1985 THROUGH DECEMBER 2024

Well Depth: 230 ft
 Top of Screen: 170 ft
 Bottom of Screen: 230 ft
 High Capacity Wells Within 1-Mile Radius: 7

Clay
 Sand
 Sandstone
 Shale
 Limestone
 Casing
 Screen



C:\Projects\LPN NRD Hydrographs\LPN_Well_Data\1111_Template_Working G-001292_SC-44A P-3 DRAFT 2.71, Hydrograph Const.



QUANTITY TRIGGERS

QUANTITY TRIGGERS

- Need to differentiate between confined aquifers and unconfined aquifers
- Consider relying on a qualitative analysis (e.g. water level trends, IMP, known well interference, etc.)
- Triggers in place since 1987, but have not yet triggered a Groundwater Management Area

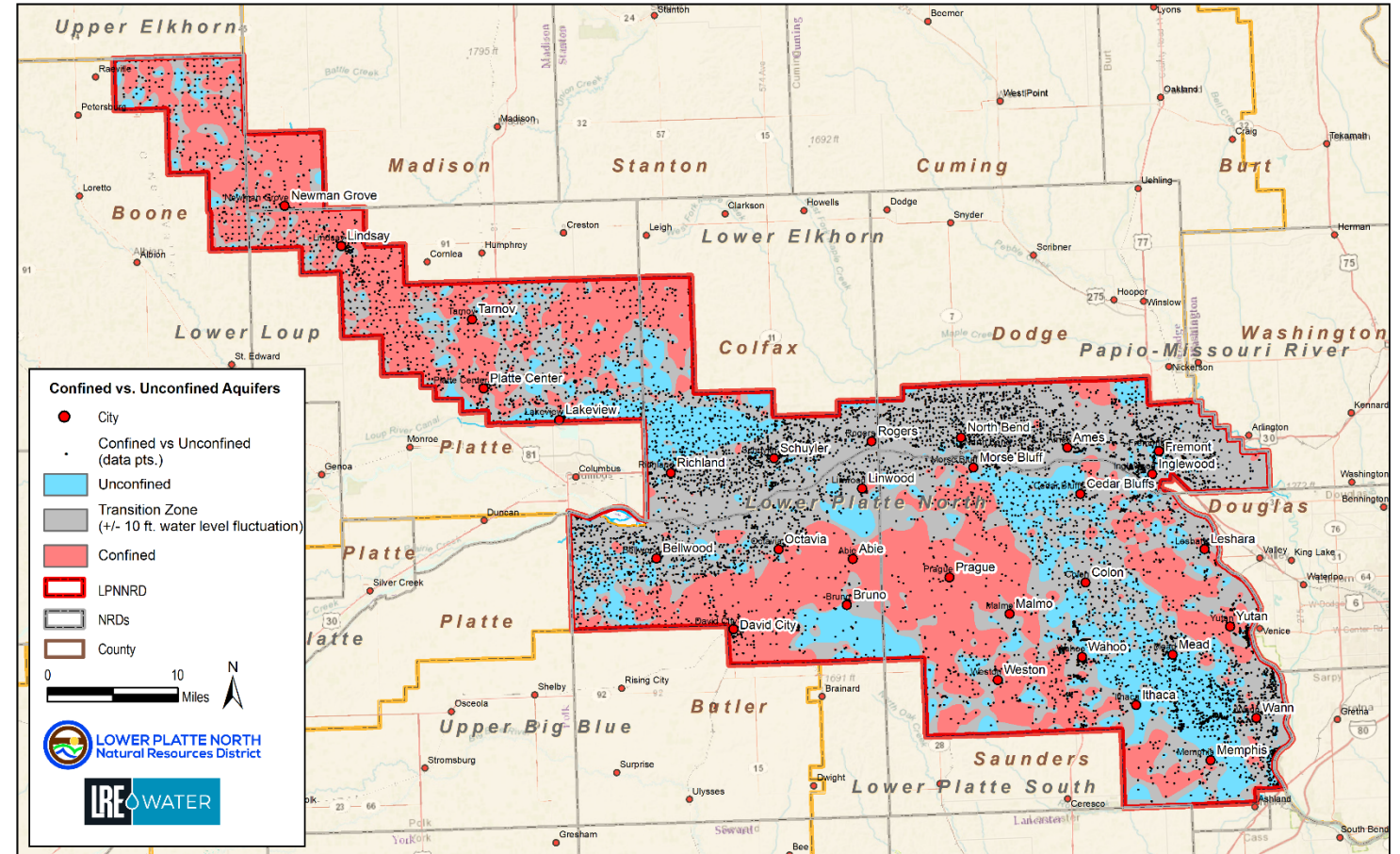
QUANTITY TRIGGERS

- Refine monitoring program
- Utilization of observation wells, in addition to spring/fall statics, in areas with limited data
- Seasonal review of water level trends in areas of quantity concern
- Ensure subareas each have spatially representative data

SCORING SHEET

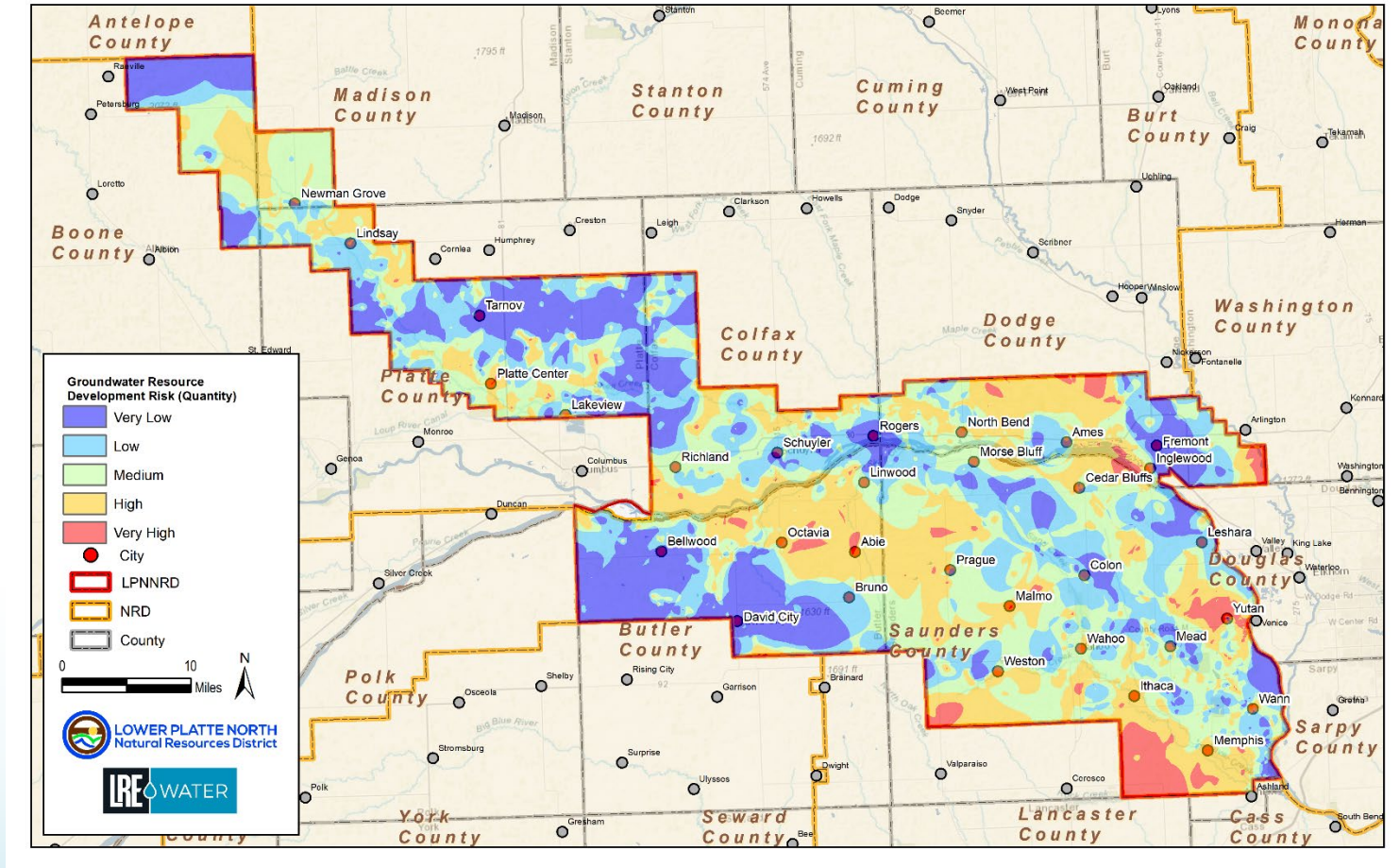
VARIANCE SCORING SHEET

- Current scoring criteria doesn't differentiate confined vs. unconfined systems
- Add factors to consider evaluation of high-capacity and domestic well interference



VARIANCE SCORING SHEET

- Separate sheet for confined & unconfined
- Resource Development Risk
- High-capacity well density
- Water level trends
- Others considerations



QUALITY TRIGGERS

WATER QUALITY

- LRE didn't conduct a detailed evaluation of quality triggers
- Public health considerations, economic impacts

NRD	PHASE I	PHASE II	PHASE III	PHASE IV
LPN	0 – 8	8 - 10	10 – 15	> 15
LE	0 to 5	5 to 9	> 9	N/A
PMR	0 to 5	5 to 8	> 8	N/A
LPS	0 to 7.5	7.5 to 10	> 10	N/A
LL	0 to 6.5	> 6.5	N/A	N/A

RETREAT PLANNING

RETREAT PURPOSE

- 1) Allow ample time to discuss the content within the Groundwater Management Plan
- 2) Provide an opportunity to discuss LRE's recommendations in greater details (Dave Hume, PG, in-person)
- 3) Provide basic education on groundwater terminology
- 4) Allow for Board and staff to ask open ended questions
 - *Begin tabulating questions now*

RETREAT AGENDA (DRAFT)

February 7, 2025 – 10:00AM to 3:00PM

- 1) NRD Topics TBD (10-11 AM)
- 2) Groundwater Basics (11-11:30AM) (LRE arrive)
- 3) Groundwater Management Plan Review (11:30-Noon)
- 4) Lunch (@ 12:00 – 12:30)
- 5) Recommendations Discussion (12:30 to 1:30)
 - Triggers, scoring sheet, observation wells, subareas
- 6) Open Groundwater Discussion (1:30 to 2:00) (LRE depart)
- 7) NRD Topics / Discussion (2:00 to 3:00)

GWMP SCHEDULE

SCHEDULE AND MILESTONES

- Draft Plan Available – Jan. 8, 2025
- Recommendations Memo – Jan. 8, 2025
- Stakeholder Group / Open House (Round 2)
 - Wahoo – Jan. 9, 2025
 - Platte Center – Jan. 16, 2025
- Board Retreat – Feb. 7, 2025
- Finalize Plan – Feb. 2025
- Agency Review/Approval Hearing – March/April 2025

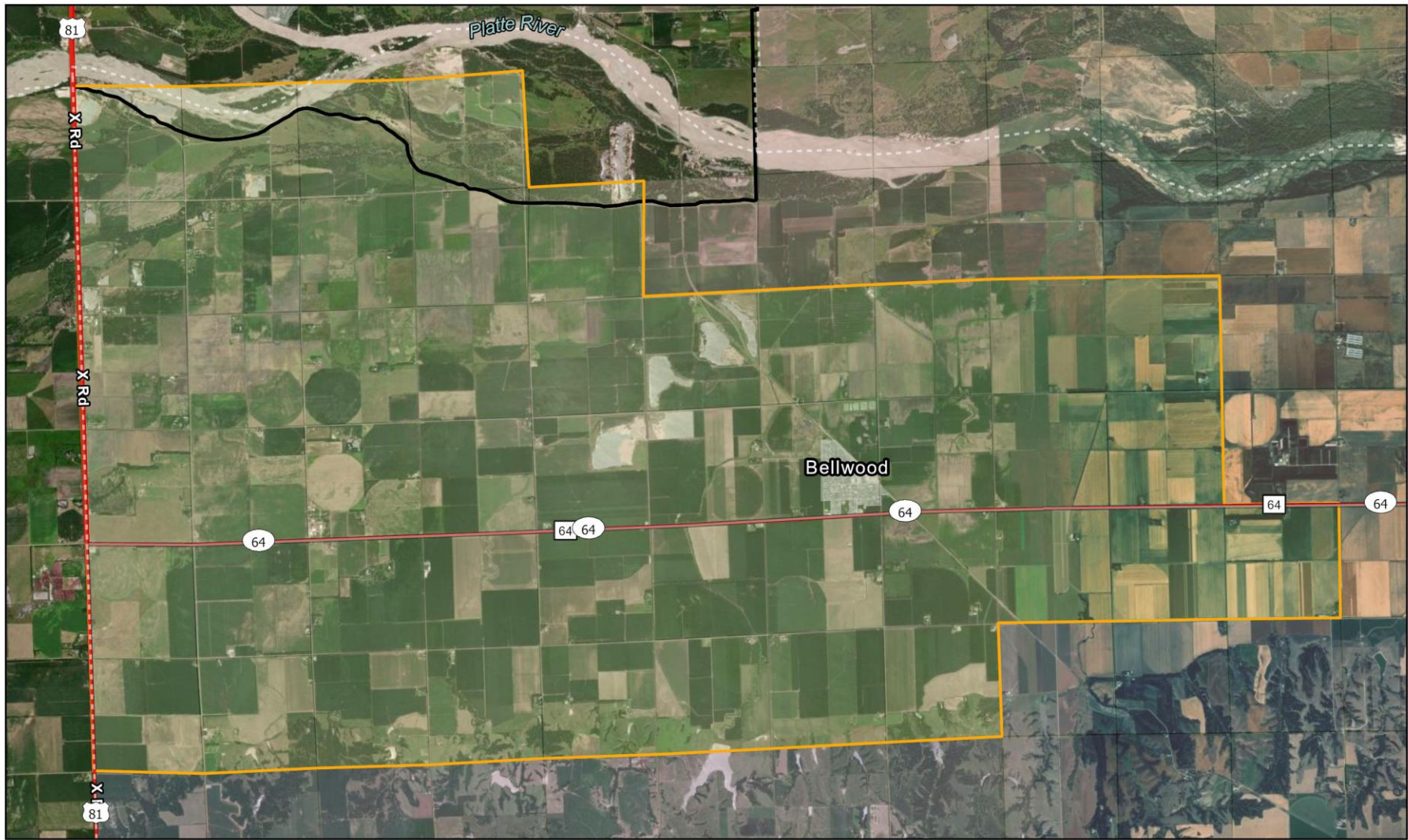


CONNECTING WATER TO LIFE



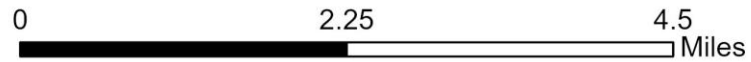
Water Quantity Aquifer Sub-Areas (Draft)

1/7/2025



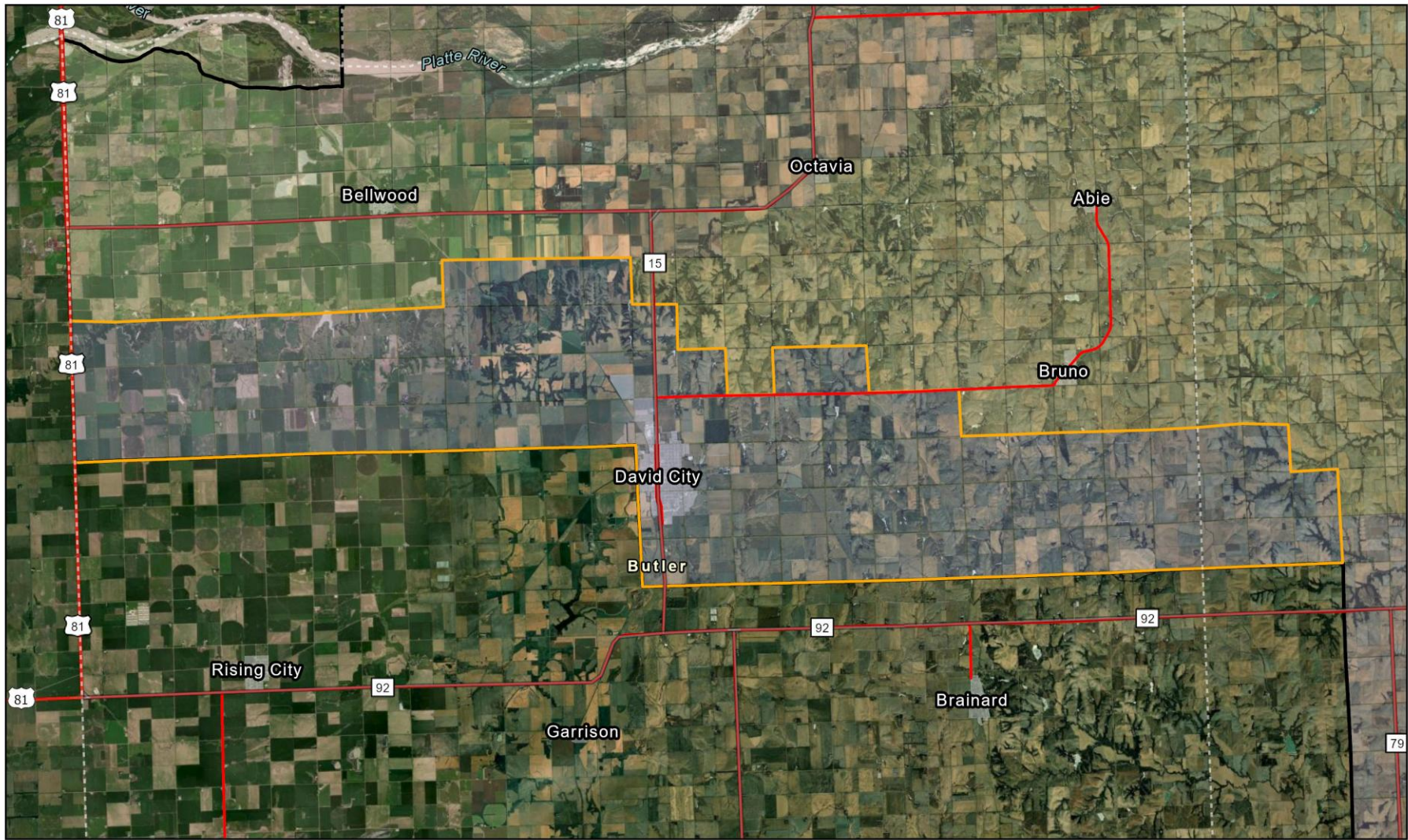
Groundwater Management Area

Bellwood



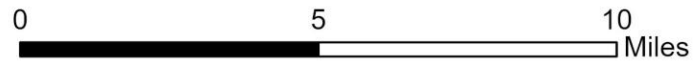
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NAD 1983 StatePlane Nebraska FIPS 2600 (US Feet)
Data: LRE/LPNNRD Imagery: NRCS





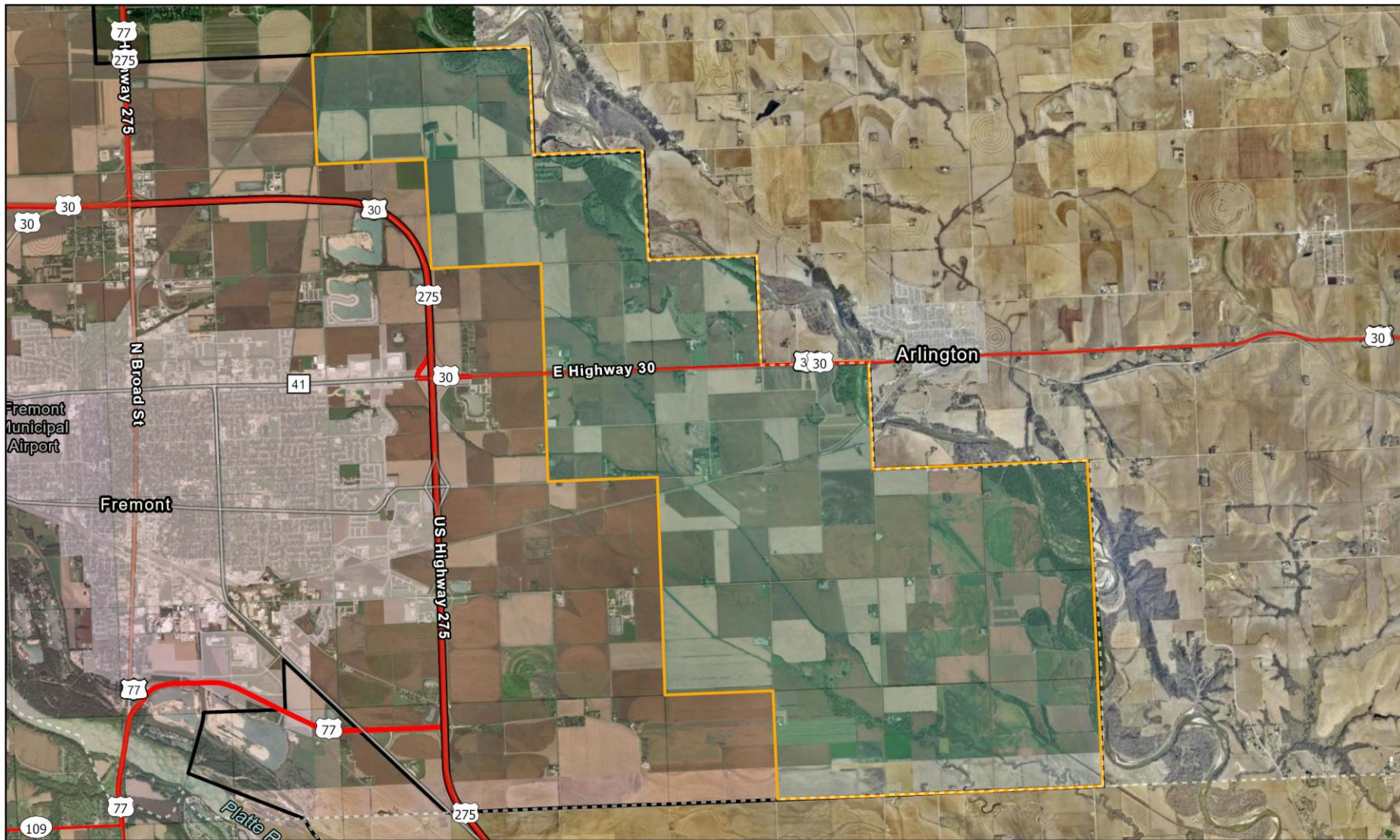
Groundwater Management Area

David City

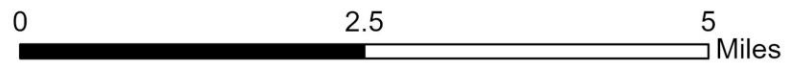


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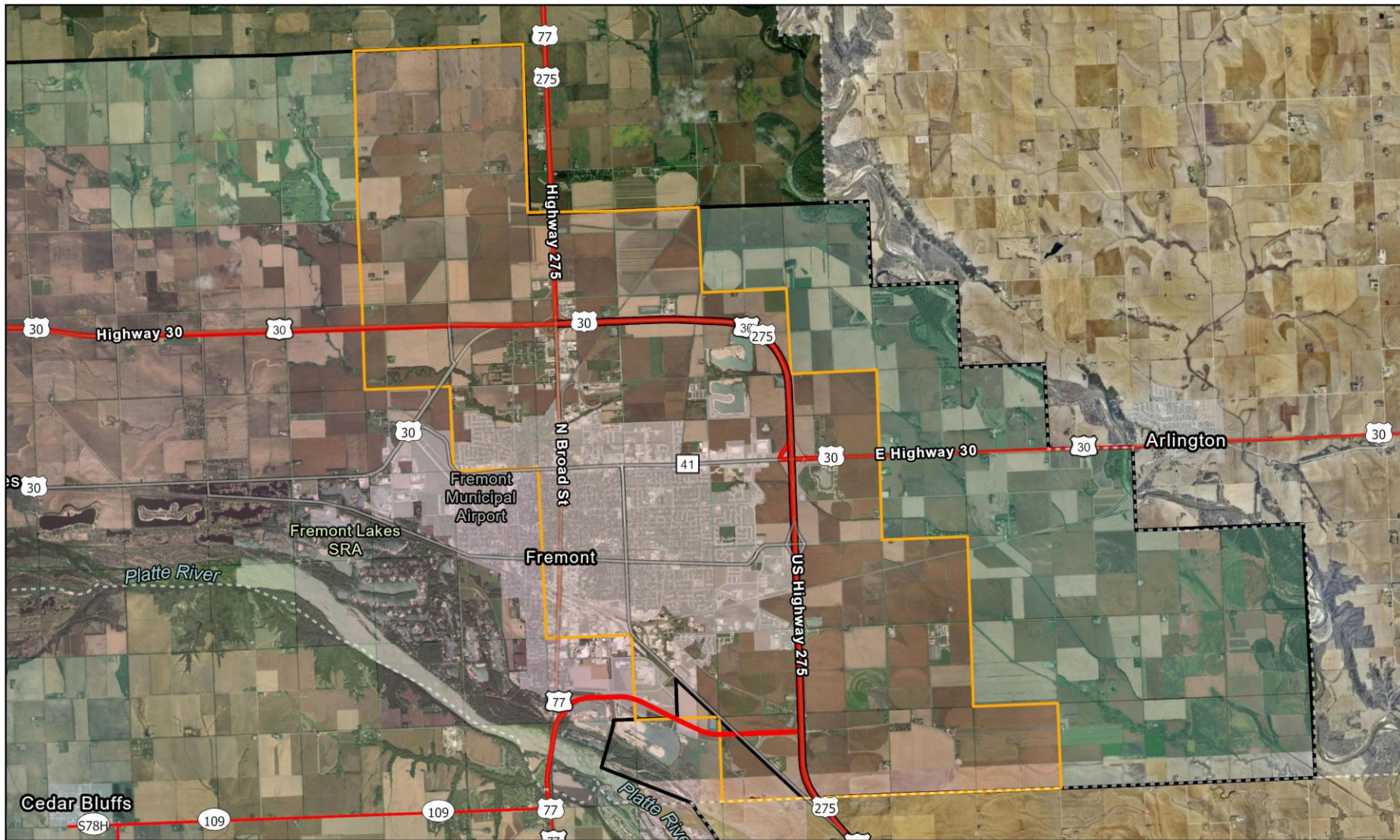


Groundwater Management Area
Fremont East

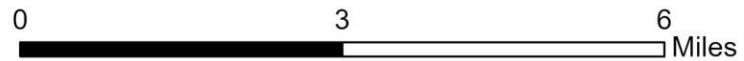


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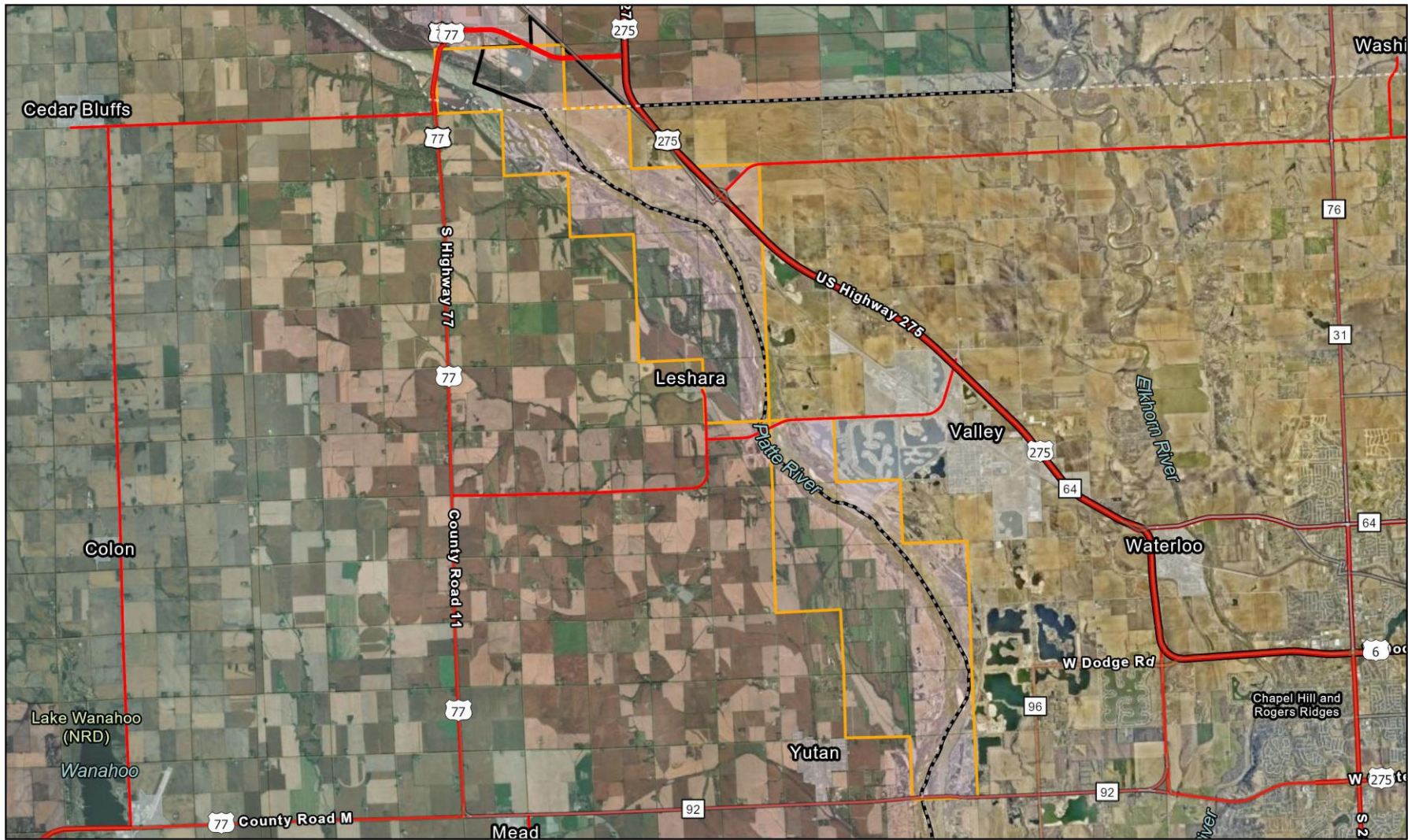


