



Dakota County Rural Water Feasibility Study

0M2.W00002

Dakota County, Minnesota

March 21, 2024

Submitted by:
Bolton & Menk, Inc.
12224 Nicollet Avenue
Burnsville, MN 55337
P: 952-890-0509



Real People. Real Solutions.

Page intentionally left blank

Certification

Dakota County Rural Water Feasibility Study

For

Dakota County, Minnesota
0M2.W00002

March 2024

PROFESSIONAL ENGINEER

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Signature:  _____

Typed or Printed Name: Seth A. Peterson

Date: 3/21/2024 License Number: 26468

Page intentionally left blank

Table of Contents

I.	Background	1
A.	Project Purpose.....	1
II.	Determination of Study Area	3
A.	Data Collection.....	3
B.	Manganese Areas of Concern.....	6
C.	Nitrate Areas of Concern	6
III.	Solution Alternatives	7
A.	Connect to Public Water System	7
B.	Rural Water System	19
C.	Point of Use/Independent Treatment System	21
D.	County-Wide Rural Water System	21
E.	Summary.....	35
IV.	Cost Analysis.....	37
A.	Connect to Public Water System	37
B.	Rural Water System	41
C.	Point-of-Use/Independent Treatment	44
D.	Funding	44
V.	Summary and Next Steps.....	45

Figures

Figure 1 – Manganese Locations	4
Figure 2 – Nitrate Locations	5
Figure 3 – Proposed Water System Expansion – City of Burnsville.....	11
Figure 4 – Proposed Water System Expansion – City of Empire	12
Figure 5 – Proposed Water System Expansion – City of Hastings	13
Figure 6 – Proposed Water System Expansion – City of Inver Grove Heights.....	14
Figure 7 – Proposed Water System Expansion – City of Lakeville	15
Figure 8 – Proposed Water System Expansion – City of Northfield	16
Figure 9 – Proposed Water System Expansion – City of Rosemount	17
Figure 10 – Rural Water System – City of Empire	23
Figure 11 – Rural Water System – City of Empire	24
Figure 12 – Rural Water System – Greenvale Township.....	25
Figure 13 – Rural Water System – Greenvale Township.....	26

Figure 14 – Rural Water System – Marshan Township.....	27
Figure 15 – Rural Water System – Marshan Township.....	28
Figure 16 – Rural Water System – Nininger Township	29
Figure 17 – Rural Water System – Nininger Township	30
Figure 18 – Rural Water System – Ravenna Township	31
Figure 19 – Rural Water System – Ravenna Township	32
Figure 20 – Rural Water System – Vermillion Township.....	33
Figure 21 – Rural Water System – Vermillion Township.....	34

Tables

Table 1 – Summary of Private Well Testing Results, Dakota County	1
Table 2 – Alternatives for Each Area of Concern	35
Table 3 – Estimated Summary Costs – Public Water System Extension.....	37
Table 4 – Estimated Payments by Scenario – Public Water System Extension	39
Table 5 – Estimated Summary Costs – Rural Water System.....	41
Table 6 – Estimated Payments by Scenario – Rural Water System	43
Table 7 – Estimated Summary Costs – Point of Use Treatment	44

Appendix

Appendix A: Hastings Meeting Minutes

Appendix B: Rosemount Meeting Minutes

I. Background

A. Project Purpose

It is Dakota County’s goal for all residents to be provided with safe and high-quality drinking water. A portion of residents are connected to one of several large public water systems, while 8,000+ homes use private wells as their main water source.

The Dakota County Ambient Groundwater Quality Study 1999-2019 determined that 62% of private wells sampled exceeded the drinking water guidelines for nitrate, manganese, arsenic, gross alpha, and the herbicide Cyanazine. Studies of private well water quality are available on the Dakota County website at <http://www.co.dakota.mn.us>. It should be noted that testing results could not be acquired for all private wells in the County. Most of the guideline exceedances are for two contaminants of concern, manganese, and nitrate. A summary of the results for nitrate is shown in Table 1.

Township or City	Year of Sampling	Estimated No. of Private Drinking Water Wells	Percent of Households w/ Nitrate > 10 mg/L	Median Nitrate (mg/L)
Douglas TWP	2020	250	29%	12.7
Hampton	2020	11	25%	8.9
Hampton TWP	2021	335	30%	7.1
Hastings	2020	40	44%	10.6
Marshan TWP	2020	400	37%	16.9
Miesville	2020	250	32%	15.6
New Trier	2020	33	0%	Non-detect
Nininger TWP	2021	320	36%	11.1
Ravenna TWP	2022	835	45%	9.7
Vermillion	2020	11	33%	Non-detect
Vermillion TWP	2021	400	44%	10.1

Manganese is a common mineral, which may dissolve into groundwater over time from the surrounding geology. According to the Minnesota Department of Health, long-term exposure to elevated levels of manganese in drinking water may lead to neurological issues including memory, attention, and motor skill issues. Children under 1 year old are at risk for behavior and learning issues. The Minnesota Department of Health recommends adults and children over 1 year old are safe at manganese levels of 300 µg/L or less. Infants under 1-year-old drinking formula made with tap water are safe at levels of 100 µg/L or less.

Nitrate commonly enters groundwater via agricultural use of fertilizers. According to the Minnesota Department of Health:

“Consuming too much nitrate can affect how blood carries oxygen and can cause methemoglobinemia (also known as blue baby syndrome). Bottle-fed babies under six months old are at the highest risk of getting methemoglobinemia. Methemoglobinemia can cause skin to turn a bluish color and can result in serious illness or death. Other symptoms connected to methemoglobinemia include decreased blood pressure, increased heart rate, headaches, stomach cramps, and vomiting.”

The Minnesota Department of Health Health Risk Limit for private drinking water wells is 10 mg/L.

The County has received a community grant of \$50,000 for a feasibility study to determine the “feasibility and cost to provide municipal water or rural water services to private drinking water wells in south/southeastern Dakota County, with focus on those areas with highest nitrate concentrations”. The County enlisted the consulting firm Bolton & Menk, Inc. to assist with the study. This report will summarize the study’s findings.

II. Determination of Study Area

A. Data Collection

The latest sampling data was gathered from Dakota County for private wells within the county. The manganese and nitrate concentrations were analyzed, and two figures of the data were made via GIS, one for each contaminant. A color gradient was added to show which wells had the highest concentrations. These figures are shown in Figures 1 and 2. By mapping the water quality results, areas with higher concentrations of the contaminants could be seen.

Any clusters of private wells with high manganese and/or nitrate levels were labeled as potential “areas of concern”. The final decision on which areas of concern to include in this study was based on:

- High nitrate concentrations
- High manganese concentrations
- Density of private wells
- Proximity to existing public water systems
- Possible establishment of a rural water service provider

Figure 1 – Manganese Locations

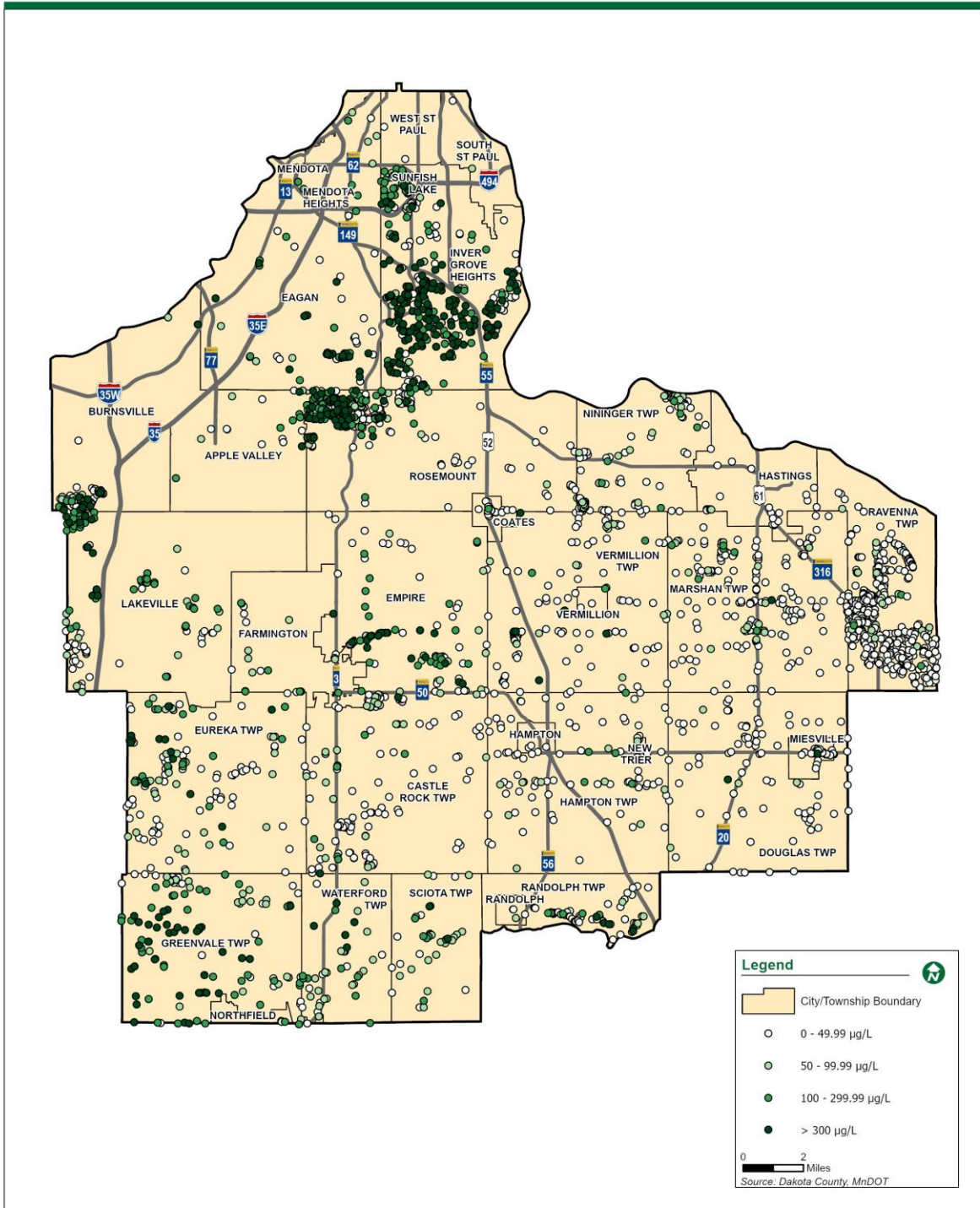
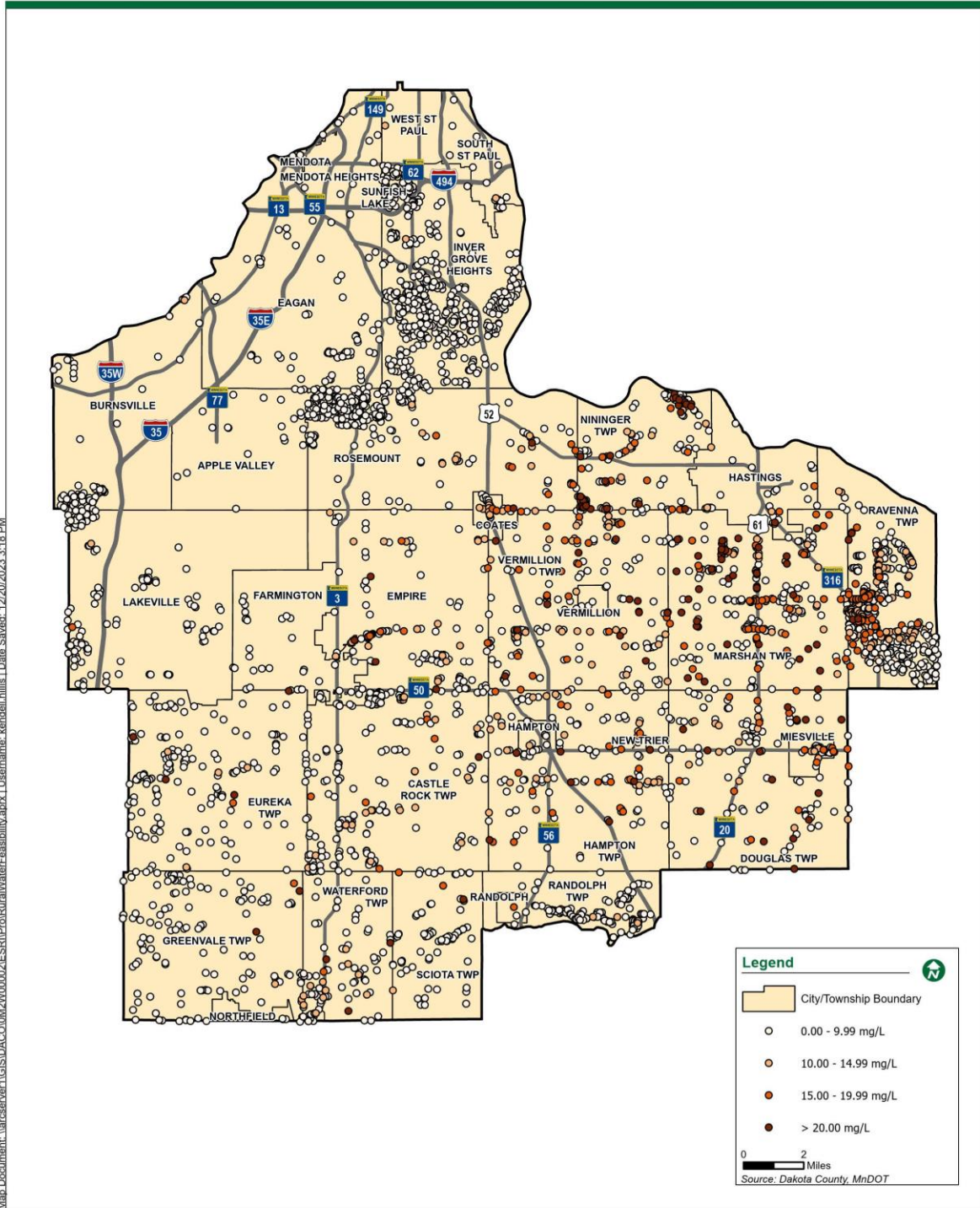


Figure 2 – Nitrate Locations



B. Manganese Areas of Concern

Clusters of wells with high manganese concentrations were found in four (4) general locations: northern Dakota County, far western Dakota County, the center of the county, and a cluster in the southwestern corner of the county. From these, five (5) areas of concern were created:

1. Southwest Burnsville/Northwest Lakeville area
2. City of Empire area
3. Township of Greenvale area
4. South Inver Grove Heights area
5. Northern Northfield area

C. Nitrate Areas of Concern

Clusters of wells with high nitrate concentrations were most often found in the eastern portion of the county, an area with high agricultural activities. This was expected, as nitrate is a common ingredient in agro-industrial fertilizer. There were nine (9) clusters of wells with consistently higher nitrate levels, which were then used to create nine (9) areas of concern:

1. City of Coates area
2. City of Empire area
3. South Hastings area
4. Marshan Township area
5. Nininger Township area
6. City of Northfield area
7. Ravenna Township area
8. City of Rosemount areas
9. Vermillion Township area

III. Solution Alternatives

A. Connect to Public Water System

A public water system is a system designed to provide drinking water to its users, which is owned by a municipality, such as a city or a township. These systems are required to meet federal and state drinking water regulations, including water quality limits in the drinking water they supply. Funds to construct and maintain these systems can be acquired through City/Township budgets, federal/state loans or grants, user fees, or a combination of these.

