



**2023 Annual Voluntary Integrated Management Plan (VIMP)
Report**

Reporting on 2023 Data and Activities

Middle Niobrara Natural Resources District

July 9th, 2024



Purpose

The Middle Niobrara Natural Resources District (MNNRD or District) and the Nebraska Department of Natural Resources (NeDNR or Department) jointly adopted a Voluntary Integrated Management Plan (VIMP) which became effective on December 30th, 2020.

Annual reports for the Voluntary IMP are intended to provide transparency between the MNNRD and NeDNR, and to keep the public informed about integrated water management activities within the District. This annual report covers the actions and progress made by the MNNRD in 2023 to implement voluntary IMP items with a focus on groundwater quantity.

MNNRD Reporting Responsibilities

The VIMP requires that the MNNRD annually reports on the following ground water data collected by the District:

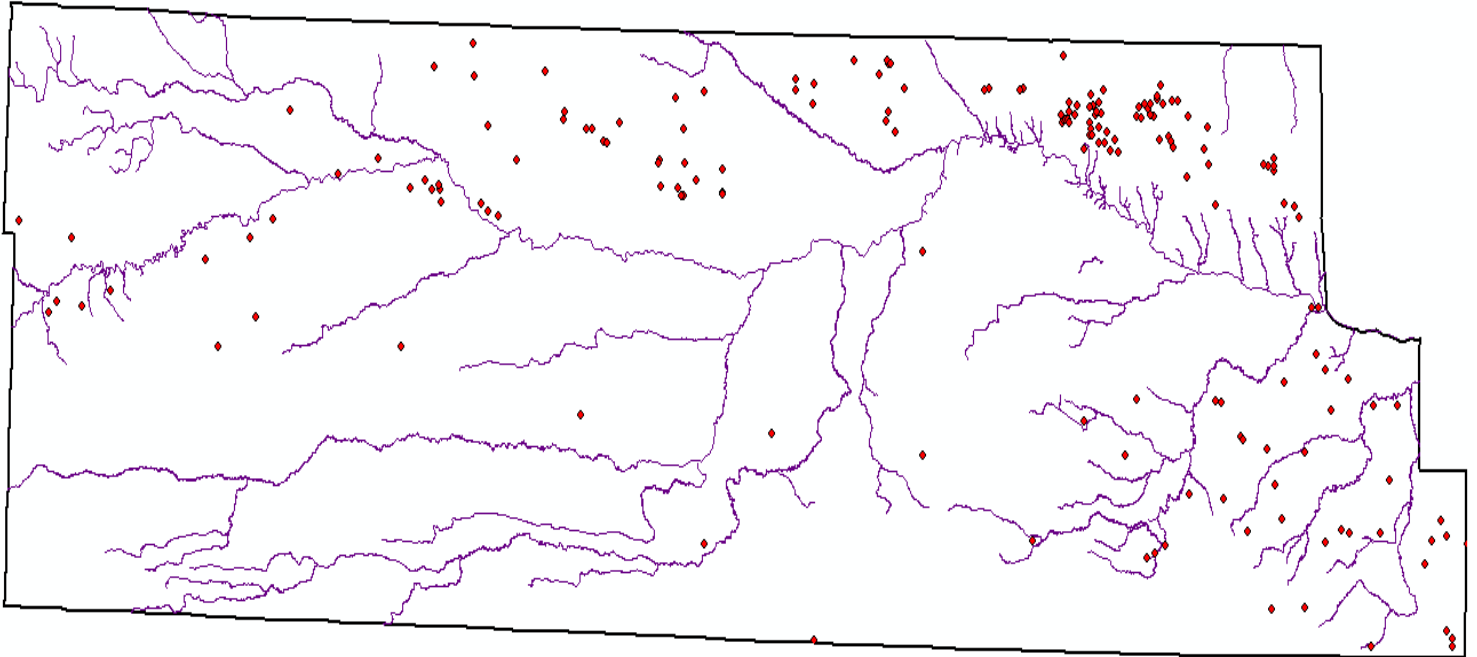
1. Static groundwater level measurements.
2. Certification of groundwater uses and any changes to these certifications.
3. Information gathered through the municipal and non-municipal industrial accounting process.
4. Irrigation water use data collected by the District, such as from metered high capacity well flow data.
5. Stream gage measurements on District-sponsored gages.
6. Water well construction permits issued and denied and any conditions associated with the permits issued.
7. Any variances issued, including the purpose, location, any required offset, the length of time for which the variance is applicable, and the reasoning behind approval of the variance.
8. Approved transfers, including all the information provided with the application and used in the approval of the transfer, the location of the land area or well that is being transferred, and the location of the land area or well that will replace the original relevant flow meter data collected.
9. Any retirements of irrigated aces or other activities by the District for the purpose of mitigating depletions.
10. Information related to any water banking transactions.
11. In keeping with Neb. Rev. Stat. §46-715(3) which requires the IMP to include procedures to track depletions and gains to streamflow's resulting from new, retired, or other changes to uses:
 - a. Geographic location of new water wells permitted.
 - b. Depletion calculated (and method of calculation) for each new water well permitted.