Groundwater Management Area
Fremont

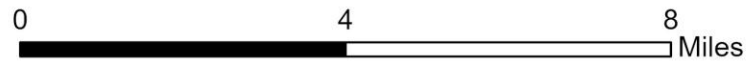


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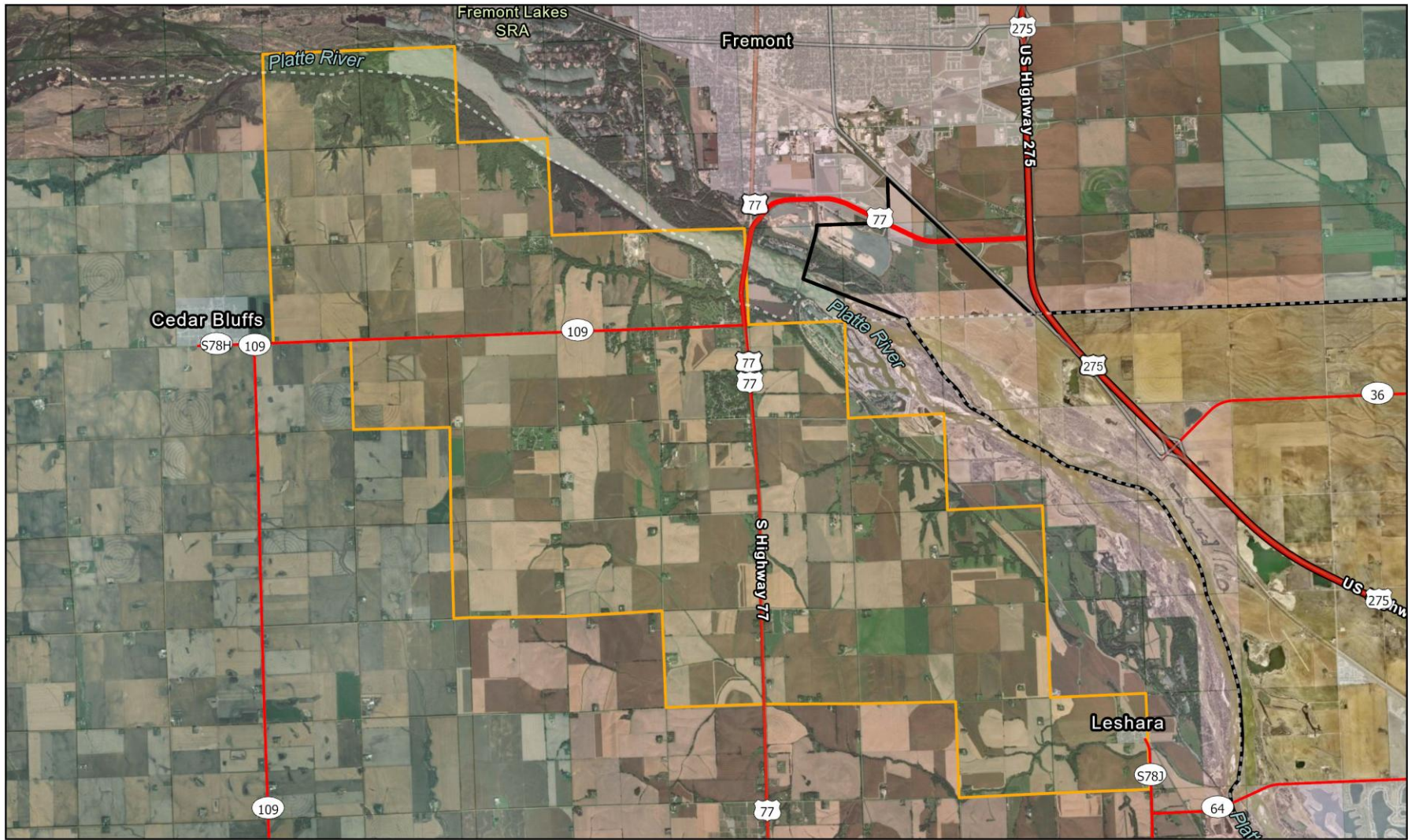


Groundwater Management Area
Leshara Platte Valley

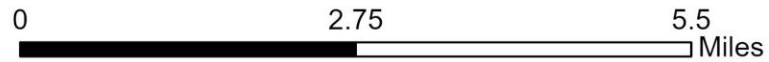


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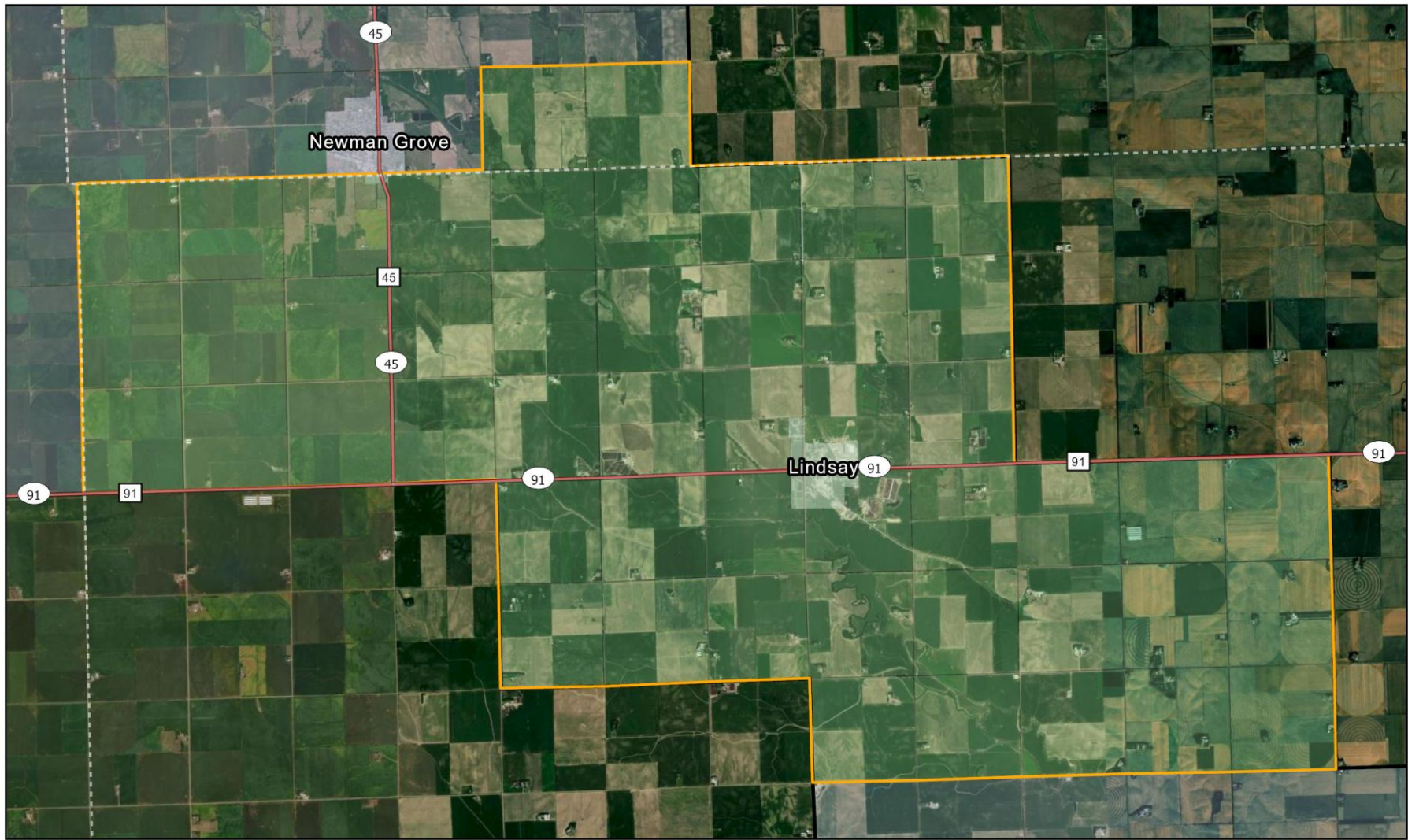


Groundwater Management Area
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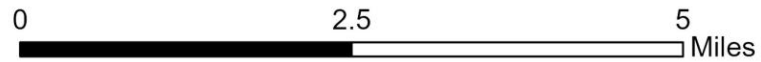


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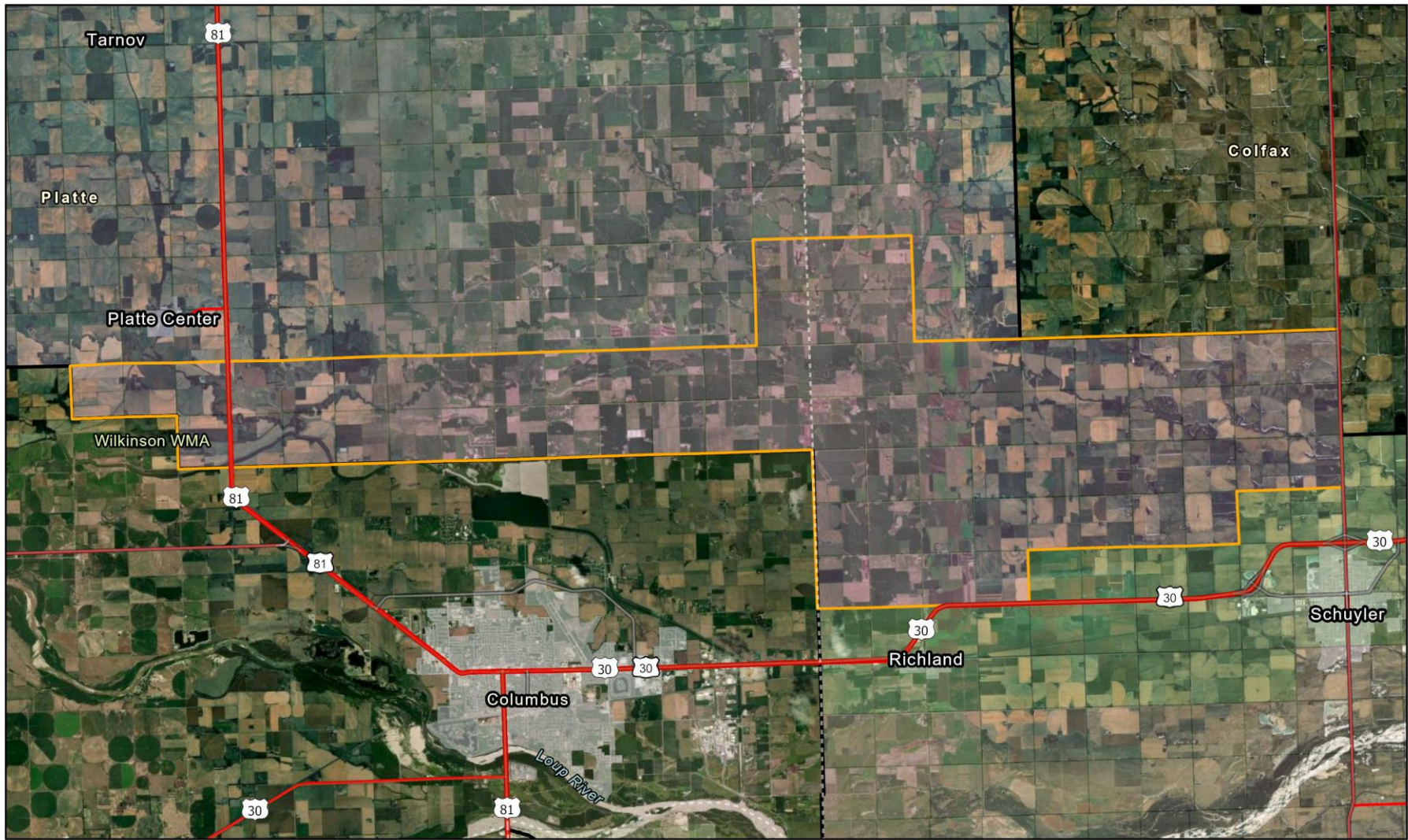


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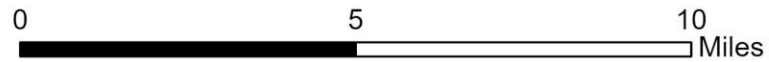


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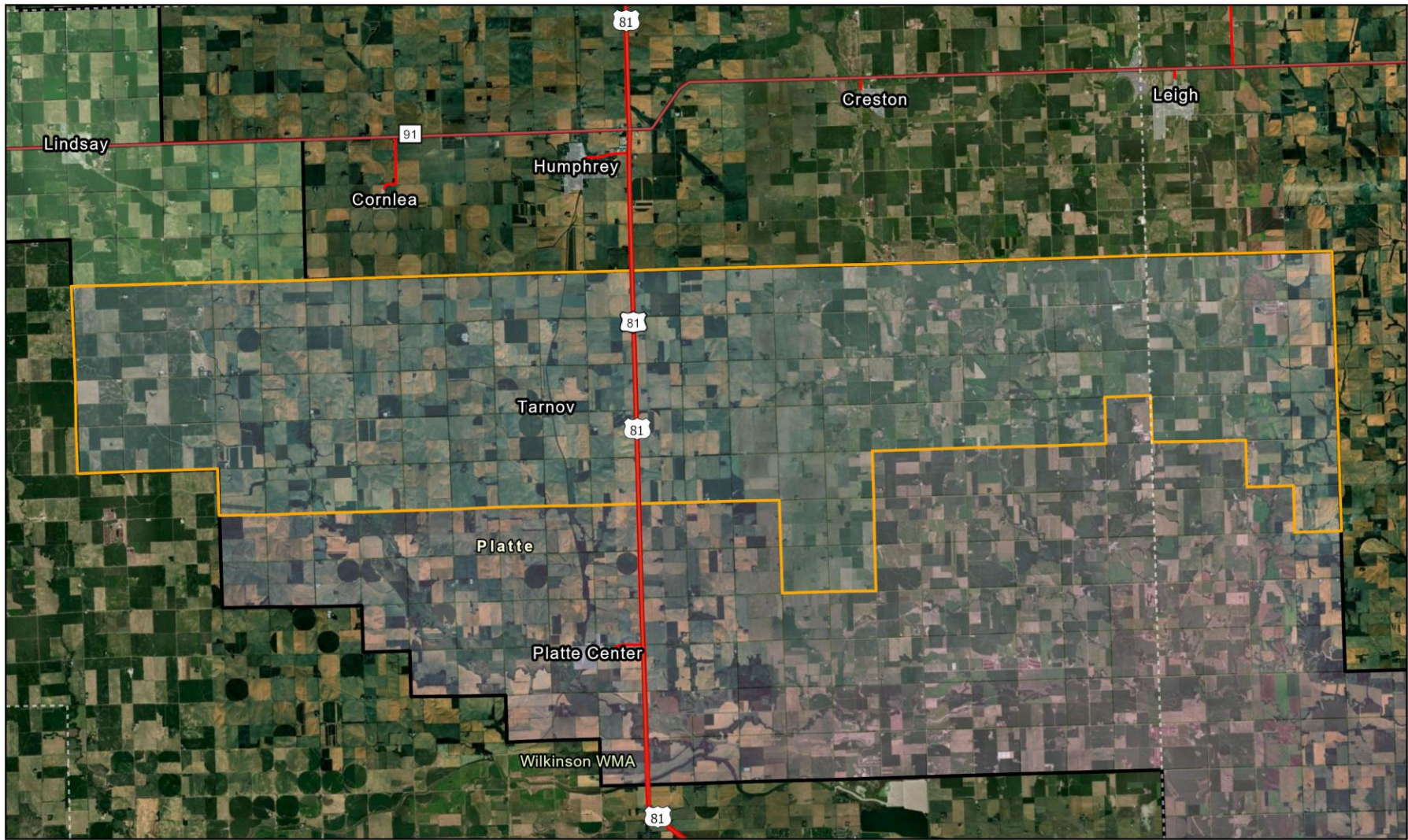


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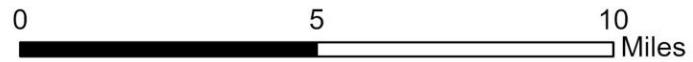
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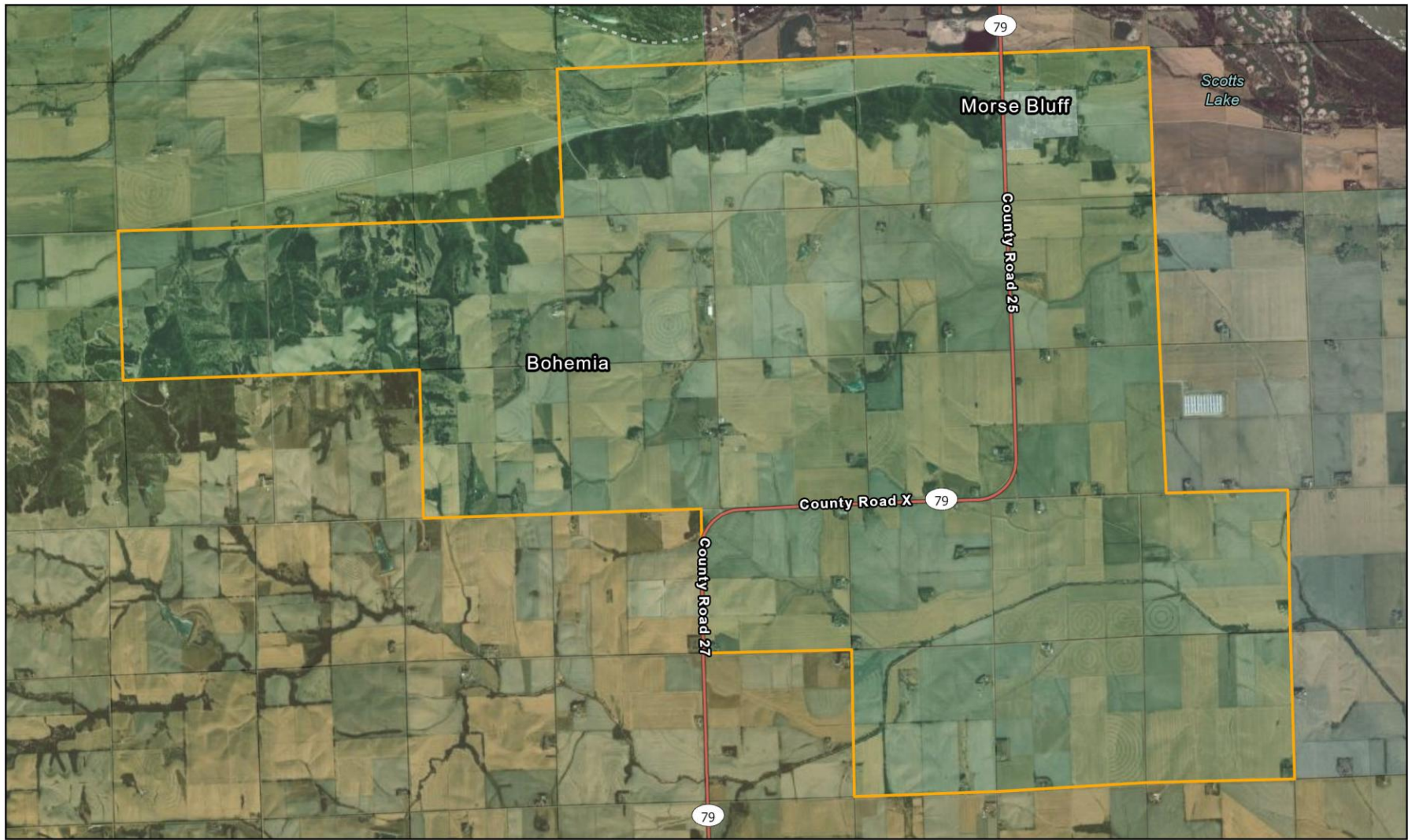
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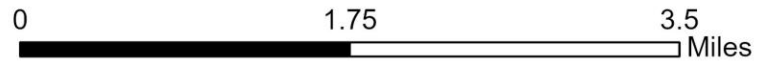
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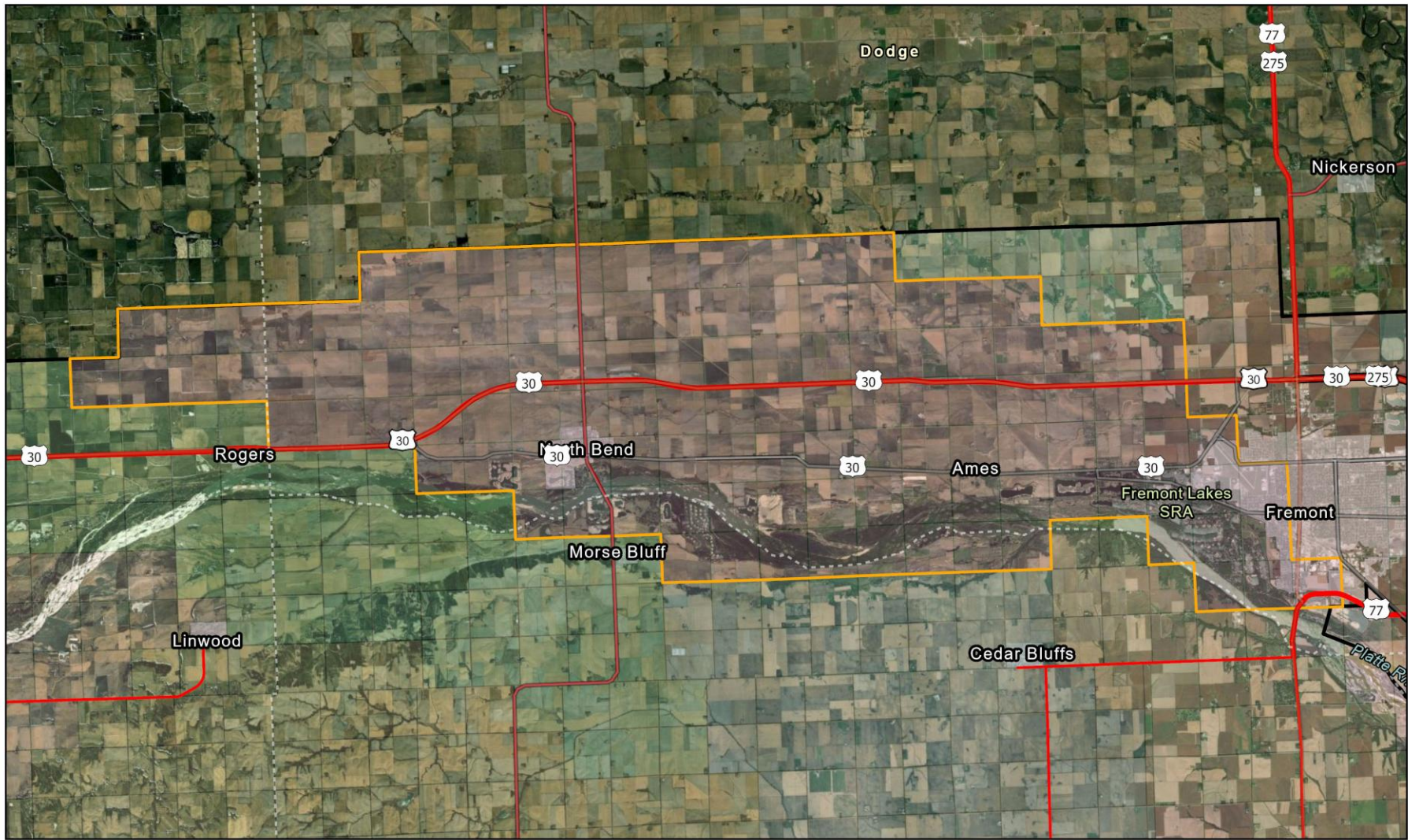
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Morse Bluff



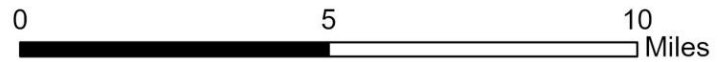
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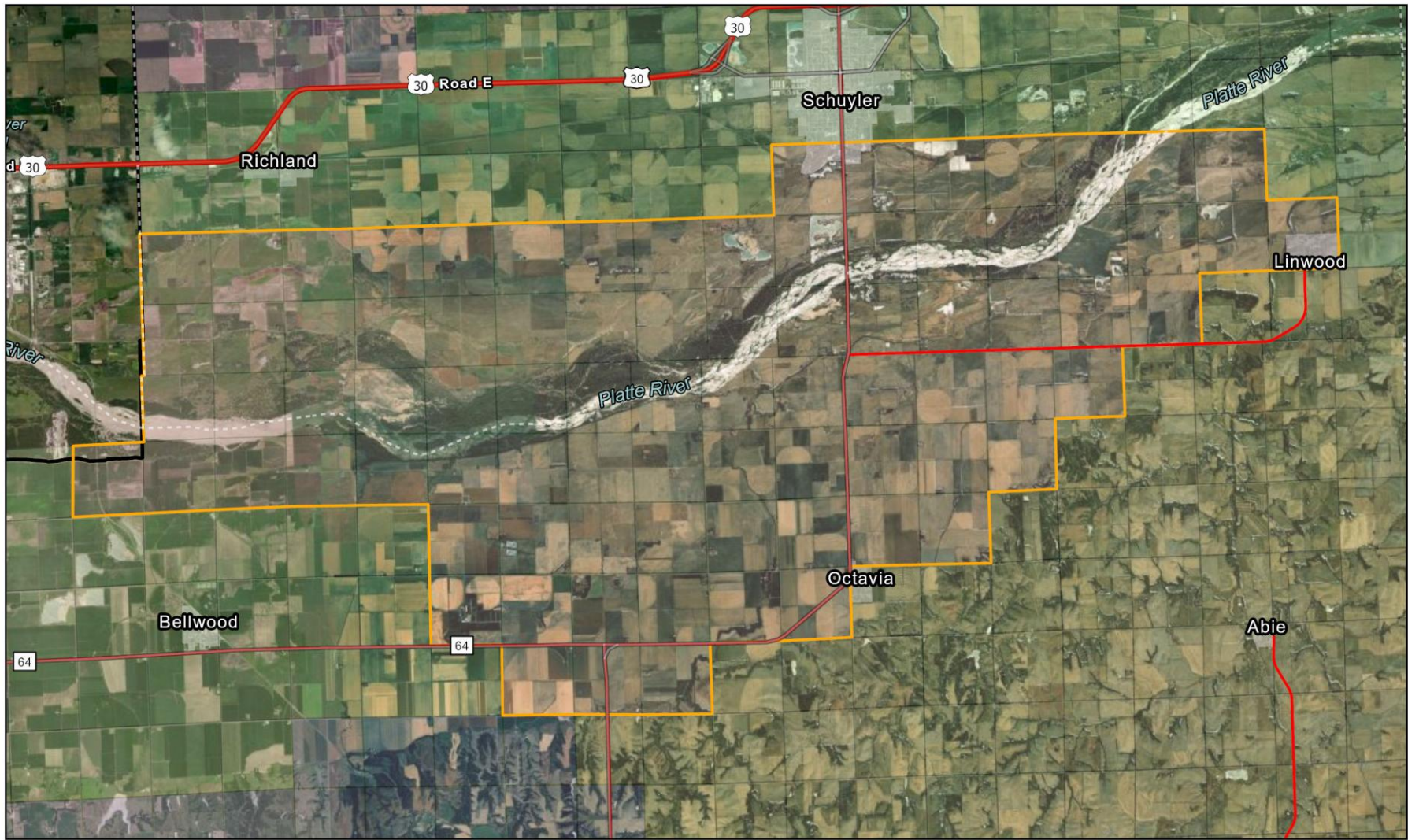
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North Bend



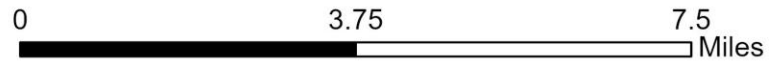
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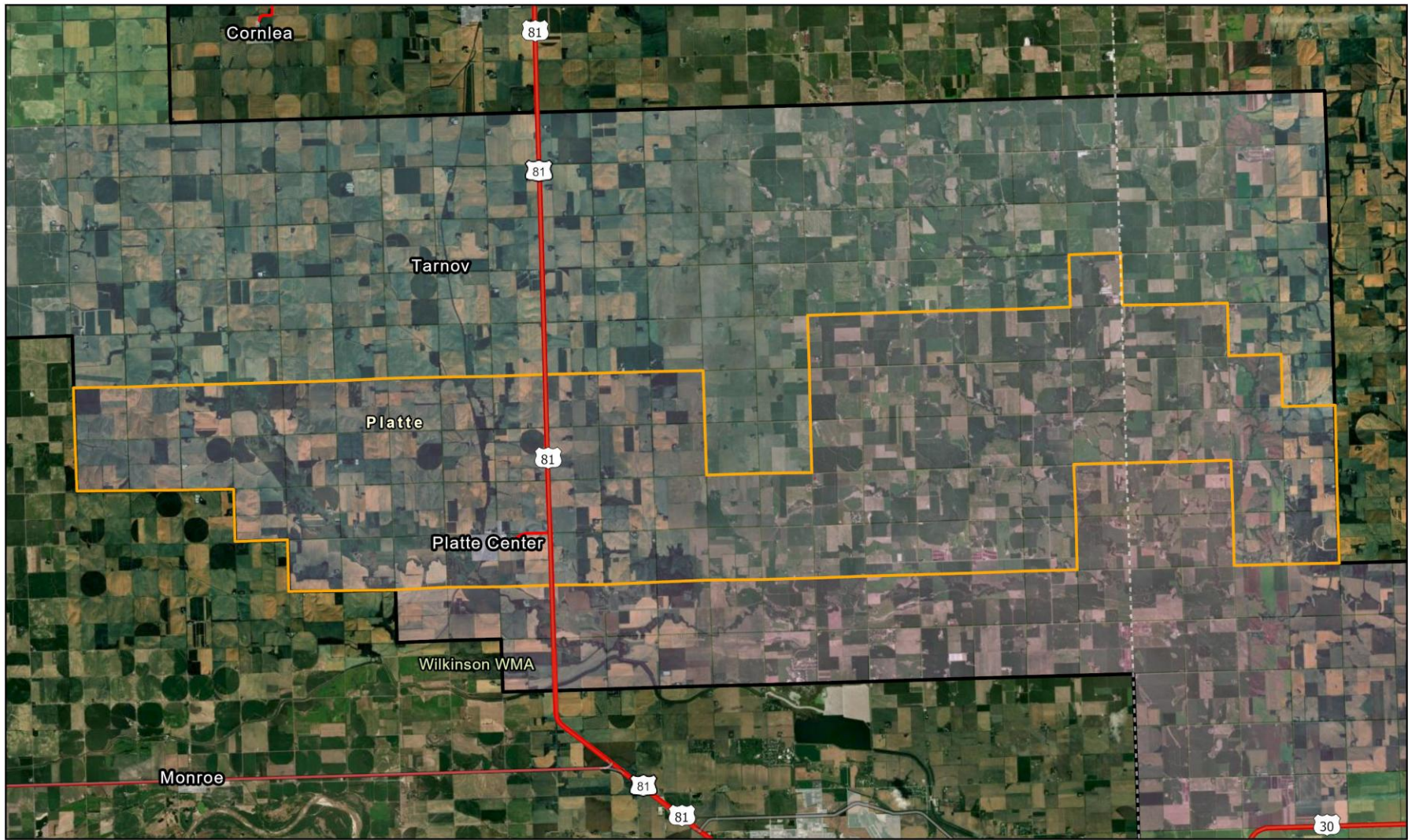
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Octavia



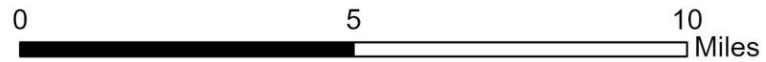
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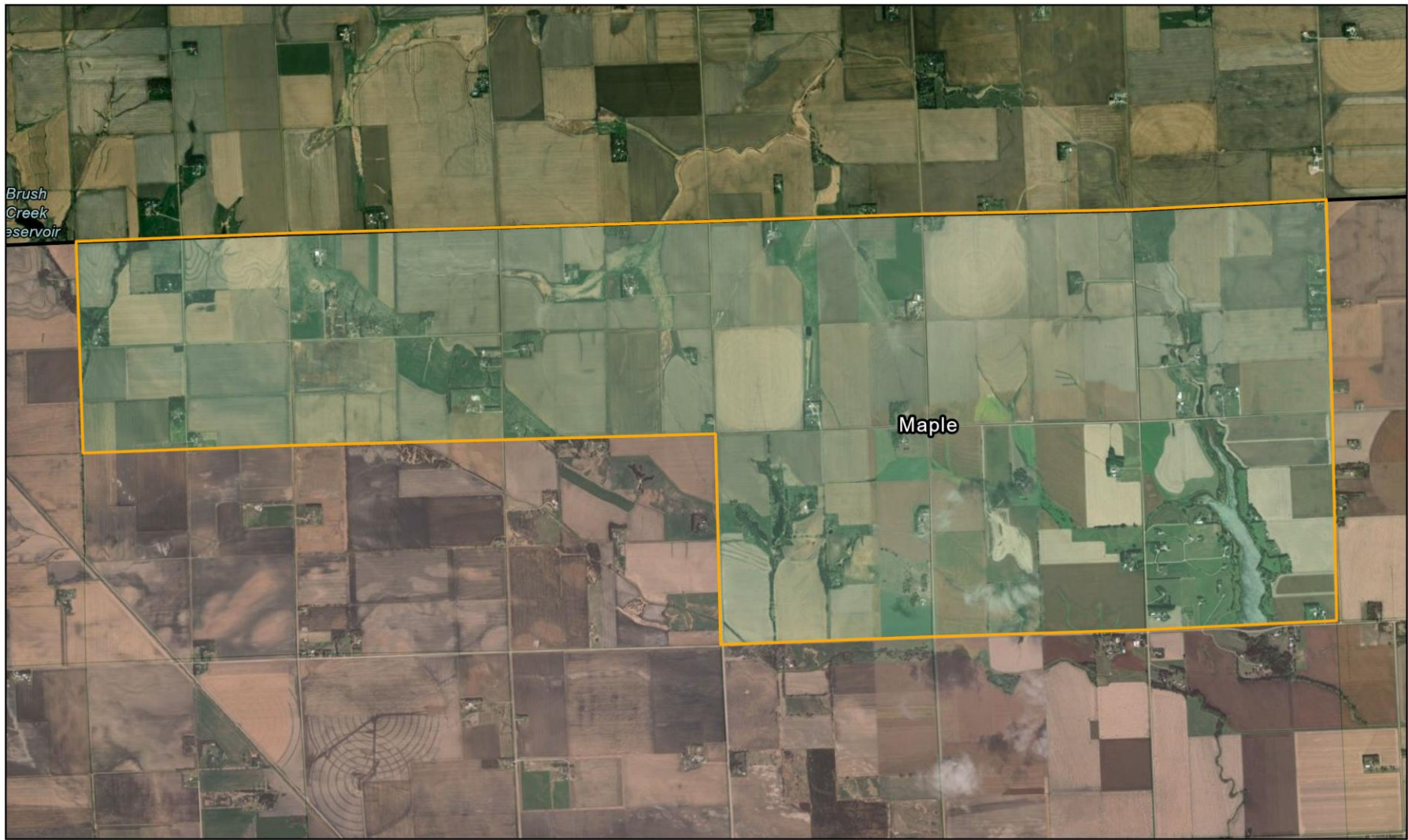
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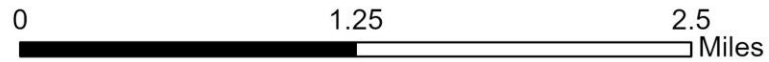