When considering a system expansion, the system must analyze whether it can feasibly afford to construct and maintain such an expansion. They must also determine how this expansion might impact the rest of the system. Factors in this analysis include system pressure, water age, and available water capacity. If the system has sufficient operational and maintenance capacity, it must also consider capital and long-term costs. There may also be political and cultural factors at play. Some areas do not wish to pay for public water service and prefer their private wells. All of these variables were considered in the analysis of whether the connection to an existing public water system is a feasible alternative.

Once the areas of concern were defined, the closest public water system was found for each. It was this closest system that was assumed to best serve the area of concern. An analysis of what factors are at play for each proposed system expansion was completed, which included discussions with some systems directly.

To determine how many wells of concern could be served by the proposed systems, each system was sketched over a parcel map for the local area. If the proposed system passed by or touched a parcel, and that parcel contained a well of concern, the parcel was included in the count. It was assumed any parcel that was passed or touched by a proposed system could be connected to the system via a service line.

To determine the total number of parcels that could be served by a system, each system was sketched over a parcel map for the local area. If the proposed system passed by or touched a parcel, the parcel was included in the count. It was assumed any parcel that was passed or touched by a proposed system could be connected to the system via a service line.

1. Burnsville Area of Concern

In the southwestern corner of Burnsville, there is an area containing several private wells of concern. The Comprehensive Plan for the Burnsville water system does not show an expansion into this area of concern.

To further investigate if Burnsville has any plans to expand its water system in this area, discussions were held with the City of Burnsville staff. They advised that the City of Burnsville has no plans to expand into this area. The neighborhood in question is older, and there has been a lack of community support to connect to City water in the past. The large number of dead-end roads would also make service difficult, as pressure and water turnover are harder to control than in looped systems. This meeting concluded that it is cost-prohibitive for the City of Burnsville to serve the northern portion of this area of concern at this time and that any such connection or expansion would be driven by resident support.

The proposed system expansion to serve the area of concern in Burnsville is shown in Figure 3 and will be used to generate the cost estimate in Section IV. The total number of properties with wells of concern this could impact is 35, and the total number of properties that could connect is 152.

2. Coates Area of Concern

There are several wells of concern located in the City of Coates. In 2022, Bolton & Menk, Inc. wrote a facility plan for a connection to the City of Rosemount water system. This plan also details the watermain routes that would need to be installed to serve the City of Coates residents. More details about this possible solution can be found in the March 2022 City of Coates Facility Plan.

3. Empire Area of Concern

The City of Empire Comprehensive Plan does not currently list a planned expansion. A meeting was held with the Assistant City Engineer for Empire to discuss possible expansions of the water system which may not have been listed.

The City has recently incorporated and is interested in expanding its existing system. The decision for expansion will be based upon developer interest. While the City is not currently expanding into the area of concern, should a developer desire to build in the area, the City would be willing to expand its system to serve those residences.

To estimate the costs of such a possible system expansion, an example system expansion was generated and is shown in Figure 4. This example system will be used to generate the cost estimate in Section IV. The total number of properties with wells of concern this could impact is 33, and the total number of properties that could connect is 98.

4. Greenvale Area of Concern

The Greenvale Area of Concern is approximately 2 miles from the border of the City of Northfield at its closest point. A meeting was held with representatives from the City of Northfield to discuss possible expansion of the City water system to serve the area of concern.

The city is currently undergoing large renovation projects for both its water and wastewater facilities. This is consuming large portions of the city's capital and operation budgets, leaving little for expansion of its horizontal infrastructure. There are plans to expand the system, but only to serve the western edge of the City limits and growth areas.

Politically, the City cannot serve areas outside of its city limits, which would include the area of concern. To expand into this area, the City would need to annex it, which would be a difficult and time-consuming political process. If connecting to an existing system was a proposed solution for this area, several political and monetary concerns would need to be addressed.

5. Hastings Area of Concern

On June 21, 2023, a meeting was held between the City of Hastings, Dakota County, and Bolton & Menk, Inc. to discuss the potential of expanding the City water system to

cover homes served by wells of concern. During this meeting, the City expressed support for the County's goal of serving homeowners with wells of concern. However, the City was experiencing several issues within its system which prevented them from expanding at this time, including PFAS detections in their raw water. The City is currently working to find funds for PFAS treatment to ensure it provides high-quality water to its existing customers. If the City does add PFAS treatment, the operational challenges will be such that their available staffing will not be able to properly maintain an expanded system. They do not believe they will be able to expand their system at this time, but should the City's situation change, they would be willing to discuss the possibility of expansion again. No system expansion is currently feasible until this problem is resolved.

To estimate the costs for Hastings to expand their system to serve some wells of concern, an example expansion was created and shown in Figure 5. This example system will be used to generate the cost estimate shown in Section IV. The total number of properties with wells of concern this could impact is 136, and the total number of properties that could connect is 659.

6. Inver Grove Heights Area of Concern

The Inver Grove Heights Comprehensive plan shows no planned expansion into the area of concern. The area consists of many small, dead-end roads and few looped, main roads. This creates challenges for the operation of any system expansion as pressure and water age are harder to control for this type of neighborhood layout. It would also require high capital costs. Any expansion into this area of concern will have significant monetary and operational challenges.

To estimate the costs for a system expansion in this area, the proposed expansion was drawn up and is shown in Figure 6. This expansion will be used to generate the cost estimate in Section IV. The total number of properties with wells of concern this could impact is 162, and the total number of properties that could connect is 1,044.

7. Lakeville Area of Concern

In the northwestern corner of Lakeville, there is an area containing several wells of concern. The Lakeville Comprehensive plan does show a water main expansion through the southern portion of this area in the future. Once this water main line is installed, there is the possibility that homeowners using these private wells could connect to the Lakeville system.

To estimate the costs of such a system expansion, an example expansion was created and shown in Figure 7. This example expansion will be used to generate the cost estimate in Section IV. The total number of properties with wells of concern this could impact is 22, and the total number of properties that could connect is 69.

8. Nininger Area of Concern

The Nininger area of concern is approximately 1 mile outside of Hastings City limits. As discussed in section III.A.4, the City of Hastings cannot expand its system at this time. The City of Hastings has stated that any expansion to serve the Nininger area would need to be on an individual land-owner basis.

9. Northfield Area of Concern

As discussed in Section III.A.3., any area served by the City of Northfield municipal water system must be within the City limits. In order to expand into this area, the City would need to annex it, which would be a difficult and time-consuming political process. If connection to an existing system was a proposed solution for this area, there are several political and monetary concerns that would need to be addressed. A possible system expansion is shown in Figure 8 and was used to generate the costs shown in Section IV. The total number of properties with wells of concern this could impact is 35, and the total number of properties that could connect is 192.

10. Ravenna Area of Concern

The Ravenna Area of Concern is approximately 3 miles outside of the Hastings City limits. As discussed in section III.A.4, the City of Hastings cannot expand its system at this time. However, should this situation change, the City would be willing to revisit this alternative in the future.

11. Rosemount Area of Concern

On July 17, 2023, a meeting was held between the City of Rosemount, Dakota County, and Bolton & Menk, Inc. to discuss the potential of expanding the City water system to cover homes served by wells of concern.

The City does not have a centralized water treatment system and is currently exploring solutions to solve higher manganese concentrations from some wells. Rosemount has been growing and has several expansion projects planned for the city water system. Portions of the areas of concern will be picked up by these system expansions. It is likely that many of the private wells will be removed from service once these expansions are completed. These areas should continue to be examined as the expansions occur.

To estimate the costs for a system expansion, an example layout was created and shown in Figure 9. This layout will be used to generate the cost estimate in Section IV. The total number of properties with wells of concern this could impact is 141, and the total number of properties that could connect is 453.