- c. Estimated total consumptive use of each new water well permitted.
- d. Retirements of agricultural, municipal, or industrial groundwater consumptive uses.
- e. Information on any mitigation or new projects that have occurred, including geographic location, description of type and operations of the project, source water of the project, and calculated benefits associated with the project (if the project is groundwater augmentation, the report should include calculated accretions as well as the method/models used to estimated accretion values)
- f. Streamflow accretion activities.
- g. Water banking activities.
- h. District regulations/management activities (designated groundwater management areas, use restrictions, etc.)
- i. New depletions accounting report.
- j. New data collected or model/study results (conservation measures, riparian ET, etc.).
- k. Offsets provided for depletions resulting from increased consumptive use related to the above-listed items. This includes reporting on offsets and mitigation activities for the purpose of addressing new depletive water uses. Such activities to be reported include canal diversions for the purpose of groundwater recharge, operation of stream augmentation projects, conjunctive management, and irrigated acre retirements.

1. Static Groundwater Level Measurements

The Middle Niobrara NRD collects static groundwater level measurements at 225 sites across the district semi-annually. Measurements are collected prior to irrigation season in late March and early April, and again after the irrigation season in late October and early November. These time frames allow the District to see the full effects of the drawdown from the irrigation season and the subsequent recharge. These 225 sites consist of 74 dedicated monitoring wells and 151 irrigation wells. Total sampling sites have increased dramatically since 2011 when the Board of Directors required new irrigated acres to be sampled for groundwater quality and quantity. With the District being open for irrigated acre development again for the first time since 2014, there have been several new monitoring sites added to the list. The District also added 14 dedicated monitoring wells in 7 different locations in 2021/2022. Monitoring wells have dedicated data loggers/pressure transducers in one or more of the wells on site. These data loggers take a water level measurement, once a day, every day of the year. The MNNRD is currently working on adding 15 telemetry set ups to monitoring wells, allowing for real time data review. This data is a valuable addition to regular static water level data.

MNNRD Water Quantity Sampling Sites



The Middle Niobrara saw two very different extremes in the last 24 months. 2022 brought some of the lowest precipitation totals the District has seen in the last 20 years. While in 2023 many District residents received over 100" of snow during the 2022/2023 winter and >30" of precipitation. Both of those totals doubling yearly averages for this part of the state. This amount of precipitation reduced needs for both surface and groundwater irrigation in 2023. Producers used 3-7" Ac/In less on average than they have in years past. Combining limited irrigation and high precipitation, static water levels across the District began to trend back towards the record highs the Middle Niobrara has experienced in recent years. Ditches, meadows, and low spots in ag fields are again full of standing water, a familiar sight after 15 years of above average precipitation. Measurements from the irrigation wells were nearly the same post-irrigation, as they were pre-irrigation. Numerous monitoring wells had higher static water levels during fall measurements than they had during spring measurements. There are a few exceptions, as the Middle Niobrara NRD differs vastly in topography, land use, and precipitation.