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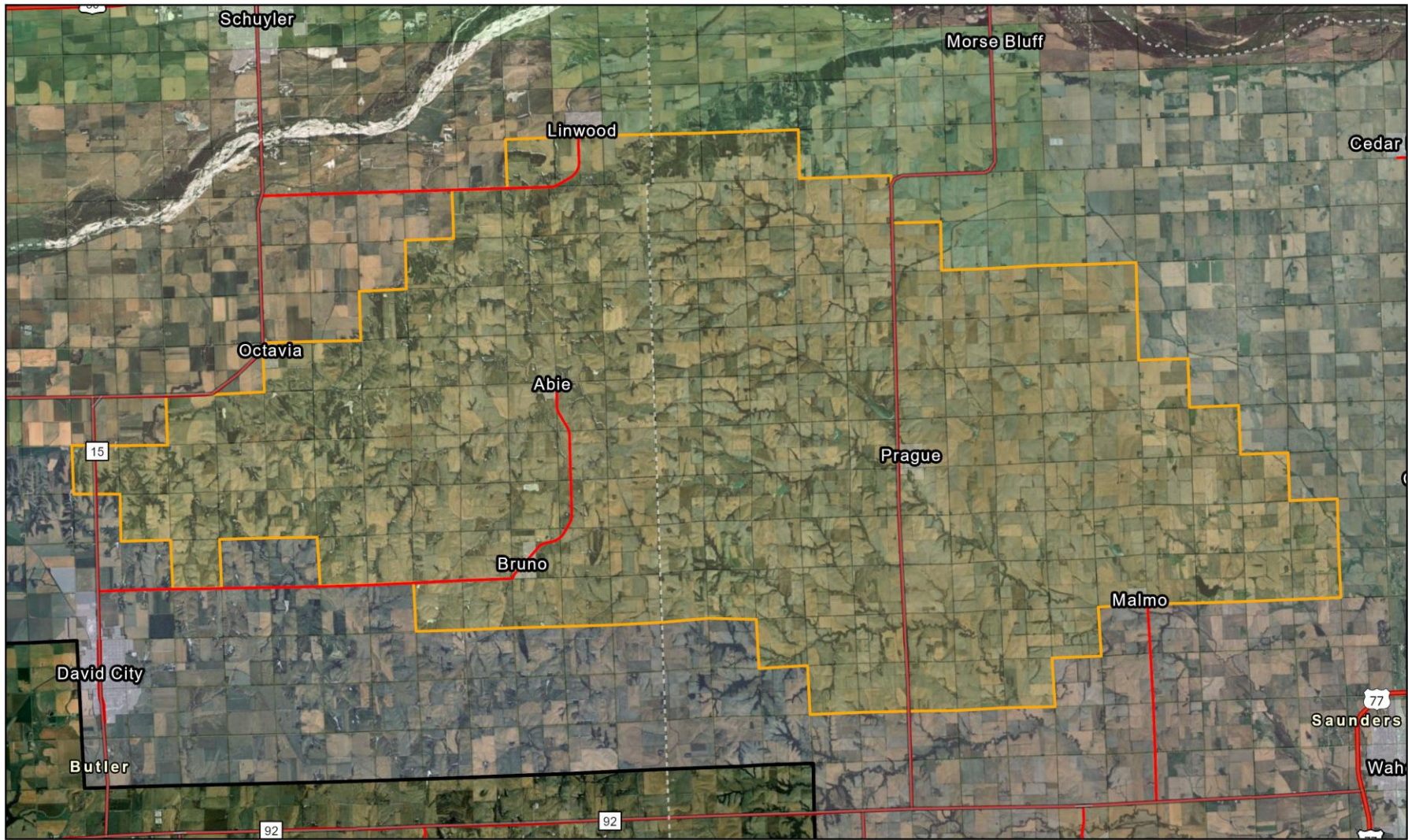


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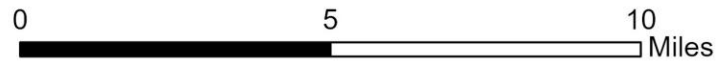
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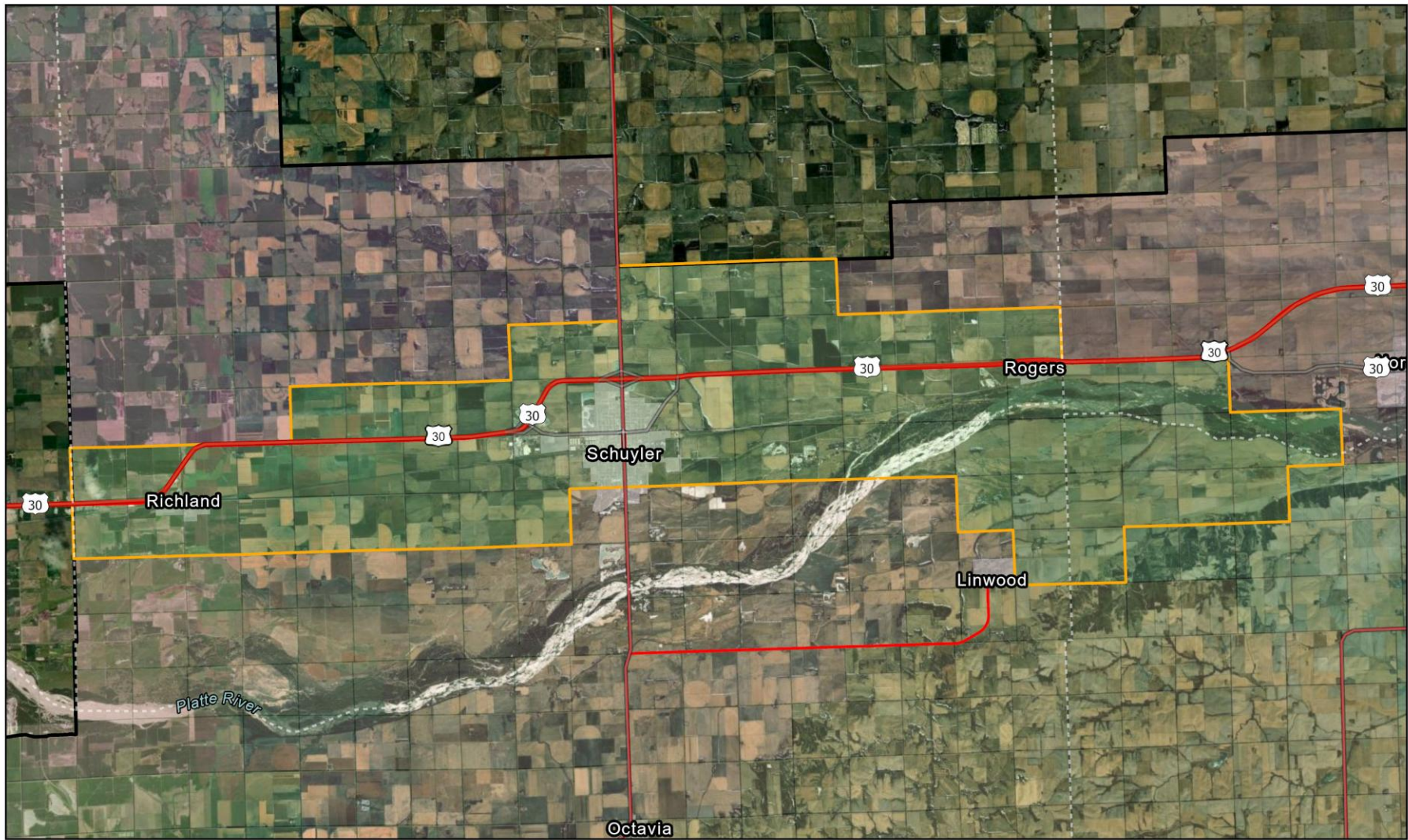
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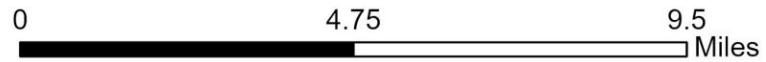


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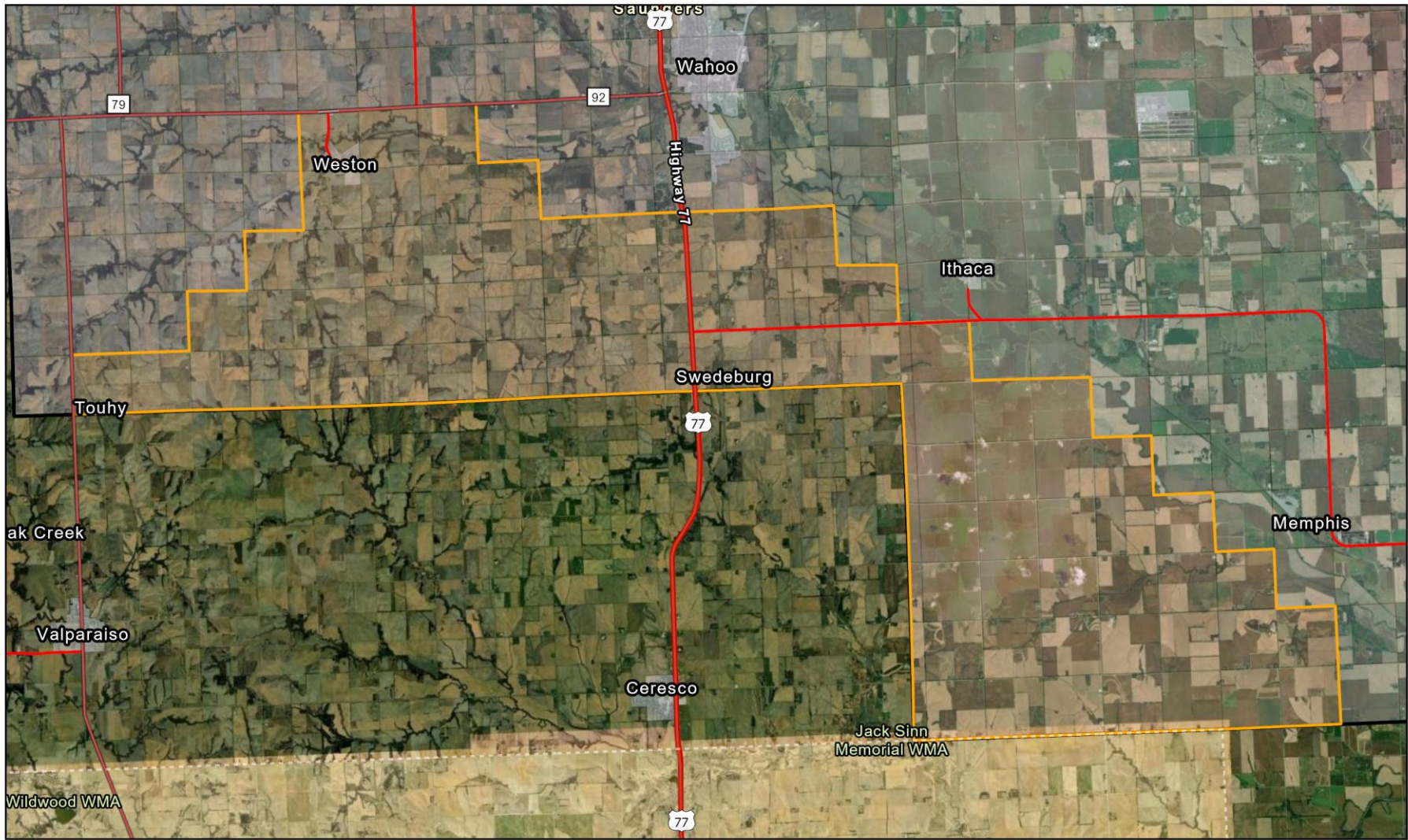


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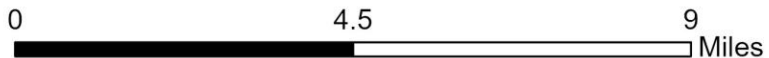


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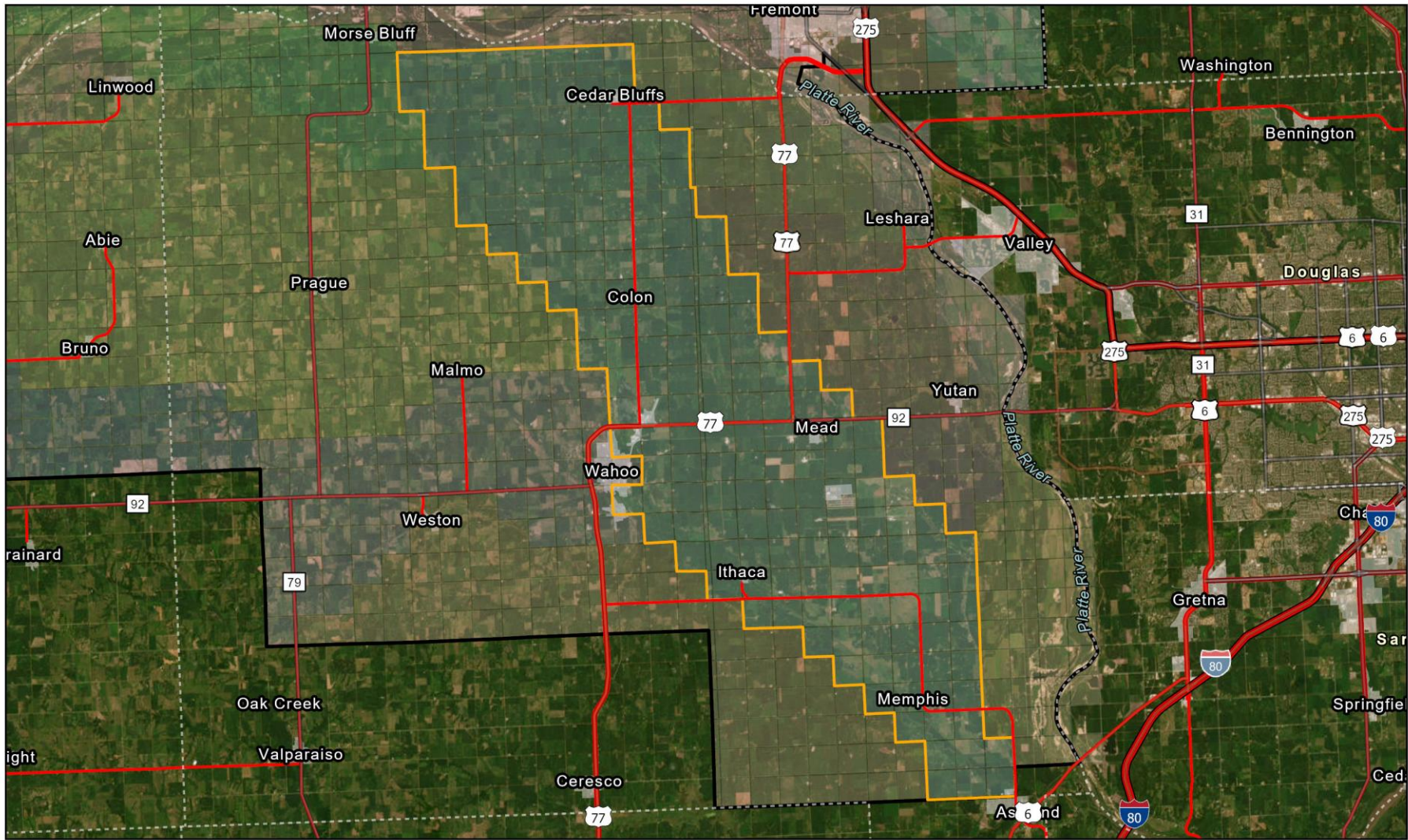


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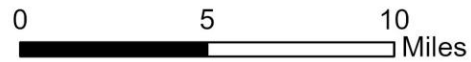


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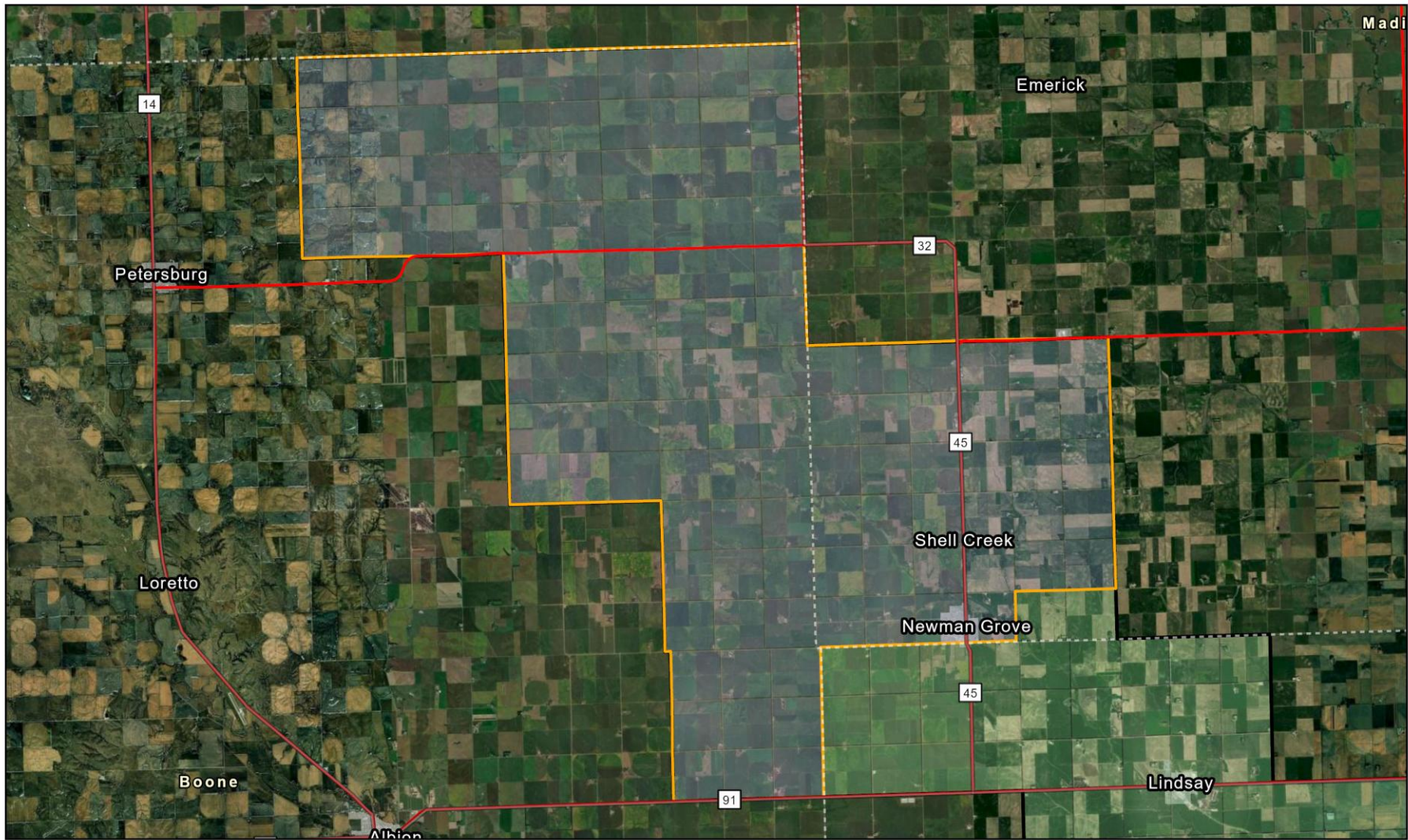


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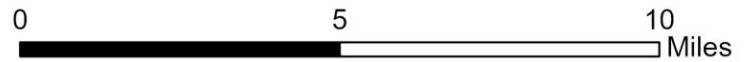


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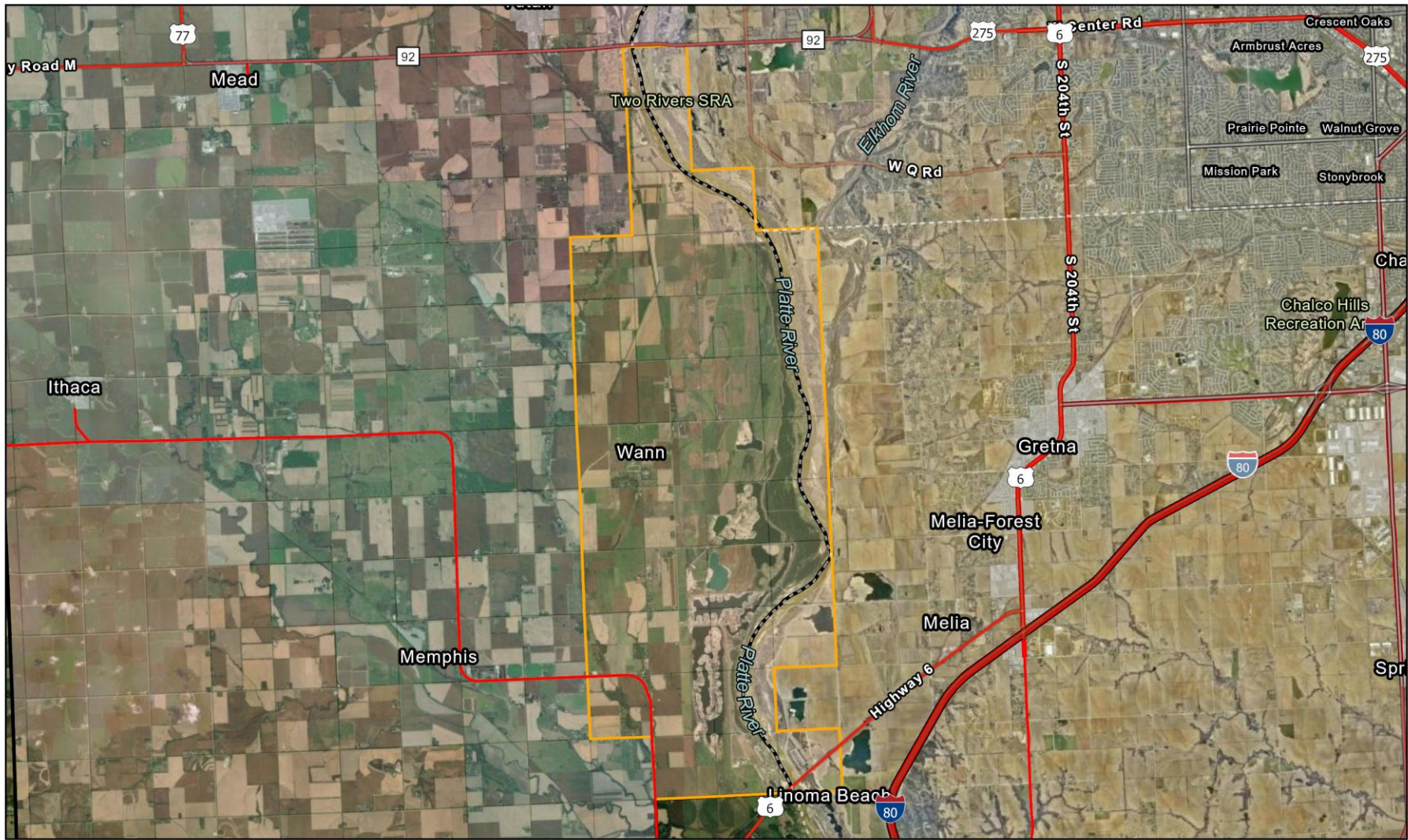


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Upper Newman Grove



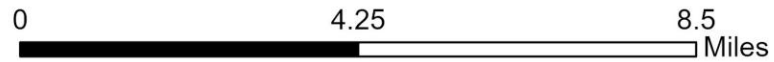
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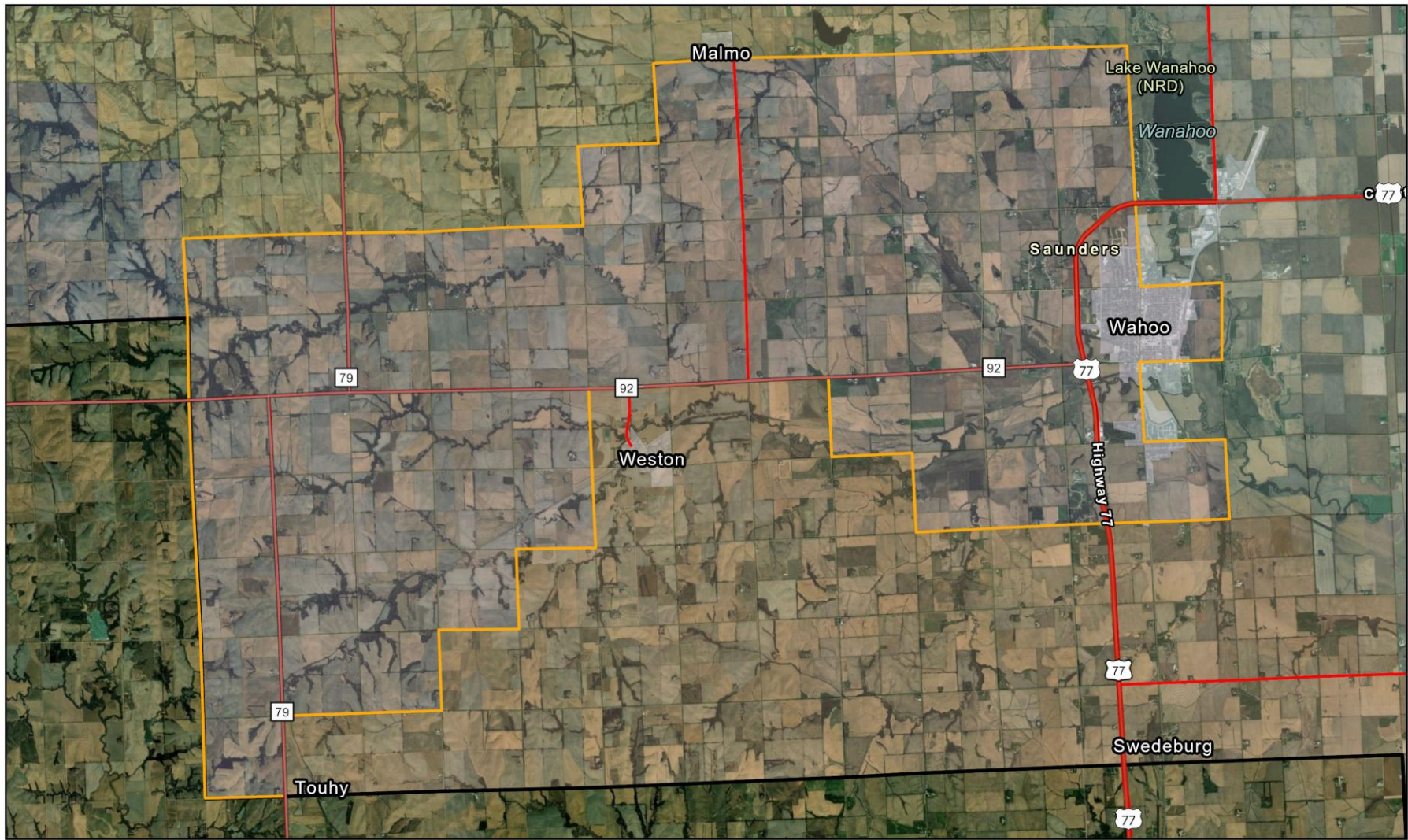
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Wann



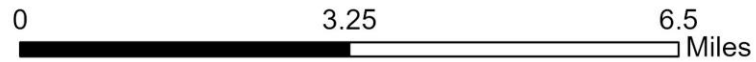
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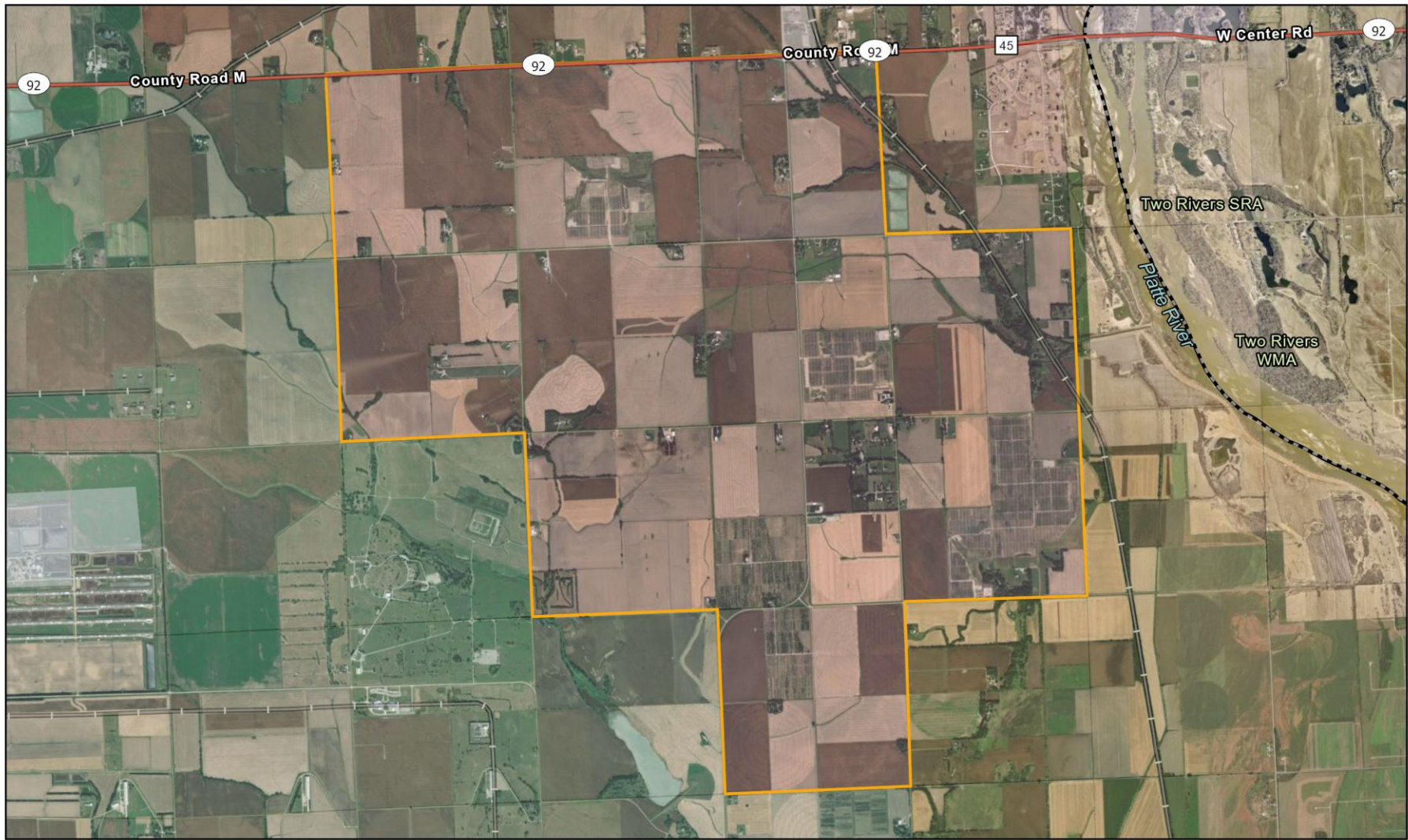
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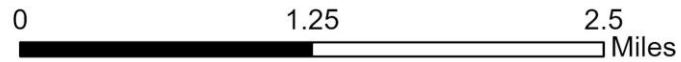