Figure 3 – Proposed Water System Expansion – City of Burnsville

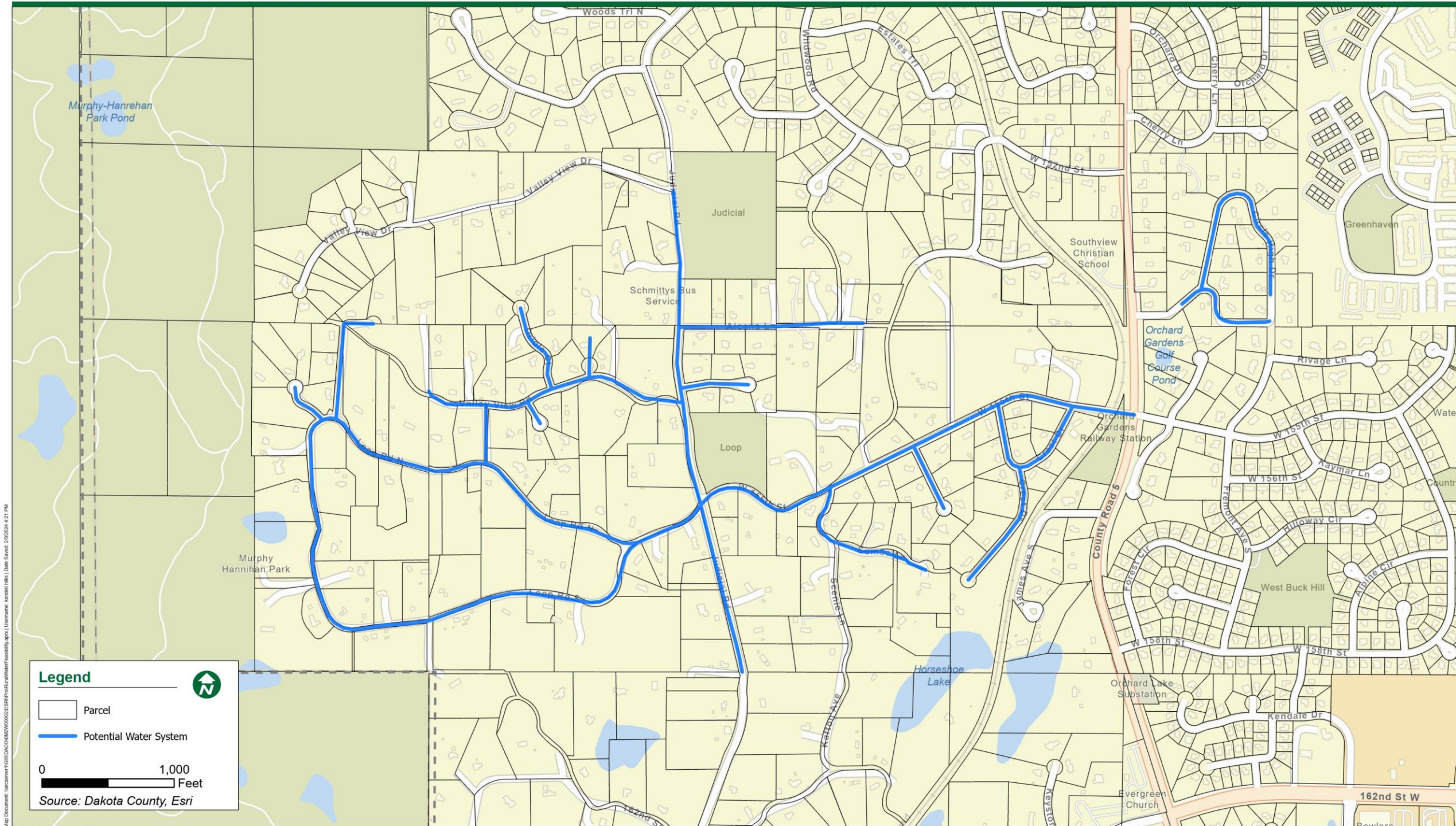


Figure 4 – Proposed Water System Expansion – City of Empire

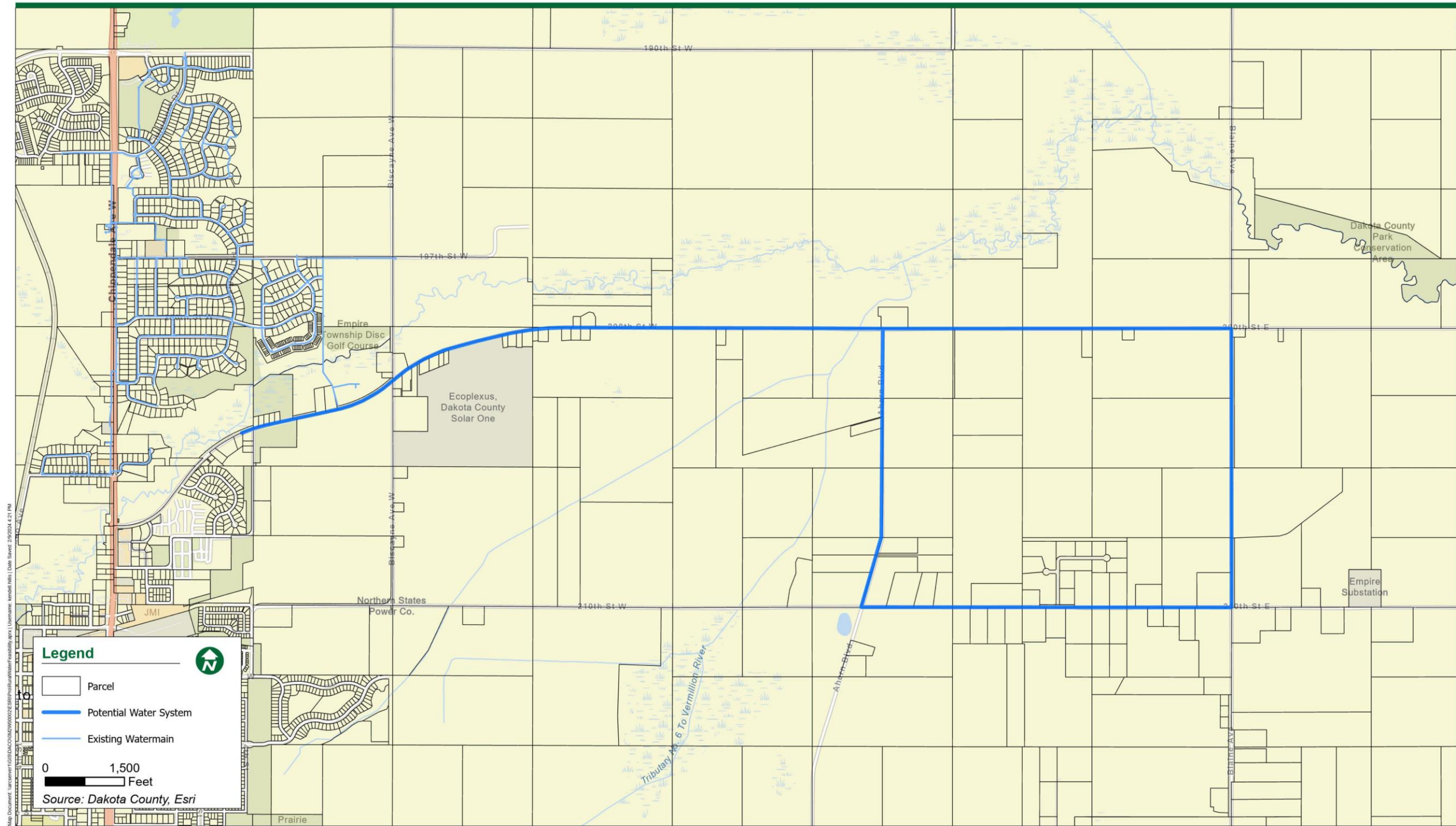


Figure 5 – Proposed Water System Expansion – City of Hastings

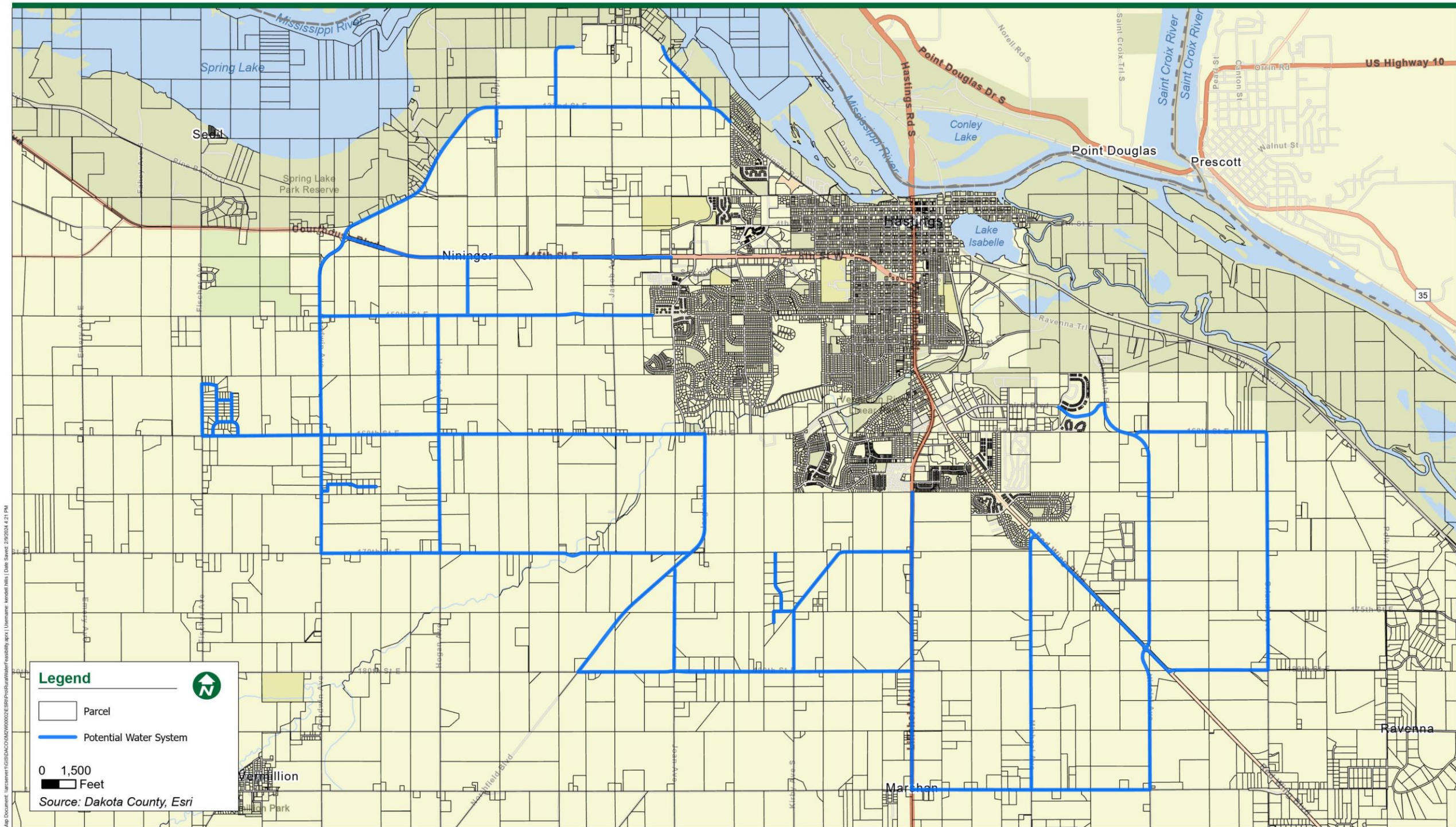


Figure 6 – Proposed Water System Expansion – City of Inver Grove Heights

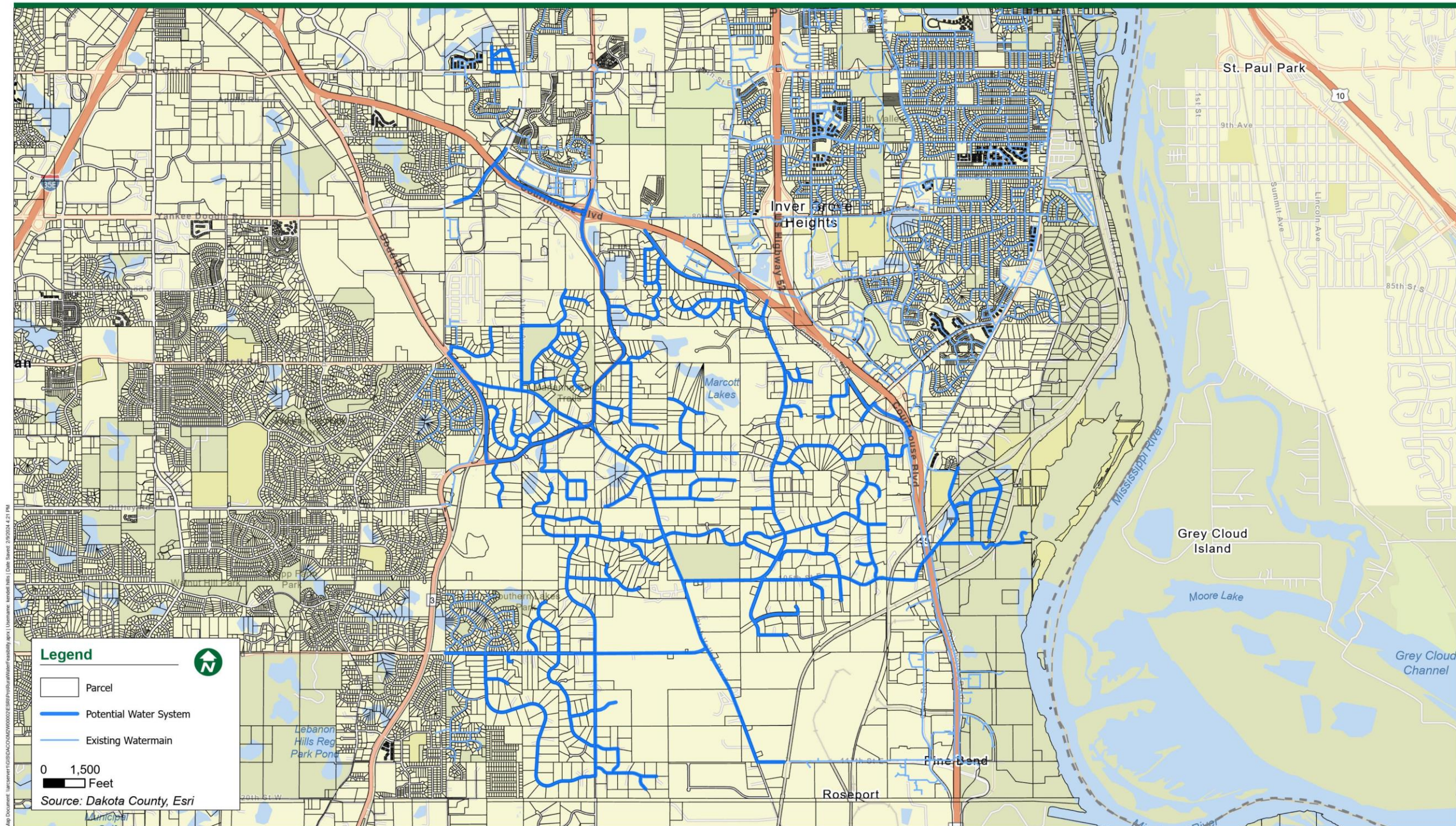


Figure 7 – Proposed Water System Expansion – City of Lakeville

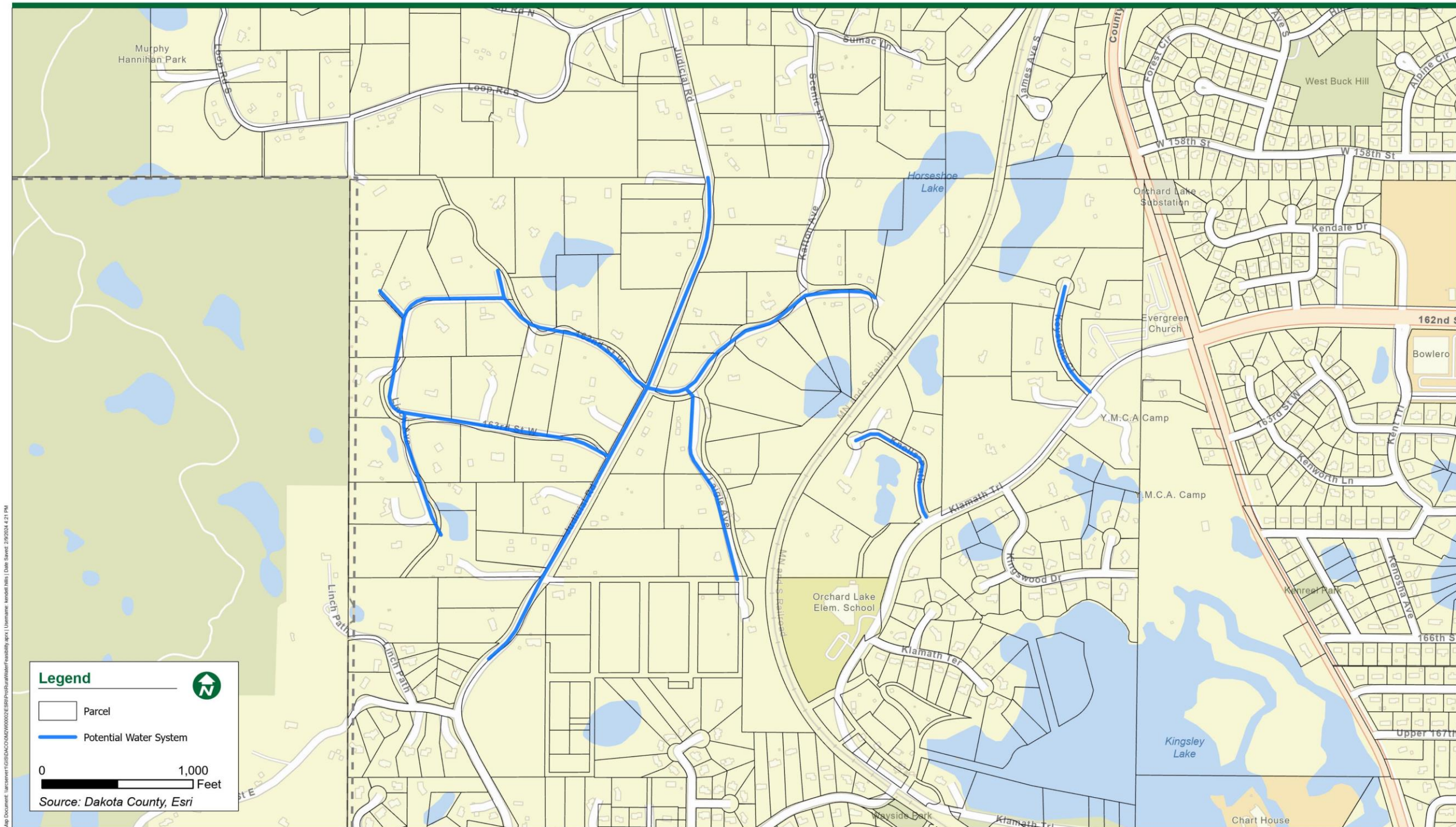


Figure 8 – Proposed Water System Expansion – City of Northfield

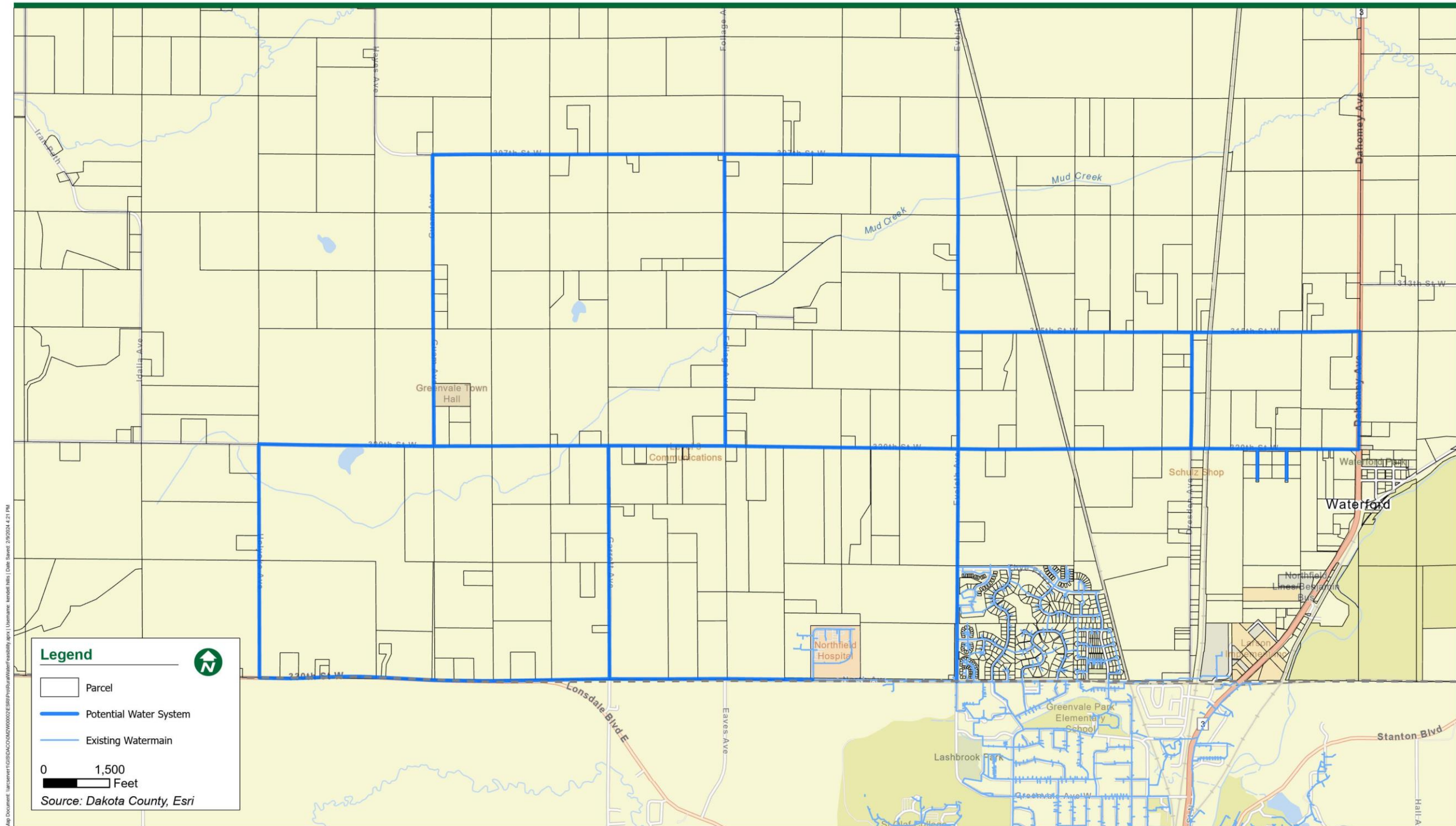
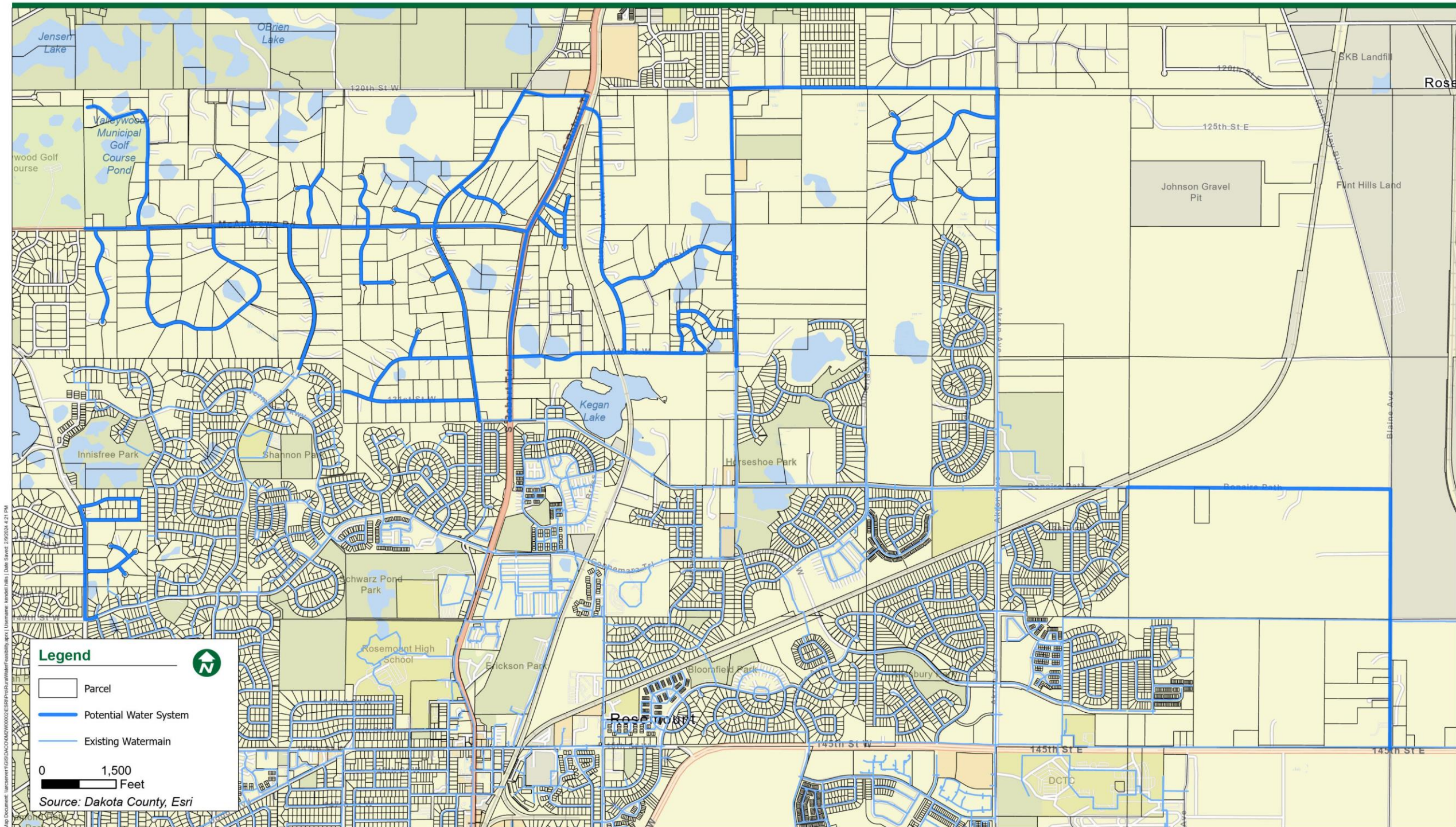