The District currently maintains an average of almost 1' above 1998 levels and 3.5' in the last 10 years.

The graph located below shows the changes in measurements from the fall of 2023, relative to the measurements from the fall of 2022(1), 2020(3), 2018(5), and 2013(10). Included in the graph are the highest and lowest changes measured since the fall of 2022 as well as the average change and the percentage of sampled wells showing an increase. Tables are sorted by county and the District as a whole.

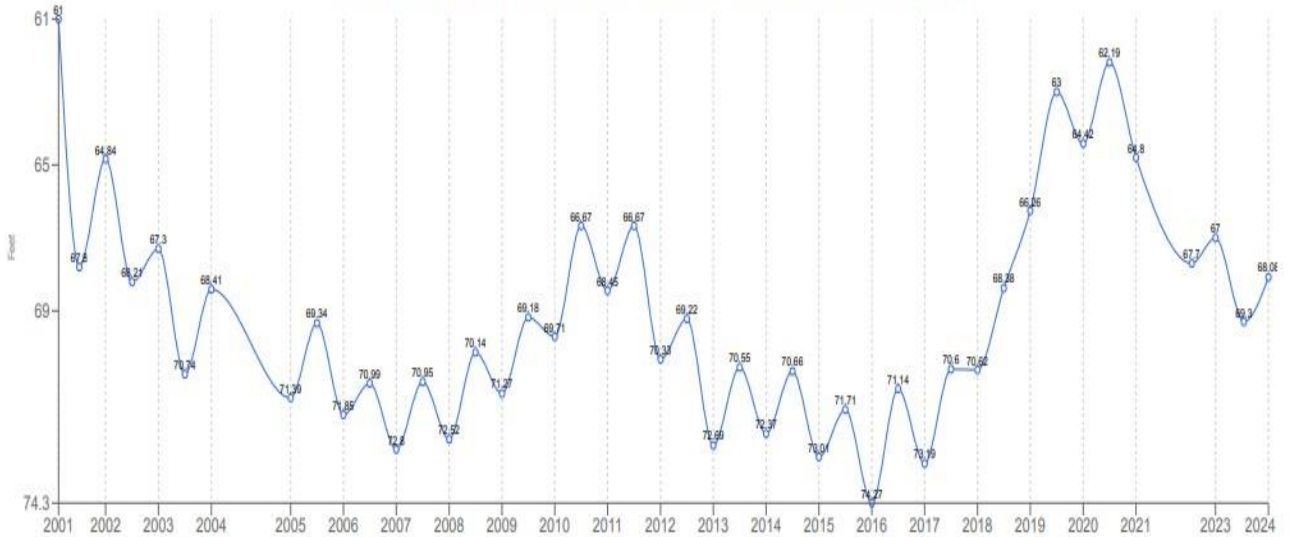
Fall 2023 Static Water Level Eval					
<u>Rock County</u>	<u>1 Year</u>	<u>3 Years</u>	<u>5 Years</u>	<u>10 Years</u>	<u>Oldest Measurement</u>
# Wells Sampled	12	10	10	7	12
# Wells Increased	0	1	10	7	5
% Increased Since	0%	10%	100%	100%	42%
Average Change(Feet)	-1.82	-1.93	3.66	2.71	-0.14
<u>Brown County</u>	<u>1 Year</u>	<u>3 Years</u>	<u>5 Years</u>	<u>10 Years</u>	<u>Oldest Measurement</u>
# Wells Sampled	39	43	44	31	44
# Wells Increased	19	8	21	31	20
% Increased Since	49%	19%	48%	100%	45%
Average Change(Feet)	0.09	-2.55	0.44	1.94	0.49
<u>Cherry County</u>	<u>1 Year</u>	<u>3 Years</u>	<u>5 Years</u>	<u>10 Years</u>	<u>Oldest Measurement</u>
# Wells Sampled	82	89	89	38	90
# Wells Increased	70	75	75	32	69
% Increased Since	85%	84%	89%	84%	77%
Average Change(Feet)	1.51	1.19	2.35	4.22	2.27
<u>Keya Paha County</u>	<u>1 Year</u>	<u>3 Years</u>	<u>5 Years</u>	<u>10 Years</u>	<u>Oldest Measurement</u>
# Wells Sampled	34	34	34	23	34
# Wells Increased	32	16	23	23	20
% Increased Since	94%	47%	68%	100%	59%
Average Change(Feet)	3.62	-0.22	1.36	4.6	0.97
<u>MNNRD District</u>	<u>1 Year</u>	<u>3 Years</u>	<u>5 Years</u>	<u>10 Years</u>	<u>Oldest Measurement</u>
# Wells Sampled	167	176	177	99	180
# Wells Increased	121	100	129	93	114
% Increased Since	72%	57%	73%	94%	63%
Average Change(Feet)	0.85	-0.88	1.95	3.37	0.90

