

WATER PERMIT NO. 2872-2

Name of Applicant: **Butler Machinery Company**

Address: **3401 33rd Street S, Fargo ND 58104**

Phone: **701-232-0033**

Amount of Water Claimed: **0.133 cfs**

Total Acres: **3.07 AF**

Source of Water Supply: **Groundwater**

Water to be used for: **Commercial**

County: **Pennington**

Type of Waste Disposal System:

Location: **Northwest in Rapid City SD**

PRIORITY Date Received: **7-25-2023**

Application/License Fee: **\$700.00**

Corrected Application Received:

Period of Annual Use: **January 1 – December 31**

Remarks:

Diversion Point: **SE 1/4 NE 1/4 Section 21 -T2N-R7E**

Land to be Irrigated: **N/A**

Depth of Well: **450**

Well Driller:

Remarks:

Type of Map: **aerial**

				*	
			21		

Reviewed and the Number Assigned on: **7-25-2023**

By: **Rachel Rodriguez**

Notice of Hearing - date to intervene: _____

SOUTH DAKOTA
WATER PERMIT NO. 2872-2

Date of first receipt of application July 25, 2023.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 2872-2 to Butler Machinery Company, 3401 33rd Street S, Fargo ND 58104 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 2872-2 appropriates up to 3.07 acre-feet of water annually at a maximum pump rate of 0.133 cubic feet of water per second from one well to be completed into the Minnekahta or Minnelusa Aquifer (approximately 450 - 650 feet deep) located in the SE 1/4 NE 1/4 Section 21-T2N-R7E for commercial use. This site is located in the northwest part of Rapid City SD.
2. The water appropriated shall be used for the purpose of commercial use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 2872-2 is October 16, 2023.
5. The date from which applicant may claim right is July 25, 2023.
6. One-fifth of the construction is to be completed on or before April 16, 2026.
7. All construction is to be completed on or before October 16, 2028.
8. Water is to be put to beneficial use on or before October 16, 2032.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. The well authorized by Water Permit No. 2872-2 shall be constructed into a single water source, either the Minnekahta or Minnelusa aquifer, but not both. At the time of licensing, the final water right will be issued for the developed water source.
2. The well approved by Water Permit No. 2872-2 is located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals under this Permit shall be controlled so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
3. The well authorized by Permit No. 2872-2 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
4. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Minnekahta or Minnelusa aquifer.

(continued)

5. Water Permit No. 2872-2 authorizes a total annual diversion of up to 3.07 acre-feet of water.

WATER MANAGEMENT BOARD

By: *Eric Gronlund*
Eric Gronlund, Chief Engineer
Water Rights Program
Department of Agriculture and Natural Resources

NOV 09 2023
date



FORM 2: Application for uses other than irrigation
(type or print)

Mail to: SD DANR, Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>2872-2</u> Hydrologic Unit <u>10120110</u>
	Basin <u>Middle Cheyenne Elk</u>
	Newspaper <u>Rapid City Journal</u>
	(office use only)

PAID
JUL 24 2023
Ck# 332911
Rec't# 264123

Application for Permit to Appropriate Water in South Dakota

Check use(s) of water:

☐ Municipal	☐ Water Distribution System	☐ Recreational	☐ Institutional
☐ Rural Water System	☒ Commercial	☐ Fish & Wildlife	☐ Geothermal
☐ Domestic (over 18 gpm)	☐ Industrial	☐ Other _____	

Type of Application:
(check one)

☒ New	☐ Vested Right (Use predates Mar 2, 1955)	☐ Future Use Reservation
☐ Place to Beneficial Use Water Reserved by Future Use Permit No. _____		
☐ Amendment/Correction to Permit No. _____		

Description of amendment/correction: (i.e. change diversion point(s), add diversion point(s), change use, etc.)

1. Name to Appear on Water Permit Butler Machinery Company

Mailing Address 3401 33rd St S Fargo ND 58104
(Address) (City) (State) (Zip Code)

Phone 701-232-0033 Mobile _____ Email markajohnson@butlermachinery.com

2. Amount of water claimed 0.133 *CFS or 60 **GPM and 3.07 ***AF or 1,000,000 Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use)

3. Source of water supply Ground Water - one well

4. Location of point of diversion SE1/4 NE1/4 section 21-T2N-R7E County Pennington
(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)

If not a public water supply (e.g. municipal), will water be used outside of the area described above? ☐ Yes ☒ No

If "Yes," where will water be used? _____
(example - NW1/4 section 12-T104N-R53W)

5. County or counties where water will be used Pennington

6. Annual period during which water is to be used January 1 - December 31

7. Give a description of the project. When available include any preliminary engineering report or other reports or information that will help explain the project. (Attach sheet if more space is needed)

New well to supply business needs of Butler Machinery Company in Rapid City, 3601 Deadwood Ave N. Currently, Butler utilizes a shared well from a nearby property. The city of Rapid City is unable to cost effectively provide water to this part of the city.

RECEIVED

JUL 25 2023

OFFICE OF
WATER

I, Twylah Blotsky President, the applicant, certify under
Name of Person Title (if applicable)

penalty of perjury that I have read this application, examined the attached map, and that the matters stated are true. I further certify, if acting on behalf of an entity or individual other than myself, that I am authorized to submit this application.

Supplemental Information

(type or print)

1. Well Information (check one or both as applicable) ☒ Drilling new well(s) ☐ Using existing well(s)

- a) If new wells, how many 1 Have test holes been drilled? ☐ Yes ☒ No Drilled by _____
(if yes, please provide copies of logs)
- b) If existing wells, how many _____ Provide copy of log(s), if available. Drilled by _____

For either existing or proposed wells:

- c) Well Depth (required) 450 ft ^{to 650} Depth to Top of Water Bearing Material _____ Depth to Water from Surface _____
- d) Distance to nearest domestic well on applicant's property N/A Property owned by others 1,000 ft

2. Wastewater Disposal System Information

- a) Type of System (i.e. septic tank, drain field) N/A
- b) System Capacity (gallons) N/A Year Constructed N/A
- c) Connected to the City of Rapid City Sanitary System

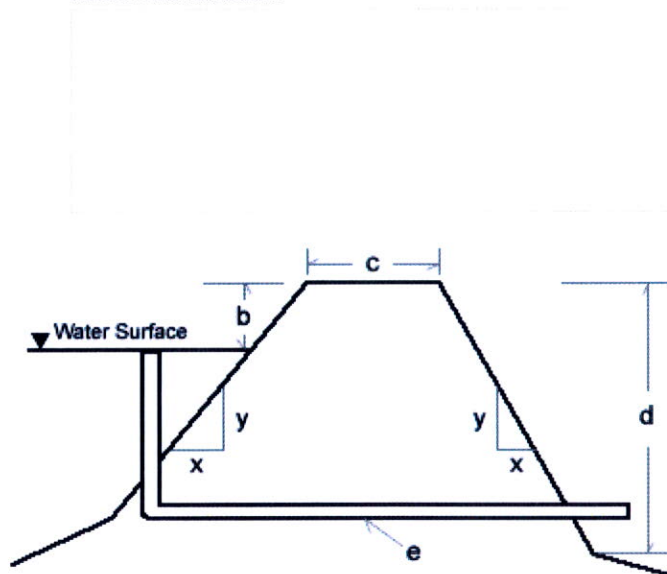
3. Dugout Information

- a) Surface Dimensions N/A Depth N/A
- b) Depth to water (ground surface to water level) N/A

4. Water Storage Dams

If the proposed water use system contains one or more storage dams, please furnish the information requested below for each dam. The locations of the dams need to be shown on the map submitted with the application.

- a) If a private engineering firm or government agency was involved in the design of this dam, please give their name and address:



- b) Freeboard _____
- c) Crest Width _____
Crest Length _____
- d) Height _____
- e) Primary Outlet Capacity _____
If pipe, diameter _____
- f) Secondary Spillway Capacity _____
Spillway Width _____
- g) X & Y Slope (e.g. 3 to 1 is a typical slope)
Upstream _____
Downstream _____
- h) Area of Impoundment _____
- i) Storage _____ Acre Feet
- j) Drainage Area Above Dam _____ Acres

Scale: 1 inch = 534 feet

750

Feet



DANR
SOUTH DAKOTA

Completed by: Ron Duvall

Ron Duvall, Engineer III
SD DANR, Water Rights Program

Date: 8/14/23

Water Permit Application No. 2872-2

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date July 24, 2023

RECEIVED OF Butler CAT 3401 33rd St. S, Fargo ND 58104

The following amount in fees for services rendered as provided for by law:

Fee for Application for Permit No. <u>2872-2</u> to Appropriate Water, to construct and to put water to beneficial use	\$ <u>500.00</u>
Fee for Application for Permit No. _____ to Appropriate Water for Future use	\$ _____
Fee to retain Future Use Permit No. _____ after period of seven years.	\$ _____
Fee for Inspecting Constructed Works, confirming beneficial use and issuing Water License No. <u>2872-2</u>	\$ <u>200.00</u>
Fee for Filing Transfer Form _____	\$ _____
Fee for _____	\$ _____
Fee for Issuing New Well Driller's License No. _____	\$ _____
Fee for Renewal of Well Driller's License No. _____	\$ _____
Fee for Issuing Well Pump Installer's License No. _____	\$ _____
Fee for Renewal of Well Pump Installer's License No. _____	\$ _____
(Any Other Work Provided by Law)	
TOTAL	\$ <u>700.00</u>

By Eric Gronlund
Chief Engineer
EGM



531558796

B0233-6756 09/19/2022 11:02AM Rec'd by SD SOS

Secretary of State
500 E. Capitol Ave
Pierre, SD 57501-5070
(605) 773-4845

2022
FILING YEAR

ANNUAL REPORT

Foreign Business Corporation
SDCL 59-11-24, 24.1

Please Type or Print Clearly in Ink
Please submit one Original
Make payable to the SECRETARY OF STATE

Filing Fee: \$50

Total Fee: \$50

1. Business ID and Name:

FB012429
BUSINESS ID

BUTLER MACHINERY COMPANY
BUSINESS NAME

2. The jurisdiction under whose law it is formed **NORTH DAKOTA**

3. The address of the principal executive office (business address):

Actual Street Address

**3401 33RD ST SW
FARGO, ND 58104-8822**

Mailing Address

**3401 33RD ST SW
FARGO, ND 58104-8822**

4. The South Dakota Registered Agent's Name:

South Dakota law permits the registered agent to be either (a) a noncommercial registered agent, (b) a commercial registered agent, or (c) an office holder.

(b) The South Dakota Commercial Registered Agent's name & CRA#

CRA: **C T CORPORATION SYSTEM (0000002)**

Actual Street Address in this State

**319 S COTEAU ST
PIERRE, SD 57501-3187**

Mailing Address in this State

5. The names and business addresses of its principal officers.

Title	Name	Address
Treasurer	Chris Gay	3401 33rd St SW, Fargo, ND 58104
President	TWYLAH BLOTSKY	3401 33RD ST SW, FARGO, ND, 58104

6. The names and business addresses of its directors (governors).

Name	Address
Chris Lee	6127 27th St S, Fargo, ND 58104

7. Beneficial Owners (optional): A beneficial owner is a person who has or in some manner controls an equity security. Please consult an attorney for legal advice if you have any questions concerning this entry. Any question under this heading is considered a request for legal advice and the secretary of state's office is, by statute, not permitted, to provide legal advice.

No person may execute this report knowing it is false in any material respect. Any violation may be subject to a civil and/or criminal penalty (SDCL 47-1A-129; 22-39-36).



09/19/2022

Dated

Email (Optional)

Trisha Deitz

Signature of an Authorized Person

Trisha Deitz

Printed Name

**Water Rights Program
File Documentation**

NAME OF PERSON OR FILE: Mark Johnson

DATE: Aug. 24 and 25, 2023 TELEPHONE: 701-298-2179

RE: Targeted Aquifer for Permit Application

COMMENTS:

Discussed with Mark what the target aquifer for their application was since the application noted a 450-foot depth and that is a slightly deep depth for a Minnekahta aquifer well and just a bit shallow for a Minnelusa aquifer well at their location. Mark had discussed which aquifer and well depth with Kim Taylor of Taylor drilling would be appropriate for their project. Kim told Mark they should be able to get a Minnekahta aquifer well. But if the Minnekahta aquifer is not productive, the Minnelusa aquifer is not much deeper. I discussed the option to apply for both aquifers with the knowledge that a well from only one aquifer can be developed. Per the attached email, Mark approved amending the application with a well depth range of 450 to 650 feet to account for possible development of a well from either aquifer.



Adam Mathiowetz
Natural Resources Engineer
DANR-Water Rights Program

Mathiowetz, Adam (DENR)

From: Mark A Johnson <MarkAJohnson@butlermachinery.com>
Sent: Friday, August 25, 2023 1:18 PM
To: Mathiowetz, Adam (DENR)
Cc: Duvall, Ron
Subject: RE: [EXT] Water Permit Application for Rapid City SD Facility

Hi Adam,

The amendment sounds OK to me. Please advise what we need to do for next steps.

Thank you,
Mark

Mark A Johnson | Butler Machinery Company | Facilities Manager
3401 33rd ST S | Fargo, ND 58104 | P 701-298-2179 | C 701-720-8503

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From: Mathiowetz, Adam (DENR) <Adam.Mathiowetz@state.sd.us>
Sent: Friday, August 25, 2023 11:15 AM
To: Mark A Johnson <MarkAJohnson@butlermachinery.com>
Cc: Duvall, Ron <Ron.Duvall@state.sd.us>
Subject: Water Permit Application for Rapid City SD Facility [EXTERNAL]

Mark,

This email is a follow up to our August 24, 2023, conversation regarding the application for appropriation of water for the Rapid City Butler Machinery facility. The listed depth on the application, 450 feet, is a little deeper than expected for a Minnekahta aquifer well and a little shallow than expected for a Minnelusa aquifer well. As we discussed on the phone, you had discussed with your well driller, Taylor Drilling, getting either a Minnekahta aquifer or a Minnelusa aquifer well for your project with the expectation that a Minnekahta aquifer well should be sufficient and provide you the water that your project requires. However, for the application to cover both aquifers, it needs to be amended to a well depth range of 450 to 650 feet. Does this proposed amendment sound reasonable and acceptable?



Adam Mathiowetz, PE

Engineer, Water Rights Program

Department of Agriculture and Natural Resources

523 E. Capitol Ave. Pierre SD, 57501

605.773.3352

danr.sd.gov



3401 33rd Street S Fargo, ND 58104

701.232.0033 tel | 701.298.1717 fax

July 20, 2023

SD DANR, Water Rights
523 E Capital Ave
Pierre, SD 57501-3182

RE: Application for Permit to Appropriate Water in South Dakota

To Whom It May Concern:

Please find attached Application for Permit to Appropriate Water in South Dakota for the Butler Machinery store in Rapid City, SD.

Enclosed is the filing fee of \$700.00.

If there are any questions related to this Application, please direct them as follows.

Butler Machinery Company
Attn: Mark A Johnson, Facilities Manager
3401 33rd St S
Fargo, ND 58104
701-298-2179 desk
701-720-8503 mobile
markajohnson@butlermachinery.com

Thank you for your consideration of this application.