LOWER PLATTE NORTH
Natural Resources District



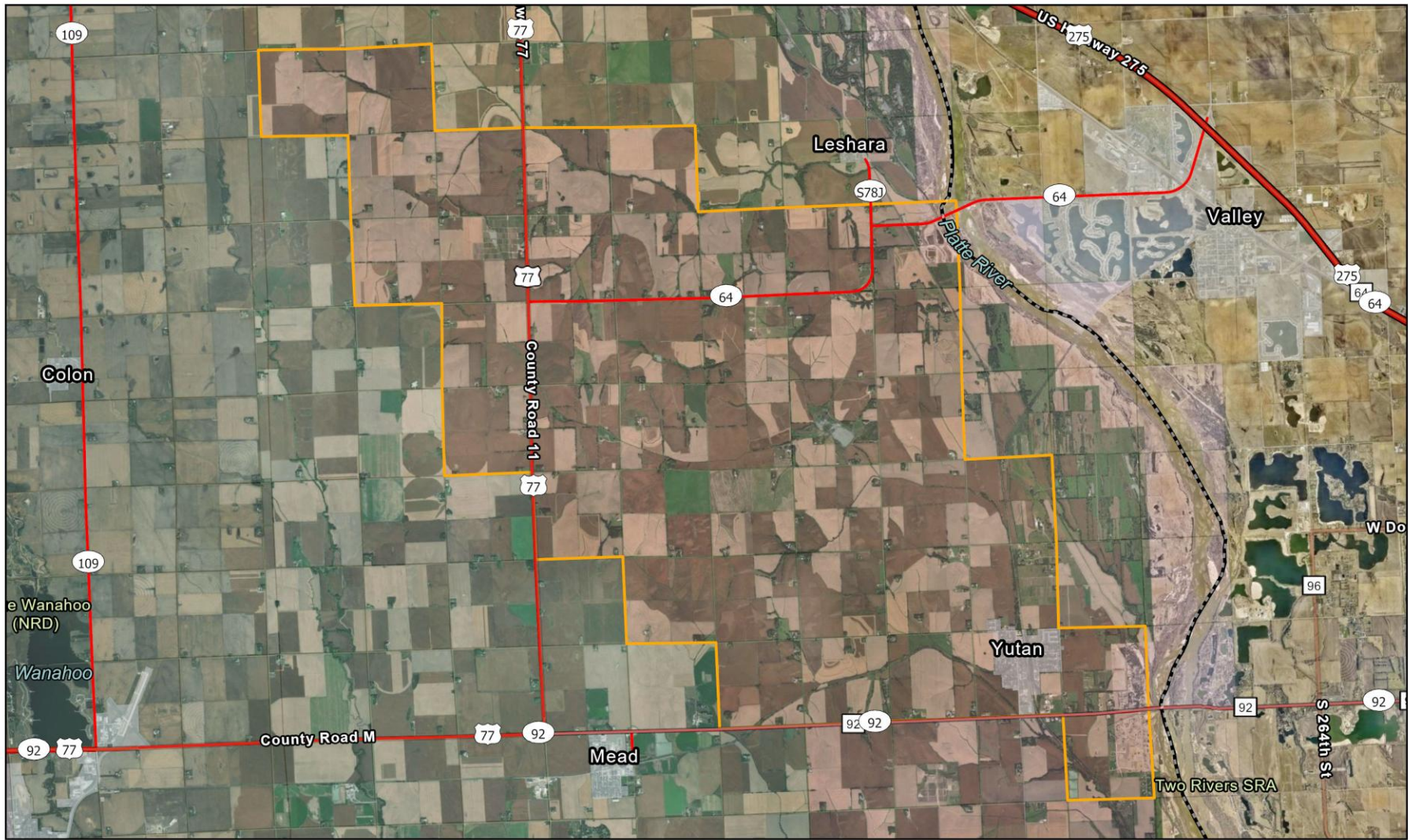
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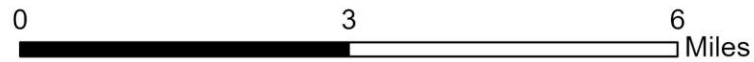
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Groundwater Management Area

Yutan



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December 10, 2024
 Invoice No: 28515

Invoice Total:	\$2,172.75
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Daryl Andersen
 Lower Platte North NRD
 511 Commercial Park Road
 Wahoo, NE 68066-0126

Please Remit To:
LRE Water
1221 Auraria Pkwy
Denver, CO 80204
(303) 455-9589
billing@LREwater.com

Invoice Email: dandersen@lpnrd.org
 Project No.: 5036LPN03
 Project Name: LPNNRD GW Management Plan

Professional Services through November 25, 2024

Task 04 Plan Review & Presentation

Professional Personnel

	Hours	Rate	Amount	
Mohr, Jonathan	.50	195.00	97.50	
Totals	.50		97.50	
Total Labor				\$97.50

Reimbursable Expenses

Mohr, Jonathan			50.25	
Total Reimbursables			50.25	\$50.25

Total this Task \$147.75

Task 05 Review & Refine Subarea Delineations

Professional Personnel

	Hours	Rate	Amount	
Mohr, Jonathan	8.50	195.00	1,657.50	
Totals	8.50		1,657.50	
Total Labor				\$1,657.50

Total this Task \$1,657.50

Task 07 Quantity Trigger & Well Interference Pro

Professional Personnel

	Hours	Rate	Amount	
Hume, David	1.50	245.00	367.50	
Totals	1.50		367.50	
Total Labor				\$367.50

Total this Task **\$367.50**

Total this Invoice **\$2,172.75**

Outstanding Invoices

Number	Date	Balance
28251	11/19/2024	3,830.75
Total		\$3,830.75

Total Now Due **\$6,003.50**

Groundwater Management Plan

DRAFT

January 2025

Approval Date: XX/XX/XXX

Prepared for:



**LOWER PLATTE NORTH
Natural Resources District**

Prepared by:



Board of Directors - 2024

Name	Sub-District
Lon Olson	1
Vacant	1
John Goldsberry	2
Bill Saeger	2
Dave Saalfeld	3
Andrew Tonnies	3
Chris Yosten	4
Matt Bailey	4
Mark Seier	5
David Lawrence	5
Joe Birkel	6
Robert Hilger	6
Ryan Sabatka, Chairman	7
Ryan Engel	7
Jerry Johnson	8
Roger Harder	8
Duane Johnson	9
Robert Meduna Jr	9
Thomas McKnight	At-Large

This third update of the Lower Platte North Natural Resources Groundwater Management Plan (GWMP) has been prepared per Nebraska Revised Statute 46-709. The GWMP was created based upon the best available scientific information.

TABLE OF CONTENTS

List of Tables	ii
Table of Figures	ii
List of Abbreviations and Acronyms	iii
1 Introduction	1
1.1 LPNNRD Background	1
1.2 Legal Authority and Obligations.....	2
1.3 Agency Roles and Functions	3
1.4 Joint-Planning Efforts	4
1.5 Rules and Regulations	6
2 Description of the NRD	10
2.1 Groundwater Regions and Principal Aquifer	10
2.2 Hydrogeologic Datasets	11
2.3 Topography	14
2.4 Soils	14
2.5 Geology and Hydrological Characteristics	16
2.6 Total Saturated Sand.....	17
2.7 Confined vs. Unconfined Aquifers	18
2.8 Transmissivity.....	20
2.9 Climate and Precipitation	21
2.10 Land Cover.....	22
2.11 Population – Economic Base	23
2.12 Water Use.....	25
2.13 Surface Water.....	25
2.14 Wells and Test Holes	27
2.15 Partners and Programs.....	28
2.16 Environmental Education and Information.....	30
3 Groundwater Quantity	31
3.1 Groundwater Levels and Existing Wells.....	31
3.2 Opportunity for Groundwater Recharge	34
3.3 Water Demand.....	36
3.4 Certified Irrigated Acres	37
3.5 Water Quantity Activities.....	37
4 Groundwater Quality	39
4.1 Aquifer Vulnerability	39
4.2 Wellhead Protection Areas	42
5 Goals and Objectives	45
5.1 Groundwater Management Goals and Objectives	45
6 Stakeholder Involvement	48
6.1 Stakeholder Group.....	48
6.2 Open House Meetings	48
7 Recommendations	49
7.1 Quality Management Recommendations.....	49
7.2 Quantity Recommendations	50
8 References	52

LIST OF TABLES

Table 1: Confined and Unconfined Aquifer Triggers.....	7
Table 2: Geologic Sequence of Major Formations in LPNNRD	16
Table 3: LPNNRD Land Cover Change (2009 – 2023).....	22
Table 4: Population of Incorporated Places (1990 – 2025)	24
Table 5: LPNNRD Steam Gage Information.....	26
Table 6: Active Registered Well Distribution	36
Table 7: LPNNRD PWS State-Approved WHP Plans	42

TABLE OF FIGURES

Figure 1: LPNNRD Location	1
Figure 2: Board of Director Sub-districts (2025)	3
Figure 3: Lower Platte River Basin Coalition NRDs	5
Figure 4: Quality and Quantity Management Areas	7
Figure 5: Groundwater Limited Development Areas.....	8
Figure 6: Groundwater Regions of the LPNNRD	11
Figure 7: AEM Flights within and near the LPNNRD	12
Figure 8: Topography of the LPNNRD	14
Figure 9: Soil Types	15
Figure 10: Bedrock Formations.....	16
Figure 11: Total Saturated Sand, Well and Test Holes to Bedrock.....	18
Figure 12: Confined vs. Unconfined Aquifers	20
Figure 13: Aquifer Transmissivity.....	21
Figure 14: Average Annual Precipitation (1981-2020).....	22
Figure 15: 2023 Land Cover	23
Figure 16: Major River Systems, Stream Gages and Diversion Points.....	26
Figure 17: Registered Active Wells in the LPNNRD.....	27
Figure 18: Test Holes within 5-miles of LPNNRD	28
Figure 19: Groundwater-Level Changes in LPNNRD, Predevelopment to Spring 2023.....	31
Figure 20: Observation Well Network	32
Figure 21: Depth to Groundwater	33
Figure 22: Potential Areas for Sub-irrigation	34
Figure 23: Artificial Recharge Potential	35
Figure 24: Percent of NeDNR Active Registered Wells	36
Figure 25: Certified Irrigated Acres in the LPNNRD (2024).....	37
Figure 26: Aquifer Vulnerability.....	40
Figure 27: LPNNRD Nitrate Concentrations 2023	41
Figure 28: Wellhead Protection Areas	43
Figure 29: Five Steps of the WHP Program	43
Figure 30: Proposed Groundwater Management Subareas	50

LIST OF ABBREVIATIONS AND ACRONYMS

ACT	Nebraska Groundwater Management Act
AF	Acre Feet
AEM	Airborne Electromagnetic
Assessment	LPNNRD Hydrogeologic Assessment (2023)
Coalition	Lower Platte River Basin Coalition
CSD	Conservation and Survey Division
District	Lower Platte North NRD
DCP	Drought Contingency Plan
DEM	Digital Elevation Model
ENWRA	Eastern Nebraska Water Resources Assessment
EQIP	Environmental Quality Incentive Program
GIS	Geographic Information System
GWMA	Groundwater Management Area
GWMP	Groundwater Management Plan
HCA	Hydrologically Connected Areas
IMP	Integrated Management Plan
LENRD	Lower Elkhorn Natural Resources District
LPMT	Lower Platte Missouri Tributary Groundwater Model
LPNNRD	Lower Platte North Natural Resources District
LPSNRD	Lower Platte South Natural Resources District
LPRCA	Lower Platte River Corridor Alliance
LWS	Lincoln Water System
Mg/L	Milligrams per Liter
MUD	Metropolitan Utilities District
NARD	Nebraska Association of Resources Districts
NASS	National Agricultural Statistics Service
NDEE	Nebraska Department of Environment and Energy
NeDNR	Nebraska Department of Natural Resources
NHCAs	Non Hydrologically Connected Areas
NPDES	National Pollutant Discharge Elimination System
NRC	Natural Resources Commission
NRD	Natural Resources District
LWS	Lincoln Water System
PMRNRD	Papio-Missouri River Natural Resources District
PPM	Parts Per Million
PPB	Parts per Billion
RWS	Rural Water System
SQS	Special Quantity Subareas
UNL	University of Nebraska-Lincoln
USGS	United States Geological Survey
WHP	Wellhead Protection

1 INTRODUCTION

1.1 LPNNRD BACKGROUND

The Lower Platte North Natural Resources District (LPNNRD or District) spans 1,587 square miles, or just over 1 million acres, over seven counties in eastern Nebraska and is shown in Figure 1. The total estimated population is nearly 66,000 (NARD, 2024). The primary watershed utilized to delineate the LPNNRD is Shell Creek, starting at the northwest boundary past Newman Grove and to the southeast to the Lower Platte River at Fremont, and includes the Wahoo Creek watershed to the southeast near Ashland. The LPNNRD economy is predominantly focused on agricultural and industrial activities.

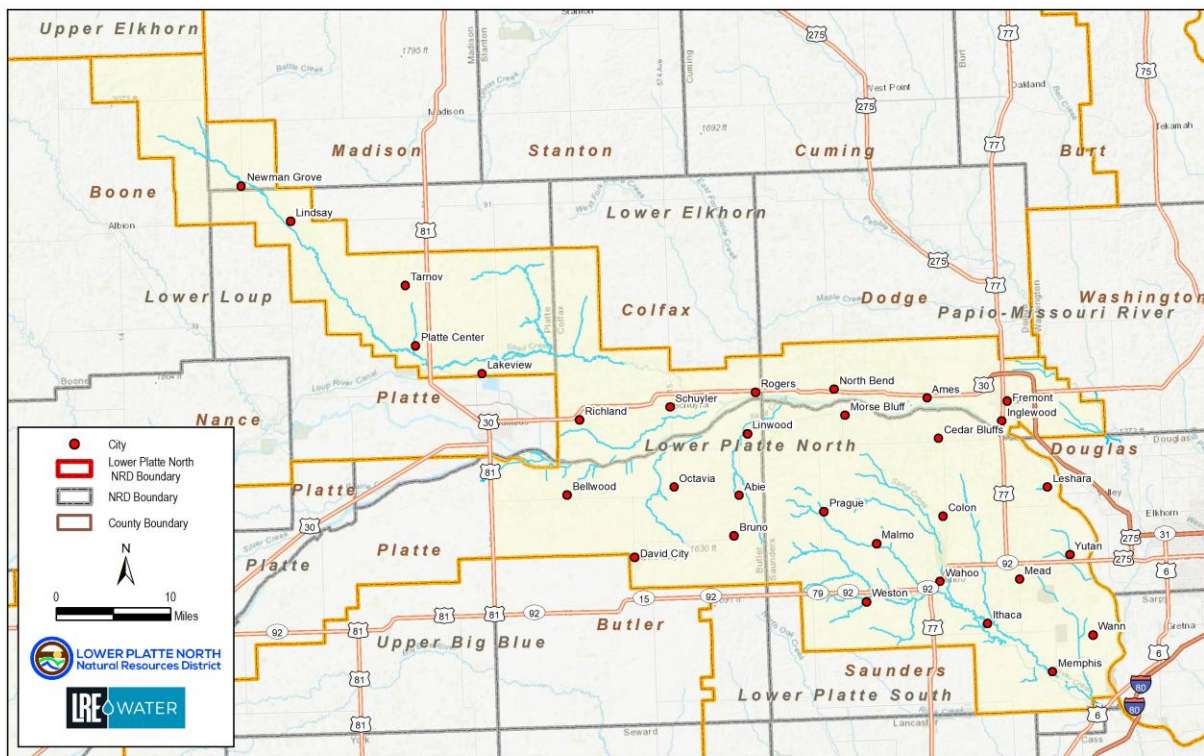


Figure 1: LPNNRD Location

1.2 LEGAL AUTHORITY AND OBLIGATIONS

Groundwater management, recognized as one of the state's most valuable natural resources, is a key responsibility granted to the Nebraska Natural Resources Districts (NRDs). The declaration, intent, and purpose of NRDs were established by the Nebraska Groundwater Management and Protection Act (Act) as outlined in Nebraska Revised Statute Chapter 46, Article 7.

In 1984, the Nebraska Legislature mandated that NRDs prepare a Groundwater Management Plan (GWMP) by January 1986. The original LPNNRD GWMP was prepared in 1985 and with the adoption of the 1985 plan, the LPNNRD embarked upon a new era of groundwater resource management marked by an intensive program of data collection designed to characterize the resource and establish the relationship with other water resource related aspects. In addition, the District developed education and demonstration programs designed to increase awareness of groundwater supplies, use, and protection.

The GWMP was updated in 1995, as an amendment to the 1985 version and the amendment meets the intent of LB51 and fulfills the District's need for continued understanding of the supply and quality of its groundwater resource, and sets forth a plan of protection for the future. The Board of Directors recognizes, along with the Nebraska legislature, that groundwater is a valuable resource and planned management is essential and in the public interest.

This version of the GWMP is intended to meet requirements of Section 46-709 of the Act (NeDNR, 2021), which states, The plan shall include, but not be limited to, the identification to the extent possible of the following:

- 1) Groundwater supplies within the District including transmissivity, saturated thickness maps, and other groundwater reservoir information, if available;
- 2) Local recharge characteristics and rates from any sources, if available;
- 3) Average annual precipitation and the variations within the District;
- 4) Crop water needs within the District;
- 5) Current groundwater data-collection programs;
- 6) Past, present, and potential groundwater use within the District;
- 7) Groundwater quality concerns within the District;
- 8) Proposed water conservation and supply augmentation programs for the District;
- 9) The availability of supplemental water supplies, including the opportunity for groundwater recharge;
- 10) The opportunity to integrate and coordinate the use of water from different sources of supply;
- 11) Groundwater management objectives, including a proposed groundwater reservoir life goal for the District. For management plans adopted or revised after July 19, 1996, the groundwater management objectives may include any proposed integrated management objectives for hydrologically connected groundwater and surface water supplies but a management plan does not have to be revised prior to the adoption or implementation of an integrated management plan pursuant to section 46-718 or 46-719;
- 12) Existing subirrigation uses within the District;
- 13) The relative economic value of different uses of groundwater proposed or existing within the District; and
- 14) The geographic and stratigraphic boundaries of any proposed management area.

This version was prepared by the staff, Board of Directors, with technical and planning assistance provided by LRE Water.

1.3 AGENCY ROLES AND FUNCTIONS

The LPNNRD is governed by a locally elected Board of Directors. The LPNNRD has 19 Board of Directors members spread throughout nine sub-districts, and one at-large member, and are distributed as shown in Figure 2. Based upon state statute, each NRD shares a common set of responsibilities, shown below, but each also establishes its own additional priorities based upon need.

- Erosion prevention and control
- Soil conservation
- Flood prevention and control
- Prevention of damages from flood water and sediment
- Water supply for any beneficial uses
- Development, management, utilization and conservation of groundwater and surface water
- Pollution control
- Solid waste disposal and sanitary discharge
- Drainage improvement and channel rectification
- Development and management of recreational and park facilities
- Forestry and range management
- Outdoor recreation

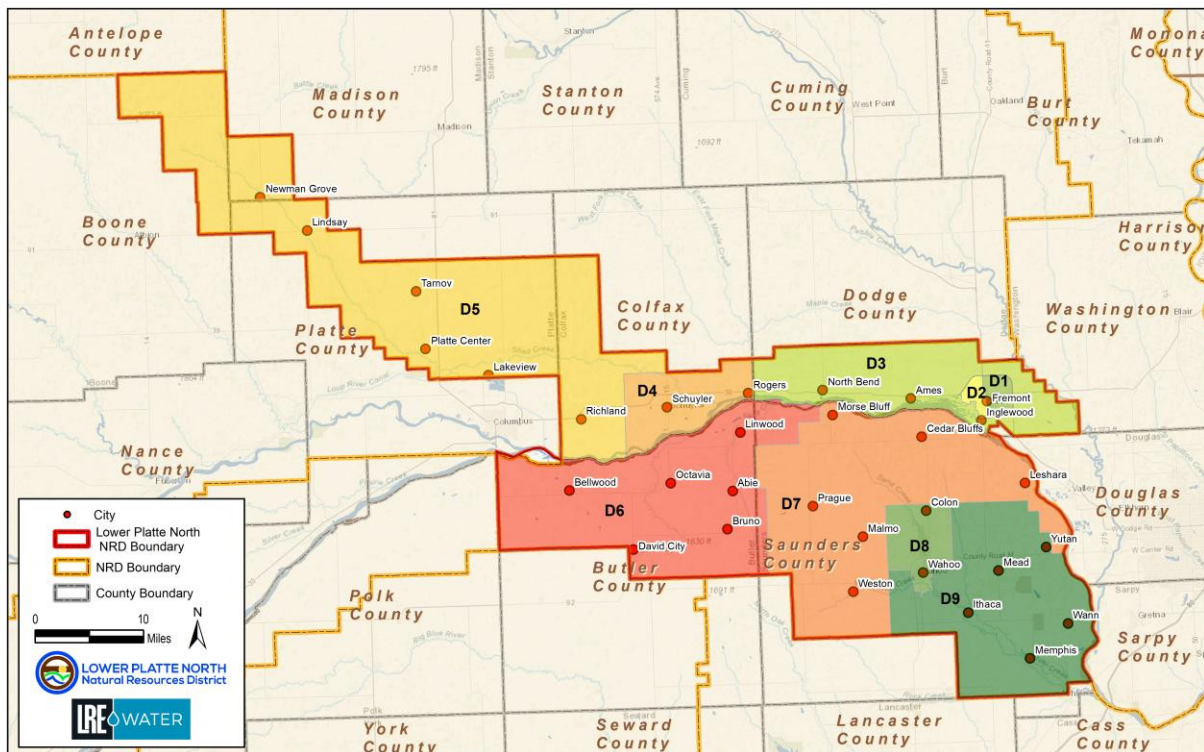


Figure 2: Board of Director Sub-districts (2025)

The LPNNRD has identified services as projects and programs with a focus on the following:

- Water Management
 - Groundwater quality includes groundwater phase areas, monitoring programs, chemigation, nitrogen certification, nitrate management, wellhead protection (WHP) program, and well decommissioning.
 - Groundwater quantity includes groundwater control areas, water level management areas, well permits and registration, variances, irrigated acre certification, and conservation.
- Rural Water Systems (RWS)
 - Management of the Bruno-David City RWS and Colon-Wahoo RWS.
- Forestry and Wildlife
 - Implementing a tree planting program
- Watershed and Flood Damage Reduction
 - Management of seven watershed-wide flood reduction projects that include nearly 60 flood reduction structures, including three high-hazard dams.
- Conservation Programs
 - Cost-share for soil and water conservation, small dams, cost-share for priority watersheds, rock and jetty program, and weed management.
- Education
 - Includes newsletters, environmental education program, events, grants and scholarships, and workshops

1.4 JOINT-PLANNING EFFORTS

Lower Platte River Basin Coalition

In 2017, seven NRDs came together to form the Lower Platte River Basin (Basin) Coalition (Coalition). This Coalition is operating under the guidance of the Basin Water Management Plan, published in October 2017. The Basin is one of Nebraska's most valuable resources, playing a crucial role in the state's agricultural, social, industrial, and municipal development and sustainability (Coalition, 2017).

The Coalition includes the LPNNRD, along with the NeDNR, Upper Loup, Lower Loup, Lower Platte South Natural Resources District (LPSNRD), Lower Platte North, Papio-Missouri River Natural Resources District (PMRNRD), Lower Elkhorn Natural Resources District (LENRD), and Upper Elkhorn Natural Resources District. These NRDs collaborate with the Nebraska Association of Resource Districts (NARD) to maintain a sustainable balance between water users and water suppliers in the Basin (Figure 3). Key groundwater elements of the Basin Water Management Plan have been integrated in this GWMP update.

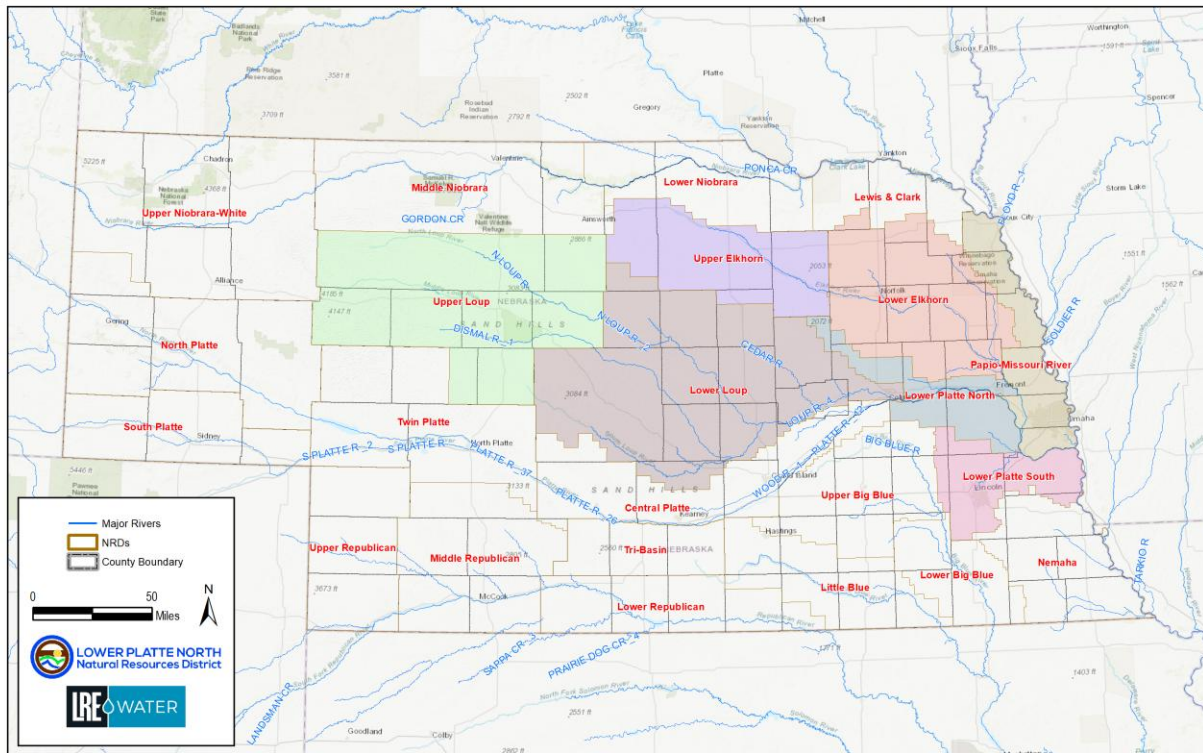


Figure 3: Lower Platte River Basin Coalition NRDs

Lower Platte River Drought Contingency Plan

The Lower Platte River, along with its tributaries and aquifers, supports approximately 80 percent of Nebraska’s population, thousands of businesses and industries, over two million irrigated acres, and provides streamflows for threatened and endangered species. The risks posed by drought are diverse, and a potential drought in the region could seriously impact public health, the economy, and fish and wildlife. Addressing water supply shortages during droughts in the Lower Platte River is believed to yield ancillary benefits to other sectors, including irrigation, power, environmental, and recreational benefits (Consortium, 2019). As a result, the LPNRRD, LPSNRD, PMRNRD, Metropolitan Utilities District (MUD), Lincoln Water System (LWS), and NeDNR established the Lower Platte River Drought Contingency Plan in 2019.

Integrated Management Plan

The LPNRRD’s first voluntary Integrated Management Plan (IMP) was adopted on June 11, 2018, and by the NeDNR on June 13, 2018, and was effective as of July 15, 2018. The IMP was developed in accordance with the Nebraska Ground Water Management and Protection Act (Act). The Act assigns the NeNR and the District the responsibilities and authority for the management of groundwater, surface water, and their hydrologically connected areas in accordance with the Act, N.R.S. Chapter 46, Article 7. The voluntary IMP provides the framework for joint management of groundwater and surface water, recognizing that the two water sources are hydrologically connected. This framework enables the District and the NeDNR to coordinate management actions and the monitoring of groundwater and surface water, in order to better protect water resources for future generations (LPN, 2018). The IMP recognized five goals:

- 1) Develop and maintain a District-wide water supply inventory
- 2) Develop and maintain a District-wide water demand inventory
- 3) Develop and implement water use policies and practices with the purpose of achieving and sustaining a balance between water uses and supplies
- 4) Communicate to the public that Nebraska has a great supply of water, and a need to continue to manage it well
- 5) Coordinate with the Lower Platte River Basin NRDs, and appropriate groups and agencies, to develop a water management plan for the Coalition that maintains a balance between current and future water supplies and demands

LPNNRD Drought Contingency Plan

Add information.....

1.5 RULES AND REGULATIONS

The Groundwater Management Area Rules and Regulations were last implemented on January 1, 1997, and last amended on June 15, 2018. Under Neb. Rev. Statutes 46-701 to 46-754 of the Act, the LPNNRD has designated the entirety of the District as a Phase One Management Area for groundwater quality and a Level One Management Area for groundwater quantity.

1.5.1 Groundwater Quality Management Areas

The primary threat to water quality is nitrate contamination, along with an emerging threat from uranium. The LPNNRD conducts groundwater sampling to establish Groundwater Quality Management Areas. Management areas can have one of four designated phases (i.e., Phase I through Phase IV) based on nitrate concentration trigger levels must be within a minimum 9-square mile area, are at identified trigger levels for a minimum of two sampling events. A management area must contain a minimum of 10 registered wells and contaminant trigger levels must be exceeded in over 50 percent of the wells sampled. Based on the June 15, 2018, amended Rules and Regulations, the phases and corresponding groundwater nitrate concentration trigger levels are as follows:

1. **Phase I:** 0 to 8 parts per million (ppm)
2. **Phase II:** > 8 to 10 ppm
3. **Phase III:** > 10 to 15 ppm
4. **Phase IV:** > 15 ppm

Currently, the LPNNRD has two Quality Management Areas. One is near the Village of Bellwood and is currently in a Phase II level of management. The second is near the cities of Richland/Schuyler area, where a Phase III level of management is in place as shown in Figure 4. Additional nitrogen management, reporting, and educational requirements are required for operators within Phase II and III areas.