One Representative Static Groundwater Level Graph from each county in the MNNRD

*Data From One Location that is a Representative Graph of **Western Rock County** Static Water Levels*

Ground Water Level Measurement: Well 7216

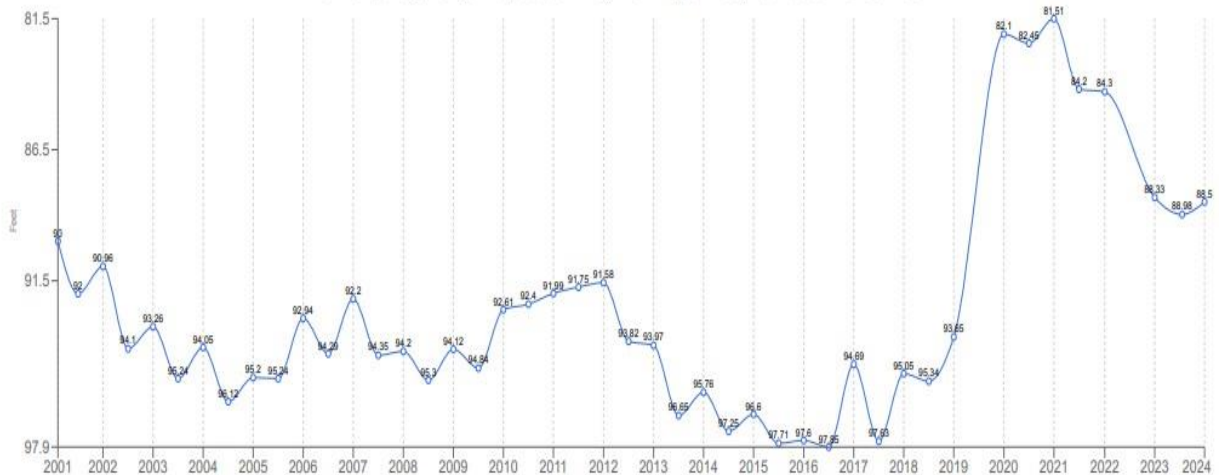
Township: 29, Range: 20, Section: 4, Well Depth: 100, Formation: undefined



*Data From One Location that is a Representative Graph of **Brown County** Static Water Levels*