Sincerely,

A handwritten signature in purple ink, appearing to read "MAJ", is written over the name Mark A Johnson.

Mark A Johnson
Facilities Manager

Duvall, Ron

From: Duvall, Ron
Sent: Friday, June 30, 2023 3:59 PM
To: Mark A Johnson
Cc: Rodriguez, Rachel
Subject: RE: [EXT] Well Permit for Butler Machinery Rapid City
Attachments: ButlerMachinery_D1585LDV6-NONIRRIG.pdf

Mark,

Sorry for the delayed response. I have taken your application and drafted a new one and prepared a map that identifies the legal description of where the well is to be located. It is mostly complete except an email address is nice to have and question No. 2 of the first page needs to have an annual volume of water identified in either gallons per year or acre-feet per year. This volume should be the maximum amount that would ever be used in a year. So, don't use an average value but also be realistic on your maximum value. For example, you will not be pumping 60 gallons per minute, 24 hours a day, 365 days a year (at least I doubt it 😊). The \$700.00 application fee as you suggested is correct. If you could get by with a pump rate no greater than 45 gallons per minute, then the fee would be \$300.00. The application should be signed by one of the persons listed on the South Dakota Secretary of State's business filing which I have included with the attached application.

After you get the application completed, signed, and returned with the map I prepared and the fee we should be able to start working up a report and recommendation. If changes are needed, feel free to make them as needed – it is your application.

Please let me know if you have any questions.

Thank you,

Ron Duvall
Dept. of Agriculture & Natural Resources
Office of Water, Water Rights Program
605.773.3352
danr.sd.gov



DANR
SOUTH DAKOTA

From: Mark A Johnson <MarkAJohnson@butlermachinery.com>
Sent: Tuesday, June 13, 2023 10:45 AM
To: Duvall, Ron <Ron.Duvall@state.sd.us>
Cc: Rodriguez, Rachel <Rachel.Rodriguez@state.sd.us>; Schlaak, Karen <Karen.Schlaak@state.sd.us>
Subject: RE: [EXT] Well Permit for Butler Machinery Rapid City

Hello Ron, all,

I've attached a copy of my draft well application for our Rapid City store. Also included a copy of the map I intend to submit. Our store manager has met with Taylor Drilling from Rapid City to supply some of the depth and water flow information.

I was hoping you can review for completeness, and any other feedback. I will likely have our CEO sign this, so the email address would probably change as well. Also, I figure the fee for this permit will be \$700, please confirm.

Let me know if you can review this, thank you!
Mark

Mark A Johnson | Butler Machinery Company | Facilities Manager

3401 33rd ST S | Fargo, ND 58104 | P 701-298-2179 | C 701-720-8503

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From: Duvall, Ron <Ron.Duvall@state.sd.us>

Sent: Wednesday, May 10, 2023 1:46 PM

To: Mark A Johnson <MarkAJohnson@buttermachinery.com>

Cc: Rodriguez, Rachel <Rachel.Rodriguez@state.sd.us>; Schlaak, Karen <Karen.Schlaak@state.sd.us>

Subject: Well Permit for Butler Machinery Rapid City [EXTERNAL]

Mark,

I have attached the correct application forms to use assuming you are not applying for a permit solely for water use to irrigate. There is an instruction sheet attached but, in addition to the application form (two pages), we also need a map showing the location of the proposed well and the location of use if outside of the immediate vicinity of the well, and application/license fees the total of which is dependent on the amount of water specified in your application. The proposed well construction on Form 2A (page 2 of the application form) needs to at least include the proposed depth of the well and distance to nearest existing well on property owned by others if that information is known. If not known, please indicate so on the application.

Please let me know if you have any questions.

Thank you,

Ron Duvall
Dept. of Agriculture & Natural Resources
Office of Water, Water Rights Program
605.773.3352
danr.sd.gov



DANR
SOUTH DAKOTA

From: Mark A Johnson <MarkAJohnson@buttermachinery.com>

Sent: Tuesday, May 9, 2023 2:30 PM

To: DANR Mail <DANRMail@state.sd.us>

Subject: [EXT] Well Permit for Butler Machinery Rapid City

Good afternoon,

Butler Machinery at 3601 Deadwood Avenue, Rapid City, wishes to apply for a water well permit to serve this location.

The lot is in Rapid City city limits, however they do not have adequate water service in this area of the City. Further, I understand that we can apply for a water well permit in the City Limits as long as there is not adequate water service within a certain distance (I have been told 400'). Currently we receive water from a shared water well originating on a nearby neighboring property.

Since this is a rare occurrence (to get a well permit), I wanted to ensure that I have to proper forms before I get too far into the process. Given our circumstance, can you please confirm everything that I need to submit? I am happy to have a phone conversation as well.

Thanks in advance for the assistance!

Mark

Mark A Johnson | Butler Machinery Company | Facilities Manager

3401 33rd ST S | Fargo, ND 58104 | P 701-298-2179 | C 701-720-8503

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**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 2872-2, Butler Machinery Company**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Agriculture and Natural Resources concerning Water Permit Application No. 2872-2, c/o Twylah Blotsky, President, 3401 33rd Street South, Fargo ND 58104.

The Chief Engineer is recommending APPROVAL of Application No. 2872-2 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights, 3) the proposed use is a beneficial use and 4) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board with the following qualifications:

1. The well authorized by Water Permit No. 2872-2 shall be constructed into a single water source, either the Minnekahta or Minnelusa aquifer, but not both. At the time of licensing, the final water right will be issued for the developed water source.
2. The well approved by Water Permit No. 2872-2 is located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals under this Permit shall be controlled so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
3. The well authorized by Permit No. 2872-2 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
4. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Minnekahta or Minnelusa aquifer.
5. Water Permit No. 2872-2 authorizes a total annual diversion of up to 3.07 acre-feet of water.

See report on application for additional information.

Eric Gronlund, Chief Engineer
September 26, 2023

Report to the Chief Engineer
On Water Permit Application No. 2872-2

Butler Machinery Company

c/o Twylah Blotsky

September 25, 2023

Water Permit Application No. 2872-2 proposes to appropriate up to 3.07 acre-feet of water annually at a maximum instantaneous diversion rate of 0.133 cubic feet per second (cfs) from one well to be completed into either the Minnekahta or Minnelusa aquifer (approximately 450 to 650 feet deep) located in the SE ¼ NE ¼ of Section 21-T2N-R7E for commercial use. The site of interest is located in Pennington County in the northwest part of Rapid City, SD.

AQUIFER: Minnekahta (MNKT) or Minnelusa (MNLs)

South Dakota Codified Law (SDCL) 46-2A-9

Pursuant to SDCL 46-2A-9, “A permit to appropriate water may be issued only if there is a reasonable probability that there is unappropriated water available for the applicant’s proposed use, that the diversion point can be developed without unlawful impairment of existing domestic water uses and water rights, and that the proposed use is a beneficial use and in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board as defined by SDCL 46-2-9 and 46-2-11.” This report will address the availability of unappropriated water and the potential for unlawful impairment of existing domestic water uses and water rights within the Minnekahta and Minnelusa aquifers.

WATER AVAILABILITY:

Water Permit Application No. 2872-2 proposes to appropriate water from the Minnekahta or Minnelusa aquifers. The probability of unappropriated water being available from the aquifer can be evaluated by considering SDCL 46-6-3.1, which requires “No application to appropriate groundwater may be approved if, according to the best information reasonably available, it is probable that the quantity of water withdrawn annually from a groundwater source will exceed the quantity of the average estimated annual recharge of water to the groundwater source. An application may be approved, however, for withdrawals of groundwater from any groundwater formation older than or stratigraphically lower than the Greenhorn formation in excess of the average estimated annual recharge for use by water distribution systems.” The Minnekahta and Minnelusa aquifers are older than and stratigraphically lower than the Greenhorn Formation (Fahrenbach et al., 2010); however, the applicant’s proposed use is not for use in a water distribution system as defined by SDCL 46-1-6(17). Therefore, the average annual recharge and average annual withdrawal rates to and from the Minnekahta and Minnelusa aquifers must be considered.

MINNEKAHTA AQUIFER

MINNEKAHTA AQUIFER – HYDROGEOLOGY:

In the Black Hills of South Dakota, major aquifers that are extensively used exist within the Inyan Kara Group, Minnekahta Limestone, Minnelusa Formation, Madison Limestone, and Deadwood Formation (youngest to oldest) (Driscoll and Carter, 2001; Fahrenbach et al., 2010; Water Rights, 2023b, 2023c, and 2023d). Individually, these aquifers are separated by relatively impermeable layers within the formations or by confining layers between the formations (Driscoll and Carter, 2001; Fahrenbach et al., 2010). The direction of groundwater movement in these aquifers is generally radially outward from the outcrop in the Black Hills in South Dakota (Driscoll and Carter, 2001). While the lateral component of groundwater flow dominates the movement of water in these aquifers, extremely variable leakage can also occur (Driscoll and Carter, 2001).

The Permian aged, Minnekahta Limestone consists mainly of purple to gray, fine-grained, thin to medium bedded limestone with varying amounts of red shale (Martin et al., 2004). The Minnekahta Limestone ranges from approximately 30 to 50 feet thick (Martin et al., 2004). The Minnekahta Limestone is primarily overlain by the Spearfish Formation (primarily shale, siltstone, and fine-grained sandstone) and underlain by the Opeche Shale (Epstein and Doctor, 2013; Fahrenbach et al., 2010; Martin et al., 2004). The Minnekahta Limestone outcrops in the Black Hills (shown in Figure 1) but is otherwise buried in South Dakota (Martin et al., 2004).

In western South Dakota, Allen and others (1985) estimated the Minnekahta Limestone to underlie approximately 15,960,320 acres, and the Minnekahta aquifer is estimated to contain approximately 39,900,800 acre-feet of recoverable water in storage. In the Black Hills of South Dakota, Carter and others (2003) estimated the Minnekahta Limestone to underlie approximately 1,972,480 acres and to contain approximately 4.9 million acre-feet of recoverable water in storage. In Pennington County, the Minnekahta Limestone is estimated to underlie approximately 1,283,200 acres, and the Minnekahta aquifer is estimated to contain approximately 3,208,000 acre-feet of recoverable water in storage (Allen et al., 1985). It should be noted that the amount of recoverable water within the Minnekahta aquifer may vary from one location to another as a result of the specific aquifer characteristics and overall areal extent of the aquifer. The Minnekahta aquifer can exist under both confined and unconfined aquifer conditions (Water Rights, 2023d). The Minnekahta aquifer is generally unconfined where the formation outcrops in the Black Hills in South Dakota, and generally confined where the formation dips to the east causing the hydraulic head to be above the top of the formation (Water Rights, 2023d).

No water well or test hole completion report was submitted with Water Permit Application No. 2872-2. Water well completion reports on file with the DANR-Water Rights Program for wells completed into the Minnekahta aquifer within approximately two miles of the proposed diversion point have saturated aquifer thicknesses ranging from approximately 20 to 50 feet, with the depth to the top of aquifer materials ranging from approximately 100 to 450 feet below the ground surface, and static water levels at well completion varying from approximately flowing to 140

feet below the ground surface (Water Rights, 2023d). The Minnekahta aquifer is expected to be confined at the proposed diversion point based on the well completion reports on file for nearby wells completed into the aquifer and the lithologic logs on file for nearby observation wells (SDGS, 2023; Water Rights, 2023b, 2023c and 2023d).

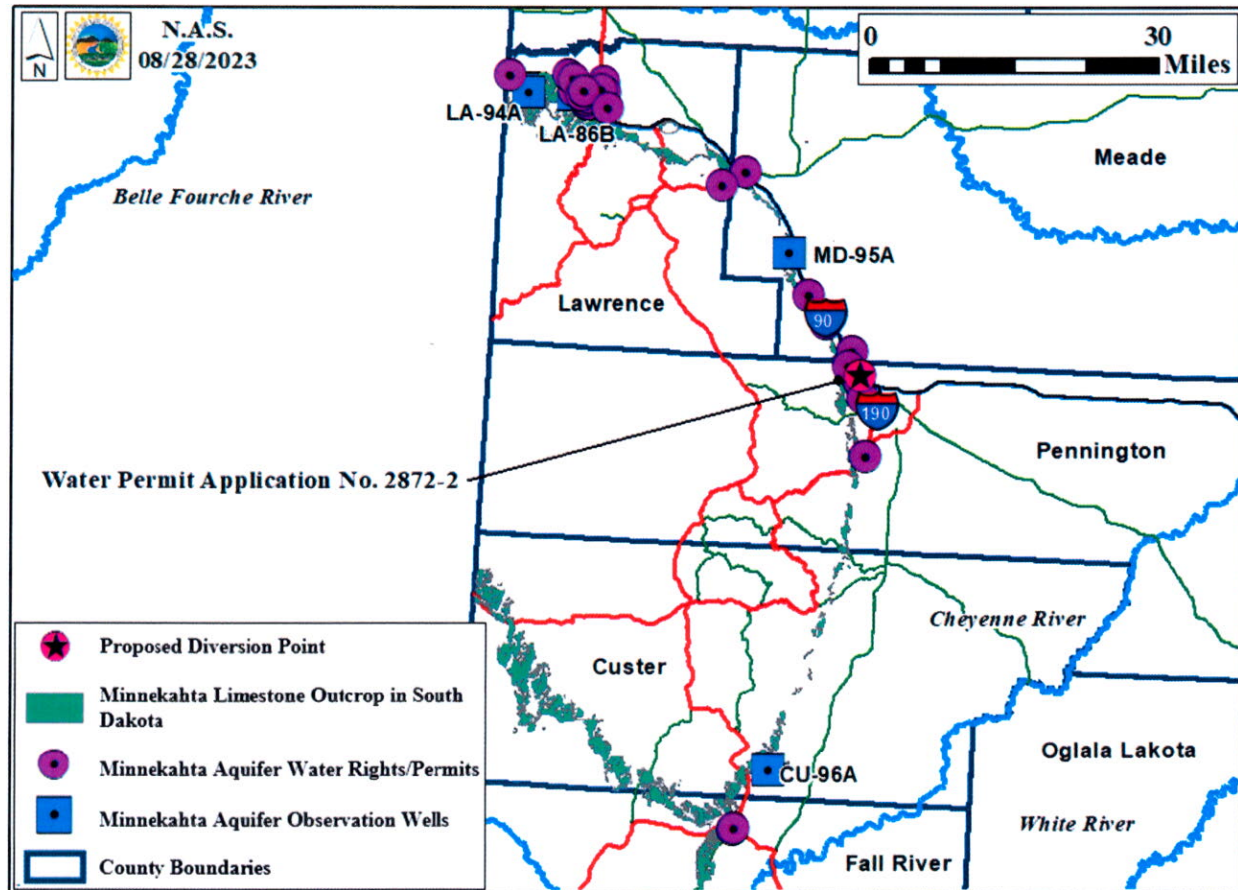


Figure 1. Minnekahta Limestone outcrop in the Black Hills in South Dakota (Martin et al., 2004), the Minnekahta aquifer observation wells and water rights/permits in the Black Hills in South Dakota (Water Rights, 2023b and 2023c), and location of the proposed diversion point for Water Permit Application No. 2872-2

MINNEKAHTA AQUIFER – HYDROLOGIC BUDGET:

Statewide Recharge

Recharge to the Minnekahta aquifer is primarily through the infiltration of precipitation where the formation outcrops (Carter et al., 2003). Some additional recharge may occur from streamflow losses within the outcrop of the Minnekahta Limestone (Carter et al., 2003; Driscoll and Carter, 2001). It is also likely the Minnekahta aquifer receives some recharge from upward leakage from the Madison and Minnelusa aquifers.