Figure 9 – Proposed Water System Expansion – City of Rosemount



Page intentionally left blank.

B. Rural Water System

There are three main items required for any water system:

- Horizontal infrastructure, such as water mains and service lines to each home
- Raw water supply, in the form of a surface water intake or groundwater well(s)
 - If groundwater wells are used, at least two (2) are needed to meet firm capacity requirements.
- Pressure sources, such as a water tower or hydropneumatic tank.

Additionally, a treatment system may also be required should the water supply not meet primary or secondary drinking water requirements.

The quantity and location of these items are unique to each water system, and are based on factors such as population served, area topography, and local hydrological features. In order for a rural water system to be feasible, the service area must be large enough to fit all required system components, but not so large as to make the horizontal infrastructure costs infeasible. The following areas of concern were considered appropriate for a rural water system:

- Empire Area of Concern
- Greenvale Area of Concern
- Marshan Area of Concern
- Nininger Area of Concern
- Ravenna Area of Concern
- Vermillion Area of Concern

Each system would need to undergo its own design process, which has significant time and monetary costs. For the purposes of this study, several assumptions were made for all six (6) systems:

- The water main would be 8-inch PVC pipe, and a 250 ft service line would need to be run to each home served. Only homes with a well of concern were assumed to need a service connection.
- Each area will be served by two groundwater wells with submersible well pumps.
- Each system would have a hydropneumatic tank for its pressure source located in a building.

To determine how many wells of concern could be served by the proposed systems, each system was sketched over a parcel map for the local area. If the proposed system passed by or touched a parcel, and that parcel contained a well of concern, the parcel was included in the count. It was assumed any parcel that was passed or touched by a proposed system could be connected to the system via a service line.

To determine the total number of parcels that could be served by a system, each system was sketched over a parcel map for the local area. If the proposed system passed by or touched a

parcel, the parcel was included in the count. It was assumed any parcel that was passed or touched by a proposed system could be connected to the system via a service line.

1. Empire area

The proposed rural water layout for the Empire area is shown in Figures 10 & 11. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 33 wells of concern. The total possible number of parcels served is 98.

2. Greenvale area

The proposed rural water layout for the Greenvale area is shown in Figures 12 & 13. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 27 wells of concern. The total possible number of parcels served is 105.

3. Marshan area

The proposed rural water layout for the Marshan area is shown in Figures 14 & 15. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 27 wells of concern. The total possible number of parcels served is 105.

4. Nininger area

The proposed rural water layout for the Nininger area is shown in Figures 16 & 17. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 22 wells of concern. The total possible number of parcels served is 94.

5. Ravenna area

The proposed rural water layout for the Ravenna area is shown in Figures 18 & 19. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 170 wells of concern. The total possible number of parcels served is 380.

6. Vermillion area

The proposed rural water layout for the Vermillion area is shown in Figures 20 & 21. The location of the pressure source and wells was not placed during this preliminary stage, though the cost of each item is described in Section IV. This proposed system would serve parcels containing 27 wells of concern. The total possible number of parcels served is 105.

A Vermillion rural water system could also connect to the existing system and serve as an expansion of the existing system.

7. Other areas of concern

For all other areas of concern noted in Section II, an alternative other than a separate rural water system was determined to be more feasible given their size and location.

C. Point of Use/Independent Treatment System

A third alternative is for each well owner to install an at-home water treatment system. There are several home water treatment methods commercially available. The treatment device with the highest level of treatment is a reverse osmosis (RO) system. These systems operate by passing water to be treated through a membrane, which traps the contaminants and allows clean water to pass through. The “brine”, or water containing the rejected contaminants, is then sent to the home’s sanitary system for disposal, whether that be a connection to a municipal sanitary system or a septic system. Both manganese and nitrate can be removed with RO treatment.

A point-of-entry or point-of-use system may also be a solution. A point-of-entry system could include an ion exchange system and would serve all taps in the home. A point-of-use system would only treat water from the tap onto which it is placed. If a home uses more than one tap for drinking water, multiple point-of-use devices would be needed. Point-of-use devices could be installed in many types and ages of homes. They are also easier to remove and replace if needed.

D. County-Wide Rural Water System

It was requested that this study include an analysis of a County-wide rural water system. The basis for this system is a drinking water system that would cover the span of Dakota County, run and operated by a rural water district. However, it was determined that Minnesota Statute 110A forbids the creation of rural water districts in Anoka, Carver, Dakota, Hennepin, Ramsey, Scott, or Washington Counties. The systems proposed in this report could still be run and operated by municipalities and townships, however.

Page intentionally left blank.