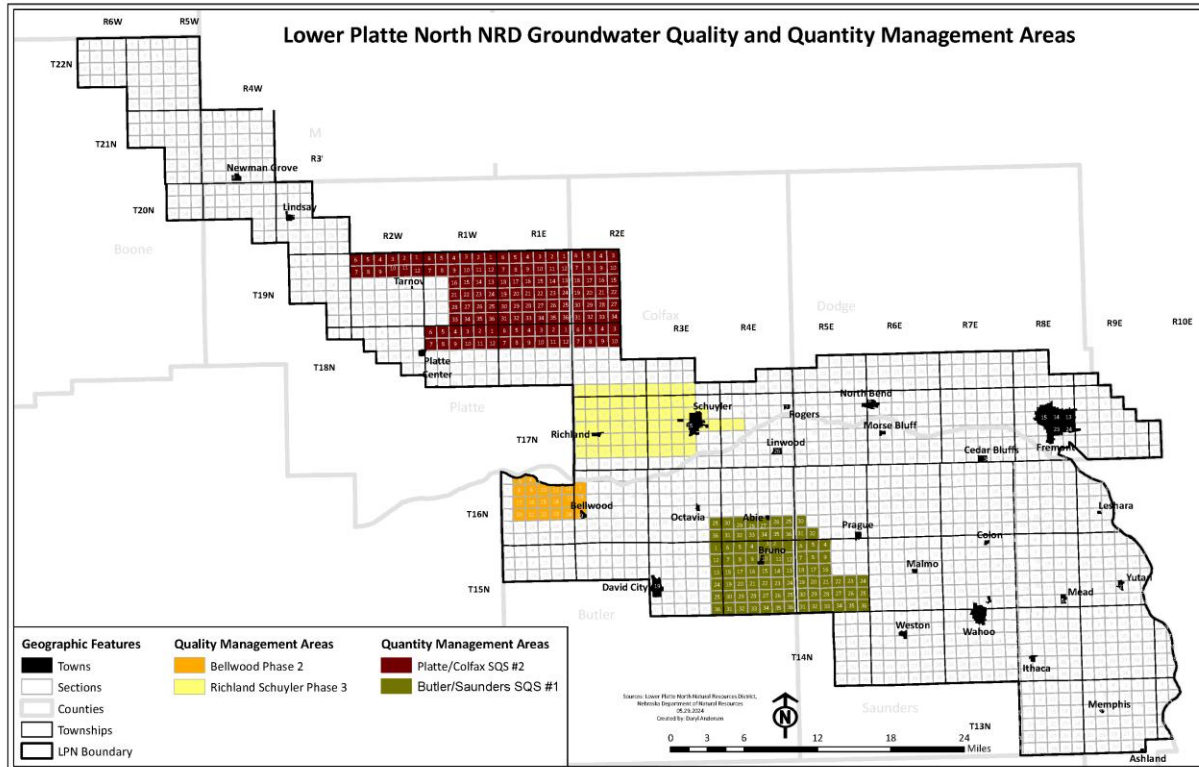


Figure 4: Quality and Quantity Management Areas

1.5.2 Groundwater Quantity Management Areas

The Rules and Regulations also allow for the development of Groundwater Quantity Management Areas based on the percentage of water level decline for an unconfined aquifer and the percentage of hydraulic head decline for a confined aquifer. Assessment of the percentage drop is calculated using spring readings of the District’s spring/fall static observation wells over a 3-year period. Over 50 percent of the wells in must reach or exceed a predetermined water level percent trigger. A general summary of the quantity triggers is shown below. Currently, the LPNNRD does not have a designated Groundwater Quantity Management Area.

Table 1: Confined and Unconfined Aquifer Triggers

AQUIFER TYPE	TRIGGER %	LEVEL CONTROL
Unconfined	10	I
	15	II
Confined	7	IA
	10	IIA
	15	IIIA

1.5.3 Groundwater Development Areas

In March 2018, the LPNDR established Groundwater Limited Development Areas, where restrictions are in place on the development of high-capacity wells and the expansion of irrigated acres. These areas were delineated by the results of NeDNR’s Lower Platte Missouri Tributaries Groundwater Model (LPMT)’s Hydrologically Connected Areas (HCAs). These areas have been determined to have a physical hydrologic connection between groundwater and surface water, and the goal is to ensure no further impact to surface water flow occurs as a result of excessive groundwater pumping. These areas are shown in **Error! Reference source not found.**

- **Within Groundwater Control Area (blue):** Up to 70 new acre-feet (AF) per year are allowed through a variance process due annually on August 15.
- **Outside Groundwater Control Area (white):** Up to 200 new AF per year with a variance deadline of September 15.
- **Restricted Development Area (red):** Was established through a separate study, and there are no new irrigated acres or water uses allowed, but consideration is given to areas within 1 mile of the red area.

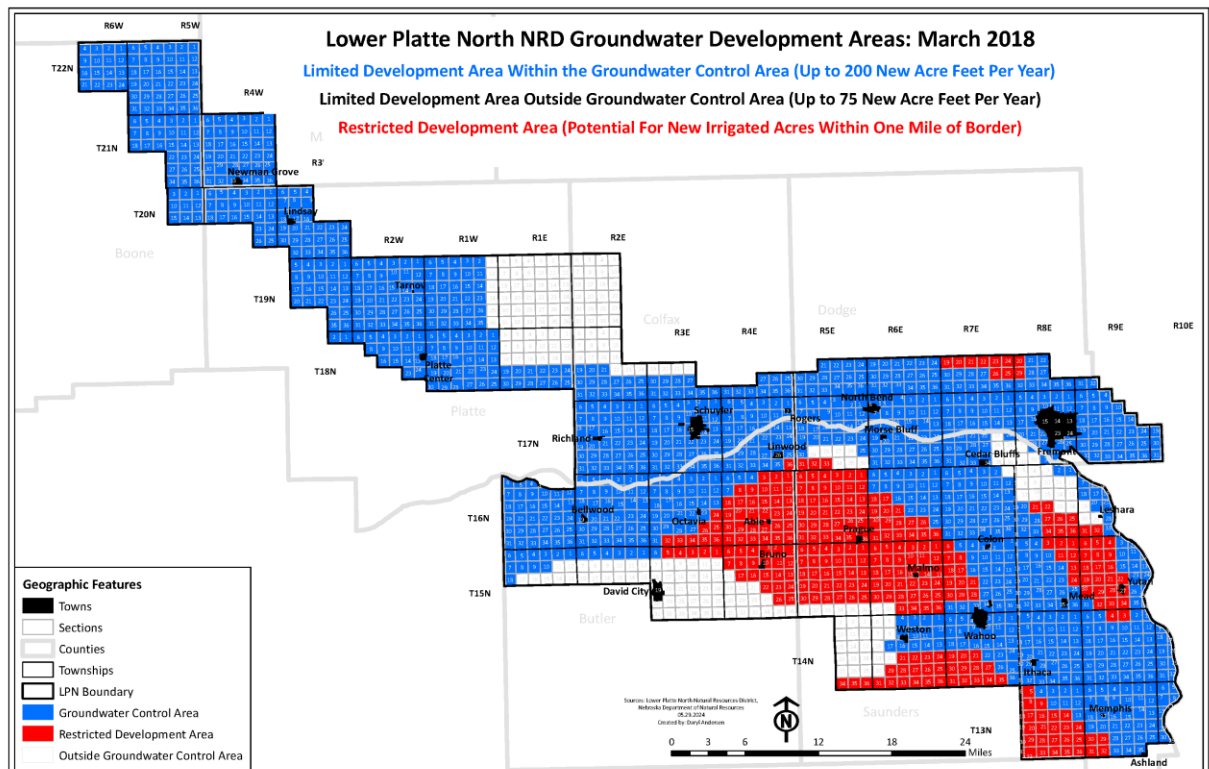


Figure 5: Groundwater Limited Development Areas

1.5.4 Special Quantity Sub-Areas

Starting on January 1, 1997, the LPNDR established two Special Quantity Sub-Areas (SQS) as a result of excessive seasonal declines in water levels that caused well interference. Due to the declines occurring during the summer, they did not qualify under the criteria for Groundwater Quantity Management Areas described above. These are referred to as Butler/Saunders SQS #1 and Platte/Colfax SQS #2. There are no new or expanded irrigated acres allowed in these areas, and several other restrictions apply.

Variations are required for a well permit or expansion of irrigated acres across the entire District. The SQS areas are shown on Figure 4 above.

DRAFT

2 DESCRIPTION OF THE NRD

2.1 GROUNDWATER REGIONS AND PRINCIPAL AQUIFER

The 1995 GWMP subdivides the District into four distinct regions based on hydrogeologic and physiographic characteristics. The regions are described in the LPNNRD Hydrogeologic Evaluation and Subarea Delineation Study (Olsson, 2009) and are shown in Figure 6.

- **Platte River** This area is characterized by fluvial sand and gravel deposits of varying thickness, which are overlain by alluvial silt and clay, and younger loess deposits. Coarser and thicker sands and gravels appear to be present in paleovalley deposits, which sometimes extend into the Uplands Region described below.
- **Shell Creek:** Located in the northwest portion of the District, this region extends from the Platte River to the Sandhills and dissects glacial terrain similar to that of the Uplands Region. The upper reaches include the Ogallala Group.
- **Todd Valley:** This region was formed by the ancestral Platte River, which carved a fluvial valley. This region consists of fluvial sand and gravel deposits capped by loess and overlies the Cretaceous-age Dakota Group bedrock formations. The fluvial deposits typically grade from fine to a progressively coarser-grained sands and gravels with depth. The Todd Valley aquifer is connected to the Platte River alluvial sand and gravel aquifer.
- **Uplands:** This region is characterized by dissected clay-rich glacial till and younger loess deposits with interbedded, discontinuous sand and gravel outwash deposits. In places, the glacial deposits overlie deeper paleovalleys that contain thicker and coarser sands and gravels or are in contact with the underlying Dakota Group. The sandstone units of the Dakota Formation contain brackish to saline water.

Principal Aquifer is the major groundwater reservoir in the District. It refers to the saturated unconsolidated sand and gravel aquifers, including the Ogallala Group, where present.

The following sections provide more insight into the hydrogeologic data and recent assessments, and background of the LPNNRD.

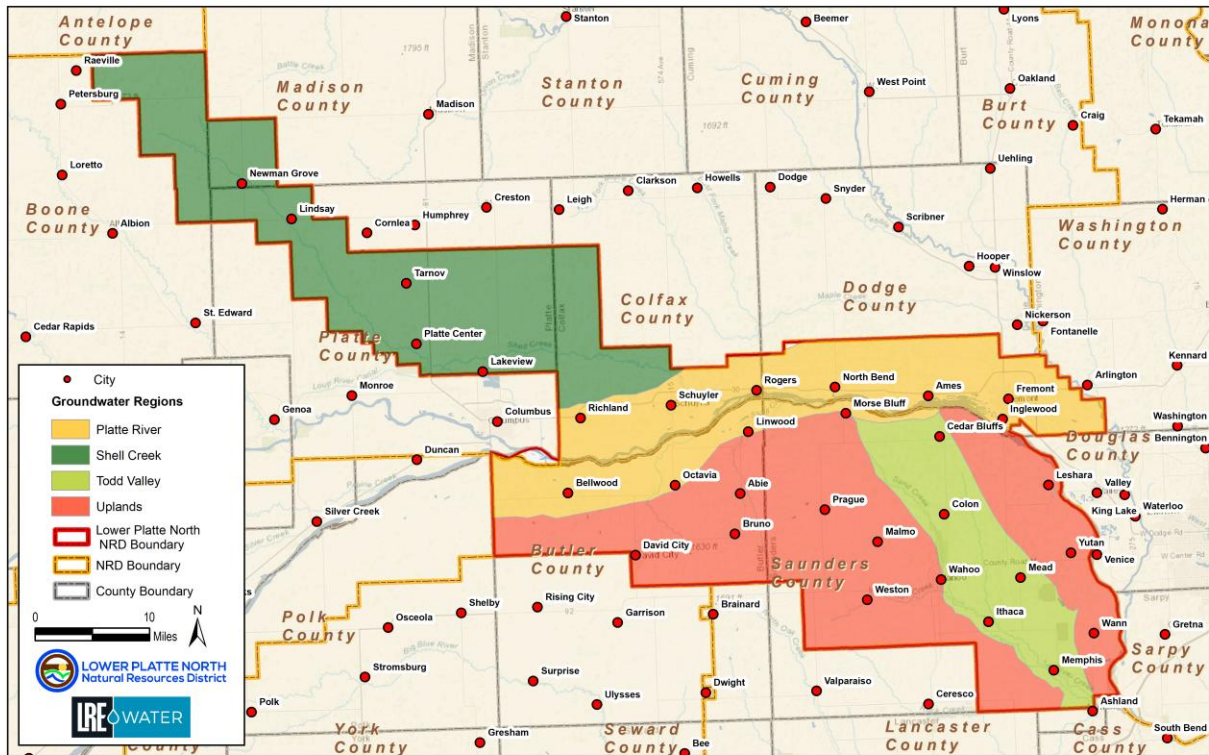


Figure 6: Groundwater Regions of the LPNNRD

2.2 HYDROGEOLOGIC DATASETS

Since 2006, the Eastern Nebraska Water Resources Assessment's (ENWRA) work has resulted in vast geologic datasets and creation of hydrogeologic frameworks for six NRDs in eastern Nebraska, including the LPNNRD. The major datasets include airborne electromagnetic (AEM) data, and geologic logs from the NeDNR and University of Nebraska-Lincoln, Conservation Survey Division (UNL-CSD) well and test holes database. These data sets and detailed desktop hydrogeologic assessments completed recently for the District are available to aid in well siting and similar groundwater management actions.

2.2.1 Airborne Electromagnetic Survey

AEM is an airborne geophysical survey method that can provide characterization of electrical properties of earth materials from 3 to 10 feet to depths over 1,000 feet. These surveys provide geophysical data quickly and efficiently and when analyzed, can help define aquifer and non-aquifer materials. The AEM surveys have been crucial in the LPNNRD's efforts to help address water quality and quantity challenges.

The LPNNRD's AEM survey datasets and reports from 2009, 2012, 2015, 2016 and 2018 are available on EWRA's projects website (<https://enwra.org/projects>). The AEM flight line locations within the District and adjacent NRDs are shown in Figure 7.

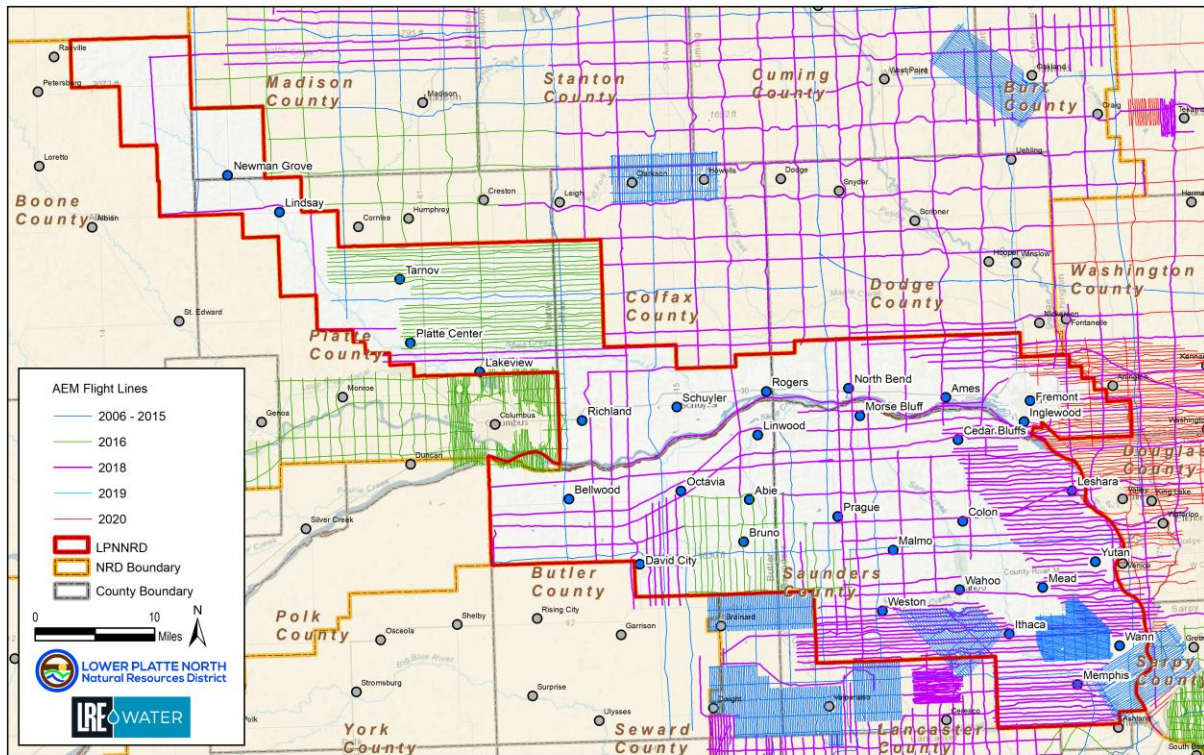


Figure 7: AEM Flights within and near the LPNNRD

2.2.2 3D AEM Framework and Hydrogeologic Assessment

In 2022, the LPNNRD utilized the AEM datasets to create a 3D AEM Framework (LRE Water, 2022), in addition to constructing detailed hydrogeologic cross sections from geologic logs. The framework was created using Leapfrog, a 3D geological modeling software program. The program delineated the hydrostratigraphy and hydraulic conductivity zones from the processed AEM data. The framework offers several benefits:

- Provides hydrogeologic information to assist staff in reviewing well permits.
- Enhances understanding of aquifer characteristics, such as recharge areas and water-bearing layers.
- Facilitates vulnerability assessments and identifies areas needing best management practices.
- Better defines hydrologically connected surface and groundwater.
- Improves collaboration with neighboring NRDs and NeDNR.
- Creates a MODFLOW grid, including layers, cells, and hydraulic conductivity zones for numerical groundwater flow modeling.

An example of a Leapfrog Works model output is shown in Figure 8 where higher resistivities are shown as brighter colors and are representative of sand and gravel. The darker colors represent low resistivity and represent clay, till, and losses. The bedrock surface is shown as a black line.

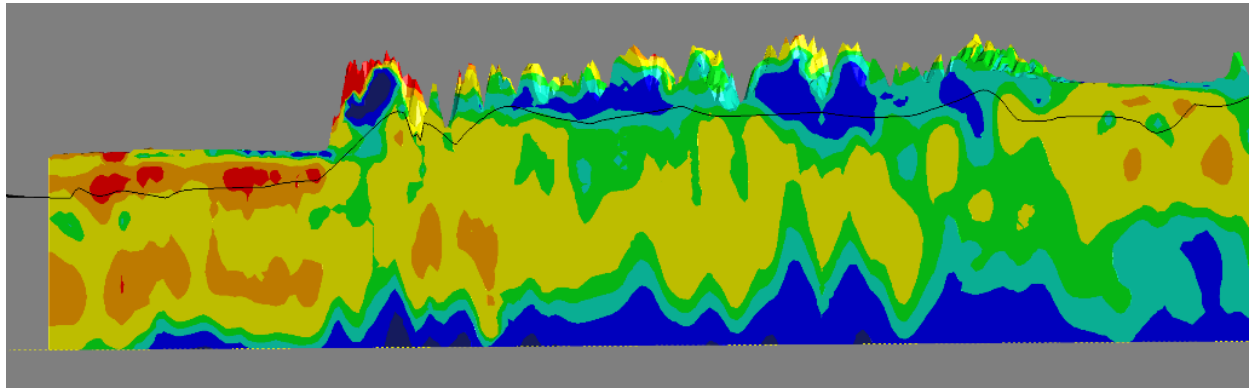


Figure 8: 3D Leapfrog output in cross section

In 2023, a Hydrogeologic Assessment (Assessment) was completed for the LPNNRD utilizing all available NeDNR well logs UNL-CSD test holes (LRE Water, 2023). In total, 22,500 well logs and 290 test holes were incorporated into the Assessment, which included a 5-mile buffer around the LPNNRD boundary. There were a total of 11,893 wells within the LPNNRD with geologic logs as seen in Figure 7. The Assessment also utilized existing geologic information from the 2022 3D AEM Framework.

In addition to a bedrock surface, the geospatial and hydrogeologic analyses completed on the geologic log data were used to develop 28 hydrogeologic cross sections, and to generate the other hydrogeologic raster surfaces, many of which were utilized to create the maps illustrated below within this plan.

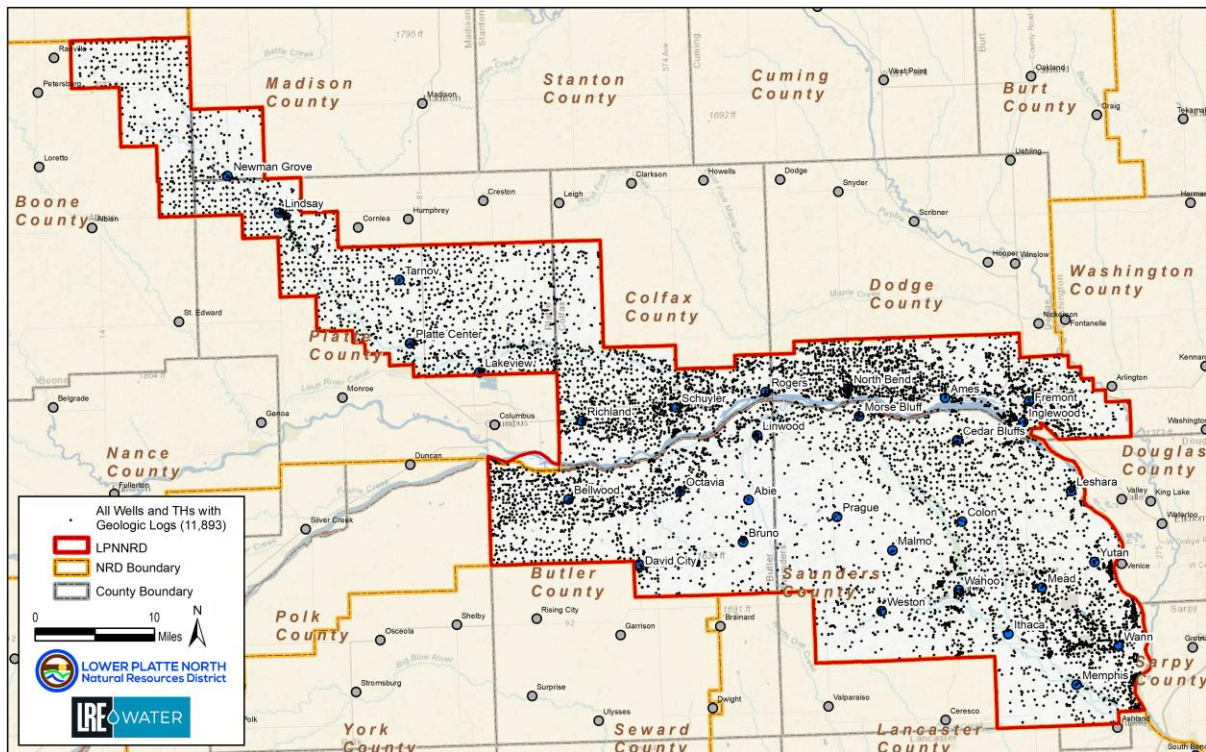


Figure 9: Well and Test Holes with Geologic Logs (LRE Water, 2023)

2.3 TOPOGRAPHY

The northwest arm of the District is dominated by upland dissected plains topography and includes portions of Boone and Madison counties, and about two-thirds of Platte County. To the southeast, the central portion of the LPNND includes approximately 125 miles of the Platte River Valley, extending from the cities of Columbus to the west and Ashland to the east. Through the east-central portion of Saunders County, from the cities of North Bend to Ashland, is a broad fertile area 5 to 8 miles wide, referred to as the Todd Valley. West and southwest Saunders County and eastern Butler County, known locally as the 'hill area', is comprised of bluffs along the north edge and rolling hills, ridges, and steep valley slopes south of the Platte River Valley. A map of the topography, derived from a Digital Elevation Model, is shown in Figure 8.

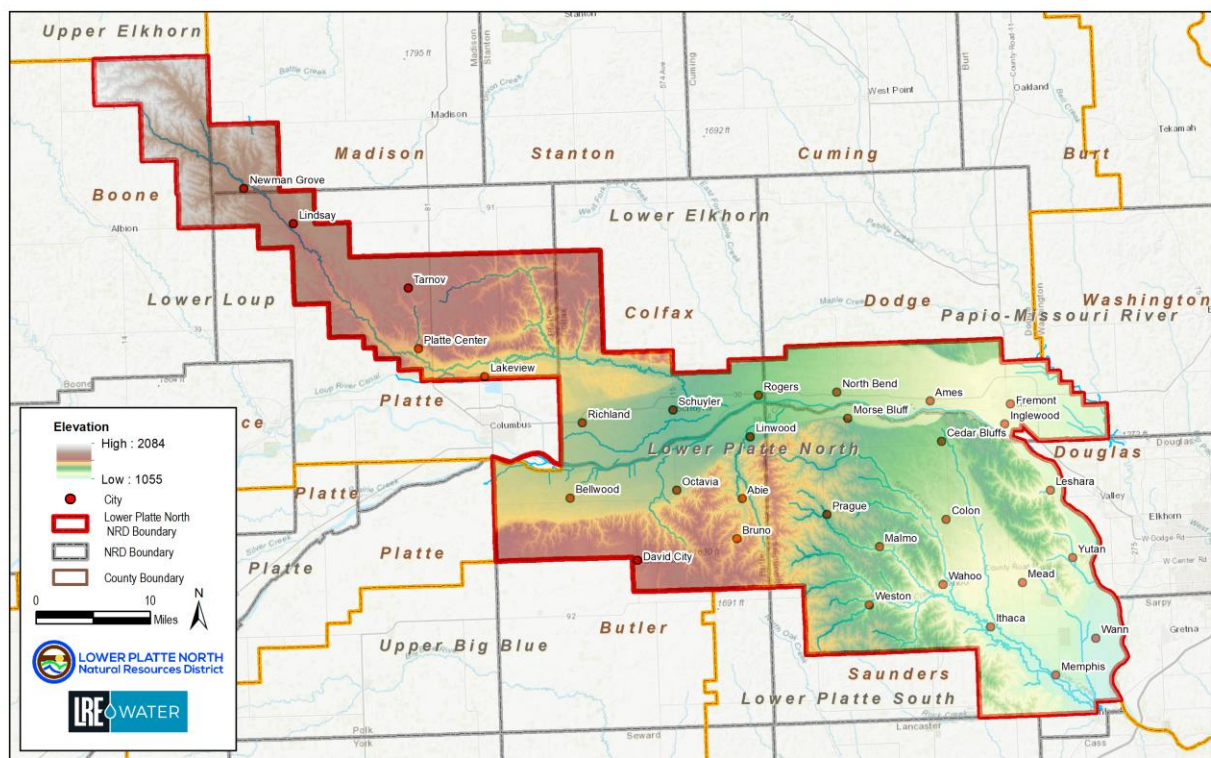


Figure 8: Topography of the LPNND

2.4 SOILS

Soils in the uplands of Butler and Saunders counties consist primarily of clays and silty clays to silty clay loams somewhat similar to the Sharpsburg and Sharpsburg-Pawnee association. Primary soils in the upland areas are eroded to a point where they no longer exist, and landowners are now farming in the "B" horizon. This has implications for surface and groundwater quality. The permeability of these soils is less than 1.0 inch per hour on slopes that range from gentle to 20 percent. Recharge rates are quite low and recharge is principally limited to perched aquifers. These soils are loess type soils with some intermixed glacial till areas. The drainage pattern and flood plain configuration of Wahoo Creek is

primarily composed of Kennebec soils of silty clay loam ranging from moderately to poorly drained (HWS, 1995).

The western portion of the Platte River corridor is comprised of Acadia-Platte alluvial fine sands underlain by sands and gravels. The eastern portion of the corridor is practically the same, however, depth to water in the eastern area is greater. This primary water line is bounded on the north by poorly drained Gibbon-Luton silty and clayey soils. Areas to the south and a few areas along the western end of the Platte River corridor contain silty soils that are well drained and of loess origin.

The northwest corner of the District is composed of moderately to well drained silty type soils with permeabilities ranging from 1 to 2 inches per hour above the areas adjacent to Shell Creek. Areas in northeast Platte County have permeability ranges of 1.5 to 5 inches per hour.

The general pattern of soil distribution shows that soils of loess origin are found on the uplands with alluvial soils predominant on the bottom lands, as seen in Figure 9. Permeabilities range from practically zero to greater than 10 inches per hour (near Columbus and southeast of Bellwood). The pattern shows that, generally, soils south of the Platte River is less permeable than those of the north side. Soil textures range from fine sands to silty clays.

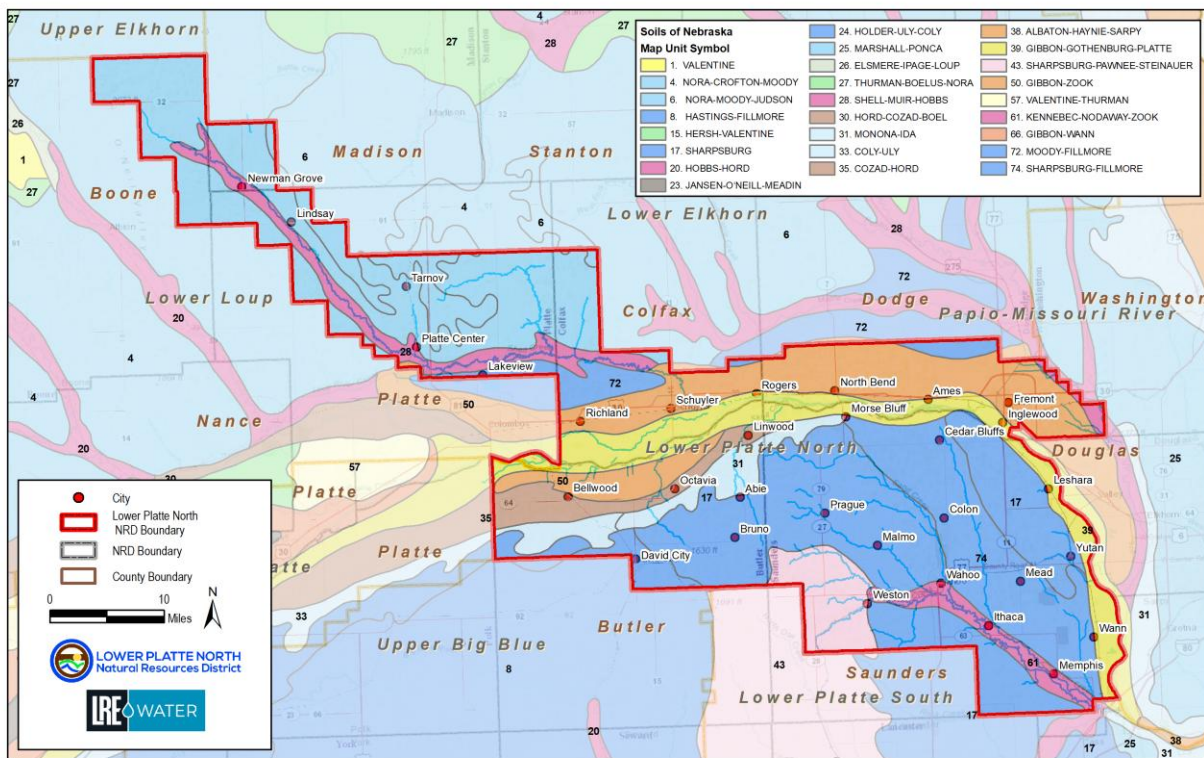


Figure 9: Soil Types

2.5 GEOLOGY AND HYDROLOGICAL CHARACTERISTICS

The geology of the District generally consists of Quaternary-age unconsolidated loess, glacial till and outwash, and older buried fluvial deposits overlying bedrock. The five primary bedrock formations are shown in 10. A description of the major unconsolidated and bedrock formations and their potential to transmit water to wells, as described in the previous plan, are listed in Table 2.