The estimated average annual recharge rate has not been quantified completely for the Minnekahta aquifer at this time; however, the precipitation component of the recharge from the Black Hills outcrop area in South Dakota was estimated to be approximately 6,500 acre-feet per year by Driscoll and Carter (2001) using data from 1950 to 1998. This estimate was only for the

Minnekahta aquifer that outcrops in South Dakota, so there may be additional recharge to other parts of the aquifer from precipitation that occurs on outcrops in other states.

Statewide Discharge

Discharge from the Minnekahta aquifer is primarily through well withdrawals (Water Rights, 2023d). Currently, there are 32 water rights/permits authorized to withdraw water from the entirety of the Minnekahta aquifer in South Dakota (Water Rights, 2023c). Table 1 summarizes the 32 Minnekahta aquifer water rights/permits, with the estimated annual use for each non-irrigation water right/permit as determined by their permitted maximum diversion rate or annual volume. Historically, average water use by non-irrigation appropriations limited by an instantaneous diversion rate have been assumed to be pumping 60% of full time at the respective permitted diversion rate. Non-irrigation water rights/permits limited by an annual volume are assumed to withdraw their entire respective annual volume limitation. This is a standard method used by the DANR-Water Rights Program for estimating annual withdrawals by non-irrigation appropriations from an aquifer (Water Rights, 2023c). Overall, the estimated average annual withdrawal rate from the Minnekahta aquifer by the non-irrigation water rights/permits is approximately 1,294 acre-feet per year (Table 1) (Water Rights, 2023c).

Currently, there are seven irrigation water rights/permits authorized to appropriate water from the Minnekahta aquifer (Water Rights, 2023c). Irrigation water rights/permits have been typically required to report their annual usage on an irrigation questionnaire since 1979. The estimated average annual withdrawal rate for the Minnekahta aquifer irrigation water rights/permits that have reported over the period of record (1982 to 2022) is approximately 283.7 acre-feet per year (Table 2) (Water Rights, 2023a). Table 2 only lists six irrigation water rights/permits as reporting in 2022 (Water Rights, 2023a and 2023c). Water Right No. 2190-2 (priority date: 07/24/1991, authorized to irrigate 1.5 acres) did not submit an irrigation questionnaire form from 2020 to 2022 for an unknown reason (Water Rights, 2023a and 2023c). Generally, irrigators in South Dakota apply less than one foot of water per acre per year (Water Rights, 2023a). However, to account for the fluctuation in wet and dry cycles from year to year, the one foot of water per acre per year application rate will be used to somewhat overestimate the annual withdrawal rate for Water Right No. 2190-2. Therefore, the average annual withdrawal rate for Water Right No. 2190-2 is approximately 1.5 acre-feet per year (Water Rights, 2023c). Collectively, the estimated average annual withdrawal rate from the Minnekahta aquifer for irrigation use is approximately 285.2 acre-feet per year.

There are domestic wells completed into the Minnekahta aquifer that do not require a water right/permit, so the withdrawal amount from those wells is unknown (Water Rights, 2023d). Due to their relatively low diversion rates, withdrawals from domestic wells are generally not considered to be a significant portion of the hydrologic budget. Additionally, with the development of rural water systems in some areas where the Minnekahta aquifer is a viable aquifer available; it is likely some domestic users may have transitioned to rural water. Therefore, the quantity of water withdrawn by domestic wells is estimated to be negligible to the hydrologic budget for the Minnekahta aquifer.

Table 1. Minnekahta aquifer water rights/permits with estimated annual use for the non-irrigation water rights/permits (Water Rights, 2023c)

Permit No.	Name	County	Status	Use Type(s)	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet)	Estimated Withdrawal Rate (acre-feet/year)
439-1	Billy J Evans	LA	LC	IRR	2.22		**
515-2	Black Hills Corporation	PE	LC	IND	0.39		169.4
647-1	McGuigan Dairy Inc	LA	LC	IRR	0.4		**
673-1	Denny Brengle	LA	LC	IRR	0.16		**
1118-1	JH & P Investments LLC	LA	LC	COM	0.49		212.9
1129-1	Rand & Gayla Williams	LA	LC	COM	0.1		43.4
1147-2	TNS Holdings II LLC	PE	LC	SHD, COM	0.08		34.8
1164-1	Westview Subdivision	LA	LC	SHD	0.06		26.1
1184-1	Don L Smith	LA	LC	COM	0.1		43.4
1194-1	Spearfish Fairground	LA	LC	IND, COM	0.2		86.9
1265-1	Harold R & Tammie C Karlson	LA	LC	COM	0.45		195.5
1336-1	Piedmont Senior Citizens Center	MD	LC	INS	0.1		43.4
1489-1	Leonard Wales	LA	LC	SHD	0.05		21.7
1541-1	Automatic Vendors Inc	MD	LC	COM	0.04		17.4
1620-1	Beth Mathis	LA	LC	SHD	0.036		15.6
1636-1	Wayne Lindstad	LA	LC	COM, DOM	0.39		169.4
1651-1	Stagebarn Housing Center	MD	LC	COM	0.022		9.6
1681-1	John & Connie Niehaus	LA	LC	COM, DOM	0.036		15.6
1704-1	Mike & Debie Palmer	MD	LC	IRR	0.44		**
1739-1	Spearfish Meadows Homeowners	LA	LC	SHD	0.111		48.2
1811-1	Butte Electric Cooperative Inc	LA	LC	COM	0.011		4.8
1833-1	Haier Enterprise Inc	LA	LC	IRR	1.56		**
1893-2	Windmill Truck Stop	PE	LC	COM	0.1		43.4
1902-1	Spring Creek Homeowners Association Inc.	LA	LC	SHD	0.089		38.7
1925-1	Boulder Canyon Country Club	LA	LC	COM	0.03		13
1976-1	Premier Surfaces LLC	LA	LC	COM	0.044	1	1*
2007-1	Ridge on Lookout Mt. Homeowners Assoc.	LA	PE	WDS	0.078	12.3	12.3*
2177-2	Superior Truck Wash Inc	PE	LC	COM	0.047		20.4
2190-2	Church of Jesus Crist of LDS	FR	LC	IRR	0.088		**
2422-2	Hot Springs School District	FR	LC	IRR	0.088		**
2756-2	Chad Gollnick	PE	LC	COM, DOM	0.027	1.5	1.5*
2865-2	Black Hills Tiny Resort	PE	PE	COM	0.022	5.2	5.2*
						TOTAL:	1,294
LC: Licensed Water Right; PE: Water Permit; FR: Fall River; LA: Lawrence;							
MD: Meade; PE: Pennington; COM: Commercial; DOM: Domestic; IND: Industrial; INS: Institutional; IRR: Irrigation;							
SHD: Suburban Housing Development; WDS: Water Distribution System							
*Limited to authorized annual volume **Irrigation questionnaires (Water Rights, 2023a)							

Table 2. Reported historic irrigation use from Minnekahta aquifer (Water Rights, 2023a)

Year	No. of Water Rights/Permits Reporting	Reported Pumpage (acre-feet)
1982	4	42.54
1983	6	445.39
1984	6	55.1
1985	6	337.7
1986	6	254.2
1987	6	300.36
1988	6	451.77
1989	6	351.85
1990	6	427.37
1991	5	338
1992	6	343.9
1993	6	239.3
1994	6	404.64
1995	7	144.58
1996	7	214.21
1997	7	196
1998	7	342.55
1999	8	261.99
2000	9	187.39
2001	9	338.69
2002	8	449.33
2003	9	409.04
2004	9	316.65
2005	10	241.29
2006	9	342.01
2007	8	312.61
2008	8	187.72
2009	8	201.73
2010	7	242.65
2011	7	229.16
2012	7	312.05
2013	7	251.37
2014	7	273.08
2015	7	133.35
2016	7	282.51
2017	7	354.68
2018	7	232.31
2019	7	225.78
2020	6	295.4
2021	6	290.2
2022	6	371.13
Min	4	42.54
Max	10	451.77
Avg	7	283.7

Hydrologic Budget Summary

The estimated average annual recharge rate to the Minnekahta aquifer from precipitation on the outcrop in South Dakota is approximately 6,500 acre-feet per year.

The estimated average annual withdrawal rate from the Minnekahta aquifer is approximately 1,582.3 acre-feet per year (non-irrigation: 1,294 acre-feet/year; irrigation: 285.2 acre-feet/year; Water Permit Application No. 2872-2 (if approved, assuming full volume appropriation): 3.07 acre-feet/year). Based on the hydrologic budget, there is a reasonable probability unappropriated water is available from the Minnekahta aquifer for the proposed appropriation.

MINNEKAHTA AQUIFER – OBSERVATION WELL DATA:

Administrative Rule of South Dakota (ARSD) 74:02:05:07 requires that the Water Management Board shall rely upon the record of observation well measurements in addition to other data to determine that the quantity of water withdrawn annually from the aquifer does not exceed the estimated average annual recharge of the aquifer.

Observation wells provide data on how the aquifer reacts to regional climatic conditions and local pumping. The DANR-Water Rights Program monitors four observation wells completed into the Minnekahta aquifer (Water Rights, 2023b). The three closest observation wells to the proposed diversion point are MD-95A (approximately 15 miles northwest), CU-96A (approximately 42 miles southwest), LA-86B (approximately 42 miles northwest) (as shown in Figure 1) (Water Rights, 2023b). The hydrographs for these observation wells are displayed in Figures 2 to 4 (Water Rights, 2023b). The data points utilized to construct the hydrographs are measurements of the static water level in the observation wells from the top of the well casing.

Observation well MD-95A is approximately 0.2 miles from the closest Minnekahta Limestone outcrop and CU-96A is approximately 0.9 miles, which is a primary recharge area for the Minnekahta aquifer. As such, the hydrographs for PE-95E and CU-96A are more reactive to the magnitude of recharge occurring on the outcrop than areas downgradient from the outcrop, resulting in observation wells near the outcrop showing greater fluctuations to seasonal recharge and withdrawals than observation wells further away. Overall, the hydrographs for the observation wells display generally stable water levels over their respective periods of record. The hydrographs for the observation wells completed into the Minnekahta aquifer indicate that the aquifer responds well to climatic conditions because water levels are rising during wetter periods and declining to a stable water level during drier periods. The generally stable water levels displayed on the hydrographs indicate that climatic conditions and therefore, the effects of recharge to and natural discharges from the aquifer govern the long-term fluctuations of waters levels in the aquifer rather than the impacts of pumping from the Minnekahta aquifer. By recognizing that both recharge to and natural discharge from an aquifer can be captured for pumping, the observation well hydrographs demonstrate unappropriated water is available for the proposed appropriation.

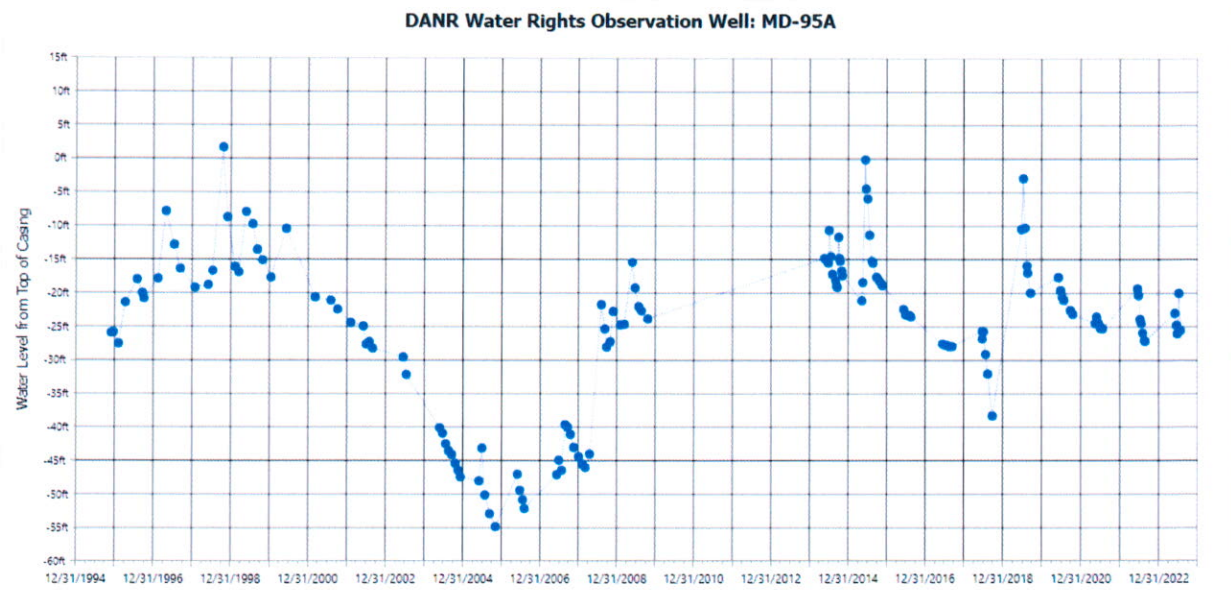


Figure 2. Hydrograph for observation well MD-95A (Water Rights, 2023b)

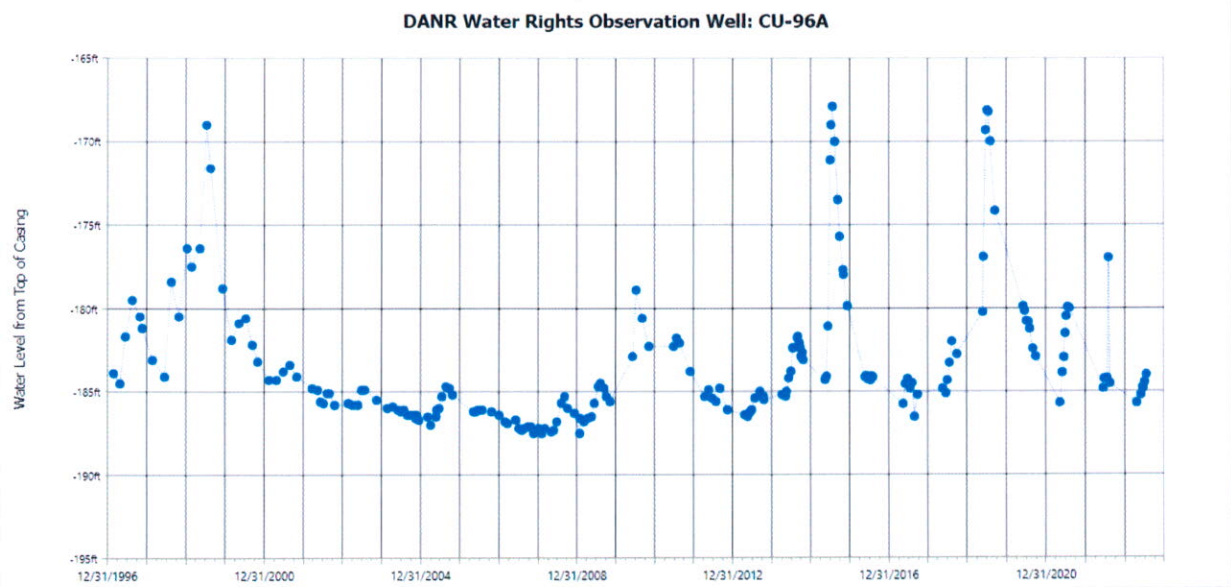


Figure 3. Hydrograph for observation well CU-96A (Water Rights, 2023b)