Figure 10 – Rural Water System – City of Empire

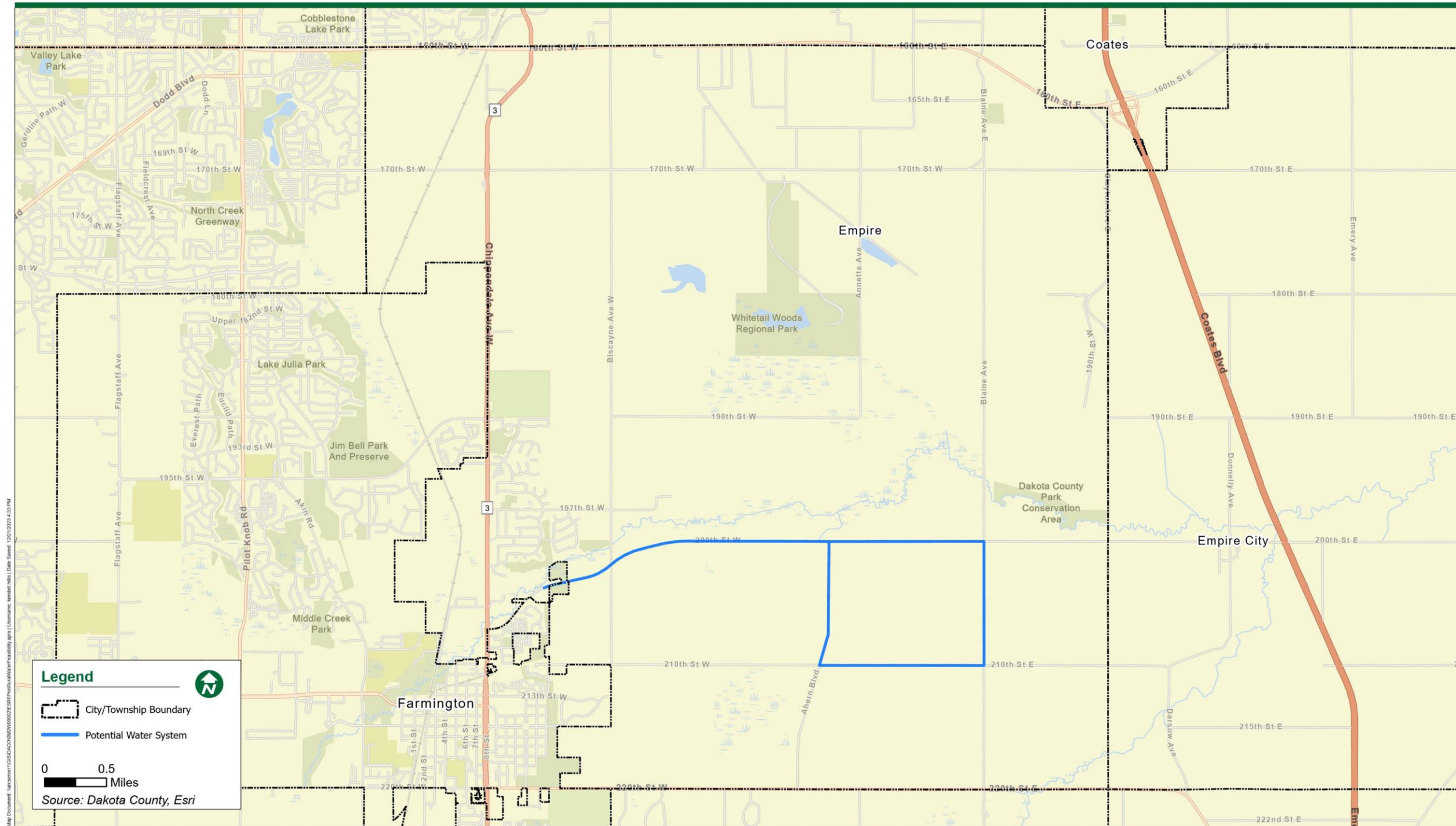


Figure 11 – Rural Water System – City of Empire

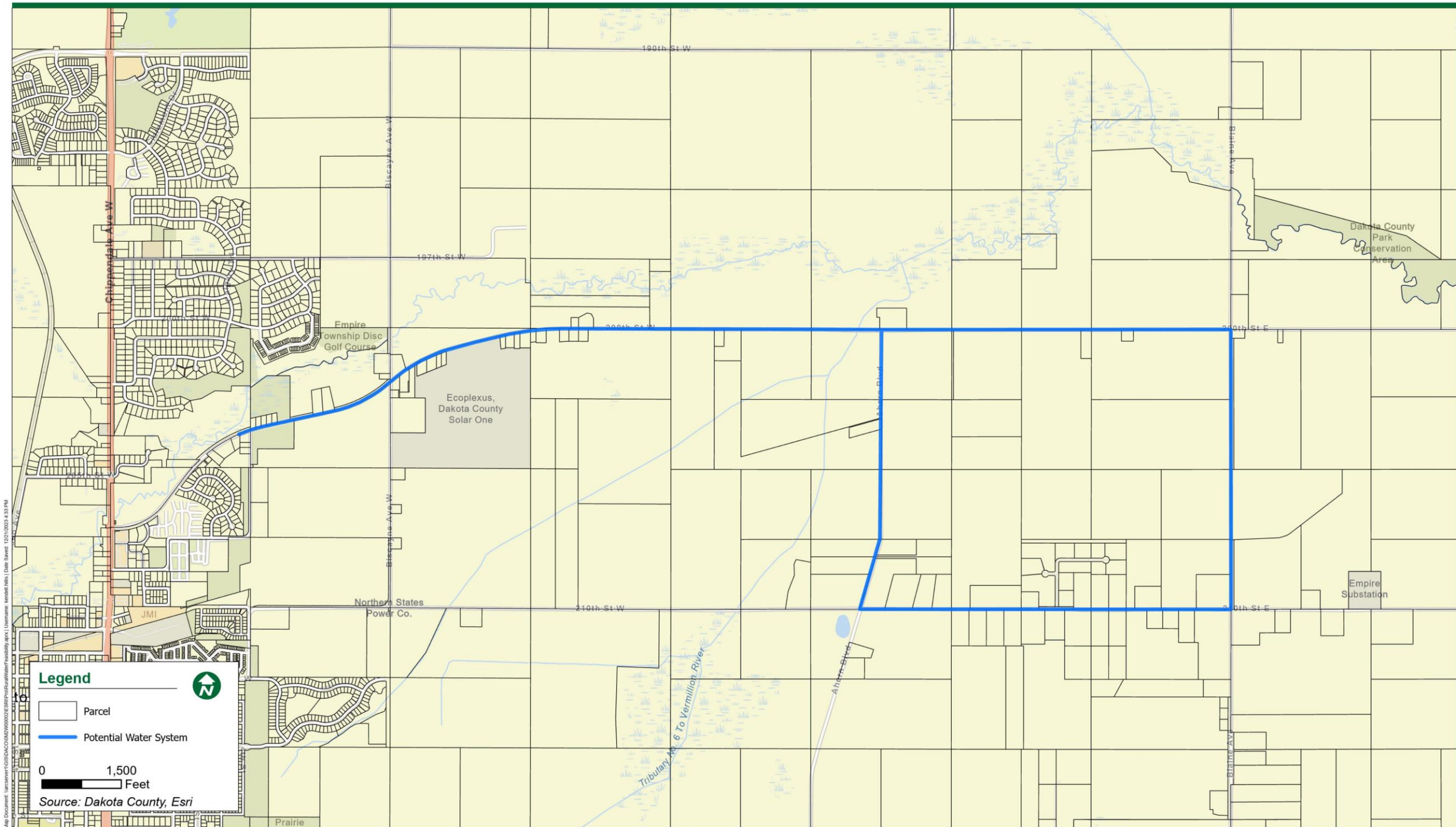


Figure 12 – Rural Water System – Greenvale Township

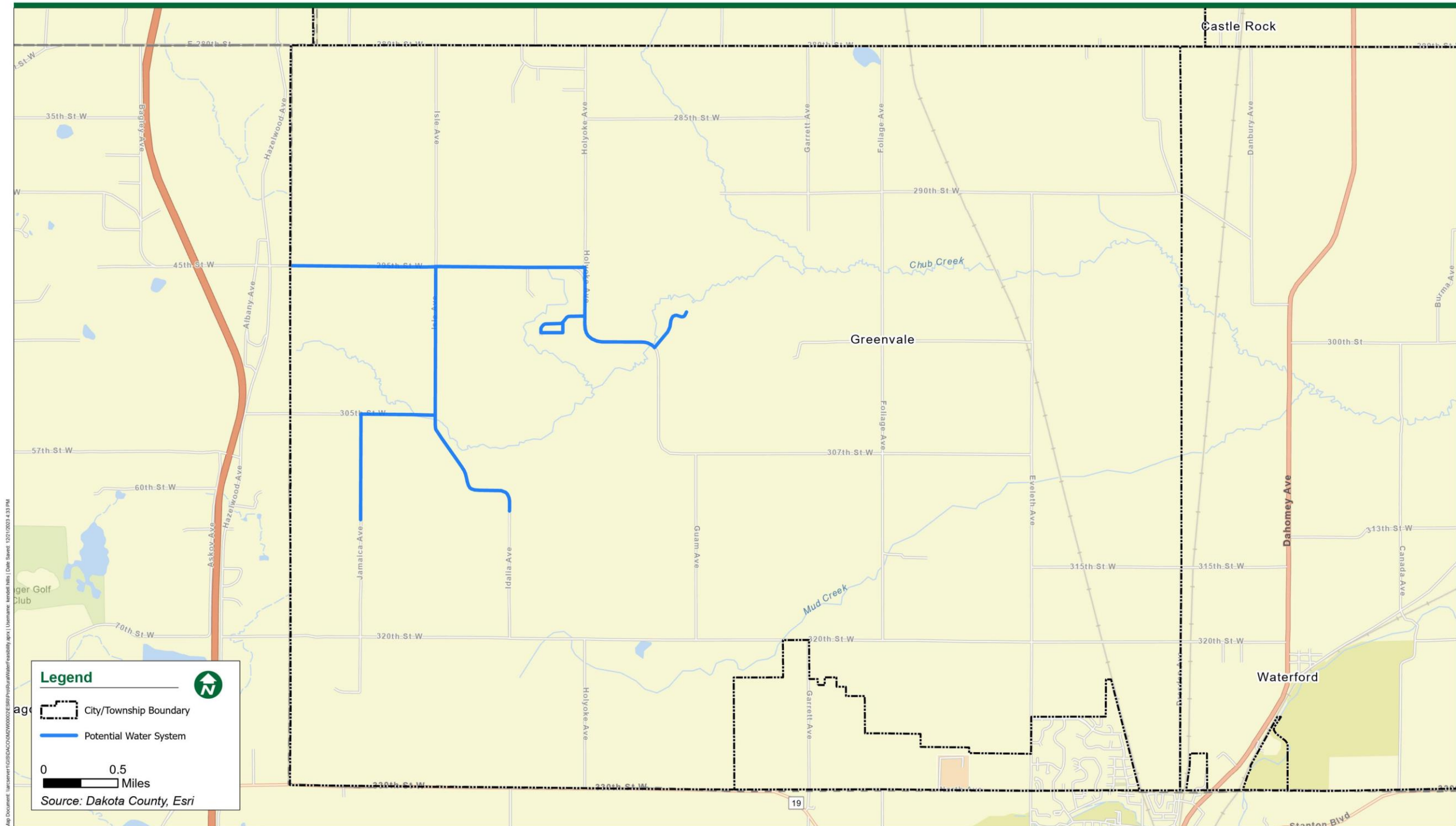


Figure 13 – Rural Water System – Greenvale Township

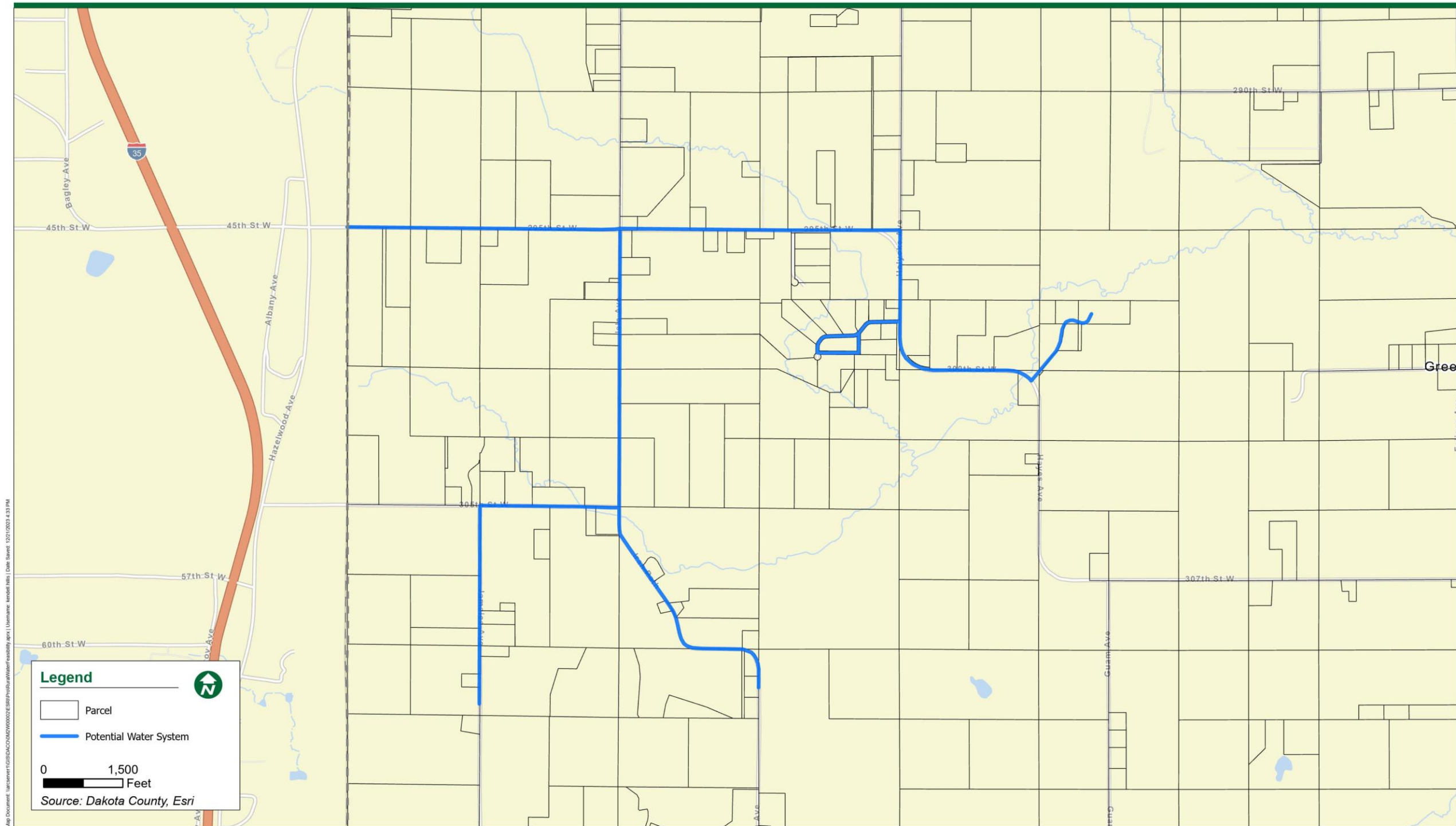


Figure 14 – Rural Water System – Marshan Township

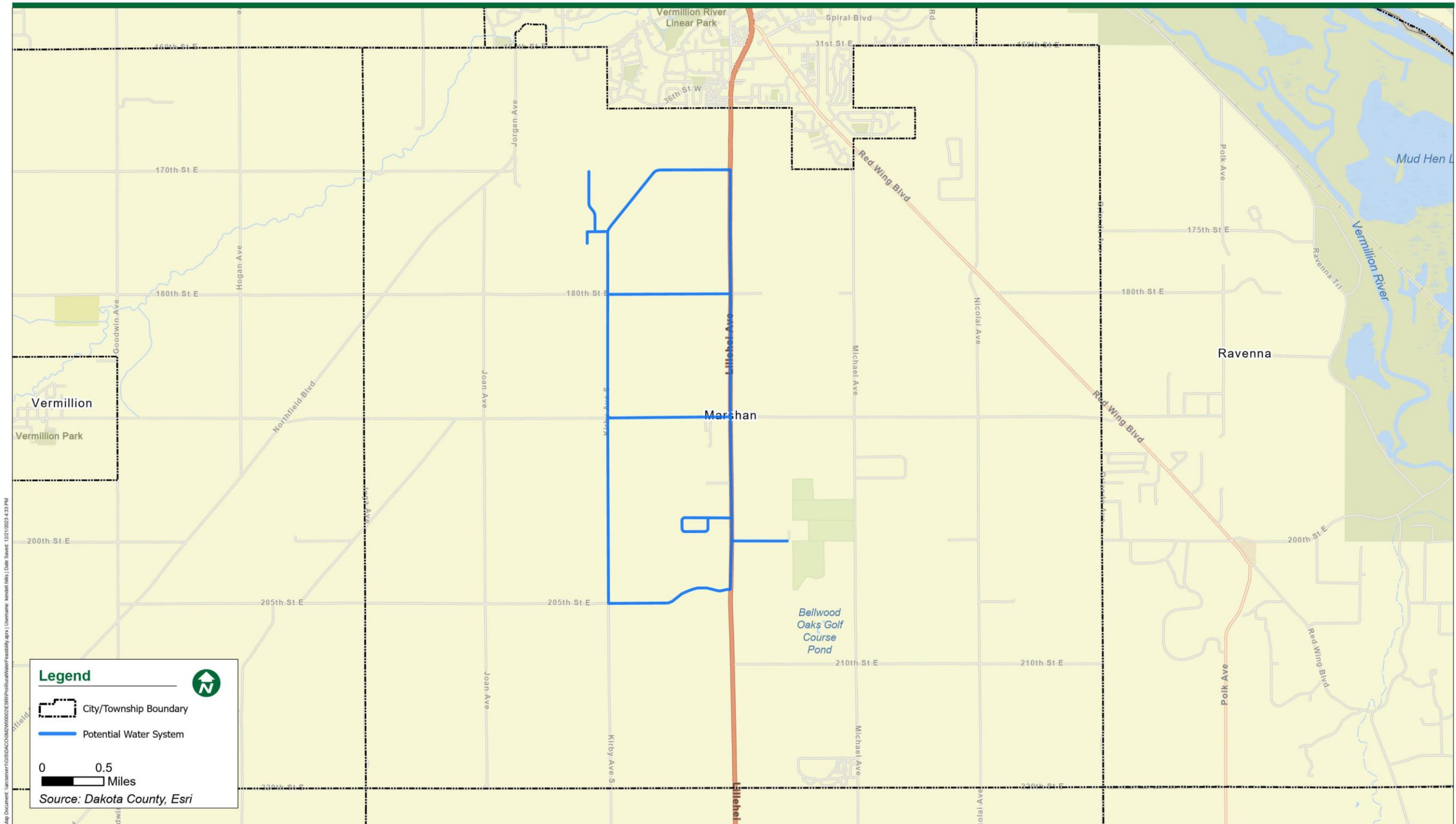


Figure 15 – Rural Water System – Marshan Township

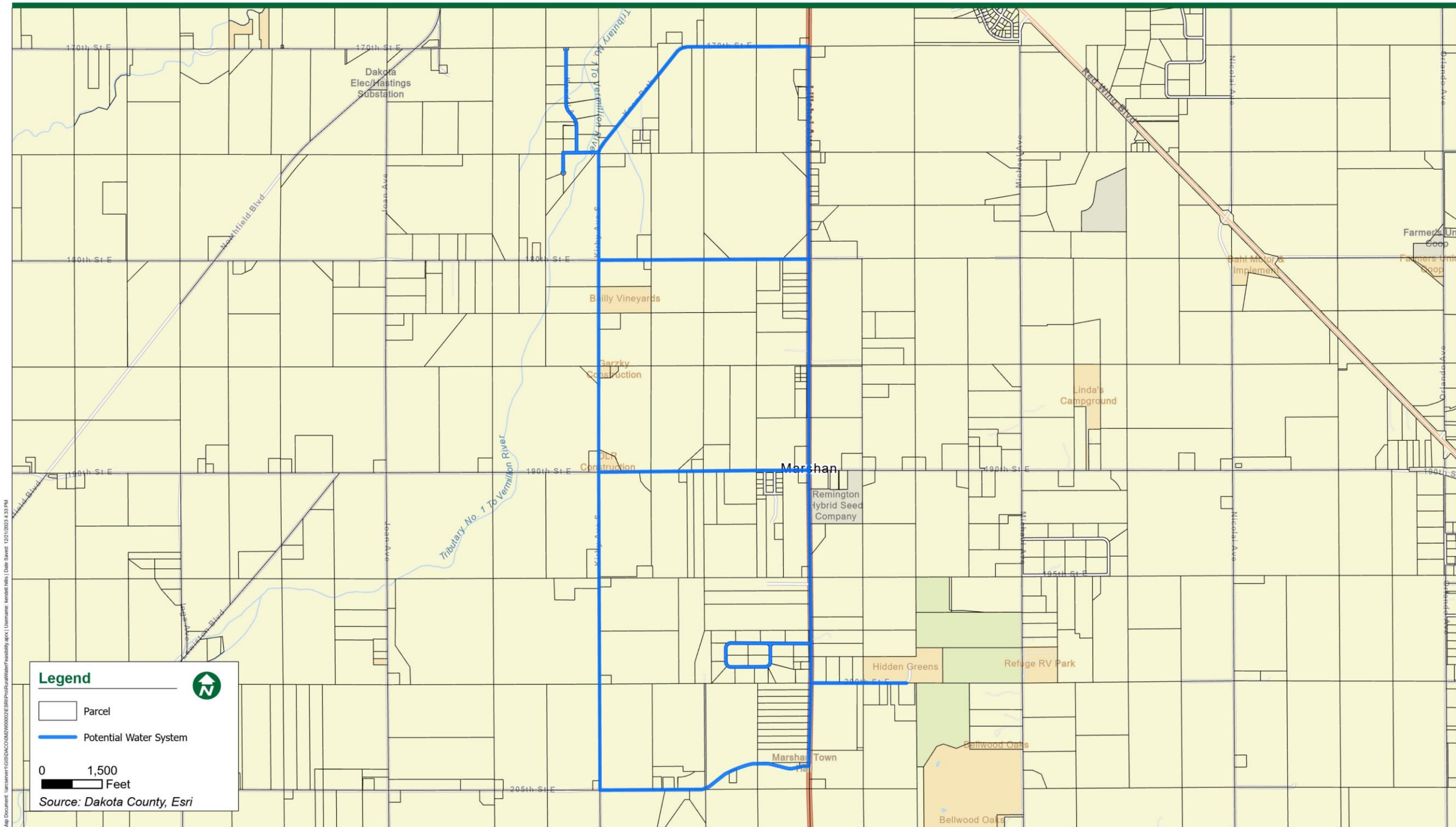


Figure 16 – Rural Water System – Nininger Township

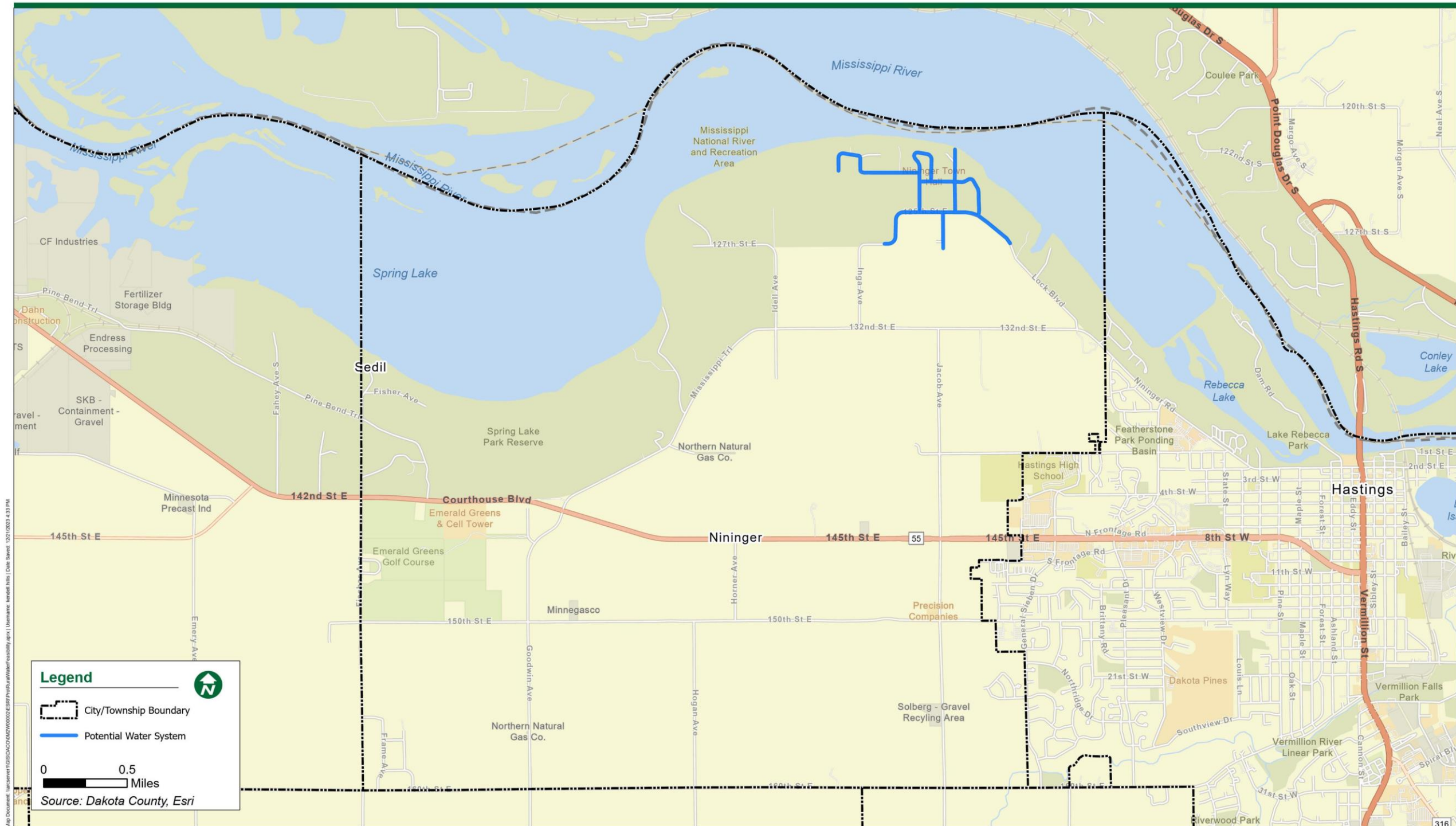


Figure 17 – Rural Water System – Nininger Township

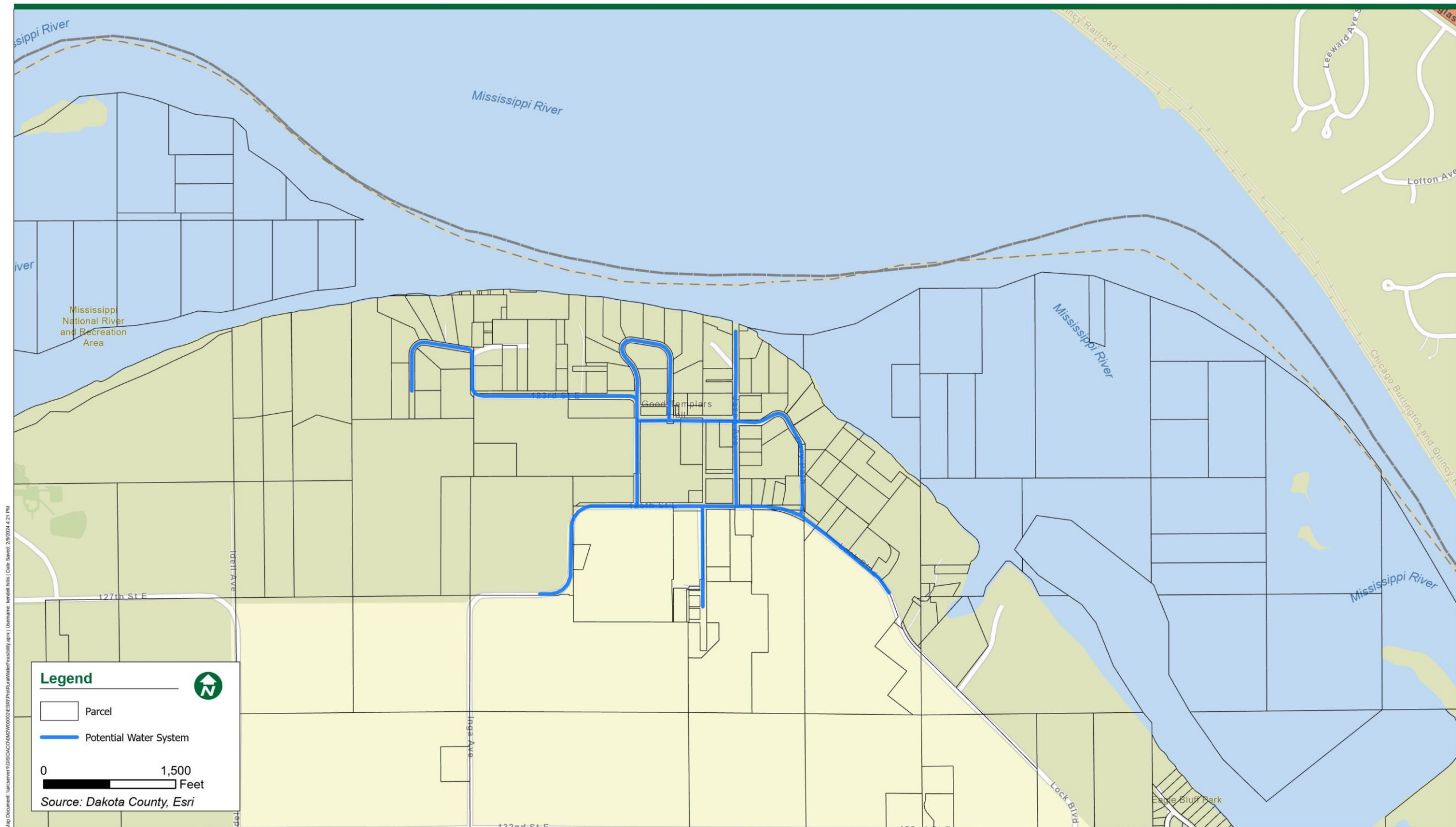


Figure 18 – Rural Water System – Ravenna Township

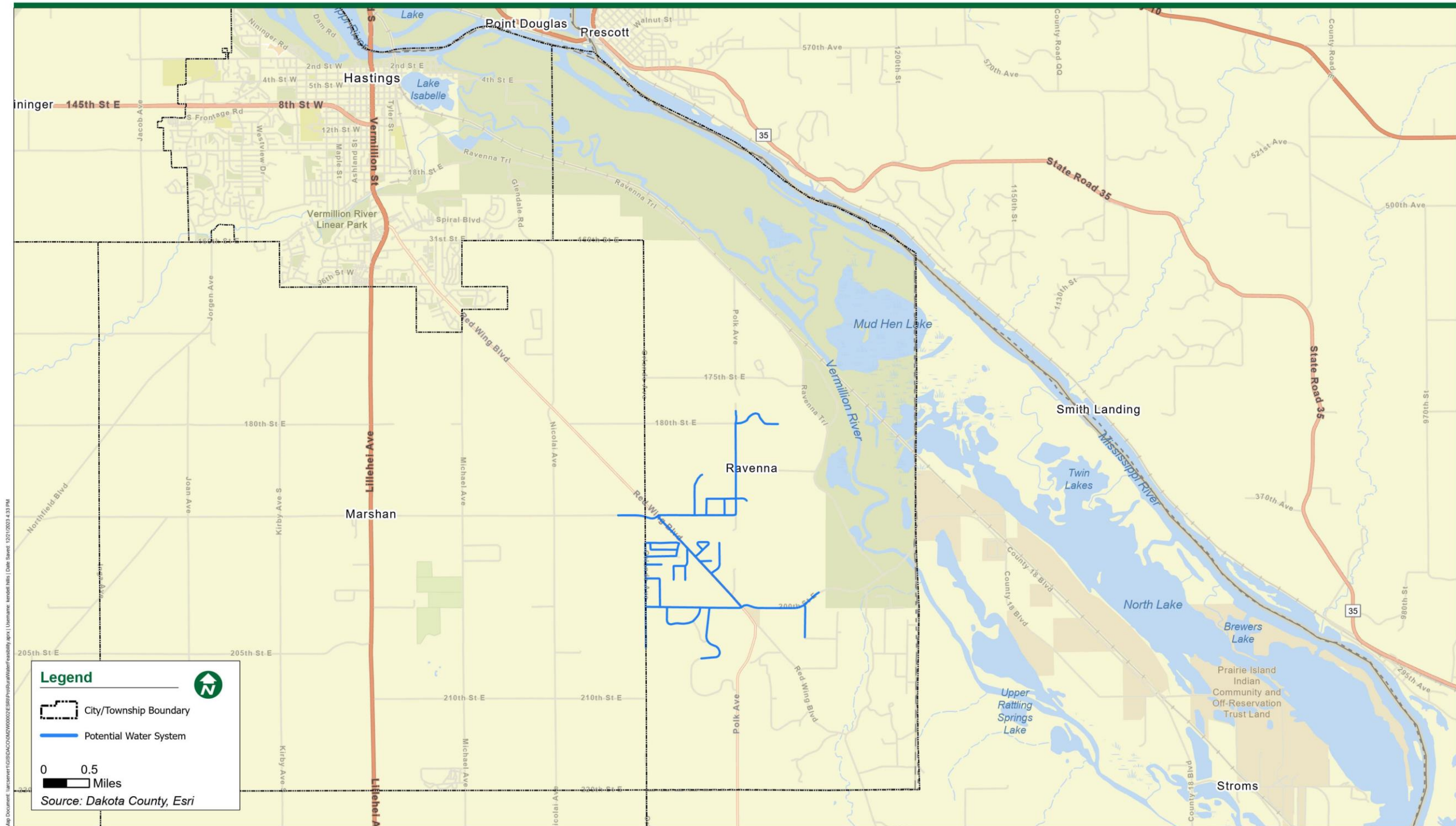


Figure 19 – Rural Water System – Ravenna Township

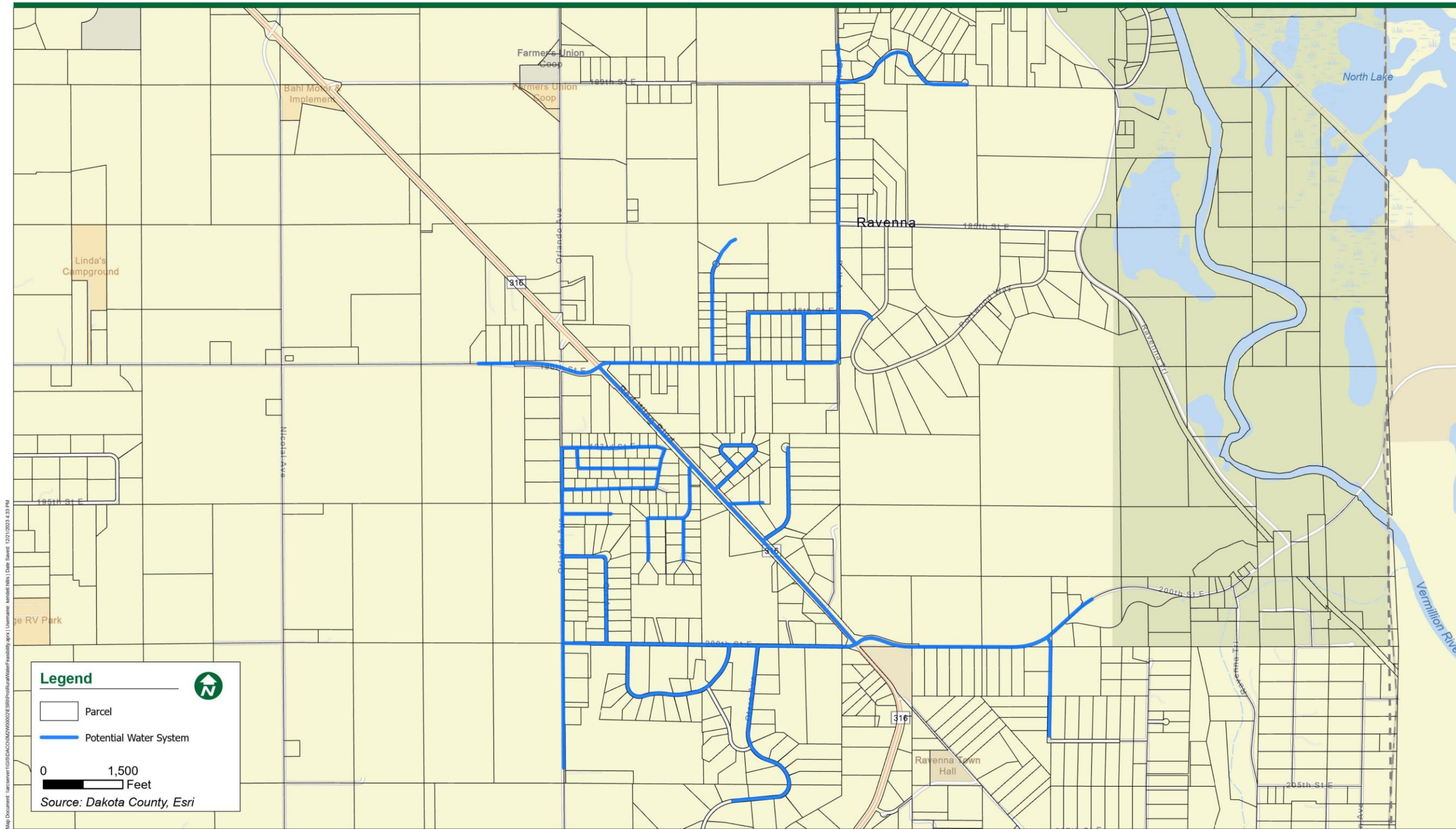


Figure 20 – Rural Water System – Vermillion Township

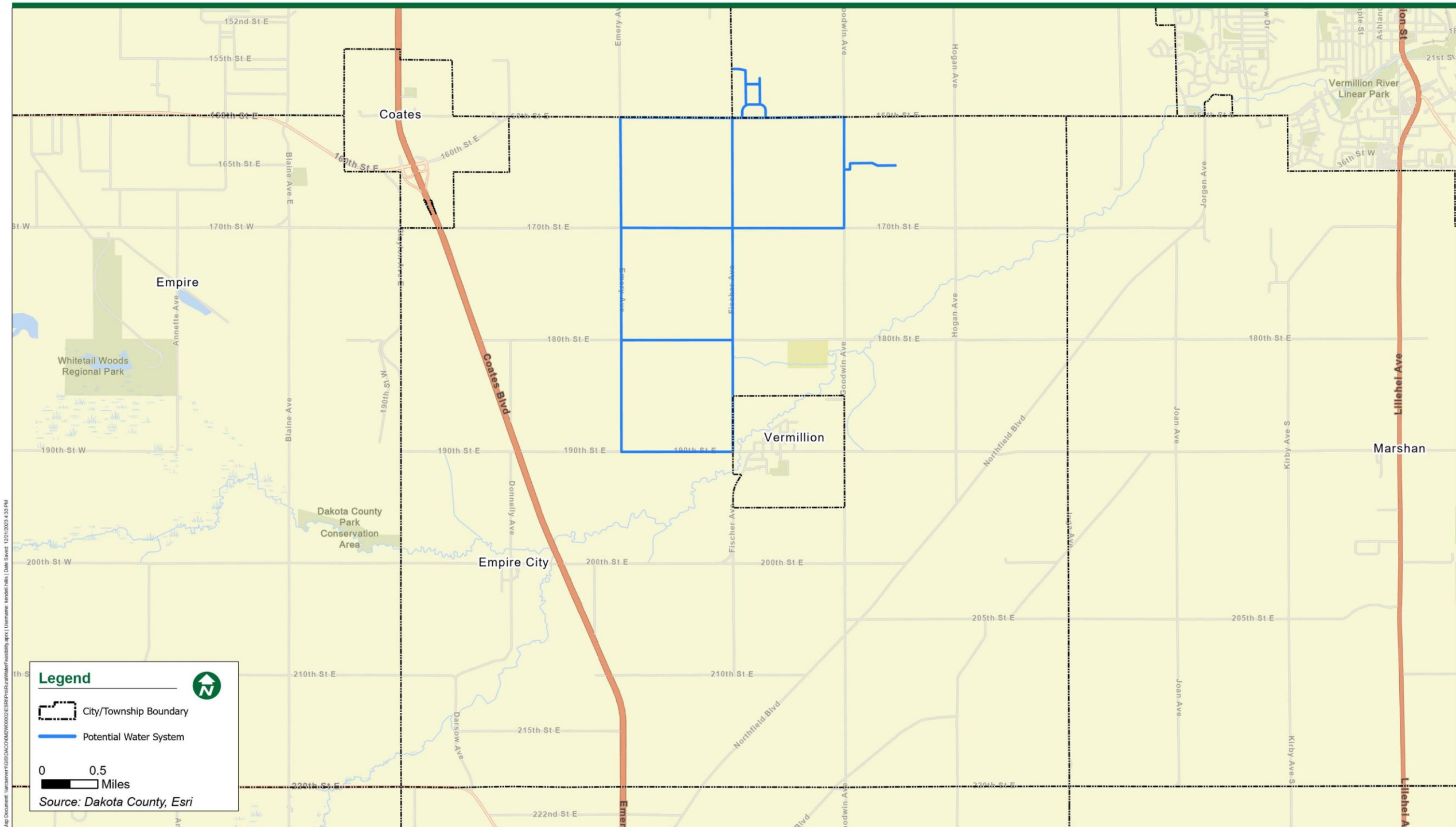
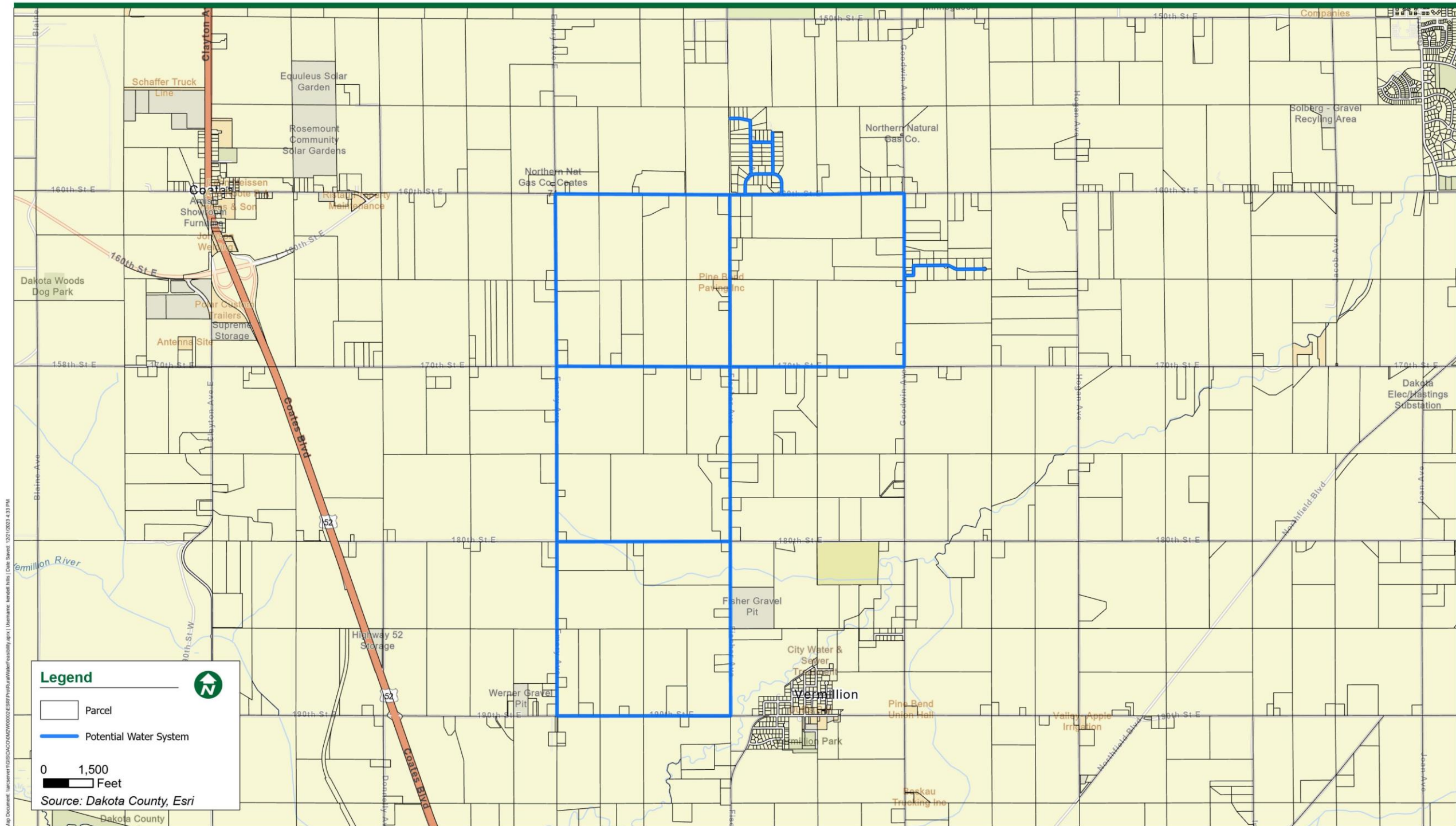


Figure 21 – Rural Water System – Vermillion Township



E. Summary

A summary of the possible alternatives for each area of concern is shown below in Table 1.

Table 2 – Alternatives for Each Area of Concern			
Area of Concern	Public Water System Expansion	Rural Water System	At-Home Treatment
Manganese			
Southwest Burnsville/Northwest Lakeville Area	X		X
City of Empire Area	X	X	X
Greenvale Township Area		X	X
South Inver Grove Heights Area	X		X
City of Northfield Area	X		X
Nitrate			
City of Coates Area	X		X
City of Empire Area	X	X	X
South City of Hastings Area	X		X
City of Rosemount Areas	X		X
Marshan Township Area		X	X
Nininger Township Area		X	X
City of Northfield Area	X		X
Ravenna Township Area		X	X
Vermillion Township Area		X	X

Page intentionally left blank.

IV. Cost Analysis

A. Connect to Public Water System

The cost for the public water systems to expand to serve an area of concern is highly variable. There are also costs associated with any political or water quality challenges the systems would need to overcome that cannot be estimated at this time. However, the cost for the watermain to extend into the area of concern can be estimated.

To determine the water main and service line costs for this alternative, possible system extensions were created. These are shown in Figures 3-9. The length of the water main for these proposed extensions was then estimated. It was assumed the systems would not need additional water sources or pressure sources due to this expansion. However, whether this is the case could not be determined at this time.