Ground Water Level Measurement: Well 7014

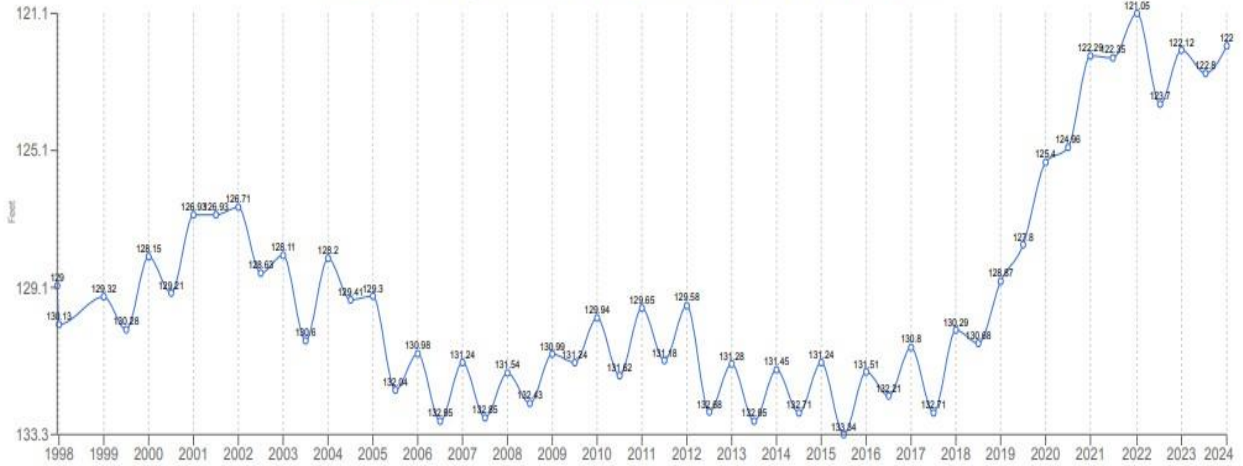
Township: 31, Range: 23, Section: 26, Well Depth: 130, Formation: undefined



Data From One Location that is a Representative Graph of Keya Paha County Static Water Levels

Ground Water Level Measurement: Well 7089

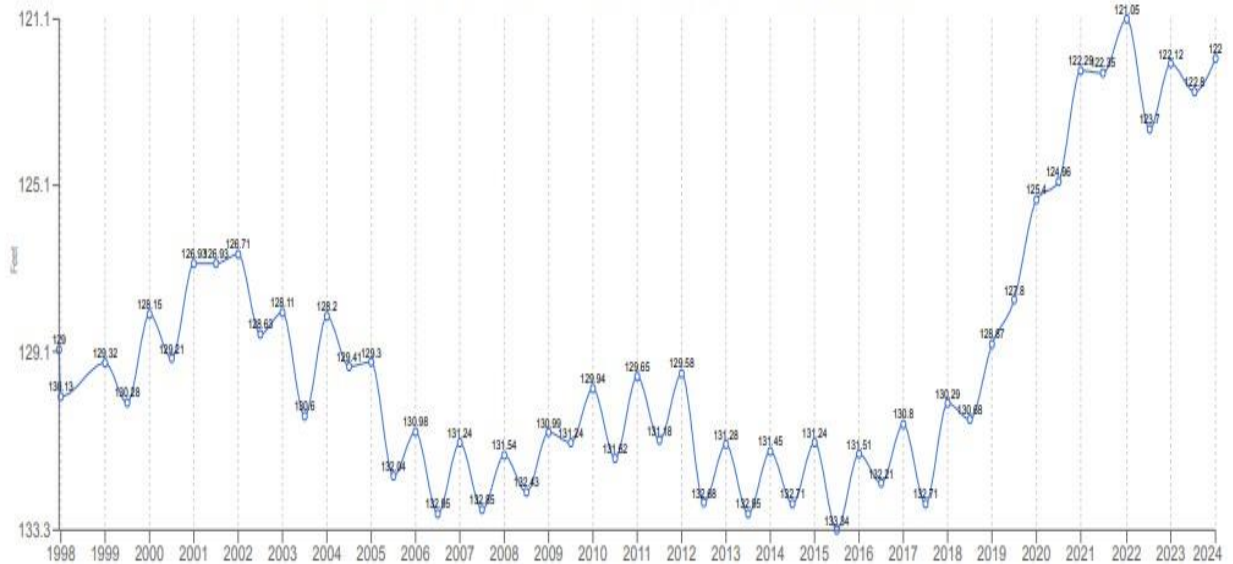
Township: 34, Range: 25, Section: 24, Well Depth: 180, Formation: undefined