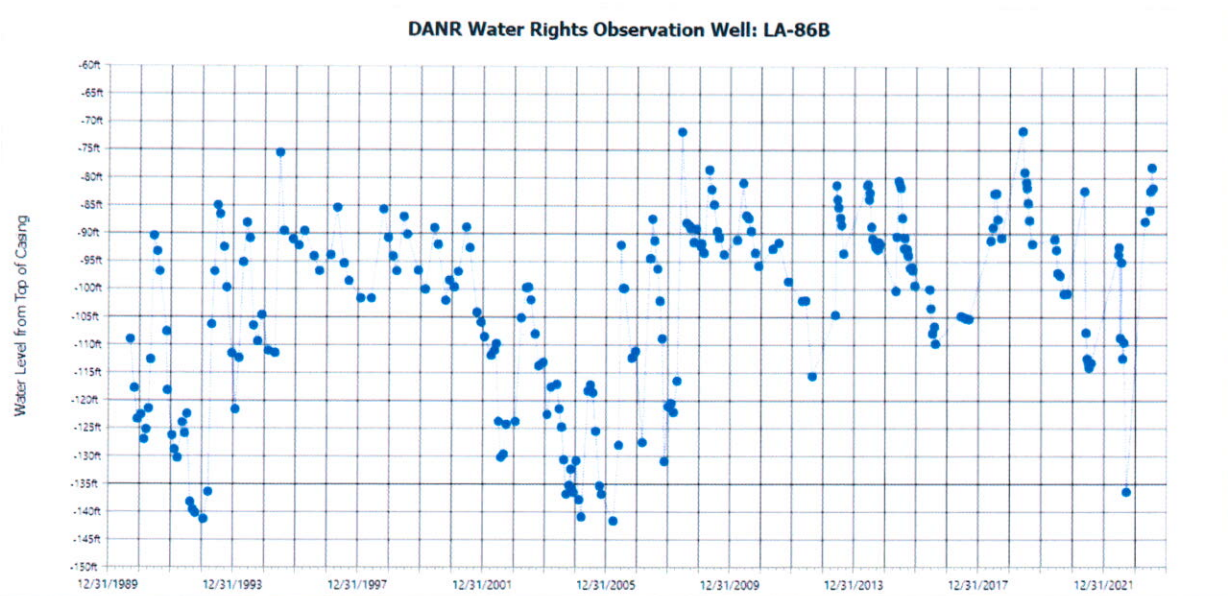


Figure 4. Hydrograph for observation well LA-86B (Water Rights, 2023b)

MINNEKAHTA AQUIFER – POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

Currently in South Dakota, there are 32 water rights/permits authorized to appropriate water from the Minnekahta aquifer (Water Rights, 2023c). The closest water rights/permits to the proposed diversion point are Water Right Nos. 1893-2 and 2177-2, which are held by Windmill Truck Stop and Superior Truck Wash. The diversion points for Water Right Nos. 1893-2 and 2177-2 are located approximately 0.5 miles south of the proposed diversion point for this application (Figure 5) (Table 3) (Water Rights, 2023c).

There are domestic wells on file with the DANR-Water Rights Program that are completed into the Minnekahta aquifer, with the closest domestic well on file (not held by the applicant) located approximately 1.2 miles southwest of the proposed diversion point (Water Rights, 2023d). There could potentially be other domestic wells completed into the Minnekahta aquifer near the proposed diversion point that are not on file with the DANR-Water Rights Program. The location of the domestic wells in the well completion report database maintained by the Water Rights Program is based on the location on the report listed by the driller at the time of well completion.

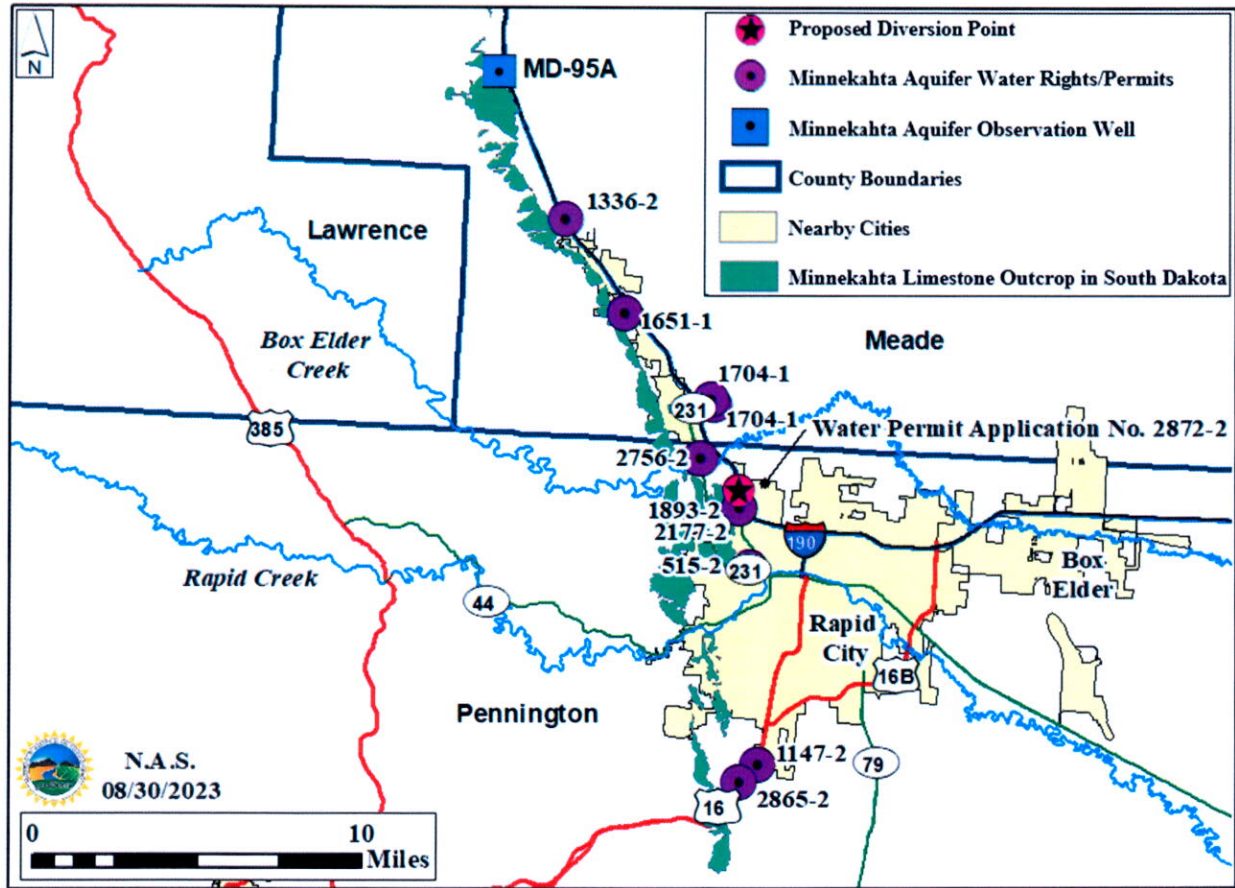


Figure 5. Location of the proposed diversion point for Water Permit Application No. 2872-2 with the Minnekahta aquifer water rights/permits and observation well within approximately 15 miles (Water Rights, 2023b and 2023c)

Table 3. Water rights/permits authorized to withdraw water from the Minnekahta aquifer within approximately 15 miles of the proposed diversion point, as shown in Figure 5 (Water Rights, 2023c)

Permit No.	Name	Status	Use	Authorized Acres if IRR	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet)
515-2	Black Hills Corporation	LC	IND		0.39	
1147-2	TNS Holdings II LLC	LC	SHD, COM		0.08	
1336-1	Piedmont Senior Citizens Center	LC	INS		0.1	
1651-1	Stagebarn Housing Center	LC	COM		0.022	
1704-1	Mike & Debie Palmer	LC	IRR	11	0.44	
1893-2	Windmill Truck Stop	LC	COM		0.1	
2177-2	Superior Truck Wash Inc	LC	COM		0.047	
2756-2	Chad Gollnick	LC	COM, DOM		0.027	1.5
2865-2	Black Hills Tiny Resort	PE	COM		0.022	5.2
LC: Licensed Water Right; COM: Commercial; DOM: Domestic; IND: Industrial; INS: Institutional; IRR: Irrigation; SHD: Suburban Housing Development						

The Minnekahta aquifer can exist under both confined and unconfined aquifer conditions (2023d). Based on the water well completion reports on file, and lithologic logs on file for nearby observation wells, the Minnekahta aquifer is expected to be confined near the proposed diversion point (SDGS, 2023; Water Rights, 2023b and 2023d). Drawdown created by pumping a well generally does not extend far from the pumped well in an unconfined aquifer; however, in a confined aquifer, drawdown from pumping could extend a distance from the diversion point. The exact drawdown behavior of a well cannot be known without an aquifer performance test. However, observation wells completed into the Minnekahta aquifer near permitted/licensed diversion points can provide some insight on how the aquifer responds to pumping.

Observation well LA-86B (approximately 42 miles northwest of the proposed diversion point) has six high-yield wells (assumed to be a well with an authorized diversion rate greater than 0.2 cfs) within approximately three miles of it (Water Rights, 2023b and 2023c). Some drawdown resulting from pumping can be seen on the hydrograph for LA-86B, along with the water level in the aquifer recovering in response to recharge during the spring season (Figure 4) (Water Rights, 2023b). The lithologic log on file for LA-86B noted the well was drilled approximately 290 feet below the ground surface, had a casing stick up height of zero feet, and the top of aquifer materials approximately 260 feet below the ground surface (SDGS, 2023). The lowest recorded static water level on the hydrograph is approximately 141 feet below the top of the well casing (shown in Figure 4), which indicates there was still approximately 120 feet of artesian head pressure in LA-86B even during a drier period when wells are expected to be pumping more water and when water levels are generally naturally lower in response to drier conditions (SDGS, 2023; Water Rights, 2023b).

Water well completion reports on file with the DANR-Water Rights Program for wells completed into the Minnekahta aquifer within approximately two miles of the proposed diversion point have saturated aquifer thicknesses ranging from approximately 20 to 50 feet (Water Rights, 2023d). This would generally allow for enough thickness for a pump to be placed 20 feet below the top of the aquifer, which is required for the well to be considered adequate under ARSD 74:02:04:20(6). Any drawdown as a result of the proposed diversion for this application is not expected to unlawfully impair nearby adequate wells. In Meade and Pennington Counties, there are no substantiated complaints on file with the DANR-Water Rights Program regarding well interference for adequate wells completed into the Minnekahta aquifer (Water Rights, 2023e).

The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has developed rules to allow water to be placed to maximum beneficial use without the necessity of maintaining artesian head pressure for domestic use. The Water Management Board defined an “adversely impacted domestic well” in ARSD 74:02:04:20(7) as:

“A well in which the pump intake was set at least 20 feet below the top of the aquifer at the time of construction or, if the aquifer is less than 20 feet thick, is as near to the bottom of the aquifer as is practical and the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner’s needs.”

The Water Management Board considered the delivery of water by artesian head pressure versus maximum beneficial use during the issuance of Water Right No. 2313-2 for Coca-Cola Bottling Company of the Black Hills. The Board adopted the Findings of Facts and Conclusions of Law that noted the reservation of artesian head pressure for delivery of water would be inconsistent with SDCL 46-1-4 which states, “general welfare requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable...” (Water Rights, 1995). Furthermore, the Water Management Board found if increased cost or decreased production as a result of impacts on artesian head pressure by legitimate users is to be considered as an unlawful impairment, it would also conflict with SDCL 46-1-4 (Water Rights, 1995). With that in mind, some existing well owners may need to install or lower pumps depending on the specific characteristics of the Minnekahta aquifer at their location. However, when considering the statutes (SDCL 46-1-4 and 46-6-6.1), rules (ARSD 74:02:04:20(6) and (7)), the estimated saturated thickness of the Minnekahta aquifer near the proposed diversion point, the artesian head pressure in observation wells near permitted/licensed diversion points, and the lack of well interference complaints, any drawdown created from the proposed diversion is not expected to cause an unlawful impairment on existing water right/permit holders or domestic users with adequate wells. Therefore, there is a reasonable probability that any interference from the proposed appropriation will not impose unlawful impairments on existing users with adequate wells.

MINNELUSA AQUIFER

MINNELUSA AQUIFER – HYDROGEOLOGY:

The Lower Permian and Upper Pennsylvanian aged, Minnelusa Formation consists mainly of yellow to red, interbedded sandstone, siltstone, shale, limestone, and dolomite (Martin et al., 2004). Generally, the three units include: an upper unit consisting of red to white sandstone (up to approximately 200 feet thick), the middle unit consisting of dolomite, sandstone, and shale with anhydrite in subsurface (approximately 200 to 300 feet thick), and lower unit consisting of sandstones and dolomites with basal red shale (approximately 0 to 300 feet thick) (Rahn and Gries, 1973). The upper part of the Minnelusa Formation may also contain anhydrite which has generally been eradicated as a result of a change in depositional environment and dissolution where the formation outcrops (Carter et al., 2001b). The dissolution of the anhydrite has resulted in collapse features that have been filled with breccia (Carter et al., 2001b; Driscoll et al., 2002). The thickness of the Minnelusa Formation in the Black Hills within South Dakota ranges from approximately 375 feet thick near Belle Fourche to approximately 1,175 feet near Edgemont (Carter et al., 2001b; Driscoll et al., 2002).

The Minnelusa aquifer generally occurs within the upper sandstone units of the Minnelusa Formation (Kyllonen and Peter, 1987). The Minnelusa Formation is disconformably overlain by the Opeche Shale, which is overlain by the Minnekahta Limestone (Permian-aged) (Carter et al., 2001b). The Opeche Shale acts as a confining layer that restricts the flow of water between the Minnelusa and Minnekahta aquifers. The Minnelusa Formation is unconformably overlying the Madison (Pahasapa) Limestone (Long and Putnam, 2009). The lower unit of the Minnelusa Formation acts as a confining layer between the Minnelusa and Madison aquifers as a result of

the low permeability of the unit; however, weathering and brecciation may have increased the permeability in outcrop areas of the lower unit of the Minnelusa Formation (Kyllonen and Peter, 1987; Long and Putnam, 2009).