The watermain was assumed to be an 8-inch PVC line, with minimal restoration at the surface required during construction. It was assumed the city's own roadway right of way, and no land costs would be incurred. No service line costs were estimated at this time.

A summary of the estimated extension costs is shown in Table 3 below.

Table 3 – Estimated Summary Costs – Public Water System Extension							
Project Name	Burnsville	Empire	Hastings	Inver Grove Heights	Lakeville	Northfield	Rosemount
Length (ft)	28,156	36,817	272,227	251,143	13,551	101,101	108,471
Watermain	\$7,040,000	\$9,210,000	\$68,060,000	\$62,790,000	\$3,390,000	\$25,280,000	\$27,120,000
Mobilization (5%)	\$350,000	\$460,000	\$3,400,000	\$3,150,000	\$170,000	\$1,270,000	\$1,350,000
Subtotal	\$7,390,000	\$9,670,000	\$71,460,000	\$65,940,000	\$3,560,000	\$26,550,000	\$28,470,000
Contingency (10%)	\$740,000	\$970,000	\$7,150,000	\$6,600,000	\$360,000	\$2,660,000	\$2,850,000
Construction Subtotal	\$8,130,000	\$10,640,000	\$78,610,000	\$72,540,000	\$3,920,000	\$29,210,000	\$31,320,000
Admin, Engineering, Legal (25%)	\$2,040,000	\$2,660,000	\$19,660,000	\$18,140,000	\$980,000	\$7,310,000	\$7,830,000
Project Total Cost	\$10,170,000	\$13,300,000	\$98,270,000	\$90,680,000	\$4,900,000	\$36,520,000	\$39,150,000

To determine how many wells of concern could be served by the proposed system expansions, each system expansion was sketched over a parcel map for the local area. If the proposed system expansion passed by or touched a parcel, and that parcel contained a well of concern, the parcel was included in the count. It was assumed any parcel that was passed or touched by a proposed system expansion could be connected to the system via a service line.

To determine the total number of parcels that could be served by a system expansion, each system expansion was sketched over a parcel map for the local area. If the proposed system expansion passed by or touched a parcel, the parcel was included in the count. It was

assumed any parcel that was passed or touched by a proposed system expansion could be connected to the system via a service line.

To estimate payments for each project, two scenarios were used:

- Scenario 1: the project paid for via a 1% loan over 20 years, and
- Scenario 2: the project paid for via a grant for 50% of the project's costs, and a 1% loan over 20 years for the remainder.

The costs for these two scenarios are summarized in Table 4 on the following page.

Table 4 – Estimated Payments by Scenario – Public Water System Extension							
Project Name	Burnsville	Empire	Hastings	Inver Grove Heights	Lakeville	Northfield	Rosemount
Scenario 1							
Monthly Cost @ 1% loan	\$46,771	\$61,166	\$451,938	\$417,032	\$22,535	\$166,712	\$180,049
Yearly Cost @ 1% loan	\$561,255	\$733,991	\$5,423,258	\$5,004,386	\$270,418	\$2,000,540	\$2,160,583