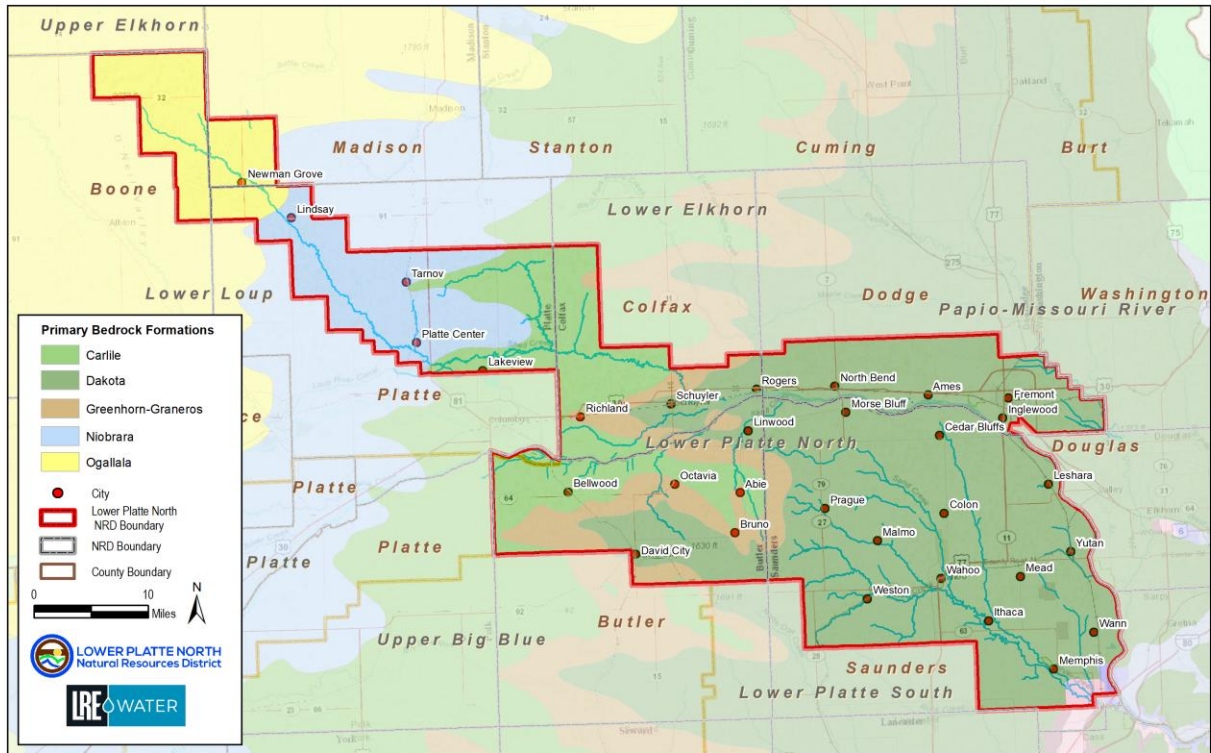


Figure 10: Bedrock Formations

Table 2: Geologic Sequence of Major Formations in LPNDR

SYSTEM	SERIES	MAJOR STRATIGRAPHIC UNITS	PHYSICAL CHARACTER	WATER SUPPLY
Quaternary	Holocene	Modern Soils	Locally silty, clayey, or sandy.	Transmits locally variable amounts of recharge to the groundwater reservoir.
		Recent valley-fill deposits	Alluvial deposits of gravel, sand, silt, and clay associated with the most recent cycle of erosion	May contribute significant amounts of water to wells.

SYSTEM	SERIES	MAJOR STRATIGRAPHIC UNITS	PHYSICAL CHARACTER	WATER SUPPLY
	Pleistocene	Loess	Wind-blown silt with lesser amounts of very fine sand and clay.	Transmits recharge to the underlying aquifers. May provide small quantities of water to shallow wells.
		Till	Ice-deposited silty, sandy clay with gravel and larger pebbles and boulders.	Relatively impermeable. Transmits water slowly to buried aquifers. Groundwater may be perched above the till. Sand deposits within the till provide water to low-capacity wells.
		Glacial outwash and other ancient valley-fill deposits	Alluvial deposits of gravel, sand, silt, and clay associated with ancient erosional and depositional cycles.	Contributes water to wells in generally large amounts, stream-deposited sand and gravel constitute the major aquifers and yields to high-capacity wells.
Tertiary	Pliocene(?)	Ancient valley-fill deposits	Mostly unconsolidated silt. May blanket Cretaceous bedrock at base and on side slopes of paleo-valleys.	Generally, too fine textured to yield water to wells.
	Miocene	Ogallala	Poorly sorted clay, silt, sand, and gravel generally uncemented to slightly cemented.	The Ogallala constitutes a major aquifer in western portion of LPNRD. Yields to large-capacity wells.
Cretaceous	Upper Cretaceous	Niobrara	Chalk	May supply water to wells where fractures exist or are saturated.
		Carlile	Shale	Not known to supply water to wells
		Greenhorn	Limestone	
		Graneros	Shale	
	Lower Cretaceous	Dakota	Sandstone and shale	Constitutes a significant aquifer in the eastern part, potentially yields and water quality are locally variable.

Source: HWS, 1995

2.6 TOTAL SATURATED SAND

The total thickness of saturated sand is an indicator that can be used qualitatively evaluate the relative potential yield from an aquifer or aquifers. The total saturated sand in the District, shown in Figure 11 (LRE, 2023), was created using water level and geologic data from NeDNR well logs and UNL-CSD test

holes logs. The thicker aquifers are present in the northwest and Todd Valley portions of the District, and generally become thinner in the central portion and beyond Todd Valley.

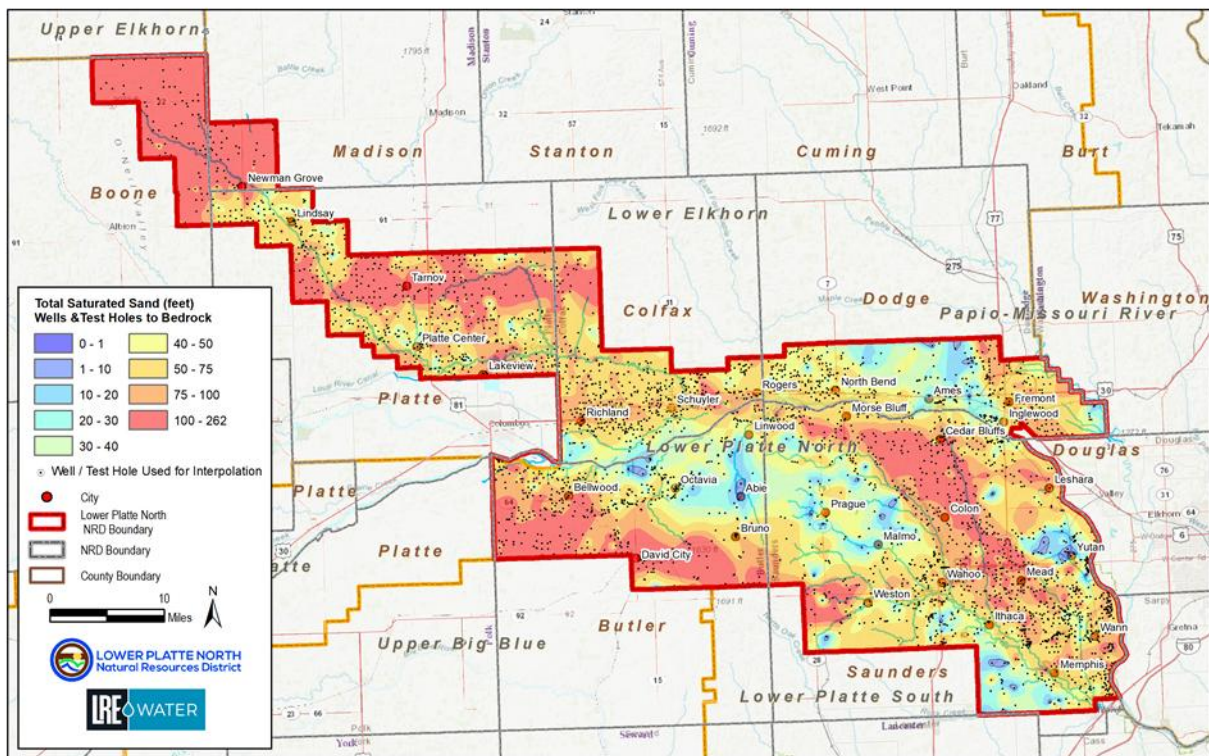


Figure 11: Total Saturated Sand, Well and Test Holes to Bedrock

2.7 CONFINED VS. UNCONFINED AQUIFERS

A confined aquifer is a formation below the land surface that is saturated with water and has impermeable layers above and below it causing it to be under pressure. As a result, when a confined aquifer is penetrated by a well, the water will rise above the top of the aquifer in the well. Artesian wells are a result of confined aquifers. In a confined aquifer, water level declines represent a reduction of artesian head, not saturated thickness.

A management strategy for a confined aquifer is to avoid pumping a confined aquifer to levels where it unnaturally transitions to unconfined conditions. The primary risk of this is decreasing the aquifer's pore pressure, which can potentially reduce well yields and quality due to changes in water pressure and oxidation. Over pumping can also lead to well interference by reducing the available head in the aquifer.

Unconfined aquifers, also referred to as the water table aquifers, are present where the upper water surface (water table) is equal to atmospheric pressure. In an unconfined aquifer, water level rises and declines changes the saturated thickness.

Management strategies for an unconfined aquifer is to avoid over pumping where the rate of withdrawal exceeds the rate of recharge. In addition, dewatering activities can draw in pollutants, potentially contaminating the water source, and excessive pumping can lead to reduced saturated thickness and

well yields, reduced water levels in nearby surface waters if hydraulically connected, and the potential for well interference with other users.

Differences in static (i.e., non-pumping) groundwater levels measured in adjacent wells could be caused by wells being screened at different depths and/or in different aquifers.

Knowing whether an aquifer is confined or unconfined is important for effective groundwater management in Nebraska for several reasons:

1. **Water Availability:** Unconfined aquifers, also known as water table aquifers, are more influenced by surface conditions and can be more susceptible to droughts. Confined aquifers, under pressure, provide a more stable water supply.
2. **Recharge Rates:** Unconfined aquifers recharge more quickly due to their proximity to the surface and direct receipt of precipitation. Confined aquifers recharge more slowly due to impermeable layers above them.
3. **Water Quality:** Unconfined aquifers are more vulnerable to surface contamination from activities like agriculture and industry, while confined aquifers are generally better protected.
4. **Management Strategies:** Different practices are required for managing confined and unconfined aquifers. Unconfined aquifer management focuses on protecting recharge areas and controlling surface contamination, while confined aquifer management involves monitoring pressure levels and ensuring sustainable withdrawal rates.
5. **Hydraulic Properties:** The hydraulic properties, such as transmissivity and storativity, differ between confined and unconfined aquifers, affecting water movement and extraction.

By understanding these differences, the staff and Board can develop more effective strategies to ensure sustainable water use and protect water quality. The confined and unconfined aquifers are shown in Figure 12 (LRE, 2023). In some areas, aquifers can transition from unconfined to confined depending on water level fluctuations. These areas are mapped as transitional zone. In general, the majority of the aquifers in the Platte River Valley and Todd Valley groundwater regions are unconfined or transitional.

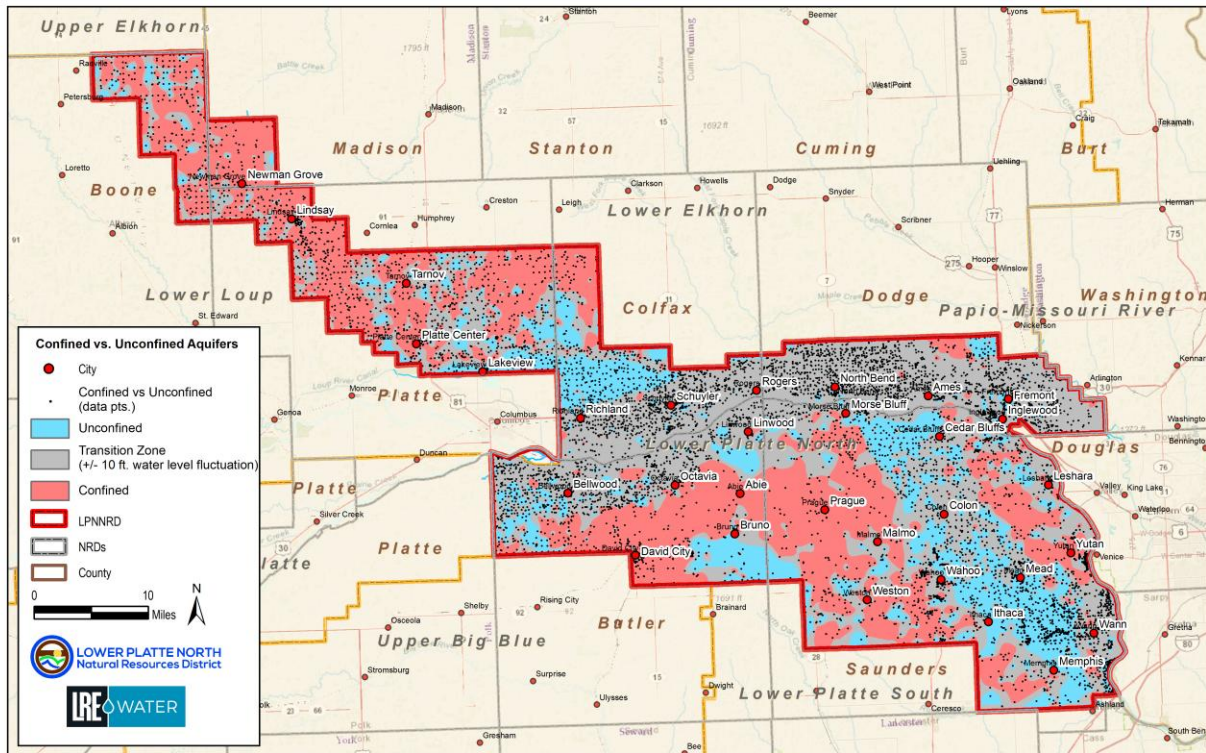


Figure 12: Confined vs. Unconfined Aquifers

2.8 TRANSMISSIVITY

Transmissivity is perhaps the one hydrologic parameter which best describes the aquifer and its potential for use and withdrawal. Transmissivity is the rate which quantifies the ability of an aquifer to transmit water and is dependent on saturated thickness and permeability.

13 shows the transmissivity of the Principal Aquifer for the LPNNRD based upon the Assessment (LRE Water, 2023). Areas with transmissivity less than 10,000 gallons per day per foot are not considered optimal areas for high-capacity wells, which are hatched.

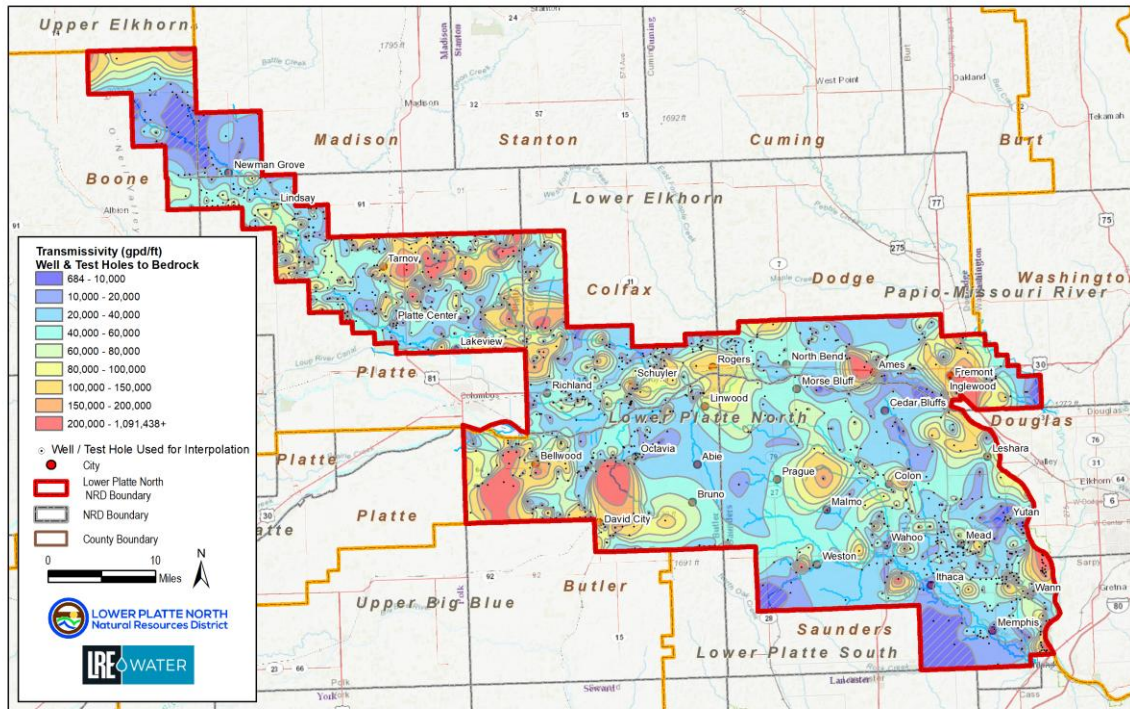


Figure 13: Aquifer Transmissivity

2.9 CLIMATE AND PRECIPITATION

Precipitation in the LPNNRD serves as the principal source of water for recharge in all but the Platte River Valley adjacent to the Platte River, where the river can provide recharge to the aquifer if induced by pumping. Figure 14 demonstrates the mean annual precipitation for the state and the LPNNRD. The average annual water requirement for maximum yield by crops varies from 25 inches for corn to 22 inches for grain sorghum and soybeans. It, therefore, appears that an abundance of moisture exists over the District, however, the timing and amount of precipitation determines crop water availability. Moisture needs are more critical at certain times in the crop growing cycle and if moisture is not available, crop production can and does suffer. Detailed evaluations of precipitation versus soil moisture and crop water needs are necessary components in providing a comprehensive management system. This area of the state receives maximum precipitation in April, May, and June. The maximum water use period by crops stretches from April through September (crop dependent), with July, August, and September water requirements exceeding available average precipitation. It is apparent that at certain times there is a need for irrigation water to produce higher yields.

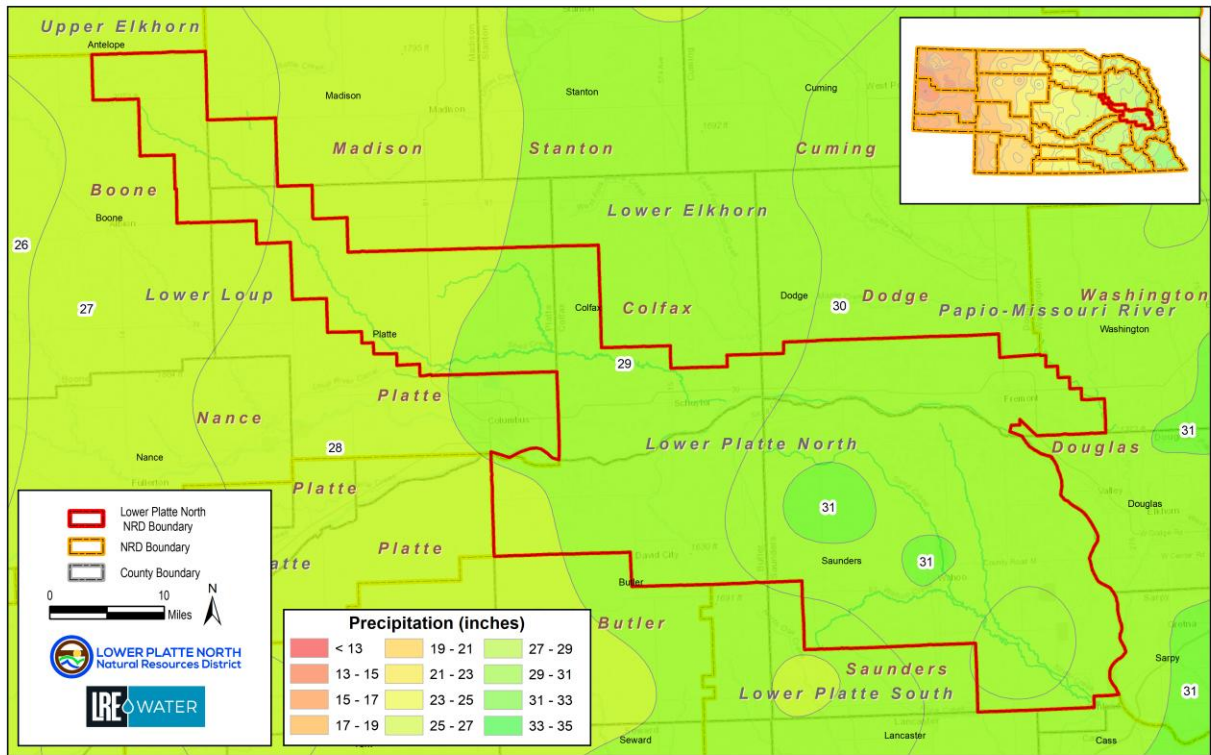


Figure 14: Average Annual Precipitation (1981-2020)

2.10 LAND COVER

The vast majority of the District’s 1,030,468 acres (approximately 75 percent) of LPNNRD is classified as row crop by the CropScope – Cropland Data Layer, derived from the U.S. Department of Agriculture’s National Agricultural Statistics Service (NASS). The NASS dataset was used to look at land cover changes since 2009 and categories were combined into seven sub-categories, out of the 37 that are available. As shown in Table 3, over 84,500 acres of grass or pasture has been converted since 2009. The increase in wetlands was not determined but could be a result of the 2019 flood event or potentially a difference in interpretations of data collected in each respective year. A spatial representation of land cover is shown in Figure 15.

Table 3: LPNNRD Land Cover Change (2009 – 2023)

Land Cover	2009	2023	Ac Change	% Change	2009 Coverage	2023 Coverage
Row Crop	716,285.3	769,604.6	53,319.3	7.4%	69.5%	74.7%
Alfalfa/Hay	19,640.1	34,722.4	15,082.3	76.8%	1.9%	3.4%
Developed	55,475.7	58,863.9	3,388.2	6.1%	5.4%	5.7%
Grass/pasture	179,834.1	95,315.4	-84,518.7	-47.0%	17.5%	9.2%
Forest	33,010.9	35,942.7	2,931.8	8.9%	3.2%	3.5%
Open Water	17,666.4	19,698.6	2,032.2	11.5%	1.7%	1.9%
Wetlands	8,556.2	16,320.7	7,764.5	90.7%	0.8%	1.6%

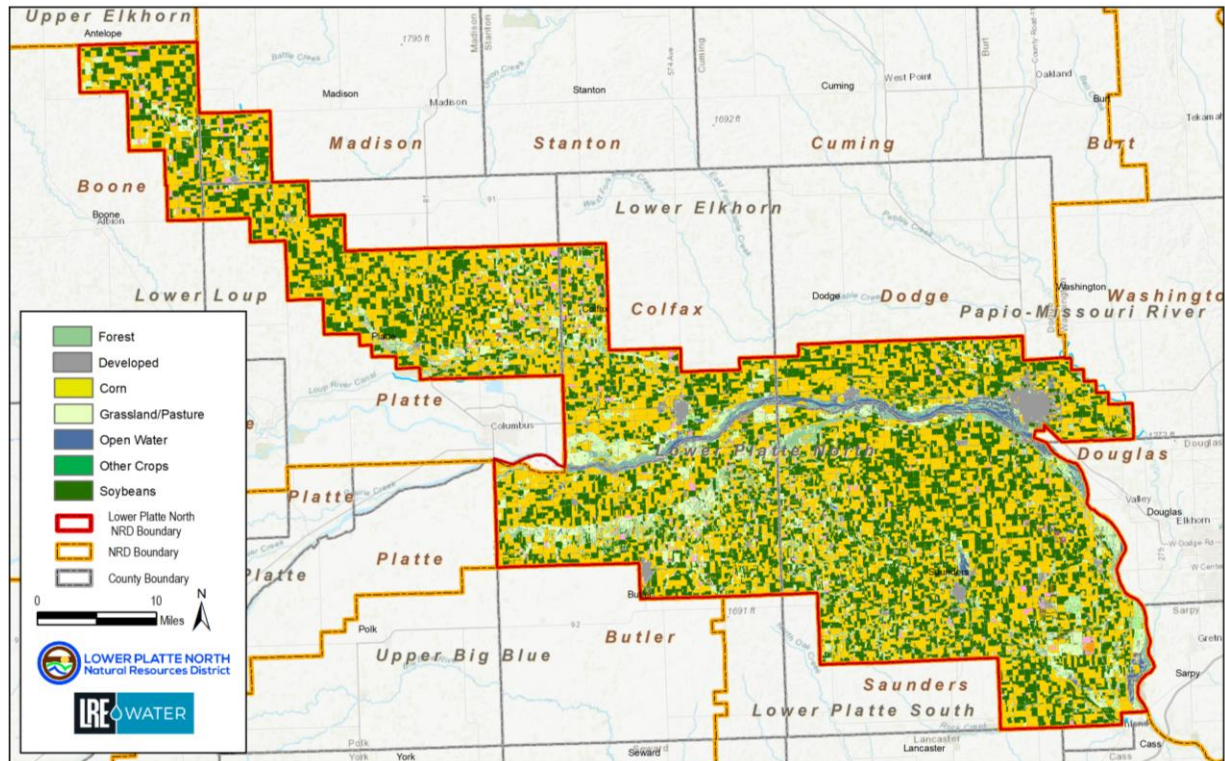


Figure 15: 2023 Land Cover

As the total number of acres harvested increases, the following occurs:

1. The number of acres of permanent cover decrease.
2. The number of acres more susceptible to erosion and runoff increases.
3. The usage of fertilizer, herbicides, pesticides, etc. increases.
4. The potential for ground and surface water degradation increases.
5. The use of high-capacity wells for irrigation increases demand on the aquifers and surface water resources.

2.11 POPULATION – ECONOMIC BASE

The economic base for LPNNRD communities varies, but generally includes agriculture, manufacturing, and services. Many of the communities rely heavily on agriculture, including crop production (corn, soybeans) and livestock farming. The City of Fremont, the largest community, has a diverse industrial base with food processing, metal fabrication, and other manufacturing sectors. Tourism and recreation are also available, with multiple state and locally operated lakes open to the public, along with use of the Platte River for open water recreation.

The total population of the LPNNRD is estimated at 65,447 (NARD, 2024), while the projected population for 2025 list incorporated places at nearly 50,000, meaning approximately 25 percent of the total population residential population in unincorporated areas, with most of these residents relying on private drinking water wells. A breakdown of population for the 28 LPNNRD communities is shown in Table 4.

Table 4: Population of Incorporated Places (1990 – 2025)

Village/City	1990	2000	2010	2020	Projected Population 2025
Yutan	1,100	1,216	1,174	1,308	1,350
Weston	310	310	324	335	340
Wahoo	3,700	3,942	4,508	4,509	4,600
Prague	340	346	303	285	290
Morse Bluff	130	134	135	135	140
Memphis	110	106	114	114	120
Mead	580	564	569	617	630
Malmo	120	109	120	120	125
Leshara	115	112	112	112	115
Ithaca	150	168	148	148	150
Colon	140	138	110	110	115
Cedar Bluffs	630	615	610	610	620
Schuyler	5,200	5,371	6,211	6,547	6,700
Rogers	95	95	95	95	100
Richland	75	73	73	73	75
North Bend	1,180	1,213	1,177	1,241	1,300
Inglewood	390	382	325	325	330
Fremont	24,500	25,174	26,397	27,141	27,500
Octavia	125	127	127	127	130
Linwood	88	88	88	88	90
David City	2,550	2,597	2,906	2,995	3,050
Bruno	110	112	99	99	100
Bellwood	440	446	435	435	440
Abie	110	108	69	69	70
Newman Grove	790	797	721	721	730
Tarnov	65	63	46	46	50
Platte Center	340	336	336	336	340
Lindsay	320	321	255	255	260
TOTALS	43,803	45,063	47,587	48,996	49,860

Source: Statistical Atlas of the U.S.

Information on industrial activity demonstrates a variety of industrial types present in the District that includes ethanol production, alfalfa products, concrete products, equipment manufacturing, fiberglass manufacturing, irrigation equipment manufacturing, sand and gravel mining, steel fabrication, confined animal feeding operations (swine and chickens), packing plants, among many others. This industrial array also yields a diversity of water needs and waste treatment problems. These needs and problems may have a degrading effect on both ground and surface water quality and quantity if not properly addressed.

2.12 WATER USE

The LPNNRD reports annually on water use as part of the LPRCA Basin Water Management Plan Annual Report. This report is available by contacting the LPNNRD office. Highlights of the reporting on water use include the following:

1. Collection of data from over 1,300 flow meters, of which nearly 1,200 are on irrigation systems.
2. Recording of water use within SQS#1 (Bulter/Saunders) and SQS#2 (Platte/Colfax).
3. Continuous updating and tracking of nearly 392,500 certified irrigated acres (as of 2024).
4. Tracking of municipal and industrial groundwater uses.
5. Data collection and monitoring of new groundwater consumptive uses (agricultural, municipal, industrial).
6. Tracking of acres for groundwater consumptive uses (agricultural, municipal, industrial).
7. Actively creating the Lower Platte River Groundwater Model, an ongoing effort with PMRNRD, LPSNRD, and NeDNR to utilize the 3-D AEM Framework created for the participating NRDs.
8. Working with the Coalition to track new stream depletion accounting (depletions and accretions).

2.13 SURFACE WATER

The LPNNRD is recognized by its northwest boundary consisting of the Shell Creek watershed extending from the cities of Newman Grove to Schuyler, where it meets the Platte River. Other significant streams include Elm Creek, Loseke Creek, Lost Creek, Skull Creek, and Wahoo Creek and its tributaries including Sand, Silver, and Cottonwood (Figure 16).

Outside of the Platte River, most of the other perennial streams do not support floating or active recreational uses. Flow through this region of the Platte River is a combination of the Upper Platte, the Loup, and the Elkhorn Rivers. Flow from the Platte River can range from no flow to overbank flows. The data, for 51 years up to 1995, at the City of Ashland shows the contributions of flow are: Elkhorn River (22 percent), Loup River (48 percent), upper Platte River (28 percent) and tributaries and valley groundwater inflow (2 percent). The annual and seasonal percentages of contribution vary extensively and are dependent upon the type of water year within the areas of influence. As the precipitation influences flow, the dry periods likewise influence flow and the manner of loss and gain to groundwater areas is often linked with flow volume.

Most of the streams receive baseflow from groundwater seepage to help maintain stream levels during dry periods. However, during heavy rain events, streams become 'flashy' and experience rapid increases in flow and water levels due to surface runoff.

There are a total of 217 active surface water diversion points across the LPNNRD with a record of 12,237 acres of irrigated crops utilizing surface water (NeDNR, 2024). Surface water rights are managed by NeDNR.

The Platte River's role in recharging groundwater by induced pumping and during periods of overbank flow within portions the LPNNRD is vital. The wellfields along the Platte River are crucial for supplying water to a significant portion of Nebraska's population, including water supplies for the City of Lincoln Water System (290,000 customers) and Metropolitan Utilities District (600,000 customers). The importance of this water source, managing the balance between groundwater recharge and surface

water flow is essential. This involves monitoring water quality, managing water withdraws, water rights, and ensuring sustainable practices to maintain the health of the aquifer and the river system.

There are a total of seven stream gages, managed USGS, within the LPNDR, including one in progress. The location and station name for each of the gage stations is shown in Table 4 with locations in Figure 16. Statistics from the USGS gage stations provide an idea of the volume of water, and variation in flow events, within Shell Creek, Wahoo Creek, and Platte River. The surface water flow within the Platte River has a dramatic effect on groundwater levels along the valley.