In western South Dakota, the Minnelusa Formation is estimated to underlie approximately 23,114,880 acres, and the Minnelusa aquifer is estimated to contain approximately 755,555,520 acre-feet of recoverable water in storage (Allen et al., 1985). In Pennington County, the Minnelusa Formation is estimated to underlie approximately 1,372,520 acres, and the Minnelusa aquifer is estimated to contain approximately 51,432,000 acre-feet of recoverable water in storage (Allen et al., 1985). It should be noted that the amount of recoverable water within the Minnelusa aquifer may vary from one location to another as a result of the specific aquifer characteristics and overall areal extent of the aquifer.

The Minnelusa Formation outcrops in the Black Hills (shown in Figure 6) but is otherwise buried in South Dakota (Martin et al., 2004). The Minnelusa aquifer can exist under both confined and unconfined aquifer conditions (Long and Putnam, 2009; Water Rights, 2023b and 2023d). The Minnelusa aquifer is generally unconfined where the formation outcrops in the Black Hills in South Dakota, and generally confined where the formation dips to the east causing the hydraulic head to be above the top of the formation (Long and Putnam, 2009; Water Rights, 2023b and 2023d).

No water well or test hole completion report was submitted with Water Permit Application No. 2872-2. Water well completion reports on file with the DANR-Water Rights Program for wells completed into the Minnelusa aquifer within approximately two miles of the proposed diversion point have saturated aquifer thicknesses ranging from approximately 20 to 60 feet, with the depth to the top of aquifer materials ranging from approximately 100 to 750 feet below the ground surface, and static water levels at well completion varying from approximately flowing to 380 feet below the ground surface (Water Rights, 2023d). The Minnelusa aquifer is expected to be confined near the proposed diversion point based on the well completion reports on file for nearby wells completed into the aquifer and the lithologic logs on file for nearby observation wells (SDGS, 2023; Water Rights, 2023b, 2023c and 2023d).

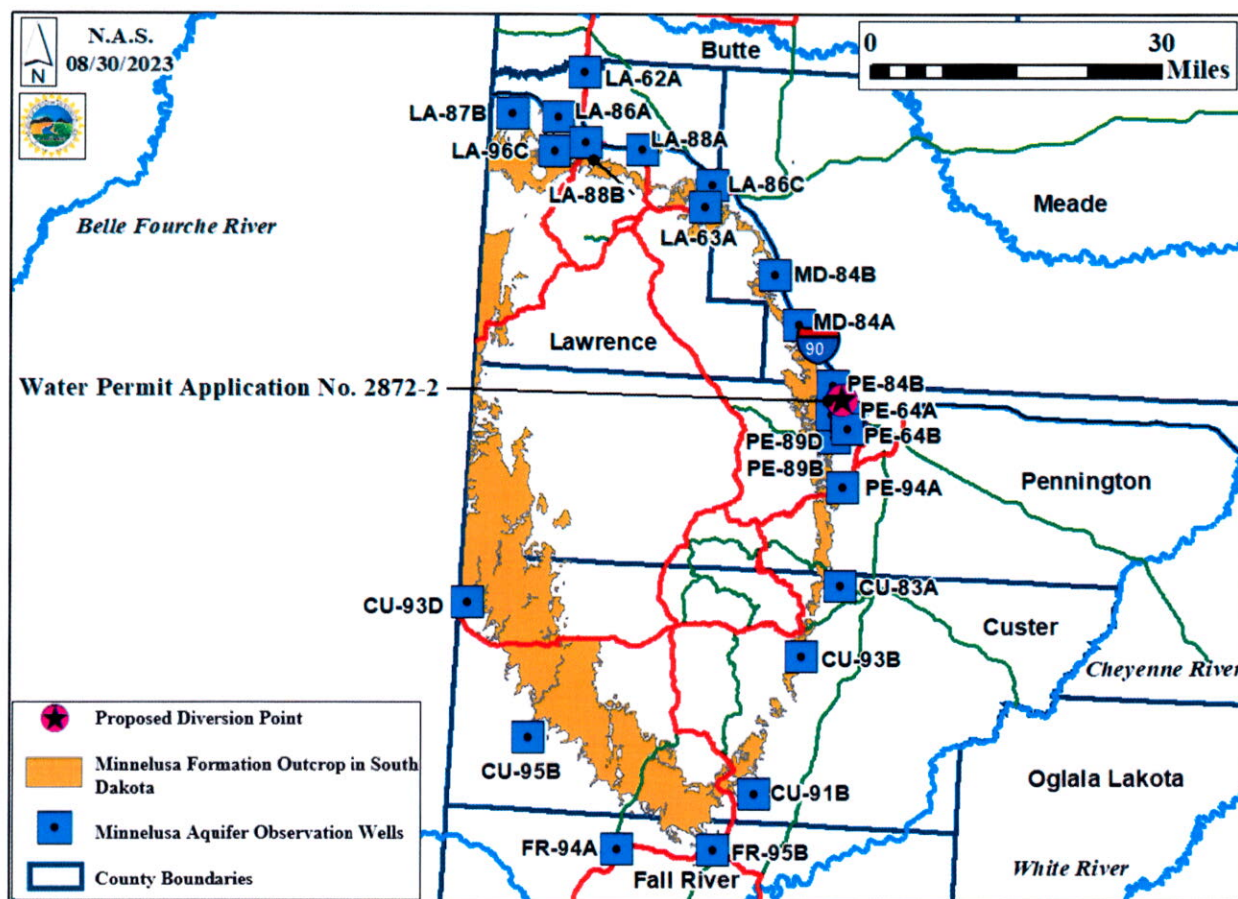


Figure 6. Minnelusa Formation outcrop in the Black Hills in South Dakota (Martin et al., 2004), the Minnelusa aquifer observation wells in the Black Hills (Water Rights, 2023b), and the proposed diversion point for Water Permit Application No. 2872-2

MINNELUSA AQUIFER – HYDROLOGIC BUDGET:

Statewide Recharge

Recharge to the Minnelusa aquifer is primarily through streamflow losses and the infiltration of precipitation where the formation outcrops (Carter and Driscoll, 2001a; Driscoll et al., 2002). Driscoll and others (2002) noted that the Madison aquifer receives more recharge than the Minnelusa aquifer as a result of the Madison outcrop having an upslope location to the Minnelusa outcrop within the Black Hills in South Dakota.

Carter and others (2001a) analyzed streamflow and precipitation data from 1931 to 1998 within the Black Hills of South Dakota and Wyoming to determine the average annual recharge to the Madison and Minnelusa aquifers. The average annual recharge rate to the Madison and Minnelusa aquifers from streamflow contributions was estimated to be approximately 93 cfs, or 67,500 acre-feet per year; plus 251 cfs, or 181,760 acre-feet per year from precipitation falling on the outcrop in the Black Hills, for a combined estimated average annual recharge rate of 344 cfs, or 249,260 acre-feet per year.

Carter and others (2001a) determined that of the combined estimated average annual recharge rate, approximately 55% of the total recharge goes to the Madison aquifer, and the remaining 45% recharges to the Minnelusa aquifer. Therefore, the estimated average annual recharge rate to the Minnelusa aquifer is approximately 112,167 acre-feet per year.

Statewide Discharge

Discharge from the Minnelusa aquifer is primarily through well withdrawals (Water Rights, 2023d) and flow to headwater and artesian springs (Carter and Driscoll, 2001a).

Currently, there are 191 water rights/permits authorized to withdraw water from the entirety of the Minnelusa aquifer in South Dakota (Water Rights, 2023c). Water Permit No. 2773-2 is authorized for use from either the Minnelusa or Madison aquifers; however, the construction period has passed for this permit and the required documentation has not been submitted indicating a well has been constructed into either aquifer (Water Rights, 2023c). Therefore, the estimated use for Water Permit No. 2773-2 will not be included in this analysis. Water Right No. 1709-1 authorizes a diversion rate of 0.333 cfs from three wells, two completed into the Minnelusa aquifer (110 gallons per minute or 0.245 cfs) and one completed into the Madison aquifer (40 gallons per minute or 0.089 cfs) for suburban housing development and commercial use (Water Rights, 2023c). The estimated use for the Minnelusa aquifer wells authorized by Water Right No. 1709-1 will be included with the non-irrigation water rights/permits in this analysis, resulting in a total of 192 water rights/permits.

Additionally, there is one future use permit reserving water from the Minnelusa aquifer – Future Use Permit No. 439-2 (Water Rights, 2023c). Future Use Permit No. 439-2 is held by the City of Rapid City and authorizes the reservation of groundwater, water from infiltration galleries on springs, and the Madison and Minnelusa aquifer wells used by the city for municipal use (Water Rights, 2023c). For the purpose of estimating the average annual withdrawal rate from the Minnelusa aquifer, Future Use Permit No. 439-2 is assumed to be developable for a total of 3,367 acre-feet per year (Water Rights, 2023c).

Of the 192 Minnelusa aquifer water rights/permits (including Water Right No. 1709-1), 48 are for irrigation use and 144 are for non-irrigation use (Water Rights, 2023c). Table 4 summarizes the 144 non-irrigation water rights/permits authorized to appropriate water from the Minnelusa aquifer with the estimated annual use for each water right/permit as determined by their authorized maximum diversion rate or annual volume. The use type determined for each water right/permit was based on the primary use categorized for each water right/permit as some permits have multiple use types (Water Rights, 2023c). Historically, average water use by non-irrigation appropriations limited by an instantaneous diversion rate have been assumed to be pumping 60% of full time at the respective authorized maximum diversion rate. Water rights/permits limited by an annual volume are assumed to withdraw their entire respective annual volume limitation. This is a standard method used by the DANR-Water Rights Program for estimating annual withdrawals by non-irrigation appropriations from an aquifer (Water Rights, 2023c). Overall, the estimated average annual withdrawal rate from the Minnelusa

aquifer by the non-irrigation water rights/permits is approximately 13,048 acre-feet per year (Table 4) (Water Rights, 2023c).

Table 4. Summary of the non-irrigation water rights/permits authorized to appropriate from the Minnelusa aquifer with estimated annual use determined by their respective authorized diversion rate or annual volume (Water Rights, 2023c)

Use Type	No. of Water Rights/Permits	Authorized Annual Volume (acre-feet/year)	Authorized Diversion Rate (cfs)	Total Estimated Use (acre-feet/year)
RWS	2		0.597	259
SHD	47	6.75	7.39	3,218
REC	1	18.4		18.4
COM	53	119	3.89	1,811
DOM	8		0.981	426
FWP	1		1.6	695
WDS	2	42.3		42.3
INS	10		0.828	360
IND	11	52	7.17	3,170
MUN	9		7.01	3,047
TOTAL:	144	238.6	29.47	13,048
RWS: Rural Water System, SHD: Suburban Housing Development, REC: Recreation,				
COM: Commercial, DOM: Domestic, FWP: Fish & Wildlife Propagation, WDS: Water Distribution System				
INS: Institutional, IND: Industrial, MUN: Municipal				

Currently, there are 48 irrigation water rights/permits authorized to appropriate water from the Minnelusa aquifer (Water Rights, 2023c). Irrigation water rights/permits have been typically required to report their annual usage on an irrigation questionnaire since 1979. The estimated average annual withdrawal rate for the Minnelusa aquifer irrigation water rights/permits that have reported over the period of record (1982 to 2022) is approximately 2,309 acre-feet per year (Water Rights, 2023a).

For comparison purposes, the average annual withdrawal rate for the 48 water rights/permits authorized for irrigation as a primary use from the Minnelusa aquifer was estimated on Table 5 utilizing the following method: for the water rights/permits with greater than ten years of irrigation reports available, the average reported irrigation over the respective period of record was used to estimate withdrawals; for the water rights/permits with less than ten years of irrigation reports available, withdrawals were assumed to equal two acre-feet per authorized acre; although, actual usage is likely less for non-turf irrigation (Water Rights, 2023a and 2023c). Non-irrigation withdrawals from permit holders with irrigation also as a permitted use were assumed to withdraw at their maximum instantaneous diversion rate 60% of the time, and the water rights/permits limited by an annual volume were assumed to withdraw their entire respective annual volume limitation.

In addition to the 48 water rights/permits authorized for irrigation as a primary use, Table 5 includes Water Right No. 1582-1, held by Bear Butte Wildlife LLC, a permit authorized for fish and wildlife propagation as a primary use, and irrigation as a secondary use (Water Rights, 2023c). The estimated average annual withdrawal rate for the non-irrigation use authorized by Water Right No. 1582-1 is included on Table 4 and the irrigation use on Table 5. Using these methods, the estimated average annual withdrawal rate for the Minnelusa aquifer irrigation water rights/permits is approximately 4,019 acre-feet per year (Table 5) (Water Rights, 2023a and 2023c). This value will be used in this analysis to estimate the average annual withdrawal rate for the water rights/permits authorized for irrigation use from the Minnelusa aquifer.

There are domestic wells completed into the Minnelusa aquifer that do not require a water right/permit, so the withdrawal amount from those wells is unknown (Water Rights, 2023d). However, Carter and others (2001b) estimated an average annual withdrawal rate from the Minnelusa aquifer for domestic and livestock use from 1987 to 1996 to be approximately 970 acre-feet per year. It is likely that water withdrawals from the Minnelusa aquifer for domestic and livestock use has increased since 1996; however, with the development of rural water systems in some of the areas where the Minnelusa aquifer is a viable aquifer; it is likely some domestic users may have transitioned to rural water. Additionally, due to their relatively low diversion rates, withdrawals from domestic wells are generally not considered to be a significant portion of the hydrologic budget. Therefore, the quantity of water estimated by Carter and others (2001b) for average annual withdrawals for domestic and livestock use from the Minnelusa aquifer will be assumed to be a probable minimum average annual withdrawal rate from the aquifer.

Hydrologic Budget Summary

The estimated average annual recharge rate to the Minnelusa aquifer is approximately 112,167 acre-feet per year. The estimated average annual withdrawal rate from the Minnelusa aquifer is approximately 21,407 acre-feet per year (including the estimated use for Water Permit Application No. 2872-2, if approved) (Table 6). Based on the hydrologic budget, there is a reasonable probability unappropriated water is available from the Minnelusa aquifer for the proposed appropriation.