Data From One location that is a Representative Graph of Cherry County Static Water Levels

Ground Water Level Measurement: Well 7089

Township: 34, Range: 25, Section: 24, Well Depth: 180, Formation: undefined



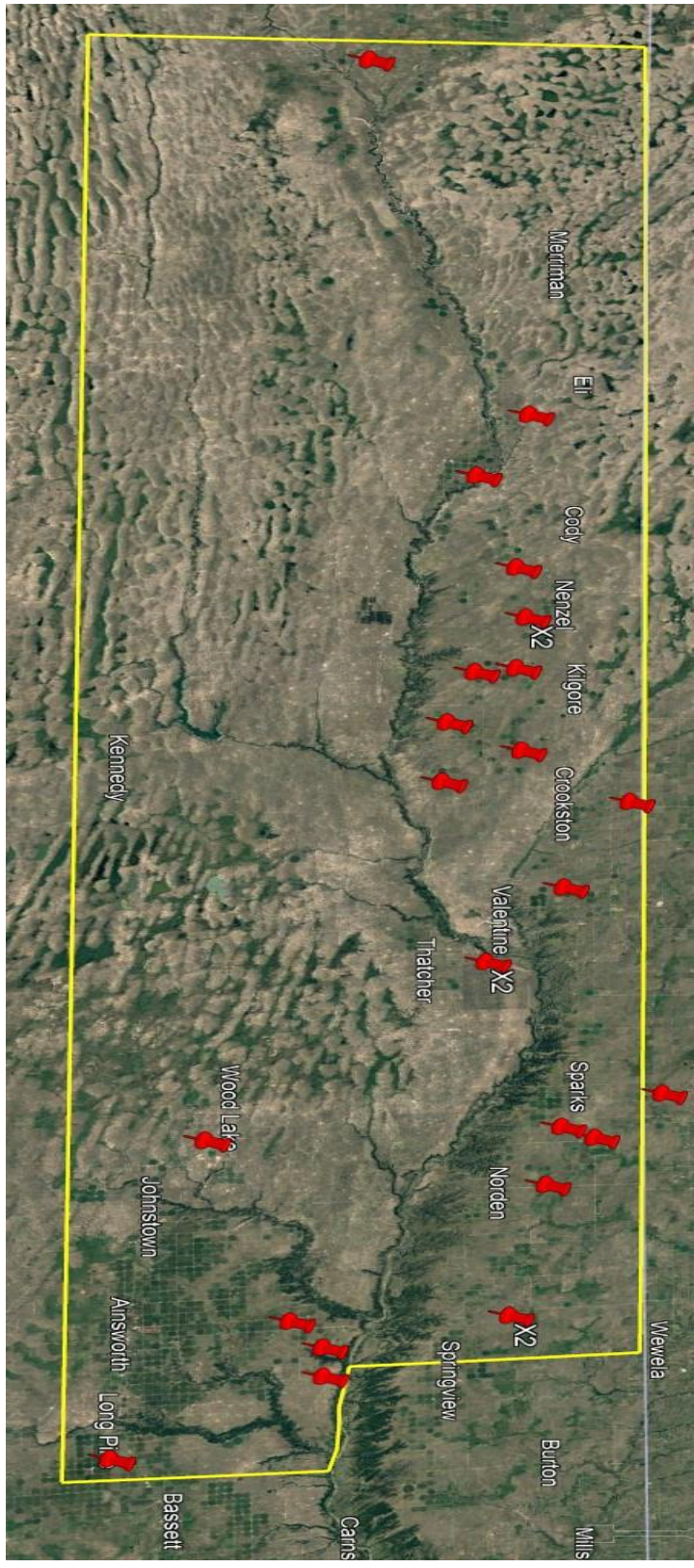
2. Certification of new groundwater uses and any changes to these certifications.