Table 5: LPNDR Steam Gage Information

Station Number	Station Name	General Location
06795500	Shell Creek near Columbus	122nd Ave - 4 miles NE of Lake Babcock
06796000	Platte River at North Bend	State HWY 79 - 0.5 miles S of North Bend
06796500	Platte River near Leshara	State HWY 64 west of Valley
06804000	Wahoo Creek at Ithaca	CRG - 1 mile S of Ithaca
06804700	Wahoo Creek at Ashland	State HWY 63 - 0.5 miles N of Ashland
06801000	Platte River near Ashland	At HWY 6
06795050	Shell Creek near Platte Center	In Progress

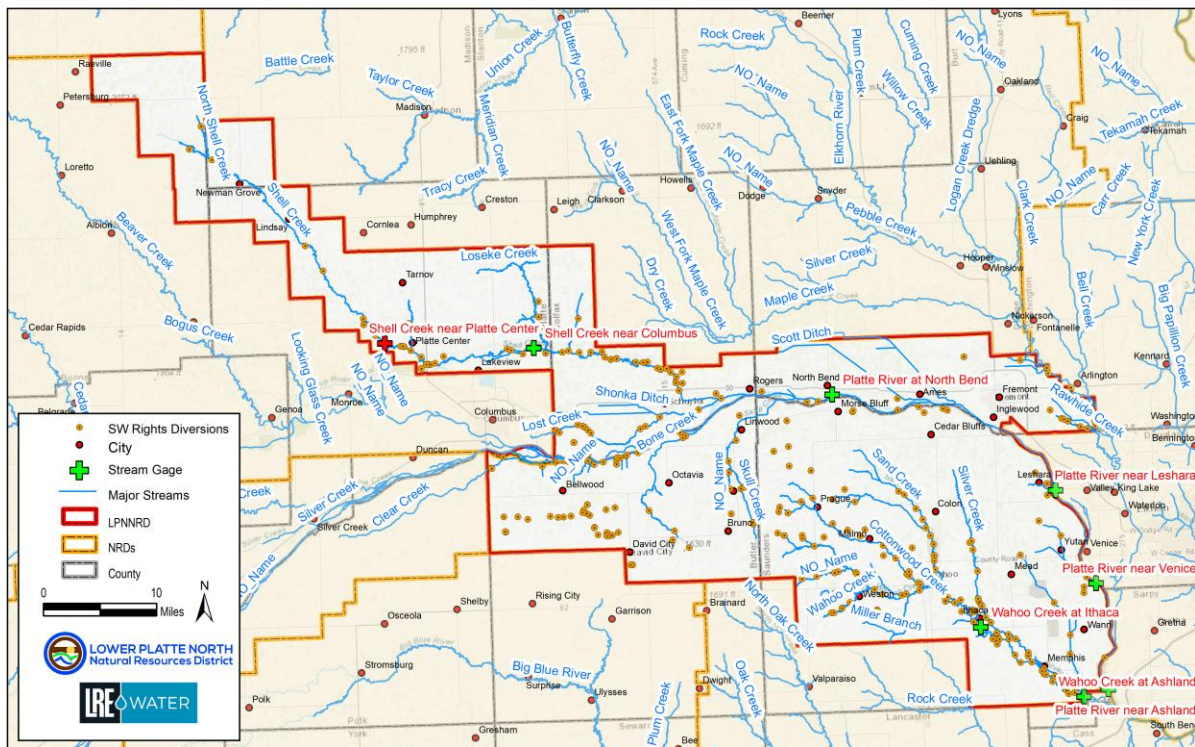


Figure 16: Major River Systems, Stream Gages and Diversion Points

2.14 WELLS AND TEST HOLES

The primary volumetric uses of groundwater in the District are for irrigation and municipal water needs, as shown in Figure 17. Groundwater is the principal source of supply for public drinking water systems, with all public water supplies deriving their supply from these sources. The cities of Lincoln, Omaha, and Fremont have extensive wellfields along the Platte River. Although the City of Lincoln is not located in the LPNNRD, a significant portion of its wellfield for public water supply is situated along the Platte River north of the City of Ashland.

The current use rate for the City of Lincoln’s wellfield averages 39.4 million gallons per day (mgd) but can reach up to 64 mgd during the summer months (LWS, 2020). This volume, combined with the demand from irrigation and other public and private users within the District, underscores the importance of both the quantity and quality of groundwater for continued and sustained development. In the absence of actual historical water use values or estimates, the development of irrigation wells serves as an indicator of aquifer use, as shown in Figure 18.

The UNL-CSD’s drilling program and has drilled 6,000 test holes throughout the state since 1930. Geologic material from these sites is preserved at the CSD Geological Sample Repository. This data is maintained by UNL-CSD and made available to the public for research, well siting, aquifer mapping, and much more. There are 287 UNL-CSD test holes within 5 miles of the LPNNRD and 151 within the border as shown in Figure 18.

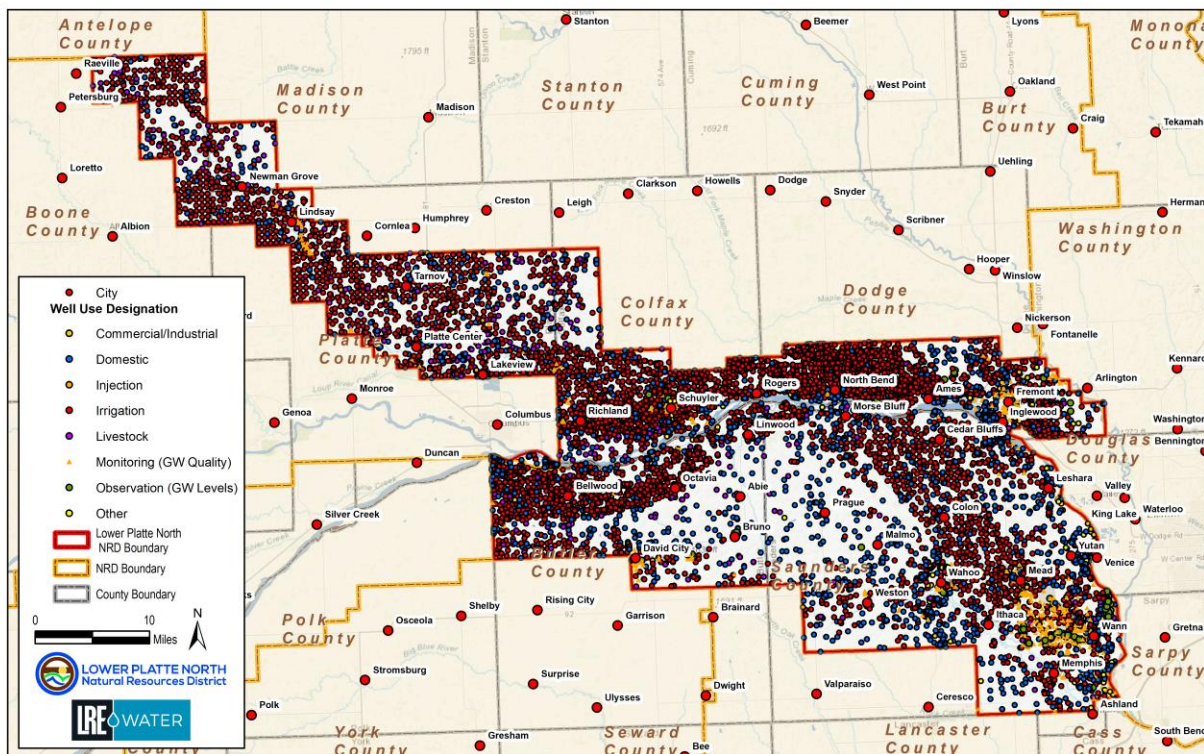


Figure 17: Registered Active Wells in the LPNNRD

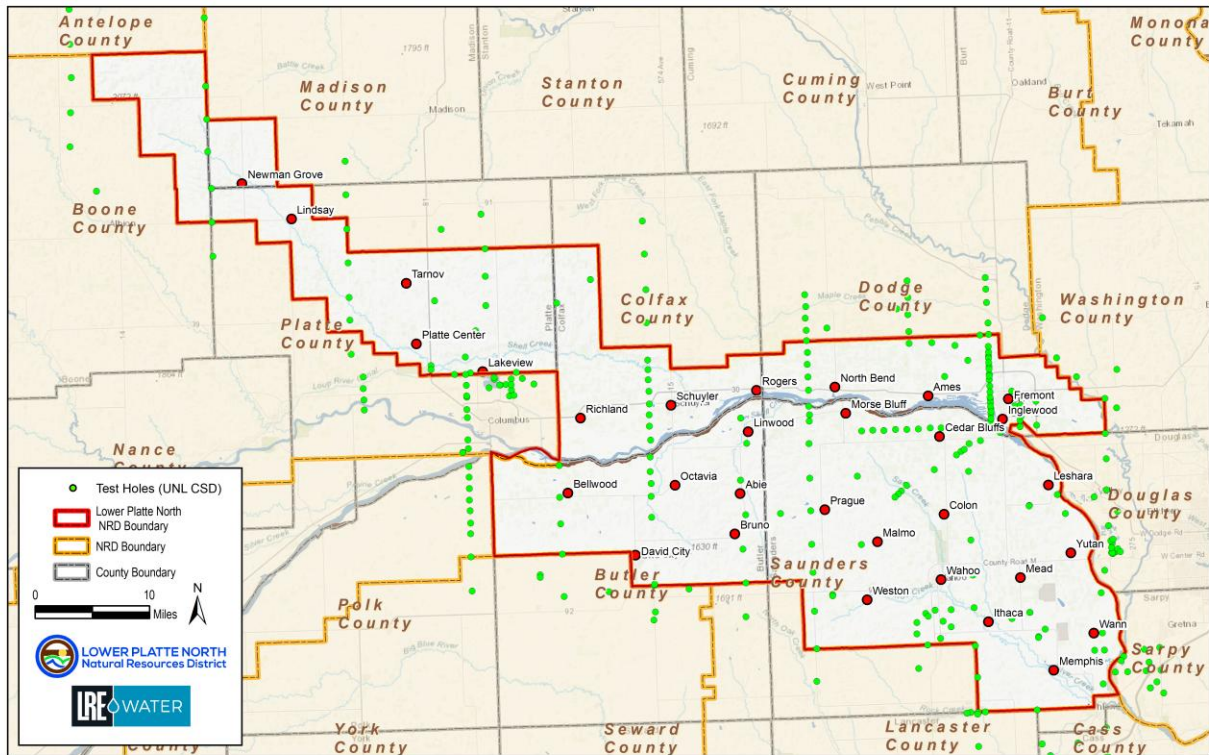


Figure 18: Test Holes within 5-miles of LPNNRD

2.15 PARTNERS AND PROGRAMS

The LPNNRD commonly works with a wide-array of partners in managing water resources. A summary of the major partners are listed below:

U.S. Geologic Survey (USGS)

The Nebraska Water Science Center, a organization of the USGS, commonly partners with NRDs to provide reliable, impartial, and foundational data and scientific analysis to support a wide-variety of groundwater and surface water projects. The USGS is responsible for the maintenance of the five stream gages in the LPNNRD.

Nebraska Department of Environment and Energy (NDEE)

The NDEE is responsible for protecting and improving human health, the environment, and energy resources. The NDEE maintains the Nebraska Groundwater Quality Clearinghouse, a one-stop location for a wide-variety of water quality data that is strongly supported by NRDs. The Source Water Protection Program is utilized to support the protection and sustainability of public water systems and the WHP program.

Nebraska Department of Natural Resources (NeDNR)

The NeDNR is a regular partner with the NRDs and is currently working with the LPNNRD on implementation and updates to the IMP. The NeDNR is responsible for the maintaining the registered

well database, permitting wells, providing GIS data, maintaining stream gages, is administering multiple funding programs.

University of Nebraska – Lincoln Extension

The UNL Extension provides education and outreach, and is spearheading a statewide initiative to enhance collaboration among project partners to tackle health concerns related to nitrate contamination.

University of Nebraska – Conservation and Survey Division (UNL-CSD)

The UNL-CSD serves as the natural resources component of the School of Natural Resources. Overtime, UNL-CSD has partnered with the LPNNRD on a variety of projects aimed at installing dedicated monitoring wells and analyzing AEM data.

Eastern Nebraska Water Resources Assessment (ENWRA)

The ENWRA started in 2006 with six NRDs collaborating on the development of a geologic framework and water budget for the previously glaciated portion of eastern Nebraska (ENWRA, 2024). This group has been responsible for the collection of AEM survey across a large area of Eastern Nebraska, including most of the LPNNRD.

Neighboring NRDs

Through efforts such as the Lower Platte River Basin Coalition, the LPNNRD regularly collaborates with neighboring NRDs on regional and local water management efforts. The LPNNRD is also a partner of the Lower Platte River Drought Contingency Plan and is working with LPSNRD and PMRNRD on development of a subregional groundwater model for the Lower Platte River.

Cities and Villages

The LPNNRD regularly collaborates with Nebraska cities and villages to manage and protect natural resources effectively including flood management, water quality programs, stormwater management, education outreach, recreation projects, and grant and funding assistance. The LPNNRD will assist communities with development of WHP plans, source water protection projects, and engage with communities to site new public water supply wells.

Counties

The LPNNRD collaborates with Counties on flood reduction and ice jam management, groundwater management, education programs at county fairs, and engagement of special projects on a county-wide basis (SQS areas).

NARD

The NARD serves as the trade association for Nebraska's 23 NRDs. Some of the basic functions include coordination and support, governmental representation, education and outreach, resource sharing, and policy development.

2.16 ENVIRONMENTAL EDUCATION AND INFORMATION

The LPNNRD offers a variety of hands-on activities, classroom presentations, field trip opportunities, career exploration and more for students to learn more about the environment and our natural resources. There are two full time staff available to implement the environmental education programs. All activities are no cost to students with classes ranging from Kindergarten through 12th grade.

Activities offered include:

- Know Your Well Program
- Adult Environmental Education 'Bees & Brews'
- Field trips to recreation areas and prairies
- Envirothon Field Day at Clint Johannes Education Building at Lake Wanahoo
- Local and regional range judging contest in partnership with area NRDs
- Spring Conservation Sensation – a natural resources field day for local 5th and 6th graders
- Test Your Well events in conjunction with local FFA Chapters
- Scholarships for:
 - Students participating in the Shell Creek Watershed monitoring
 - Nebraska Association for Conservation and Environmental Education (NACEE) – support for teachers and other educators who are interested in science as it relates to natural resources.
 - Ag in the Classroom – incorporation of program materials into the classroom

3 GROUNDWATER QUANTITY

3.1 GROUNDWATER LEVELS AND EXISTING WELLS

Most of the LPNNRD has not seen significant declines according to the UNL-CSD's annual 'Groundwater-Level Changes in Nebraska – Predevelopment (mid-1950s) to Spring 2023' dataset, shown in Figure 19. It is important to note that 2022 and 2023 were significantly dry years for the region. The primary area of concern is within Colfax County, where groundwater levels have reached 30 to 40 feet decline south of the Village of Leigh to the north in the LENRD. Other areas around the Village Bruno in Butler County also have documented declines. On the other hand, the far northwest corner of the District in the Shell Creek region has increasing level up to 30 feet east of the Village Petersburg and toward the Sandhills.

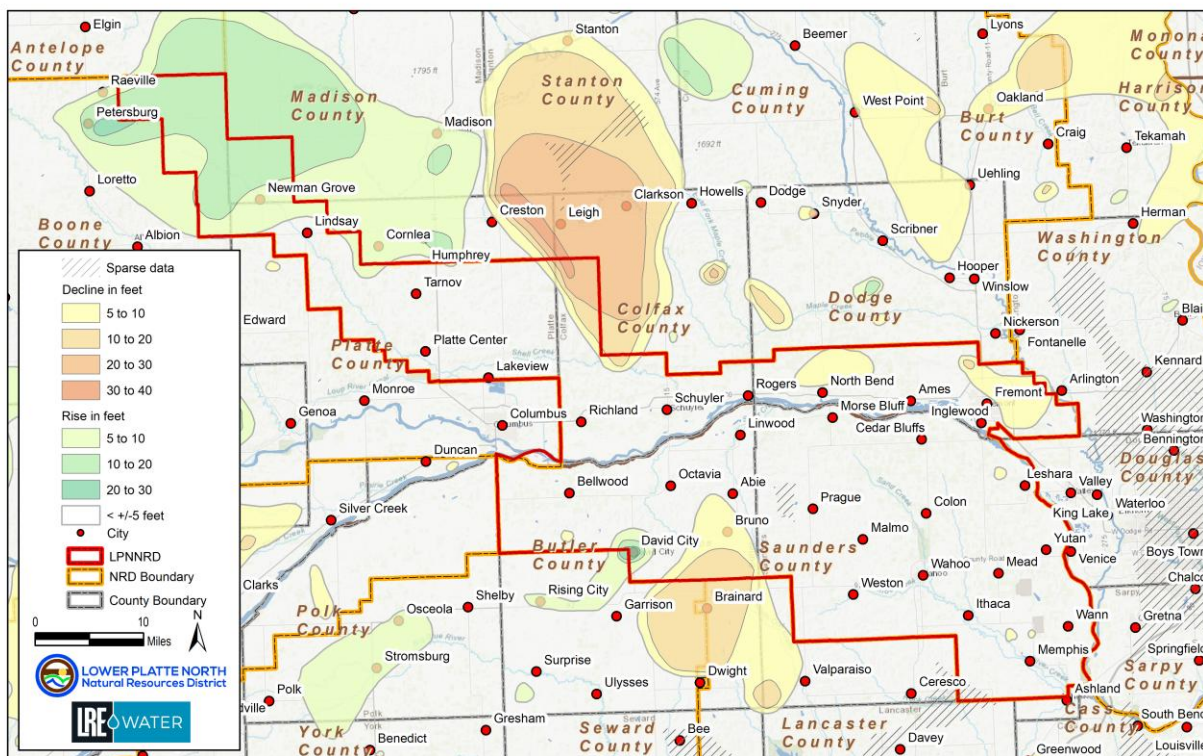


Figure 19: Groundwater-Level Changes in LPNNRD, Predevelopment to Spring 2023

Each spring and fall, LPNNRD staff measures static water levels from approximately 215 wells, most of which are utilized for high-capacity irrigation. The staff also manages a dedicated observation well network with 62 sites, each with a pressure transducer and logger with telemetry, providing real-time data to the staff and public through the District's website. The data from the spring water levels is utilized annually to review changes in water levels in are reviewed against the triggers set for water quantity Control Areas. The locations of the spring/fall static read wells and dedicated network is shown in Figure 20.

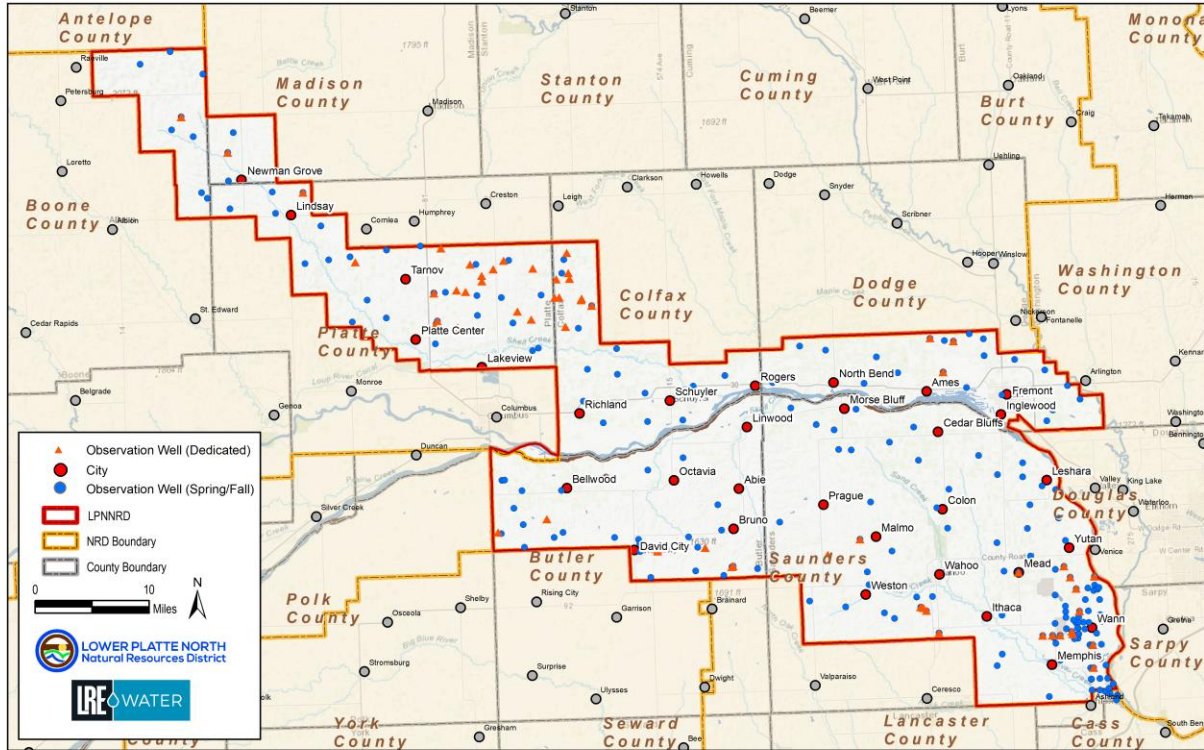


Figure 20: Observation Well Network

The depth to groundwater shown in Figure 22 was produced as part of the Assessment (LRE, 2023) and shows the depth to groundwater, in feet below grade. This elevation was determined by subtracting the ground surface elevation shown in Figure 10 from the groundwater surface elevations created during the Assessment. Water elevations were determined by reviewing all available geologic logs and test holes and utilizing static water level at data at the time of completion. Depth to water varies from near the surface to 20 feet deep along the Platte River to more than 250 feet below grade in the Shell Creek and Upland regions.

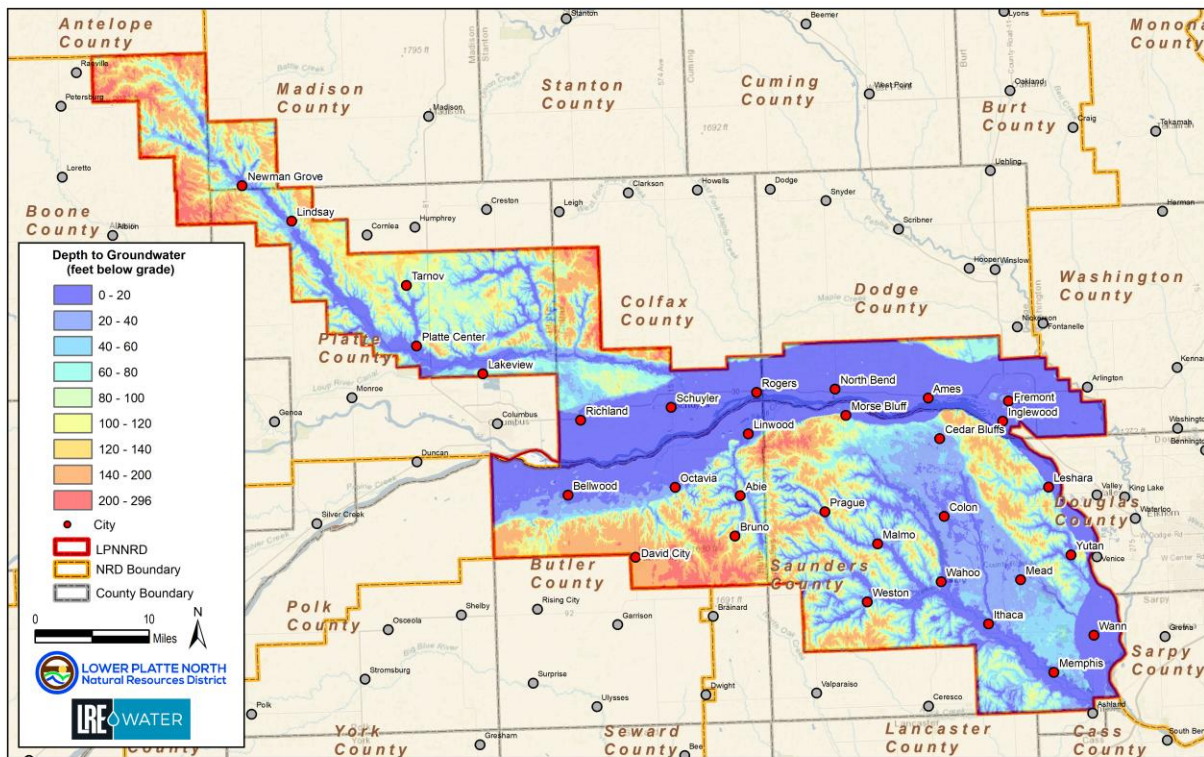


Figure 21: Depth to Groundwater

3.1.1 Sub-irrigation Potential

There is significant potential for sub-irrigation within the LPNDR. By the LPNDR Rules and Regulations has defined sub-irrigation as, “the natural occurrence of a groundwater table within the root zone of agricultural vegetation, not exceeding ten feet below the surface of the ground. To qualify as sub-irrigation, the landowner or operator must provide to the District groundwater level measurements taken at least monthly through-out the growing season of May through September for five of the last ten years and/or provide crop yields showing that sub-irrigation was able to sustain the crop through-out the growing season for five of the last ten years with comparable yields to irrigated crop ground. The Hydrogeologic Assessment (LRE, 2023) was used to identify areas within the LPNDR that includes all areas that have groundwater within 10 feet or less, which totals over 228,000 acres, or over 22 percent, mostly due to the presence of the Lower Platte River valley. The depth of groundwater was determined by subtracting the groundwater elevation surface from the Digital Elevation Model, as shown in Figure 22.

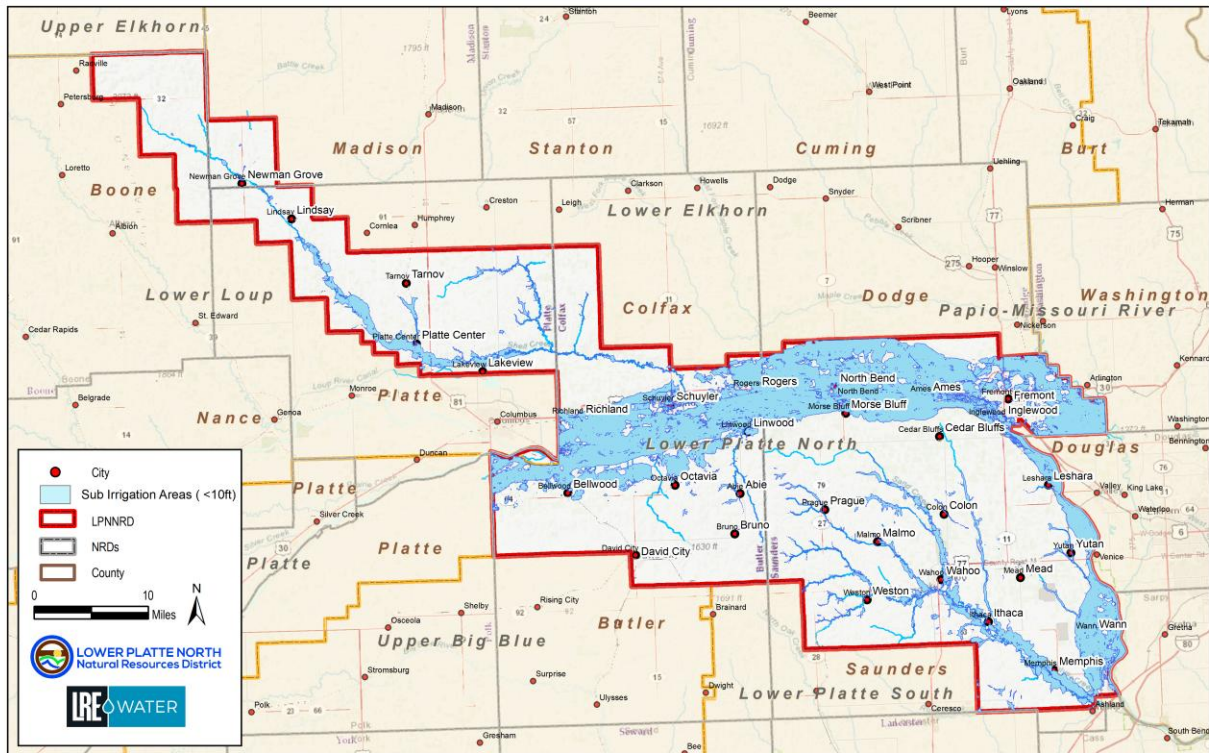


Figure 22: Potential Areas for Sub-irrigation

3.2 OPPORTUNITY FOR GROUNDWATER RECHARGE

Artificial groundwater recharge potential refers to the capacity of a specific area to effectively increase the amount of water entering an aquifer through human-controlled methods. This process, known as artificial recharge, involved techniques such as:

- **Surface spreading:** Using canals, infiltration basins, or ponds to direct water across the land surface.
- **Injection wells:** Directly injecting water into the subsurface.
- **Irrigation methods:** Recharge from agricultural practices involving furrow or sprinkler systems to enhance infiltration.

Using the GIS data resources available from the Assessment (LRE, 2023), a representation of artificial recharge was created using two key inputs, the depth to groundwater and unsaturated clay thickness above the Principle Aquifer. Using GIS, a qualitative model was created on a scale from 1 (Lowest Potential) to 5 (Very High Potential), as shown in Figure 23. As expected, the Platte Valley and Todd Valley regions display a high to very high potential, whereas other areas within the Shell Creek and Upland regions tend to be limited to area along active waterways. This map is not necessarily representative of injection well methods.

Artificial recharge potential is also closely linked to groundwater risk, as these areas also are prone to infiltration of contaminants, such as nitrate, into the aquifer, potentially degrading water quality. This is

especially critical in areas where the recharge water might carry pollutants from agricultural runoff, industrial processes, or urban runoff.

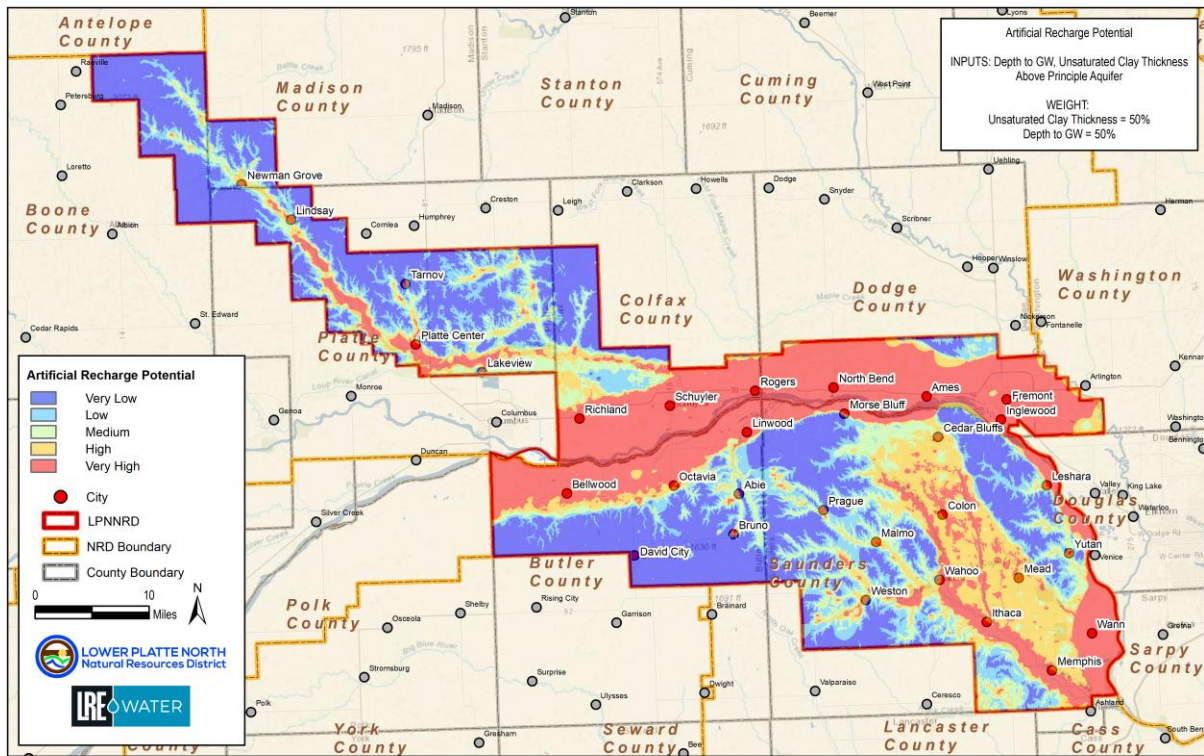


Figure 23: Artificial Recharge Potential

3.3 WATER DEMAND

3.3.1 Registered Wells

One method to generally understand water demand is through an evaluation of registered wells, as shown in Figure 24. In total, there are 13,025 registered wells in the LPNDR (including PWS wells) in 2024. This total does not account for the likely thousands of unregistered wells constructed before registration was required in 1993. Of this total, 9,711 are active, and nearly half, or 47 percent are used for irrigation. Domestic well use is the second most common at 28 percent, as seen in Table 6. The ‘other’ category includes injection, other, and recovery wells. The majority of inactive wells within the database were decommissioned wells.