Table 6. Estimated use from this outwash deposit of the Minnelusa aquifer (Water Rights, 2023a, 2023c, and 2023d)

Type of Water Right/Permit	Estimated Use (acre-feet/year)
Non-Irrigation	13,048
Irrigation	4,019
Future Use Reservation	3,367
Domestic & Livestock Use	970
Water Permit Application No. 2872-2 (<i>if approved</i> , assuming full volume appropriation)	3.07
TOTAL:	21,407

Report on Water Permit Application No. 2872-2

Table 5. Minnelusa aquifer water rights/permits with irrigation listed as one beneficial use (Water Rights, 2023a and 2023c)

Permit No.	Name	Use Type(s)	Authorized Diversion Rate (cfs)	Acres	Average Report (ac-ft/yr)	Years of Irrigation Reported	Estimated Irrigation Use (ac-ft/yr)	Estimated Non-Irrigation Use (ac-ft/yr)	Total Estimated Use (ac-ft/yr)
1183A-1	Reggie & Sebrina Keil	IRR	1.59	112	8.33	1	224		224
1183B-1	Mitch O'Connell	IRR	0.51	36	0	0	72		72
1197-1	Darrell Nicholas	IRR	0.56	125	0.54	30	0.38		0.38
1254B-1	Sleep Land & Livestock LLC	IRR	0.67	63.7	34.3	12	36.7		36.66
1276-1	Gloria Delzer	IRR	8.73	748.5	313.6	40	316.4		316.39
1382B-1	Jill M Trimble	IRR	0.34	24	10.2	15	10.9		10.91
1382C-1	Karol J Johnson	IRR	0.43	30	2.2	8	60		60
1382D-1	Polly & Jeff Garrett	IRR	0.24	16.5	2.0	8	33		33
1407-1	Cindy Trust	IRR	0.57	40	33.2	35	33.2		33.2
1520-1	Jeral & Dianne Shear	IRR, DOM	0.23	13	7.5	32	7.5	99.9	107.4
1584-1	Richard D Sleep	IRR	0.9	63	72	29	72.5		72.5
1585-1	Richard D Sleep	IRR	0.38	27	31.5	29	31.5		31.5
1677-2	4 Faces LLC	IRR	0.28	40	3.18	41	3.2		3.2
1703-1	Mike & Debie Palmer	IRR	0.11	11	2.66	23	2.7		2.7
1703-2	Tim Hamilton	IRR	5.11	522	24	13	24		24
1721-2	Randy Luallin	IRR	0.02	1.7	14.9	41	14.9		14.9
1738-2	Black Hills Health & Education Center	IRR	0.09	60	4	40	4		4
1776-1	Kyle & Lucy Conklin	IRR	0.67	141.2	86	20	86.4		86.4
1798-2	Donald Konechne	IRR	0.6	42	22.2	39	22.2		22.2
1803-1	Albert & Ryett Harty	IRR, COM, GEO, DOM, IND	0.22	10	18.0	19	18.0	95.6	113.5
1817-1	Spike Jorgensen	IRR	0.22	38	23.5	19	23.5		23.5
1830-1	James F Wunder	IRR	0.89	10	6.06	18	6.1		6.1
1867-2	Tim Hamilton	IRR	0	120	0	9	240		240
1869-1	Travis Schenk	IRR	0.33	42	43.2	16	43.2		43.2
1901-2	Donald P Wojciechowski	IRR	0.18	18	0.33	38	0.3		0.3
1953-2	Dept of Military	IRR	0.17	13	8.4	37	8.4		8.4
1970-1	Boulder Canyon Country Club	IRR	0.22	58.6	86.4	5	117.2		117.2
2247-2	James Borghum	IRR, DOM	0.09	8	6.2	30	6.2	39.1	45.3
2498A-2	Countryside Homeowners Association	IRR	0.09	107	9.1	6	214		80.36*
2750-2	Chapel in the Hills	IRR	0.145	5.5	3.0	7	11		11
2806-2	Black Hills Power Inc	IRR	0.1	7.7	19.8	3	15.4		15.4
341A-1	Cris D/Dianne K Miller	IRR	3.4	391	104	29	104		104
341B-1	Bear Butte Wildlife LLC	IRR	1.19	83.5	35.7	29	35.7		35.7
372-1	Richard D Sleep	IRR	1.78	174	278.2	41	278.2		278.2
498-2	State Veterans Home	IRR, INS	1.1	21	34	41	34	477.8	511.8
513-1	False Bottom Livestock	IRR	1.11	193.7	3	41	3		3
566-1	Eric/Michelle Jennings	IRR	1.1	121	28.6	40	28.6		28.6
660-1	John/Brenda Swanson	IRR	1.77	263	227.7	41	227.7		227.7
684-1	Edgar & Carole Kellem	IRR	1.1	133	14.8	41	14.8		14.8
709-1	Cundy Trust	IRR	1	71.5	37.0	41	37.0		37
728-1	Spearfish Canyon Country Club	IRR, COM	0.66	56.7	50.9	40	50.9	286.7	337.6
775-1	John E Swanson	IRR	1.97	138.5	143.1	41	143.1		143.1
826-1	Belle Fourche Country Club	IRR	0.8	56.2	136.1	41	136.1		136.1
842-1	Robert Phelps	IRR	1	70	2.7	38	2.7		2.7
843-1	Deb Wilburn	IRR	0.77	54	0.598	41	0.6		0.6
876-1	Gene E Johnson	IRR	1	71.3	66.4	40	66.4		66.4
889-1	Crago Cattle Co	IRR	1.6	149	98	22	98		98
891-1	Billy J Evans	IRR	1.77	126.9	116.0	41	116.0		116
1582-1	Bear Butte Wildlife LLC	FWP, IRR	1.6	0**	17.5	22	17.7	***	17.7
LC: Licensed Water Right; PE: Water Permit; *Permit limited by authorized annual volume;								TOTAL:	4,019
Authorized to irrigate acres covered under different permits; *Non-irrigation use accounted for on Table 1									

Localized Hydrologic Budget: *Carter, Driscoll, Hamade, & Jarrell (2001b)*

Carter and others (2001b) calculated hydrologic budgets for subareas of the Madison and Minnelusa aquifers for the Black Hills (in SD and WY) during the water years of 1987 to 1996. The budgets were calculated by dividing the Black Hills into nine subareas with the intent of minimizing groundwater flow to and from adjacent subareas. These subareas were determined based on several factors, including locations of major artesian springs, streamflow loss zones, and areas dominated by precipitation recharge. The proposed diversion point for Water Permit Application No. 2872-2 is located in Subarea 4 (Figure 2). The hydrologic budget for Subarea 4 is displayed in Table 7 (Carter et al., 2001b).

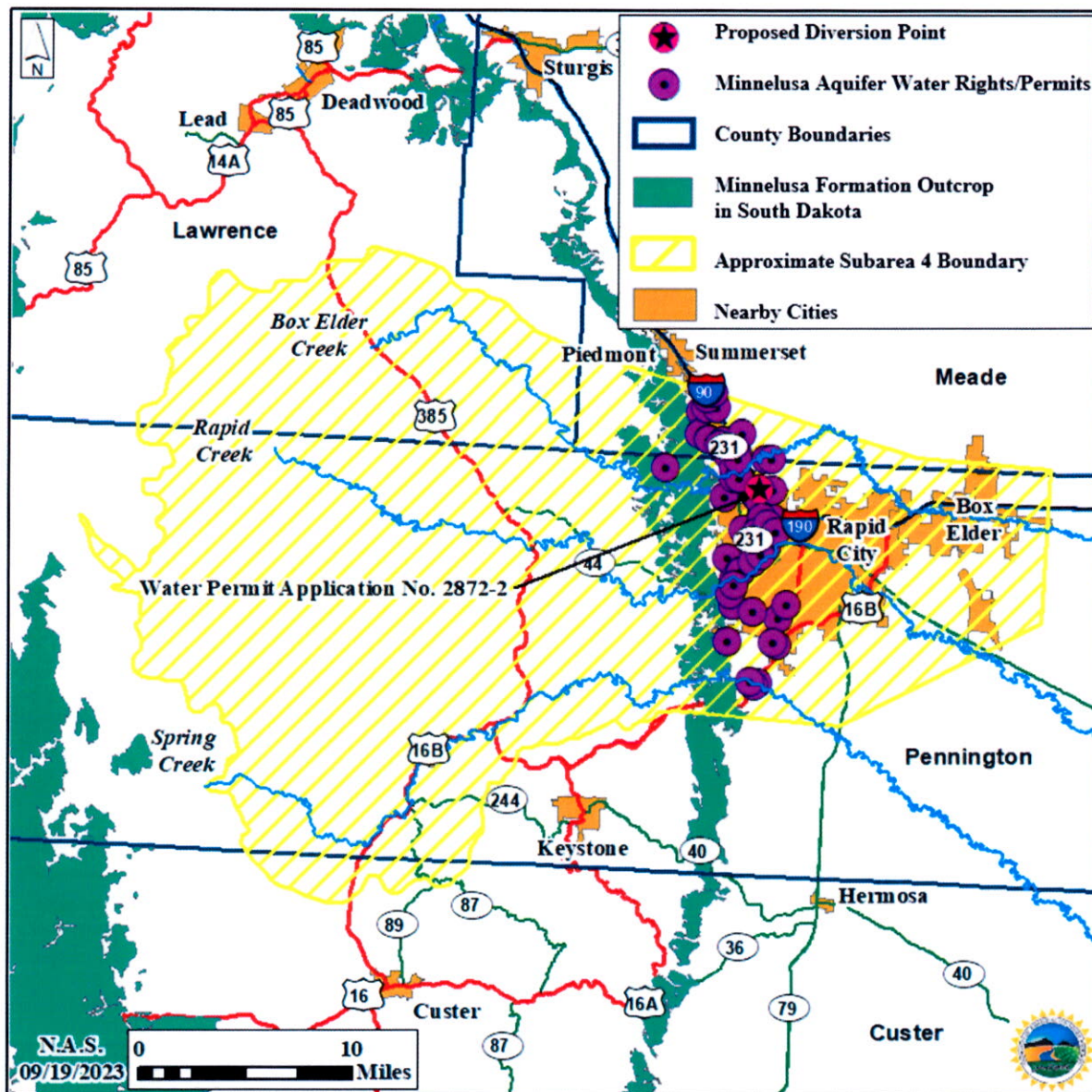


Figure 2. Subarea used for the Madison and Minnelusa aquifers localized hydrologic budgets (modified from Carter et al., 2001b), the Minnelusa Formation outcrop (Martin et al., 2004), the location of the proposed diversion point for Water Permit Application No. 2872-2, and the Minnelusa aquifer water rights/permits and observation wells within Subarea 4 (Water Rights, 2023b and 2023c)

Table 7. Estimated average annual hydrologic budget for Subarea 4 for the Madison and Minnelusa aquifers in the Black Hills (in SD and WY) for the water years 1987 to 1996 (modified from Carter et al., 2001b)

Subarea 4	Inflow:			Outflow:		
	Streamflow Recharge	Precipitation Recharge	Net Groundwater Inflow	Artesian Springflow	Wells	Net Groundwater Outflow
cfs	33.7	5.7	0	26.2	7.2	5.9
acre-feet/year	24,412.3	4,129.1	0	18,979.3	5,215.7	4,274

As shown in Table 7, Carter and others (2001b) estimated the average annual recharge rate to Subarea 4 for the Madison and Minnelusa aquifers due to streamflow, precipitation, and groundwater inflow recharge to be approximately 24,412.3 acre-feet per year. Carter and others (2001a) determined that of the combined average annual recharge rate, approximately 45% of the total recharge goes to the entire Minnelusa aquifer. Although 45% of the total recharge going to the Minnelusa aquifer is for the entirety of the Minnelusa Formation outcrop area in the Black Hills, this percentage can still be used to roughly approximate the average annual recharge rate to the Minnelusa aquifer in Subarea 4, which equates to approximately 10,985.5 acre-feet per year.

Groundwater models rely on several assumptions and the hydrologic budget for the subarea determined by Carter and others (2001b) does not account for other factors contributing to recharge. Additional recharge is likely available through upward leakage from underlying aquifers, through infiltration of precipitation at areas other than the Black Hills where the Minnelusa Formation outcrops, through streamflow losses, and through well withdrawals inducing groundwater inflow from outside the subarea.

Currently in Subarea 4, there are 58 water rights/permits authorized to withdraw from the Minnelusa aquifer (Water Rights, 2023c). For the water rights/permits authorized for irrigation use, an application rate of two feet per authorized acre per year was utilized for the purpose of estimating the average annual withdrawal rate from the Minnelusa aquifer. The average annual withdrawal rate from the Minnelusa aquifer for the non-irrigation water rights/permits was estimated utilizing the same methods used for the non-irrigation water rights/permits in Table 1. Including Water Permit Application No. 2872-2 (if approved), the estimated average annual withdrawal rate from the Minnelusa aquifer is approximately 8,100 acre-feet per year from Subarea 4. Based on the hydrologic budget for the water rights/permits within Carter and others (2001b) Subarea 4, there is a reasonable probability unappropriated water is available from the Minnelusa aquifer for the proposed appropriation.

MINNELUSA AQUIFER – OBSERVATION WELL DATA:

Administrative Rule of South Dakota (ARSD) 74:02:05:07 requires that the Water Management Board shall rely upon the record of observation well measurements in addition to other data to determine that the quantity of water withdrawn annually from the aquifer does not exceed the estimated average annual recharge of the aquifer.

Observation wells provide data on how the aquifer reacts to regional climatic conditions and local pumping. The DANR-Water Rights Program monitors 23 observation wells completed into

the Minnelusa aquifer (Water Rights, 2023b). The three closest observation wells to the proposed diversion point are PE-84B (approximately 1.9 miles northwest), PE-64A (approximately two miles southeast), and PE-89D (approximately 2.2 miles southwest) (as shown in Figure 6) (Water Rights, 2023b). The hydrographs for these observation wells are displayed in Figures 7 to 9 (Water Rights, 2023b). The data points utilized to construct the hydrographs are measurements of the static water level in the observation wells from the top of the well casing.

Observation well PE-84B is approximately 1.3 miles from the closest Minnelusa Formation outcrop, PE-64A is approximately 0.1 miles, and PE-89D is approximately 0.6 miles. The outcrop is a primary recharge area for the Minnelusa aquifer. As such, the hydrographs for PE-84B, PE-64A, and PE-89D are more reactive to the magnitude of recharge occurring on the outcrop than areas downgradient from the outcrop, resulting in observation wells near the outcrop showing greater fluctuations to seasonal recharge and withdrawals than observation wells further away. Overall, the hydrographs for the observation wells display generally stable to slightly increasing water levels over their respective periods of record. The hydrographs for these three observation wells were compared to the hydrographs for the other observations wells completed into the Minnelusa aquifer and each displayed a generally similar trend as shown on the hydrographs displayed in Figures 7 to 9 (Water Rights, 2023b). The hydrographs for the observation wells completed into the Minnelusa aquifer indicate that the aquifer responds well to climatic conditions because water levels are rising during wetter periods and declining to a stable water level during drier periods. Additionally, the water levels in the observation wells display that the amount of recharge to and natural discharge from the aquifer greatly exceeds pumping with the aquifer returning to pre-pumping conditions annually. Aquifer recovery indicates that climatic conditions and therefore, the effects of recharge to and natural discharges from the aquifer govern the long-term fluctuations of waters levels in the aquifer rather than the impacts of pumping from the Minnelusa aquifer. By recognizing that both recharge to and natural discharge from an aquifer can be captured for pumping, the observation well hydrographs demonstrate unappropriated water is available for the proposed appropriation.