In 2023 the MNNRD Board of Directors accepted applications for up to 3,000 acres of new groundwater use. There were 26 applications submitted for 2,996 irrigated acres. All 26 applications met the minimum ranking score and were approved for development. Acres will be certified as they meet MNNRD completion requirements. If they do not meet completion or timeline requirements their approval will be revoked, and the acres not certified. The location and acres of the areas approved to develop are as follows:

<u>Location</u>	<u>Acres Approved for Development</u>
SE ¼ Sec. 2-33-22	70
NW ¼ Sec. 1-33-22	128
NW ¼ Sec. 2-33-33	75
E ½ W1/2 Sec. 25/30-33-29/30	150
NE ¼ Sec. 4-29-20	67
SW ¼ Sec. 16-33-34	100
NW ¼ Sec. 5-33-31	132
SE ¼ Sec. 33-34-30	105
SW ¼ Sec. 21-35-26	126
S ½ N ½ Sec 1/12-30-25	150
NW ¼ Sec. 25-34-24	150
C of SE ¼ Sec. 30-33-30	150
SW ¼ Sec. 31-32-21	70
SW ¼ Sec. 20-32-40	100
SE ¼ Sec. 10-31-22	118
NE ¼ Sec. 10-33-27	150
SE ¼ Sec. 10-33-27	150
SE ¼ Sec. 33-32-31	132
NW 1/4 Sec. 8-34-24	135
NW ¼ Sec. 32-35-29	132
SW ¼ SE 1/4 Sec. 33-34-32	32
SE ¼ Sec. 33-34-32	100
SE ¼ Sec. 17-33-31	140
NE ¼ Sec.21-34-28	132
NW ¼ Sec. 19-34-24	70
SE ¼ Sec. 33-34-35	122
<u>Total</u>	<u>2,996</u>

The MNNRD continues to update landowner and groundwater certification changes as they are available.

Map of Locations Approved for New Irrigated Acres



3. Information gathered through the municipal and non-municipal industrial accounting process.

The Middle Niobrara NRD collects water use data from the local municipalities on a yearly basis. The municipalities below have reported data to the MNNRD. The 5-year average yearly use in millions of gallons for each city or village is found below.

<u>City / Village</u>	<u>Average Municipal Pumping (Millions of Gallons)</u>
City of Valentine	300.90
City of Ainsworth	141.40
Village of Woodlake	12.87
Village of Crookston	4.97
Village of Kilgore	4.75
Village of Merriman	18.40
Village of Cody	5.9
City of Long Pine	27.07

4. Irrigation water use data collected by the District.

Middle Niobrara NRD staff read and collect data on about 90 flow meters in the district. The board of directors voted to require flow meters on all new irrigation wells drilled after 2011, but do not require an irrigation allotment or consumptive use cap. Staff collects data on these mandatory meters, as well as a handful of flow meters that landowners have voluntarily installed and given permission for the MNNRD to utilize. Landowners in Management Zone 3 are required to report estimated water use in their yearly report forms. There are about 1,100 water use reports and flow meter measurements recorded. Per crop type averages in **Acre Inches** for 2023 are as follows:

<u>Crop Type</u>	<u>Average Water Use In Acre Inches</u>
Corn	13.8" (17.1" in 2022)
Soybeans	11.4" (16.7 in 2022)
Alfalfa	9" (13" in 2022)
Forage Crop	8.7" (13.9" in 2022)

5. Stream gage measurements on District-sponsored gages.

The Middle Niobrara NRD does not currently sponsor any stream gage measuring equipment.

The Niobrara River Basin Alliance (NRBA) will be involved in the deployment of a stream gage on the Niobrara in cooperation with the orders provided by Department of Natural Resources during the purchase of the Water Rights associated with NPPDs Hydro-facility. Data from that gage will be provided after installation.

The MNNRD does contract sampling and flow measurements for NDEE on Long Pine and Plum Creek monthly. On a 5-year rotation, district wide stream measurements and sampling are completed every week during the summer. This data is available through NDEE.