# of Wells of Concern Impacted	35	33	136	162	22	35	141
Total # of Parcels Impacted	152	98	659	1,044	69	192	453
Monthly cost for well of concern owners	\$1,336	\$1,854	\$3,323	\$2,574	\$1,024	\$4,763	\$1,277
Yearly cost for well of concern owners	\$16,036	\$22,242	\$39,877	\$30,891	\$12,292	\$57,158	\$15,323
Monthly cost per impacted parcel	\$308	\$624	\$686	\$399	\$327	\$868	\$397
Yearly cost per impacted parcel	\$3,692	\$7,490	\$8,230	\$4,793	\$3,919	\$10,419	\$4,769
Table continued on next page.							

Table 4 – Estimated Payments by Scenario – Public Water System Extension							
Project Name	Burnsville	Empire	Hastings	Inver Grove Heights	Lakeville	Northfield	Rosemount
Scenario 2							
Grant	\$5,085,000	\$6,650,000	\$49,135,000	\$45,340,000	\$2,450,000	\$18,260,000	\$19,575,000
Cost less Grant Amount	\$5,085,000	\$6,650,000	\$49,135,000	\$45,340,000	\$2,450,000	\$18,260,000	\$19,575,000
Monthly Cost @ 1% loan	\$23,386	\$30,583	\$225,969	\$208,516	\$11,267	\$83,977	\$90,024
Yearly Cost @ 1% loan	\$280,628	\$366,996	\$2,711,629	\$2,502,193	\$135,209	\$1,007,720	\$1,080,292
# of Wells of Concern Impacted	35	33	136	162	22	35	141
Total # of Parcels Impacted	152	98	659	1,044	69	192	453
Monthly cost for well of concern owners	\$668	\$927	\$1,662	\$1,287	\$512	\$2,399	\$638
Yearly cost for well of concern owners	\$8,018	\$11,121	\$19,938	\$15,446	\$6,146	\$28,792	\$7,662
Monthly cost per impacted parcel	\$154	\$312	\$343	\$200	\$163	\$437	\$199
Yearly cost per impacted parcel	\$1,846	\$3,745	\$4,115	\$2,397	\$1,960	\$5,249	\$2,385

B. Rural Water System

As discussed in Section III.B, the capital costs for a rural water system include the price for horizontal infrastructure, raw water supply, and a pressure source. The following assumptions were made for the cost estimates of all four systems:

- For water sources, it was assumed each system would need at least two water supply wells, each with a 50 gpm submersible well pump.
- For pressure sources, it was assumed each system would have one hydropneumatic tank installed of sufficient size for the system. This tank would be housed in a small building to prevent freezing and house piping, chemical feed, electrical, etc.
- For the watermain, it was assumed to be an 8-inch PVC line, with minimal restoration at the surface required during construction. It was assumed each parcel served would need a 250 ft service line from the water main to connect.
- For land costs, it was assumed each system would require a 200' x 200' area to house the one well and hydropneumatic tank, as well as an additional 105' x 105' area for the second well. It was assumed each acre of land would cost approximately \$20,000.