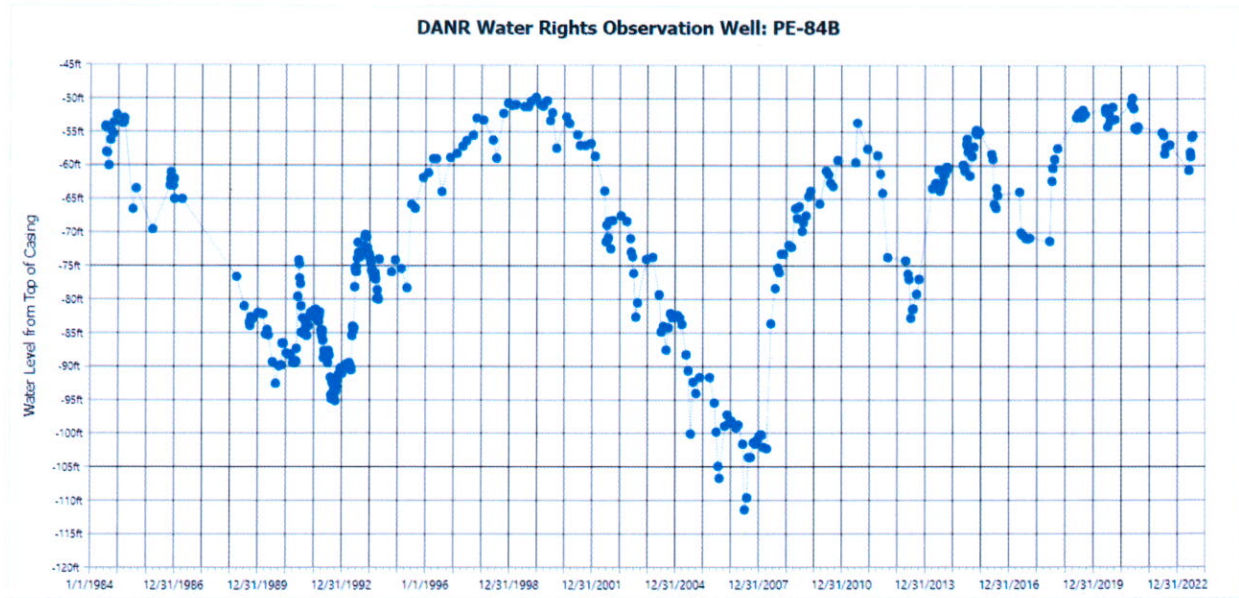


Figure 7. Hydrograph for observation well PE-84B (Water Rights, 2023b)

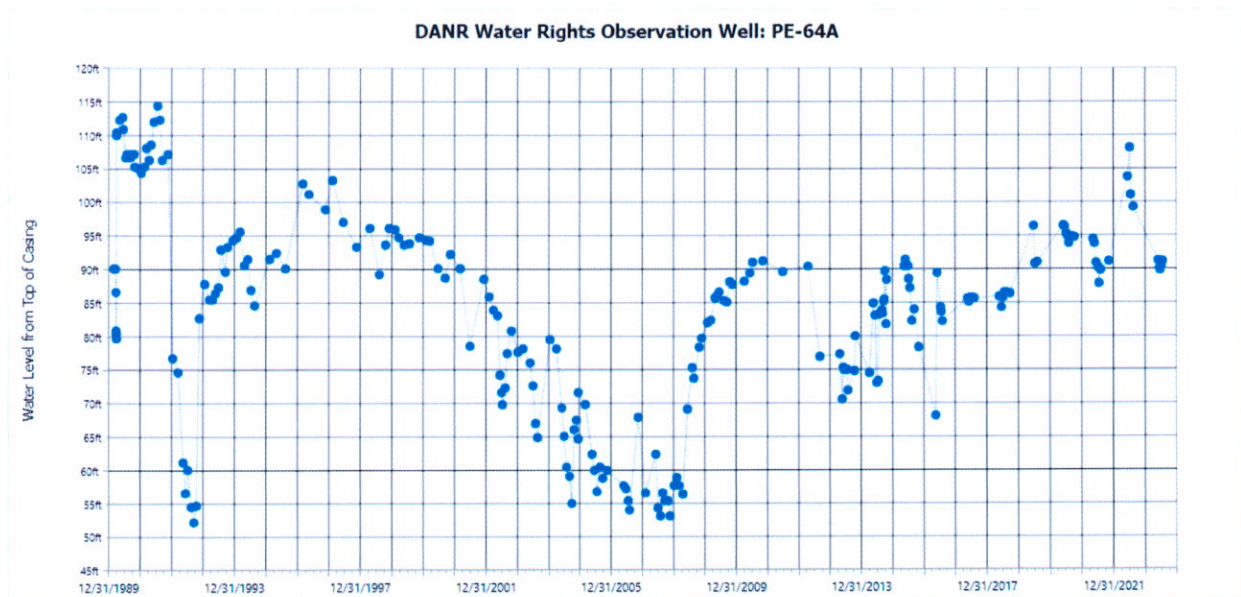


Figure 8. Hydrograph for observation well PE-64A (Water Rights, 2023b)

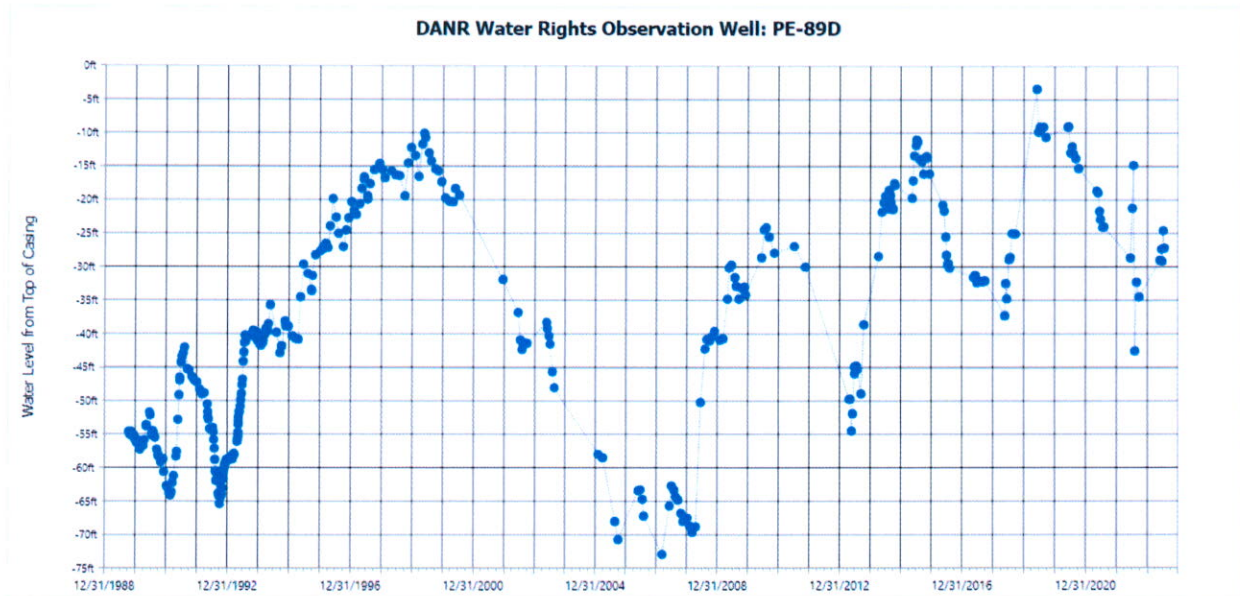


Figure 9. Hydrograph for observation well PE-89D (Water Rights, 2023b)

MINNELUSA AQUIFER – POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

Currently in South Dakota, there are 192 water rights/permits authorized to withdraw water from the entirety of the Minnelusa aquifer (including Water Right No. 1709-1) and one future use permit reserving water from the Minnelusa aquifer (Water Rights, 2023c). The closest water right/permit to the proposed diversion point is Water Right No. 1279-2, which is held by Pete Lien & Sons. The diversion point for Water Right No. 1279-2 is located approximately 0.4 miles southwest of the proposed diversion point for this application (Figure 10) (Table 8) (Water Rights, 2023c).

There are domestic wells on file with the DANR-Water Rights Program that are completed into the Minnelusa aquifer, with the closest domestic well on file (not held by the applicant) located approximately 0.7 miles northeast of the proposed diversion point (Water Rights, 2023d). There could potentially be other domestic wells completed into the Minnelusa aquifer near the proposed diversion point that are not on file with the DANR-Water Rights Program. The location of the domestic wells in the well completion report database maintained by the Water Rights Program is based on the location on the report listed by the driller at the time of well completion.

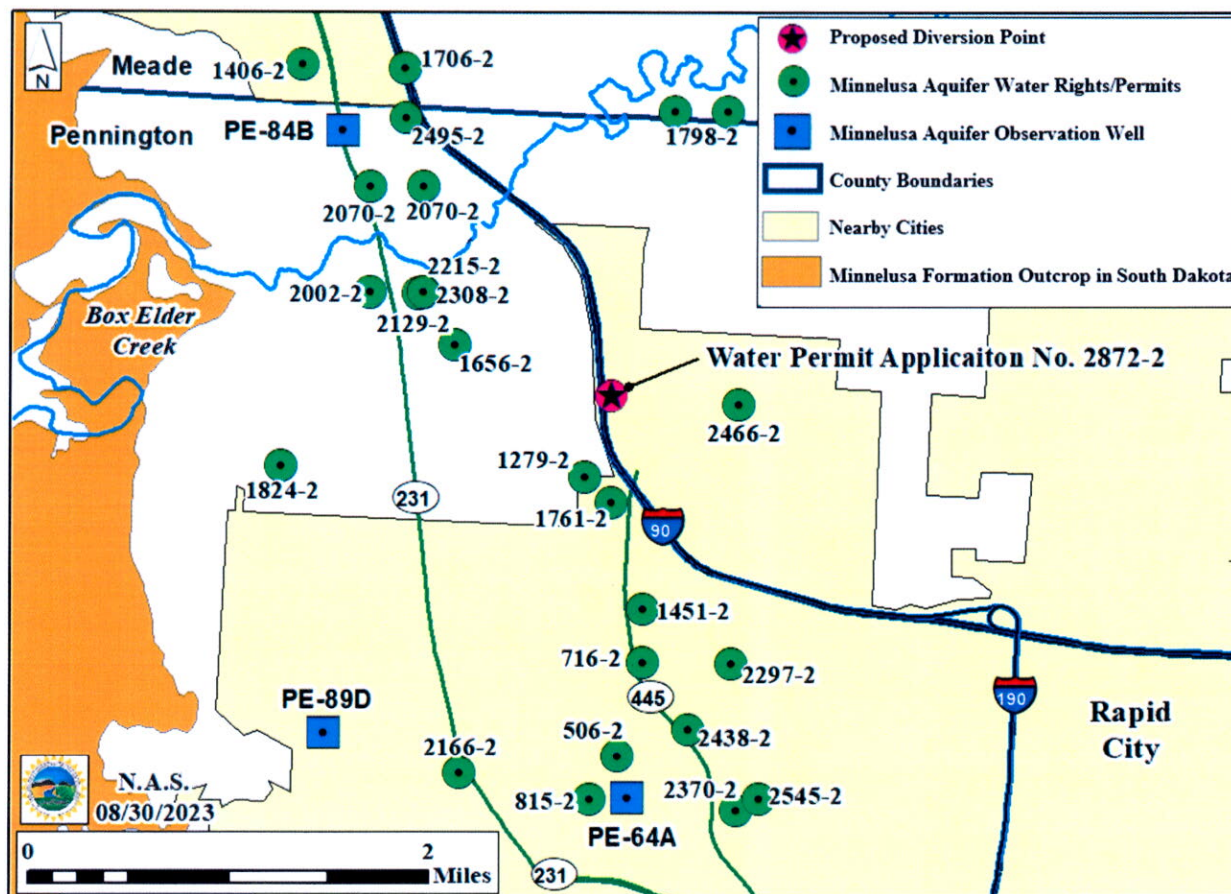


Figure 10. Location of the proposed diversion point for Water Permit Application No. 2872-2 with the Minnelusa aquifer water rights/permits and observation wells within approximately two miles (Water Rights, 2023b and 2023c)

Table 8. Water rights/permits authorized to withdraw water from the Minnelusa aquifer within approximately two miles of the proposed diversion point, as shown in Figure 10 (Water Rights, 2023c)

Permit No.	Name	Status	Use	Authorized Acres if IRR	Authorized Diversion Rate (cfs)
506-2	Pete Lien & Sons	LC	IND		0.340
716-2	Julian Staven	LC	COM		0.070
815-2	GCC Dacotah Inc	LC	IND		1.570
1279-2	Pete Lien & Sons	LC	IND		0.680
1406-2	Rodney L Vollmer	LC	SHD		0.110
1451-2	Rapid Chevrolet Co Inc	LC	COM		0.160
1656-2	Pete Lien & Sons	LC	IND		2.230
1706-2	Northdale Sanitary District	LC	SHD		0.440
1761-2	Pete Lien & Sons	LC	DOM		0.100
1798-2	Donald Konechne	LC	IRR	42	0.600
1824-2	Hidden Valley Water Users Association	LC	SHD		0.110
2002-2	Pete Lien & Sons	LC	COM		0.080
2070-2	Rodney L Vollmer	LC	SHD		0.150
2129-2	Ponderosa Ranch LLC	LC	SHD		0.167
2166-2	Elizabeth M Frederick	LC	COM		0.022
2215-2	Mac Construction	LC	COM		0.022
2297-2	Franklin Simpson	LC	COM		0.038
2308-2	B & J Mobile Home Park	LC	SHD		0.160
2370-2	Mike Sweet	LC	COM		0.133
2438-2	Stan Houston Equipment	LC	COM		0.133
2466-2	Black Hills Corporation	LC	IND		0.330
2495-2	Cobblestone Ridge LLC	LC	SHD		0.170
2545-2	Cedar Investment Property Inc	PE	COM		0
LC: Licensed Water Right; COM: Commercial; DOM: Domestic; IND: Industrial; IRR: Irrigation;					
MUN: Municipal; SHD: Suburban Housing Development					

The Minnelusa aquifer can exist under both confined and unconfined aquifer conditions (Long and Putnam, 2009; Water Rights, 2023b and 2023d). Based on the water well completion reports on file, and lithologic logs on file for nearby observation wells, the Minnelusa aquifer is expected to be confined near the proposed diversion point (SDGS, 2023; Water Rights, 2023b and 2023d). Drawdown created by pumping a well generally does not extend far from the pumped well in an unconfined aquifer; however, in a confined aquifer, drawdown from pumping could extend a distance from the diversion point. The exact drawdown behavior of a well cannot be known without an aquifer performance test. However, observation wells completed into the Minnelusa aquifer near permitted/licensed diversion points can provide some insight on how the aquifer responds to pumping.