6. Water well construction permits issued or denied and any conditions associated with the permits issued.

In 2023, the Middle Niobrara approved 34 high capacity well construction permits, down from 39 permits last year. Out of the 34 permits issued, 3 of the permits were replacement permits for existing irrigation wells and 31 were permits for new irrigation wells. Permits for new irrigation wells were approved through the new irrigated acre process, acre transfers, or variance requests like trading surface water rights for groundwater rights.

There are 14 conditions and restrictions in place during the process of an *Application For A Permit To Construct A Water Well In The MNNRD*. At their discretion, the Board of Directors may apply any other conditions to the permit application. Past examples include limits on total GPM pumped, location of the replacement well, water use efficiency conditions, and improving the mapping of the actual irrigated acres vs acres that were certified in 2008.

7. Variances

There were no variances applied for by any landowners in the MNNRD in 2023.

8. Certified Irrigated Acre Transfers

Information on transfer applications includes landowner requesting and providing the transfers, legal description, total acres being transferred, nature of the transfer, and well registration numbers if applicable. After receiving the application, MNNRD staff add the following information from both locations to the application:

Stream Depletion (SDF)

Slope and Erosion Issues

Title Report (Free and Clear Titles)

Static Water levels

Groundwater Index

After reviewing the application, the Board of Directors considers all factors and decides whether to approve, approve with conditions, or deny the application.

There were no certified irrigated acre transfer applications submitted to the MNNRD Board of Directors in 2023.

9. Retirements of irrigated acres or other activities by the District for the purpose of mitigating depletions.

The Middle Niobrara continues to be heavily involved in the Niobrara River Basin Alliance's administration of the surface waters rights acquired from NPPD. Subordination agreements are currently being set up with junior appropriators. These water rights are administered to keep local control, as well as to help mitigate depletions within the bounds of the Niobrara Basin.

The Ainsworth Irrigation District (AID) and the District continue to work together on potential projects that can reduce the amount of water going through the AID canal system that isn't being used for its intended purposes. Potential projects include reuse pits, holding facilities, and updated gate and flow monitoring technology. These projects can help keep water in the Snake River and bound for the Niobrara River, instead of being turned out and seeping away along the canal. Canal water turnouts directly damage streams, streambanks, and streambeds and have created an artificial water mound in portions of Brown and Eastern Cherry counties.

The District has cost share money available to landowners wishing to improve their irrigation water use efficiency. Projects like adding flow meters, soil moisture probes, gravity to center pivot irrigation conversions, and high pressure to low pressure conversions are eligible.

District staff and Board of Directors continue to encourage landowners to apply to relinquish surface water rights and uses in exchange for groundwater uses. These exchanges have immediate impacts to stream depletions and can be beneficial to all parties involved.

Staff and consultants completed a groundwater index that combines all available water quantity data like static water levels, stream depletion info, pumping data, and recharge and puts it into a point scale. This index will help the board of directors evaluate new irrigation and transfer requests to make better management decisions using the most recent science, technology, and data.

10. Water Banking

The Middle Niobrara has a database of irrigated acres the District has banked from reducing stream depletions since 2008. The MNNRD started accepting Certified Irrigated Acre transfer applications in 2008 when the District finished its irrigated acre certification process.

Transferring irrigated acres from a low to a higher stream depletion (SDF) requires an acre offset. Acres transferred from a higher SDF to a lower SDF are only allowed at a 1:1 ratio, with the MNNRD banking the remaining difference. Landowners are also encouraged by the MNNRD to transition their surface water irrigation to groundwater irrigation as these scenarios always result in a reduction in SDF. As a result of the 64 transfers since 2008, the MNNRD has banked a total of **1,899.23** groundwater-irrigated acres.

Conclusion

The Middle Niobrara NRD looks forward to continuing the partnership with the Nebraska Department of Natural Resources in maintaining and enhancing all our water resources throughout the District. This yearly report is a great opportunity to evaluate the surface and groundwater controls in place, as well as preserving an open line of communication between both parties. Staff and the Board of Directors are committed to a progressive approach to forever ensuring ample water quantity for all users.



Middle Niobrara NRD