A summary of the estimated system costs is shown in Table 5 below:

Table 5 – Estimated Summary Costs – Rural Water System						
Project Name	Empire RWS	Greenvale RWS	Marshan RWS	Nininger RWS	Ravenna RWS	Vermillion RWS
Length (ft)	36,817	36,955	66,889	17,896	73,589	77,463
Watermain	\$9,210,000	\$9,240,000	\$16,730,000	\$4,480,000	\$18,400,000	\$19,370,000
Service Line	\$6,125,000	\$6,562,500	\$13,062,500	\$5,875,000	\$23,750,000	\$13,562,500
Pressure Source	\$1,010,000	\$1,010,000	\$1,010,000	\$1,010,000	\$1,010,000	\$1,010,000
Wells	\$520,000	\$520,000	\$520,000	\$520,000	\$520,000	\$520,000
Land	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000	\$30,000
Mobilization (5%)	\$850,000	\$870,000	\$1,560,000	\$590,000	\$2,190,000	\$1,740,000
Subtotal	\$17,745,000	\$18,232,500	\$32,912,500	\$12,505,000	\$45,900,000	\$36,232,500
Contingency (10%)	\$1,780,000	\$1,830,000	\$3,300,000	\$1,260,000	\$4,590,000	\$3,630,000
Construction Subtotal	\$19,525,000	\$20,062,500	\$36,212,500	\$13,765,000	\$50,490,000	\$39,862,500
Admin, Engineering, Legal (25%)	\$4,890,000	\$5,020,000	\$9,060,000	\$3,450,000	\$12,630,000	\$9,970,000
Project Total Cost	\$24,420,000	\$25,090,000	\$45,280,000	\$17,220,000	\$63,120,000	\$49,840,000

To estimate payments for each project, two scenarios were used:

- Scenario 1: the project is paid for via a 1% loan over 20 years, and
- Scenario 2: the project is paid via a grant for 50% of project costs, and a 1% loan over 20 years for the remainder.

To estimate cost burdens for each user of the systems, project costs were divided by the number of estimated connections to the proposed systems. These connections could either be a) just those with wells of concern or b) all property owners reached by the proposed systems. These property owners were estimated by adding all the parcels the proposed systems pass that have a realistic path for connection to the system. For example, the proposed water system for the Empire area can serve 33 properties with wells of concern. However, it would also pass an additional 65 properties that could also connect to the water system, and thus share the cost burden for the system. It should be noted that water quality testing results could not be acquired for all private wells within the County, and more wells of concern may exist.

The costs for these two scenarios are summarized in Table 6 below:

Table 6 – Estimated Payments by Scenario – Rural Water System						
Project Name	Empire RWS	Greenvale RWS	Marshan RWS	Nininger RWS	Ravenna RWS	Vermillion RWS
Scenario 1						
Monthly Cost @ loan 1%	\$112,306	\$115,387	\$208,240	\$79,194	\$290,285	\$229,211
# of Wells of Concern Impacted	33	27	59	22	170	57
Total # of Parcels Impacted	98	105	209	94	380	217
Monthly cost for well of concern owners	\$3,403	\$4,274	\$3,529	\$3,600	\$1,708	\$4,021
Yearly cost for well of concern owners	\$40,839	\$51,283	\$42,354	\$43,197	\$20,491	\$48,255
Monthly cost per impacted parcel	\$1,146	\$1,099	\$996	\$842	\$764	\$1,056
Yearly cost per impacted parcel	\$13,752	\$13,187	\$11,956	\$10,110	\$9,167	\$12,675
Scenario 2						
Grant	\$12,210,000	\$12,545,000	\$22,640,000	\$8,610,000	\$31,560,000	\$24,920,000
Cost less Grant Amount	\$12,210,000	\$12,545,000	\$22,640,000	\$8,610,000	\$31,560,000	\$24,920,000
Monthly Cost @ loan 1%	\$56,153	\$57,694	\$104,120	\$39,597	\$145,143	\$114,606
# of Wells of Concern Impacted	33	27	59	22	170	57
Total # of Parcels Impacted	98	105	209	94	380	217
Monthly cost for well of concern owners	\$1,702	\$2,137	\$1,765	\$1,800	\$854	\$2,011
Yearly cost for well of concern owners	\$20,419	\$25,642	\$21,177	\$21,598	\$10,245	\$24,128
Monthly cost per impacted parcel	\$573	\$549	\$498	\$421	\$382	\$528
Yearly cost per impacted parcel	\$6,876	\$6,594	\$5,978	\$5,055	\$4,583	\$6,338

It should be noted that the above costs are only capital costs and do not include operation and maintenance costs for the system. Those costs would need to be added to the above costs to develop a true monthly cost.

C. Point-of-Use/Independent Treatment

To estimate the costs of RO treatment systems in the home, Culligan Water was asked to provide a quote. Culligan Water advised that a whole home water system would cost approximately \$30,000. This does not include any operation and maintenance costs. Culligan advised that this type of system would only be available in new homes, and the exact cost is highly dependent on the architecture and plumbing of the home. A point-of-use device would cost \$2,500 per tap, without any operational and maintenance costs.

To serve as a comparison, the total costs for all the homes served by the proposed rural water systems in Part B to instead be served by a Point-of-Use RO device was estimated.

Table 7 – Estimated Summary Costs – Point of Use Treatment						
Project Name	Empire RWS	Greenvale RWS	Marshan RWS	Nininger RWS	Ravenna RWS	Vermillion RWS
# of wells of concern	33	27	59	22	170	57
# of parcels	98	105	209	94	380	217
Cost per RO device	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
Cost to serve all wells of concern	\$82,500	\$67,500	\$147,500	\$55,000	\$425,000	\$142,500
Cost to serve all parcels	\$245,000	\$262,500	\$522,500	\$235,000	\$950,000	\$542,500

As shown in the tables above, at-home treatment systems are the least expensive alternative for the areas of concern. This alternative could also work for other areas of concern as well.

D. Funding

Funding possibilities vary for each alternative. If the existing public water systems were to expand to serve contaminated well owners, funding for these projects may be available under the Drinking Water Revolving Fund program under the Minnesota Public Facilities Authority. However, the proposed rural water systems would not be eligible for this funding, as they would not be owned by a City or Township. This ownership is required to be eligible for Drinking Water Revolving Fund funding.

Direct appropriations of funds for projects became available again with the 2023 legislative session. The request period for the 2024 legislative session has already closed, however the County may be able to make a direct outreach to the State legislators. The legislator(s) would then request the funds on the County’s behalf. This is often the best funding method for projects which do not qualify for other funding programs, as would be the case here.

V. Summary and Next Steps

The goal of this study was to determine the feasibility and costs of providing higher quality water to private drinking water wells of concern in Dakota County. As discussed in the previous sections, each area of concern requires its own approach to serve private well owners. Some areas will be served in the future by existing public water systems, such as the Rosemount areas. Other areas, such as Greenvale, have various political and operational constraints that make connection more difficult and may require their own rural water system.

A pro of connecting to an existing system is the security and convenience of connecting to an existing system. It is assumed the city would construct and maintain this expansion, with little to no effort required from individual homeowners. As a public water system, the existing system would be required to ensure its drinking water meets all drinking water standards, which would improve the water quality for homeowners with wells of concern.

The cons of connecting to an existing system are the political constraints and difficulties with expanding an existing system. In most of the areas discussed in this study, the City would need significant resident support to make such an expansion politically feasible. In some cases, the City would need to annex the area to be served, which is a lengthy and often difficult process. The costs for the system expansion are also very high, and existing rate payers on the systems may not wish to pay additional charges to serve these new areas. The operation of some of the areas would also be difficult.

The pros of a rural water system are similar to those of the system expansion: the water quality and maintenance for the water system would be the responsibility of a single entity, possibly the township in which the rural water system resides. These types of systems would also qualify as public water systems and thus need to meet all drinking water standards.

A con of a rural water system is the high capital costs, even under the assumption that all users who could connect to a system do. A combined water and wastewater bill is considered affordable if the total is below \$100 per month. As shown in Table 5, the monthly payments for each home served for all of the proposed rural water systems would be well above \$100. The system would also need to be managed by some entity and have a licensed operator on staff at all times. This would require a significant investment by the local township if they were to assert ownership over the system.

The pros of the point-of-use alternative are the low costs and ease of maintenance. Each system is only \$2,500 per home, which while more than the expected monthly payments of the other alternatives would be a one-time fee. Each homeowner would be responsible for their system, and thus have the flexibility to install, operate, and maintain based on their water use. No public authority, such as a City or township, would need to take ownership, eliminating the political constraints of the other alternatives.

A con of the point-of-use option is that the burden of operation and maintenance would be placed on the individual homeowner. Many homeowners may not be familiar with this type of system and would need to be educated on how to operate it properly. It also would only work on the tap onto which it was installed and would not treat all water coming into the home unless multiple devices were installed.

The next steps include continued discussions with communities in Dakota County to determine the feasibility of system expansion changes. Funding opportunities should also be followed closely to

determine if funds are available for any of the alternatives discussed. Conversations should also be held with Dakota County state legislators to gain their support for the alternatives, which would increase the funding opportunities.

Appendix A: Hastings Meeting Minutes

Page intentionally left blank



Rural Water Feasibility Study Discussion Meeting

June 21, 2023
8:00 A.M.

Public Works Building, Hastings



MINUTES

1. Introductions

- a. Dakota County Team
 - i. Valerie Nepl, P.E., Groundwater Protection Unit Supervisor
 - ii. Vanessa Demuth, P.G., Environmental Specialist
- b. Bolton & Menk Team
 - i. Seth Peterson, P.E., Senior Principal Environmental Engineer
 - ii. Meghan Brockman, PhD., Environmental Design Engineer
- c. City Team
 - i. Joe Spagnoletti, Public Works Superintendent
 - ii. Ryan Stempski, Public Works Director/City Engineer

2. Goals of Study/Background Summary

- a. Main question to be answered: What is the feasibility for the various options available to private well owners with poor water quality, due to iron or manganese?
- b. Goal: Not to push joining city water, but help facilitate decision making
- c. Determine the feasibility of providing municipal or rural water to private drinking water well users with:
 - i. High nitrate
 - ii. High manganese
- d. Map Review
 - i. Nitrate
 - ii. Manganese
- e. Possible Solutions
 - i. Rural water system
 - ii. Municipal system
 - iii. In-home treatment

3. City Infrastructure

- a. Existing boundaries
 - i. City has issue with nitrates and PFAS (PFOA and PFOS will be over new MCL, and HI is also high)
 1. City expects to get a drinking water advisory for PFAS soon.
 2. City currently under a Phase II Environmental Assessment from the MPCA for PFAS contamination
 3. Looking at \$62 million+ just to treat their own system
 - a. Includes 3 WTPs, 2-3 additional wells (each WTP treats 2 wells)
- b. Plans for expansion

- i. City feels now is not a good time for significant expansion, however;
 - 1. Are willing to hear all options
 - 2. May be open to annexation or wholesale water supply in the future
 - a. Annexation if within city limits, wholesale if not
 - 3. If they were to serve these rural areas, it has to be at no cost to their water users
 - 4. By 2027, they hope to be in a better place with the water system

4. Physical/Political Constraints

- a. Has issues with water quality (nitrates, PFAS)
- b. Looking to add Vet's home to City system (this adds more complexity to the Hastings's system)
- c. Currently in discussion with Nininger Township regarding orderly annexation process
 - i. City often gets requests for annexation from homeowners, and grants those requests if possible
- d. City currently in legal discussions on being added into the East Metro 3M settlement due to the PFAS contamination
- e. Question from Vanessa: Can Hastings increase its funding chances if it adds these private homeowners?
 - i. Unknown if this would help at this point
- f. If Hastings does expand, it will be to the West/Southwest
 - i. Comp plan includes a new well, WTP and tower in that area
 - ii. Possible expansion with relocation of MCES WWTF to the east

5. City Thoughts

- a. City's top priority is to deliver safe water to its residents
- b. City feels that adding any significant service area at this time is too much, they have a lot going on
 - i. Issues with PFAS, nitrates
- c. City is open to all options, just not right now
 - i. Needs until 2027 to get their system up to what they want, and as stated in the comp plan
- d. Joe has concerns about the additional maintenance and O&M costs/time if the City system expands

6. Next Steps

- a. BMI and Dakota County Team will look at Hastings Comp Plan as a reference for where the City's expansion areas
- b. Explore possible funding opportunities for including private homeowners

Appendix B: Rosemount Meeting Minutes

Page intentionally left blank



Rural Water Feasibility Study Discussion Meeting

July 17, 2023
9:00 AM

Location: Rosemount City Hall
Items in Read = Meeting Notes



Minutes

1. Introductions

- a. Dakota County Team
 - i. Valerie Nepl, P.E., Groundwater Protection Unit Supervisor
 - ii. Vanessa Demuth, P.G., Environmental Specialist
- b. Bolton & Menk Team
 - i. Seth Peterson, P.E., Senior Principal Environmental Engineer
 - ii. Meghan Brockman, PhD., Environmental Design Engineer
- c. City Team
 - i. Nick Egger, Public Works Director

2. Goals of Study/Background Summary

- a. Determine the feasibility of providing municipal or rural water to private drinking water well users with:
 - i. High nitrate
 - ii. High manganese
- b. Funding for the study comes from block grant
- c. Figure out: What is it going to take to fix the problem?
- d. Map Review
 - i. Nitrate
 - ii. Manganese
- e. Possible Solutions
 - i. Rural water system
 - ii. Municipal system
 - iii. In-home treatment
 - iv. Look at funding for future opportunities

3. City Infrastructure

- a. Existing boundaries
 - i. Online map of Rosemount system available
 - ii. Most areas along County Road 42 are zoned for commercial
 - iii. Areas east of 52 are a mix of residential and commercial
 - iv. There is a 4 inch stubbed water main heading towards Coates, south of the City
 1. Coates has not spoken to Rosemount about any changes to this line
- b. Plans for expansion
 - i. Rosemount has been experiencing a lot of growth
 1. Most of the growth is near Connemera Trail, 2000+ units

h:\daco\0m2w00002\1_corres\meeting\rosemount meeting minutes - copy.docx

- ii. See comp plan for details on possible expansions
- iii. City has set aside land off of Bacardi Ave W. for open space, near North 20 Brewing
 - 1. There is no desire for this to change
- iv. Area (triangular) along Biscayne Ave. – possible service area in the future
 - 1. Some failing septic systems in the area
- v. Hwy 3 – S. Robert Trail = going to get redone
 - 1. Future corridor study
- vi. South of 145 ST. E., near Vic’s Crane and Heavy Haul is slated for residential
- vii. A 2023 project is to extend service to lots off of 128th St. W.
 - 1. Has very small lots, like an urban area
 - 2. Residents will have up to 10 years to connect (council decision)
 - 3. Inspections will be increased to every 3 years for septic systems
- viii. Talk of serving NW side of Rosemount
 - 1. But lots are large and would be expensive to serve
 - 2. City just redid the roads
 - 3. Coffee Trail was not redone, but is in good shape and is not slated for redevelopment
- ix. “Project Bigfoot”
 - 1. Large water user, located south of 145 St E and W. of Blaine Ave E.
 - 2. Now believe will need less water than before, so smaller infrastructure now planned than at start of project discussions
 - 3. An increase in the water main size will still be needed
 - 4. Project will happen before 2024
 - a. 6 inch main will remain, a 16-inch main will be added
- x. No plans to serve homes off of McAndrews Road as of now

4. Physical/Political Constraints

- a. Rosemount has an issue with Manganese
- b. Rosemount doesn’t have a WTP
- c. Policy (City) for looking outside of boundary: City doesn’t look, would need to be case by case (most likely interagency agreement)
- d. Area on very western edge of town
 - i. Along diamond path
 - ii. Upper 135th ST. W
 - iii. Some residents want it to be more developed, some like the rural feel
- e. Fact Sheet – Maps with detail for Manganese
 - i. Yellow dots on nitrate map = area of complaints

5. City Thoughts

- a. Bigger lots = higher cost to serve
- b. Plans for SE corner towards Ninninger Twp.? No
 - i. Don’t see City going that way for a long time, depends on if there is a request
- c. Potential deal with Eagan?
 - i. City has only briefly discussed with Eagan
 - ii. Will need lift station to serve Cedarwood Church area due to grade
- d. How will handle request for service outside of city limit?
 - i. Interagency agreement
 - ii. Case by case basis