Table 6: Active Registered Well Distribution

TYPE	NUMBER	PERCENT
Irrigation	4,611	47%
Domestic	2,716	28%
Livestock	295	3%
Observation	211	2%
Monitoring	1,156	12%
Commercial/Industrial	71	1%
Ground Heat/Heat Pump	170	2%
Public Supply Wells	188	2%
Other	293	3%
TOTAL	9,711	100%

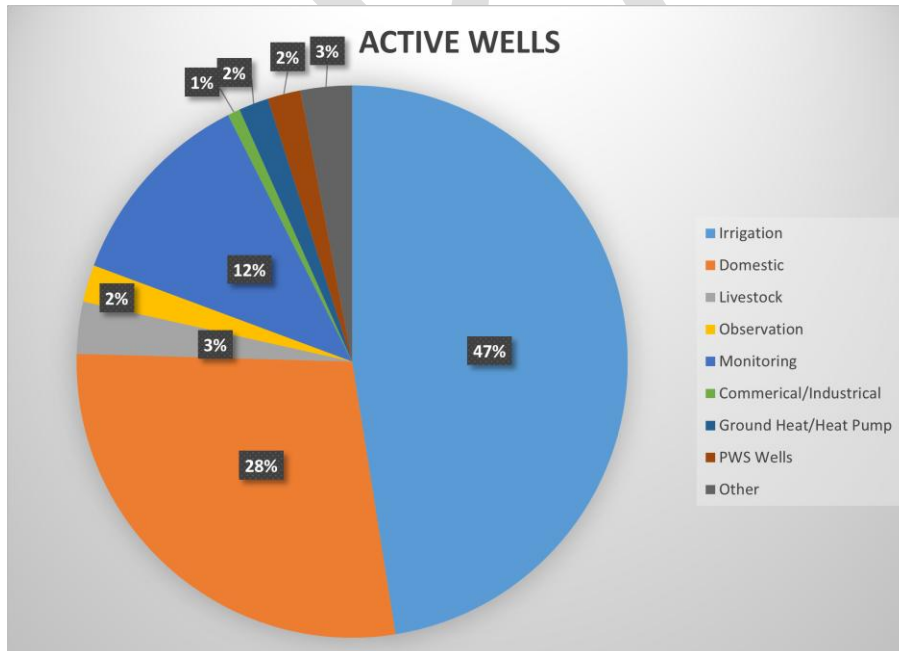


Figure 24: Percent of NeDNR Active Registered Wells

3.4 CERTIFIED IRRIGATED ACRES

The LPNNRD began certifying irrigated acres in the spring of 2010 as governed by the Nebraska Groundwater Management and Protection Act, 46-701. This statute provides the legal framework for managing and protection groundwater resources, including the certification of irrigated acres to ensure sustainable water use. The certification process helps catalog all existing irrigated acres and aligns records from the LPNNRD, County Assessor, and the Farm Service Agency. This process helps ensure that irrigation practices comply with local and state water management regulations and helps manage and allocate water resources more effectively to prevent overuse and ensure sustainability. The 2024 certified acres are shown in Figure 25.

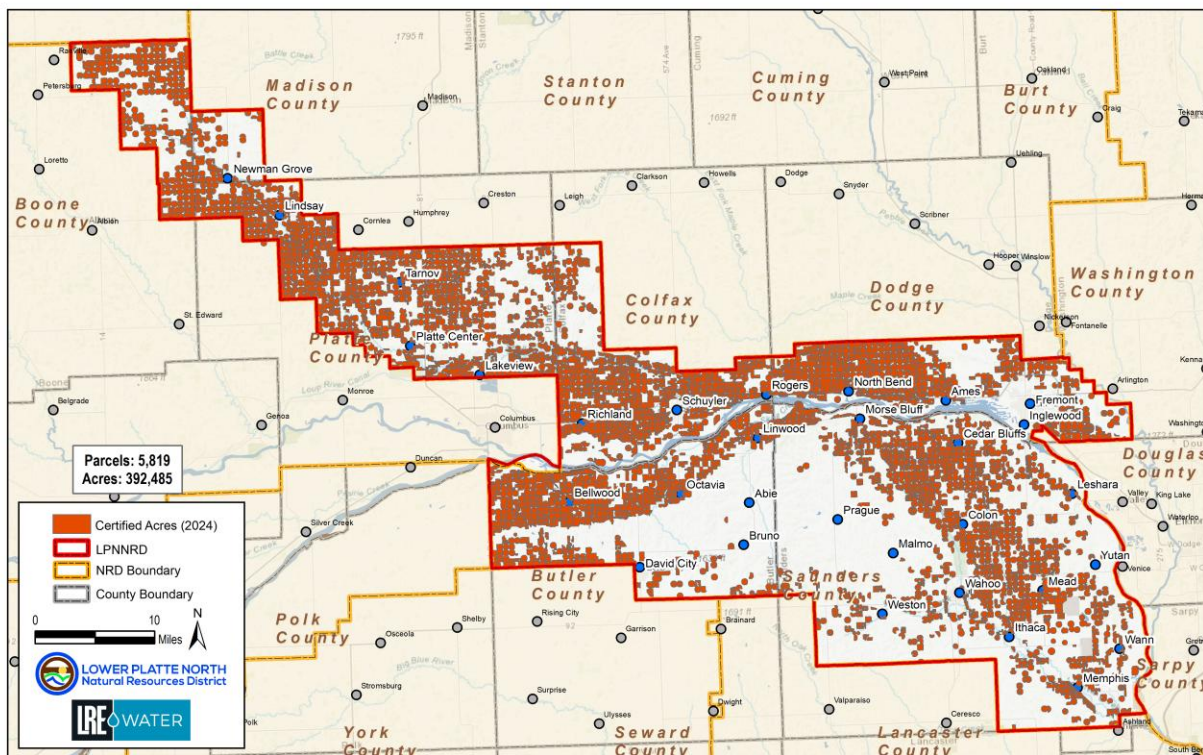


Figure 25: Certified Irrigated Acres in the LPNNRD (2024)

3.5 WATER QUANTITY ACTIVITIES

Annually, the NRDs participate in the LPRBC report on water activities, permits issued, and other related information. A summary of major water quantity activities for the LPNNRD are as follows:

- Completion of the Hydrogeologic Assessment, including the use of the information in conjunction with LENRD to display similar geological characteristics in an area of concern for groundwater level declines in Platte County.
- Annual reviews of water use within the SQS Areas.
- Initiation of the Lower Platte Basin Sub-Regional Groundwater Model.
- Issuance of 40 well permits, including replacement well permits.
- Use of a total of 1,320 flow meters, 1,155 on irrigation systems.

- Annual municipal water use reporting for all PWS
- Groundwater elevation data inventory and reporting by Region and subarea.
- Continuous inventory of certified irrigated acres.

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4 GROUNDWATER QUALITY

4.1 AQUIFER VULNERABILITY

4.1.1 Nonpoint Source Pollution

Non-point source pollution is generally defined as pollution arising from diffuse sources where no single point of release can be identified. While non-point source pollution can be related to weathering of minerals or soil erosion, human activities are commonly the originator for non-point source groundwater pollution. The diffuse application of fertilizers, pesticides, and herbicides in agricultural operations as well as urban areas account for large areas of land with soils containing these additives. Heavy application of chemicals, coupled with heavy precipitation or irrigation can result in these chemicals leaching to the groundwater. Overland flow resulting from runoff can also provide a means of chemical leaching to the groundwater aquifer. In Nebraska, as well as in the LPNNRD, nitrate is the most common non-point source pollutant.

Aquifer vulnerability within the LPNNRD was mapped as part of the Assessment (LRE, 2023) by quantifying the amount of unsaturated clay above the top of the first encountered aquifer at each well or test hole location. The clay thickness values (75% of the model weight) were reclassified into five categories:

- 0 – 5 ft = 5
- 5 – 10 ft = 4
- 10 – 20 ft = 3
- 20 – 40 ft = 2
- > 40 ft = 1

Land use was also considered (25% weight) and reclassified into two categories with a value of either 1 or 5. Irrigated farmland is considered the most vulnerable (a rating of 5), and the remaining land use categories are considered least vulnerable (ratings of 1).

The resulting raster layer contains qualitative values that show where the aquifer has more or less potential vulnerability to the downward migration of potential contaminants from activities on the ground surface. This map shows a qualitatively modeled spatial distribution of groundwater vulnerability, from very low to very high, across the LPNNRD Boundary. A “Very Low” potential vulnerability means the aquifer is not likely to receive contaminants from activities on the ground surface. Conversely, a “Very High” potential vulnerability means the aquifer is potentially very susceptible to surface contaminants. The aquifer vulnerability map is shown in Figure 266.

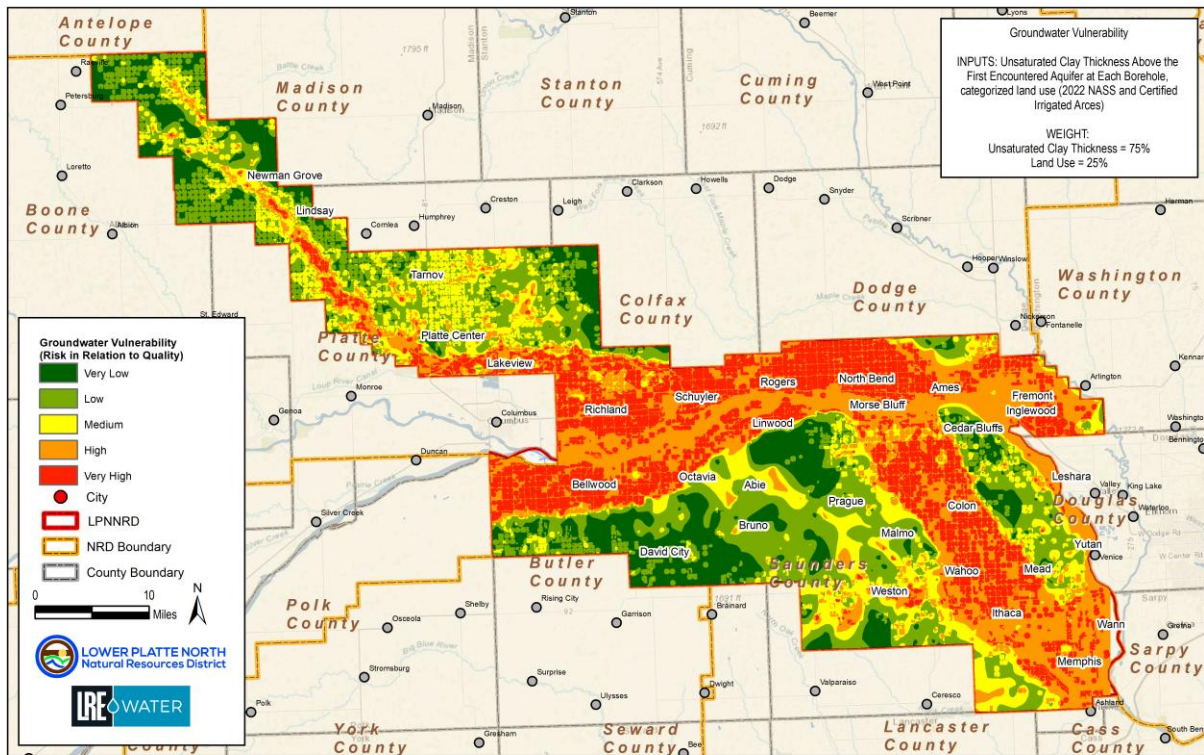


Figure 26: Aquifer Vulnerability

Nitrate can be found in most areas in Nebraska. Sources of nitrate include breakdown of organic material in soils, human or livestock wastes, and chemical fertilizers. When exposed to nitrate levels in excess of the U.S. Environmental Protection Area’s (USEPA) Maximum Contaminant Level (MCL) of 10 mg/L in drinking water, infants younger than about 6 months of age may develop methemoglobinemia or "blue-baby" syndrome. The University of Nebraska Medical Center has also recently begun researching the connection of nitrate in drinking water to various cancers in Nebraska.

To provide an illustration of the most recent nitrate concentrations, data from 2023, collected by the LPNNRD staff from 230 wells across the District, is shown in Figure 277. A total of 53 of these wells, or approximately one per township, are part of a statewide network to assess water quality. Each year, the LPNNRD staff collected representative data across the entire District and concentrated sampling in Groundwater Management Areas, as seen within the Richland/Schuyler phase three GWMA. The staff have also been obtaining additional samples throughout the Shell Creek region where concentrations of nitrate have been slowly rising.

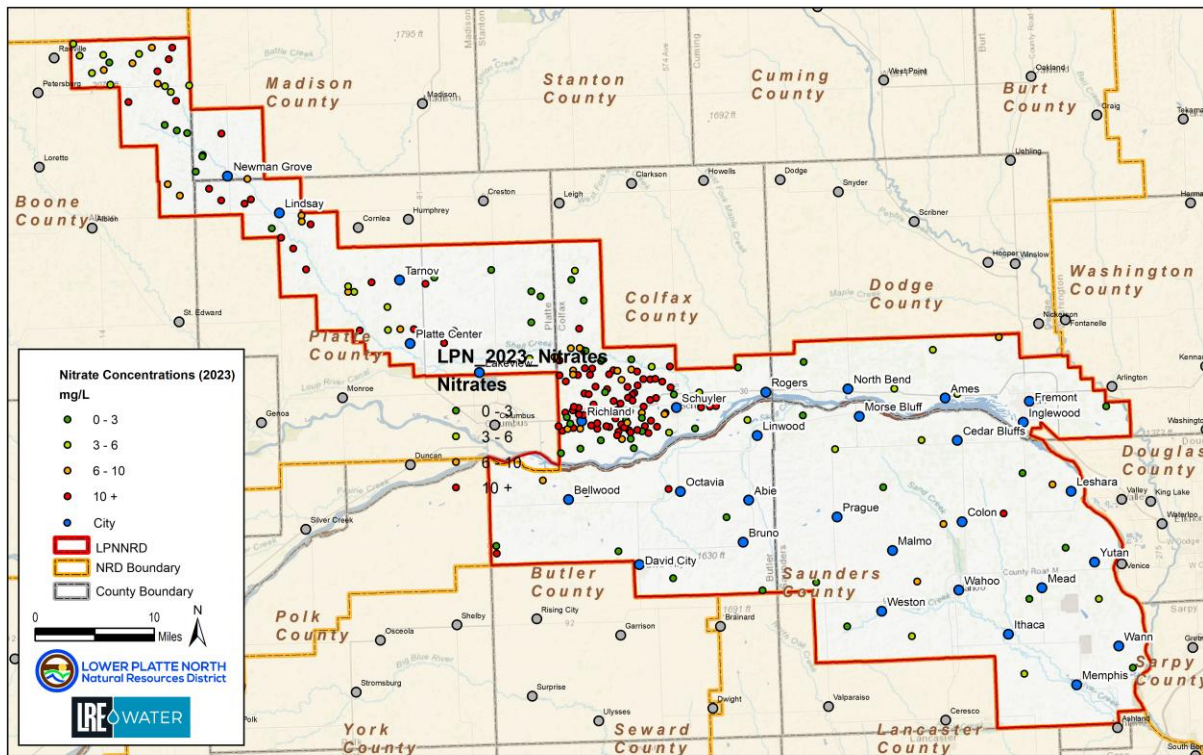


Figure 27: LPNNRD Nitrate Concentrations 2023

4.1.2 Point Source Pollution

Point source pollution generally impacts the quality of the groundwater in localized areas. However, when these sites are located above potential drinking water supplies or are located adjacent to domestic or municipal wells the impact of a spill or leak can affect larger land areas and populations. Even spills that are cleaned up to health-based cleanup goals of a regulatory agency can impact drinking water supplies as human taste thresholds of many chemicals are below the health based "action" levels (e.g., toluene, xylenes).

There are numerous manufacturing facilities and petroleum handling facilities, grain bin storage sites, and fertilizer and pesticide storage facilities within the LPNNRD. Although new regulations and generally improved product and waste handling procedures have reduced the chances of a spill or release of contaminants from these type of activities, historically, numerous spills have been documented.

The NDEE holds regulatory authority over substances that can cause or contribute to groundwater contamination. NDEE maintains a database of regulated facilities under their jurisdiction, which are known or suspected to have soil and water contamination. This database includes various categories, such as the National Pollutant Discharge Elimination System (NPDES) program, Integrated Waste Management, Leaking Storage Tanks, Livestock Waste Control, Onsite Wastewater Treatment, Release Assessment, Remedial Action Plan Monitoring, Resource Conservation Recovery, Superfund, SARA Title III, and Underground Injection Control. Some of these facilities could potentially be point sources of groundwater contamination if they do not maintain full compliance. Additional information on NDEE regulated facilities can be found an interactive mapping application on their website.

4.2 WELLHEAD PROTECTION AREAS

The NDEE oversees the WHP program, a voluntary initiative that offers financial and technical support to communities with public water suppliers to safeguard water supplies from contamination. Each community with a public water supply has a designated WHP area, as shown in Figure 28, but not all communities have exercised strict control to regulate land use activities within the WHP Area to reduce contamination threats. This area delineates the surface region around a water well or wellfield that supplies a Public Water System (PWS), indicating where contaminants are likely to travel toward and reach the water surface. The five minimum steps for the WHP Program are shown in Figure 29.

As of 2024, the LPNNRD was supporting WHP plan, well siting, and delineation efforts in the Village of Platte Center and City of Newman Grove, and had recently supported projects for the cities of Ashland, David City, and Wahoo. A summary of WHP plans in the LPNNRD is shown in Table 7.

Table 7: LPNNRD PWS State-Approved WHP Plans

PWS Name	COUNTY	DATA APPROVED
Platte Center	Platte	2025
Newman Grove	Platte/Madison	2025
Wahoo	Saunders	2023 (plan & ordinance)
David City	Butler	2023 (plan & ordinance)
Fremont	Dodge/Douglas	2010
Woodcliff Water System	Saunders/Dodge	2006
Weston	Saunders	2005
Abie	Butler	2003
North Bend	Dodge	2003
Yutan	Saunders	2003

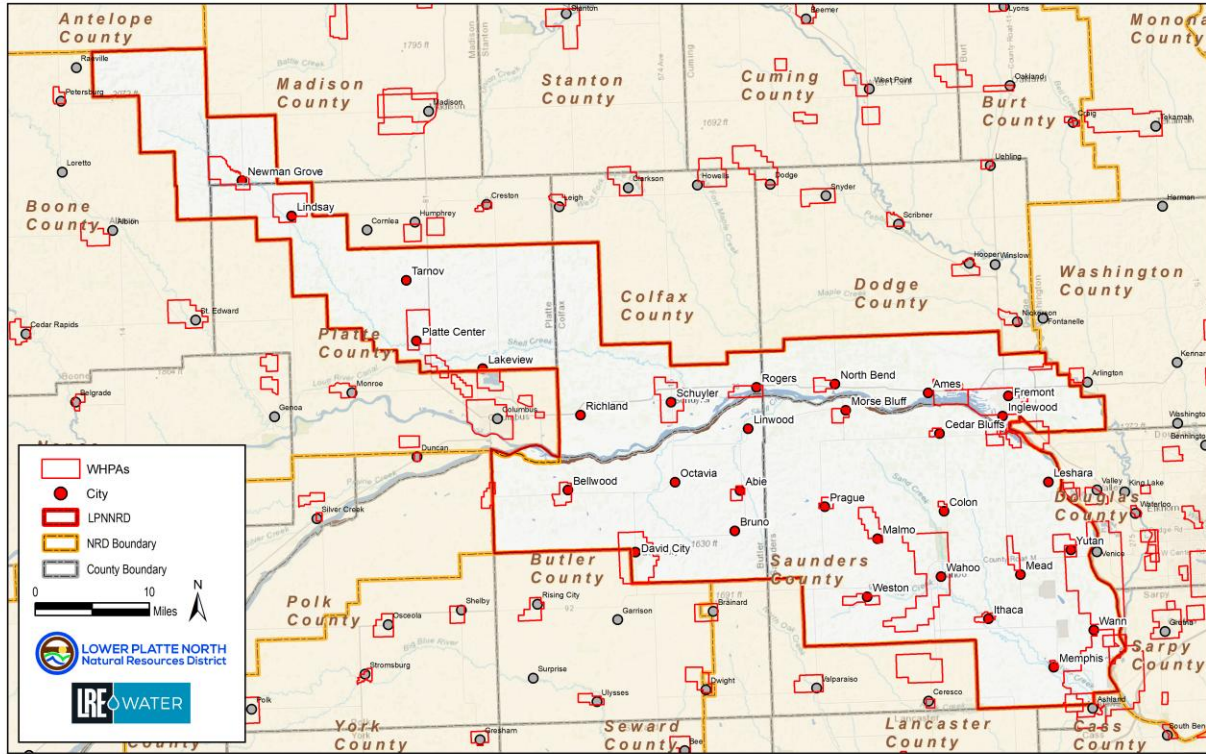


Figure 28: Wellhead Protection Areas



Figure 29: Five Steps of the WHP Program

4.2.1 Water Quality Activities

A summary of recent water quantity activities for the LPNDR for 2023 are as follows:

- Completion of 10 nitrogen/irrigation certification meetings with 200 - 300 in attendance.

- Implementation of a program, funded by WSF, to provide cost-share practices in the Schuyler-Richland GWMA for gravity to pivot/SDI conversions, water flow meters, and cover crops.
- USGS is leading an age-dating project, in conjunction with LLNRD, near the Schuyler-Richland GWMA.
- District-wide soil moisture sensor cost-share
- Well decommissioning cost-share
- Shell Creek Watershed Water Quality Project, including sensors on lawn irrigation

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5 GOALS AND OBJECTIVES

5.1 GROUNDWATER MANAGEMENT GOALS AND OBJECTIVES

The primary management target, defined below in the Vision Statement, is to maintain the ‘groundwater reservoir life goal’ – defined within the Rules and Regulations as the period of time which the District establishes as its goal for maintenance of the supply and quality of water in a groundwater reservoir. This goal can also be described as ensuring a safe yield for aquifers, which is the amount of water that can be sustainably withdrawn without causing long-term depletion or adverse effects on the aquifer and hydrologically connected water resources. The goals and objectives are intended to guide water resource management decision making.

LPNNRD Groundwater Management Vision Statement

Strive for the continuous management of the groundwater reservoir, in perpetuity, to ensure it meets the standards appropriate for its various uses, including domestic, livestock, public water supply, public health, irrigation, agriculture, wildlife, industrial, and other beneficial uses. Minimizing, as much as possible, the adverse impact of these uses on the quantity and quality of groundwater that supports lakes, wetlands, and streams.

By implementing the five goals and objectives, the LPNNRD can ensure groundwater remains a reliable resource while protecting the ecosystems that depend on it. Goal categories include monitoring, pollution prevention, conservation, public education, and sustainable management plans and regulations.

5.1.1 Goal 1 – To continuously monitor and assess groundwater levels and quality to detect changes early.

- **Objective 1.1** - The effort to monitor and sample water quality will be continued and expanded as necessary focusing on wells with known screened interval data.
- **Objective 1.2** – Integrate scientific advances and research into plans and regulations.
- **Objective 1.3** – Repeat annual NRD-wide cooperative sampling to help understand nonpoint source contamination.
- **Objective 1.4** – Collaborate with various partners to review and expand the monitoring network.
- **Objective 1.5** – Maintain and steadily expand the spring/fall water energy level monitoring network.
- **Objective 1.6** – Explore opportunities to obtain real-time water use and aquifer level data from dedicated observation wells.
- **Objective 1.7** – Continue expansion of the dedicated monitoring well network, for both quantity and quality purposes, at critical locations in the District.
- **Objective 1.8** – Ensure pumping of groundwater does not directly degrade water quality.

5.1.2 Goal 2 – To reduce the potential for pollution to ensure a sustainable supply of high-quality, consumable, and safe groundwater for all users in the NRD.

- **Objective 2.1** – Utilize available studies and tools to gain a stronger understanding of groundwater flow and contamination movement.
- **Objective 2.2** - Obtain and assess data that supports sustainable development decisions.

- **Objective 2.3** – Explore efforts for cost share programs that promote reduction of pollutants to the aquifer.
- **Objective 2.4** – Offer cost share for well decommissioning.
- **Objective 2.5** – Promote cutting-edge technologies to improve application efficiencies as nitrate-reducing tools.
- **Objective 2.6** – Proactively manage Phase Areas where vulnerable aquifers or excessive nitrate exist and recognize the importance of reducing nitrogen leaching to aquifers that provide public water supplies.

5.1.3 **Goal 3 – The LPNNRD will continue to encourage the use of highly-efficient water conservation management practices intended to maintain water levels.**

- **Objective 3.1** – Utilize hydrogeologic and modeling data to assess the impacts of new uses and understand the response of water levels to drought or reduced precipitation trends.
- **Objective 3.2** – Promote efficient irrigation and farming practices to improve soil health, reduce erosion, and enhance water retention and recharge.
- **Objective 3.3** – Connect property owners to existing conservation programs that benefit water quality and quantity.
- **Objective 3.4** – Create a strategy for managing water declines and supporting communities during severe droughts.
- **Objective 3.5** – Continue management of Control Areas where thin or limited aquifers exist and recognize the importance of conjunctive management of hydrologically connected areas.

5.1.4 **Goal 4 – Continue to be a resource for outreach and education of youth and adults emphasizing the importance of ensuring sustainable water resources remain available.**

- **Objective 4.1** – Involve stakeholders in the review process to gather diverse perspectives and needs.
- **Objective 4.2** – Expand public education programs to raise awareness about the relationship of nitrates to public health, along with other water quality issues and encourage water conservation measures.
- **Objective 4.3** – Utilize hydrogeologic data and studies to provide an opportunity for one-on-one education.
- **Objective 4.4** – Participate in natural resources workshops, county fairs, camps, workshops, and classroom presentations.
- **Objective 4.5** – Demonstrate cutting-edge technologies for water and fertilizer management.
- **Objective 4.6** – Provide information and education through news articles, social media, newsletters, brochures, and the website.
- **Objective 4.7** – Create a web-based graphic user interface to allow users to obtain and view hydrogeologic data and other relevant maps and information.

5.1.5 **Goal 5 – To develop and enforce Rules and Regulations and plans that balance usage with natural replenishment rates and reduce contamination.**

- **Objective 5.1** – Regularly update the Groundwater Management Plan and Rules and Regulations to meet changing water uses, emerging contaminants, and integration of the latest policies.
- **Objective 5.2** – Align the regulations with new state and federal policies to ensure compliance and leverage available resources.

- **Objective 5.3** – Implement an adaptive management approach that allows for flexibility and adjustment based on monitoring results and changing conditions.
- **Objective 5.4** – Continue active participation in Lower Platte River Basin integrated and drought management plans and implementation.
- **Objective 5.5** – Encourage community participation in NDEE’s Wellhead Protection Program.
- **Objective 5.6** – Utilize the hydrogeological based subareas to manage Control Areas, and as the basis for defining study areas for potential Phase Areas.
- **Objective 5.7** – Regularly review and update the Integrated Management Plan to balance water uses and ensure sustainable water management, including maintaining instream flows.
- **Objective 5.8** – Support and conduct special studies, research, and data gathering activities.

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6 STAKEHOLDER INVOLVEMENT

6.1 STAKEHOLDER GROUP

The LPNNRD established two Stakeholder Groups, one meeting in the Village of Platte Center and another meeting in the City of Wahoo. The group included agricultural producers, community representatives, NeDNR, UNL Extension, NRCS, LPNNRD, and LRE Water. The role of the stakeholder group was to work closely with LPNNRD to provide feedback, identify information, discuss concerns, communicate and engage with other stakeholders, and provide feedback on the draft Plan. A summary of the meetings included:

- Platte Center meetings on June 4th, 2024, and January 16, 2025
- Wahoo meetings on June 6, 2024, and January 9th, 2025

6.2 OPEN HOUSE MEETINGS

Two sets of Open House meetings were held to provide an opportunity for the public to learn about the purpose and requirements of the GWMP, discuss water quality and quantity concerns, review the proposed subareas, review the highlights of the draft GWMP, and discuss recommendations. Meetings occurred at:

- Wahoo on August 24, 2024, and January 9, 2025
- Platte Center on August 26, 2024, and January 16, 2025

7 RECOMMENDATIONS

***THIS SECTION WILL BE COMPLETE AFTER STAFF AND BOARD FEEDBACK ON RECOMMENDATIONS**

7.1 QUALITY MANAGEMENT RECOMMENDATIONS

This section outlines considerations for modifications, additions, or adjustments to the current procedure used for the management of groundwater quality. These recommendations were established after a review of existing data, reports, studies, input from the LPNNRD staff and Board of Directors, and the public.

7.1.1 Adoption of Groundwater Management Subareas

The original subareas were delineated by Olsson in the March 2009 LPNNRD Hydrogeologic Evaluation and Subarea Delineation Study (Olsson 2008 based on local hydrogeologic conditions and depositional characteristics; however, these were not officially recognized by the LPNNRD. LRE and the LPNNRD staff reviewed the existing sub-areas and made slight adjustments using hydrogeologic information from the Assessment (LRE, 2023). This process included the following key steps:

- 1) LPNNRD staff squared off the subareas to the nearest section boundary.
- 2) Subareas were adjusted by LRE by reviewing the saturated sand thickness, hydrogeologic cross sections, AEM, and the DEM. Overall, changes were minimal by merging small areas and adding or subtracting a few sections based upon the new saturated sand thickness.
- 3) LRE provided the LPNNRD with GIS data and an updated subarea map to allow for review and edits by District staff and the Board of Directors.

There are several advantages to adopting and utilizing subareas named by local communities or other known features. Some of the benefits include:

- 1) **Localized Management:** Subareas allow for more precise and localized management of groundwater resources. This means that specific issues within a smaller area can be addressed more effectively, rather than applying a one-size-fits-all approach across a larger region.
- 2) **Tailored Solutions:** Different subareas may have unique geological and hydrological characteristics. By focusing on subareas, the LPNNRD can focus studies and develop tailored solutions that are more effective for the specific conditions of each subarea.
- 3) **Efficient Resource Allocation:** Managing groundwater at the subarea level helps in the efficient allocation of resources. It ensures that efforts and funds are directed towards areas with the most pressing needs or the highest potential for improvement.
- 4) **Enhanced Monitoring and Data Collection:** Subareas facilitate more detailed monitoring and data collection. This detailed data can lead to better decision-making and more effective management practices.
- 5) **Community Involvement:** Working with subareas often involves local stakeholders and communities, leading to greater public involvement and support for groundwater management initiatives.

While groundwater quality and quantity studies may occur across an entire subarea, it is important to note that Groundwater Quality and Quantity Management Areas can be smaller or larger than a subarea and could include may also cross multiple subareas or portions of subareas. A breakdown of

- Choose wells with sufficient construction information to ensure they are representative of the aquifer.

7.2.2 Expansion of the Observation Well Network

- Use of observation wells that are adequately spaced from pumping wells
- Focused use of observation wells within wellhead protection areas and upgradient from PWS wells.

7.2.3 Alteration to the Variance Request Ranking Form

- Consider one form for unconfined aquifers and another for confined aquifers
- Add considerations for accounting for domestic and high-capacity well interference

Others to be added.....

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