Observation well PE-84B (approximately 1.9 miles northwest of the proposed diversion point) has four high-yield wells (assumed to be a well with an authorized diversion rate greater than 0.2 cfs) within approximately two miles of it (Water Rights, 2023b and 2023c). Some drawdown

resulting from pumping can be seen on the hydrograph for PE-84B, along with the water level in the aquifer recovering in response to recharge during the spring season (Figure 7) (Water Rights, 2023b). The lithologic log on file for PE-84B noted the well was drilled approximately 560 feet below the ground surface, had a casing stick up height of zero feet, and the top of aquifer materials approximately 455 feet below the ground surface (SDGS, 2023). The lowest recorded static water level on the hydrograph is approximately 112 feet below the top of the well casing (shown on Figure 7), which indicates there was still approximately 340 feet of artesian head pressure in PE-84B even during a drier period when wells are expected to be pumping more water and when water levels are generally naturally lower in response to drier conditions (SDGS, 2023; Water Rights, 2023b).

Within approximately two miles of the proposed diversion point, wells completed into the Minnelusa aquifer have a saturated aquifer thickness ranging from approximately 20 to 60 feet (SDGS, 2023; Water Rights, 2023d). This would generally allow for enough thickness for a pump to be placed 20 feet below the top of the aquifer, which is required for the well to be considered adequate under ARSD 74:02:04:20(6). Any drawdown as a result of the proposed diversion for this application is not expected to unlawfully impair nearby adequate wells. In Meade and Pennington Counties, there are no substantiated complaints on file with the DANR-Water Rights Program regarding well interference for adequate wells completed into the Minnelusa aquifer (Water Rights, 2023e).

The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has developed rules to allow water to be placed to maximum beneficial use without the necessity of maintaining artesian head pressure for domestic use. The Water Management Board defined an “adversely impacted domestic well” in ARSD 74:02:04:20(7) as:

“A well in which the pump intake was set at least 20 feet below the top of the aquifer at the time of construction or, if the aquifer is less than 20 feet thick, is as near to the bottom of the aquifer as is practical and the water level of the aquifer has declined to a level that the pump will no longer deliver sufficient water for the well owner’s needs.”

The Water Management Board considered the delivery of water by artesian head pressure versus maximum beneficial use during the issuance of Water Right No. 2313-2 for Coca-Cola Bottling Company of the Black Hills. The Board adopted the Findings of Facts and Conclusions of Law that noted the reservation of artesian head pressure for delivery of water would be inconsistent with SDCL 46-1-4 which states, “general welfare requires that the water resources of the state be put to beneficial use to the fullest extent of which they are capable...” (Water Rights, 1995). Furthermore, the Water Management Board found if increased cost or decreased production as a result of impacts on artesian head pressure by legitimate users is to be considered as an unlawful impairment, it would also conflict with SDCL 46-1-4 (Water Rights, 1995). With that in mind, some existing well owners may need to install or lower pumps depending on the specific characteristics of the Minnelusa aquifer at their location. However, when considering the statutes (SDCL 46-1-4 and 46-6-6.1), rules (ARSD 74:02:04:20(6) and (7)), the estimated saturated

thickness of the Minnelusa aquifer near the proposed diversion point, the artesian head pressure in observation wells near permitted/licensed diversion points, and the lack of well interference complaints, any drawdown created from the proposed diversion is not expected to cause an unlawful impairment on existing water right/permit holders or domestic users with adequate wells. Therefore, there is a reasonable probability that any interference from the proposed appropriation will not impose unlawful impairments on existing users with adequate wells.

Additional Considerations: Springs

In the past, there have been concerns that development of the Minnelusa aquifer will affect spring discharge. The nearest spring to the proposed diversion point is City Springs (approximately two miles southwest of proposed diversion point), which discharges from the Minnelusa Formation (Driscoll et al., 2002; USGS, 2023). The next nearest spring (approximately four miles southeast of proposed diversion point) was identified as discharging from the Inyan Kara Group (USGS, 2023). Lastly, Cleghorn Springs and Jackson Springs (approximately five miles southwest of proposed diversion point) are sourced primarily by water from the Minnelusa aquifer (Driscoll et al., 2002).

The Minnelusa Formation and Madison Limestone both generally underly the Minnekahta Limestone in the Black Hills of South Dakota (Fahrenbach et al., 2010). For water from the aquifers contained within the Minnelusa Formation and Madison Limestone to reach the springs discharging from the Inyan Kara aquifer, the water would have to travel through the Minnekahta Limestone. This same process occurs at many of the major springs in the Black Hills. The path that this water travels through the Minnekahta Limestone has not been extensively studied; however, breccia pipes and karst features have been identified in the Minnekahta Limestone throughout the Black Hills.

When considering the deferral of Water Permit Application No. 2585-2 for the Southern Black Hills Water System, the Water Management Board adopted a conclusion of law stating in part "...The only protection South Dakota law provides when considering an application for an underground water permit for flow from an artesian spring is under the public interest criteria" (Water Rights, 1997). Given the distance between the proposed diversion point and the springs mentioned above, while considering the applicant's proposed maximum diversion rate, there is a reasonable probability Water Permit Application No. 2872-2 can be developed without making an impact that would be measurable above the natural fluctuations in the nearest spring(s) that likely are or could be influenced by water coming from the Minnekahta or Minnelusa aquifers.

MINNEKAHTA AND MINNELUSA AQUIFERS - CONCLUSIONS:

1. Water Permit Application No. 2872-2 proposes to appropriate up to 3.07 acre-feet of water annually at a maximum instantaneous diversion rate of 0.133 cfs from one well to be completed into either the Minnekahta or Minnelusa aquifer (approximately 450 to 650 feet deep) for commercial use. The site of interest is located in Pennington County in the northwest part of Rapid City, SD.

2. Based on the observation well data and hydrologic budget, there is a reasonable probability that unappropriated water is available from either the Minnekahta or Minnelusa aquifers to supply the proposed appropriation.
3. There is a reasonable probability that the proposed diversion by Water Permit Application No. 2872-2 will not unlawfully impair adequate wells for existing water right/permit holders and domestic users.

Nakaila Steen

Nakaila Steen
Natural Resources Engineer II
SD DANR - Water Rights Program

Reviewed by:

Adam Mathiowetz

Adam Mathiowetz, PE
Natural Resources Engineer IV
SD DANR - Water Rights Program

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**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

**NOTE: TO BE SURE OF PUBLICATION ON
THE CORRECT DATES, CONTACT
THE NEWSPAPER RIGHT AWAY.**

September 28, 2023

Butler Machinery Company
Twylah Blotsky, President
3401 33rd Street S
Fargo ND 58104

Dear Ms. Blotsky:

Water Permit Application No. 2872-2 for commercial use has been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Rapid City Journal printed in Rapid City SD (Ph # 605 XX). You will need to contact the newspaper and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

Be sure to contact the above newspaper to authorize publication of your Notice and to arrange for payment. Early contact with the paper can eliminate delays. Upon receiving authorization from you, the publisher has been instructed to publish your notice. The newspaper has also been instructed to send us the Proof of Publication. We must receive Proof of Publication before action can be taken on the application.

Sincerely,

Rachel Rodriguez

Rachel Rodriguez
Water Rights Program
(605) 773-3352

enclosures

NOTE: If you plan to contest any part of the Chief Engineer's recommendation, you must file a petition pursuant to the procedures outlined in the attached notice of hearing. The Water Management Board will then consider your concerns during a hearing on the application.

NOTICE OF APPLICATION NO. 2872-2 to Appropriate Water

Notice is given that Butler Machinery Company, Twylah Blotsky, President, 3401 33rd Street S, Fargo ND 58104 has filed an application for a water permit to appropriate up to 3.07 acre-feet of water annually at a maximum pump rate of 0.133 cubic feet of water per second from one well to be completed into the Minnekahta or Minnelusa Aquifer (approximately 450 - 650 feet deep) located in the SE 1/4 NE 1/4 Section 21-T2N-R7E for commercial use. This site is located in the northwest part of Rapid City SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2872-2 with qualifications because 1) unappropriated water is available, 2) existing domestic water uses and water rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest as it pertains to matters within the regulatory authority of the Water Management Board. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501" or call (605) 773-3352. The applicant's mailing address is given above. If contesting the Chief Engineer's recommendation, the applicant shall also file a petition. A petition filed by either an interested person or the applicant must be filed by October 16, 2023.

The petition shall include a statement describing the unique injury upon approval of the application on the petitioner, the petitioner's reasons for opposing the application, and the name and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by October 16, 2023.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the application or contesting the recommendation is filed, then a hearing will be scheduled, and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

Published once at the total approximate cost of _

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Tuesday, September 26, 2023 8:59 AM
To: RCY Legals
Subject: 2872-2 Butler Machinery Company - Public Notice
Attachments: 2872-2 public.short_final.docx; FORM8.FRM.doc

Attached is a notice to be published on October 5, 2023.

Butler Machinery Company, Twylah Blotsky, President, 3401 33rd Street S, Fargo ND 58104, (701-232-0033) has been notified to contact you to authorize publication and arrange for payment.

Please send the affidavit or return the attached Proof of Publication form ASAP to the Water Rights Program, 523 E Capitol Ave, Pierre SD 57501.

Let me know if you have questions. Please acknowledge receipt of this email.

Thank you,

Rachel Rodriguez
DANR | Program Assistant
Rachel.Rodriguez@state.sd.us



*** Proof of Publication ***

STATE OF INDIANA)

County of Lake)

SS:

RECEIVED

OCT 13 2023

OFFICE OF
WATER

S.D. DANR - GROUND WATER

523 E CAPITOL AVE

PIERRE SD 57501

ORDER NUMBER 60409

I, Robin Nelson, being
duly sworn, upon his/her oath says: That he/she is now and was at all
time hereinafter mentioned, a clerk of the RAPID CITY JOURNAL, a
corporation of Rapid City, South Dakota, a legal and daily newspaper
printed and published in Rapid City, in said County of Pennington, and
has full and personal knowledge of all the facts herein stated as
follows: that said newspaper is and at all of the times herein
mentioned has been a legal and daily newspaper with a bonafide paid
circulation of at least Two Hundred copies daily, and has been printed
and published for at least one year prior to the first date of the
published notice.

This affidavit is a true and corrected copy of notice which appeared in
said newspaper on the following dates:

10/5/23
[Signature]

Section: Legal

Category: 0072 Public Notices

PUBLISHED ON: 10/05/2023

TOTAL AD COST: 70.26

FILED ON: 10/5/2023

Subscribed and sworn to before me this 5 day of
OCTOBER, 2023.

Notary Public

My commission expires

_____, 20____

**NOTICE OF APPLICATION NO.
2872-2 to Appropriate Water**

Notice is given that Butler Machinery Company, Twyla Blotsky, President, 3401 33rd Street S, Fargo ND 58104 has filed an application for a water permit to appropriate up to 3.07 acre-feet of water annually at a maximum pump rate of 0.133 cubic feet of water per second from one well to be completed into the Minnekahta or Minnelusa Aquifer (approximately 450 - 650 feet deep) located in the SE 1/4 NE 1/4 Section 21-T2N-R7E for commercial use. This site is located in the northwest part of Rapid City SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 2872-2 with qualifications because 1) unappropriated water is available, 2) existing domestic water uses and water rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest as it pertains to matters within the regulatory authority of the Water Management Board. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501" or call (605) 773-3352. The applicant's mailing address is given above. If contesting the Chief Engineer's recommendation, the applicant shall also file a petition. A petition filed by either an interested person or the applicant must be filed by October 16, 2023.

The petition shall include a statement describing the unique injury upon approval of the application on the petitioner, the petitioner's reasons for opposing the application, and the name and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by October 16, 2023.

If the applicant does not contest the recommendation of the Chief Engineer and no petition to oppose the application is received, the Chief Engineer shall act on the application pursuant to the recommendation with no hearing held before the Water Management Board. If a petition opposing the

*** Proof of Publication ***

application or contesting the recommendation is filed, then a hearing will be scheduled, and the Water Management Board will consider this application. Notice of the hearing will be given to the applicant and any person filing a petition.

(Published October 5, 2023 for a total approximate cost of \$70.26 and may be viewed for free at www.sdpublishnotices.com)
Legal No: 60409

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Thursday, September 28, 2023 8:50 AM
To: MarkAJohnson@buttermachinery.com
Subject: 2872-2 Butler Machinery Company - Public Notice
Attachments: Rec.pdf; Ltr.pdf; PublicNotice.pdf

Good morning,

Attached is a copy of the report, chief engineer's recommendation and information regarding the public notice for your water permit application. As stated in the letter, **please contact the paper(s) as soon as possible to authorize publication and arrange for payment.** This information is also being mailed to you today.

Thank you,

Rachel Rodriguez
DANR | Program Assistant
Rachel.Rodriguez@state.sd.us





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

NOV 09 2023

Butler Machinery Company
c/o Twylah Blotsky
3401 33rd Street S
Fargo ND 58104

Dear Ms. Blotsky:

Enclosed is Water Permit No. 2872-2 authorizing construction of the water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

Form 10, *Notice of Completion of Works and Application of Water to Beneficial Use*, is enclosed. Please return this completed form after you have finished the system and have put the water to beneficial use. An investigation can then be scheduled so the water license may be issued, thus completing the acquisition of a water right.

An informational sheet *Common Water Right Questions* is also enclosed. This sheet is intended to answer some of the questions associated with obtaining and keeping a water right.

Sincerely,

Eric Gronlund, Chief Engineer
Water Rights Program
(605) 773-3352

enclosures



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

**Affidavit of Public Notice
Posting on DANR Website**

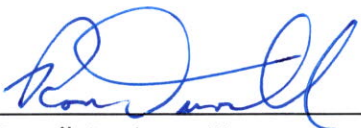
Pursuant to SDCL § 46-2A-4, public notice of the following application was posted on the DANR web site at <https://danr.sd.gov/public>. The posted public notice is the same notice as published in the pertinent newspaper(s) and a copy of the public notice is maintained in the application file. If the application is contested, the posting is moved to the DANR contested case website at <https://danr.sd.gov/public/ContestedCase.aspx> until final action is taken on the application pursuant to SDCL § 46-2A-4.

Application No.: 2872-2

Name of Applicant: Butler Machinery Company

Date of Posting: 10/2/2023

Date of Removal: 11/9/2023



Ron Duvall, Engineer III

11/9/2023

Date

Subscribed and sworn to before me, a notary public, this 9 day of Nov, 2023.



Notary Public - South Dakota
My commission expires: **Rachel Rodriguez**
My Commission Expires
May 16, 2029

(SEAL)



Location <u>SE</u> $\frac{1}{4}$ <u>NE</u> $\frac{1}{4}$ Sec <u>21</u> Twp <u>2N</u> Rg <u>7E</u> County <u>Pennington</u> GPS Coordinates Lat: <u>44.12091</u> Lon: <u>-103.27453</u> Please mark well location with an "X" on section grid Well Completion Date <u>12/7/2024</u> Distance from nearest potential pollution source (Septic tank, abandoned well, feed lot, etc.) <u>350</u> ft. from <u>Abandoned septic system</u> (identify source) PROPOSED USE: ☐ Domestic/Stock ☐ Municipal ☒ Business ☐ Monitoring Well ☐ Irrigation ☐ Industrial ☐ Institutional ☐ Test Hole ☐ Dewatering Well ☐ Geothermal ☐ Other _____ METHOD OF DRILLING: Rotary - Air CASING DATA: ☒ Steel ☐ Plastic ☐ Other If other describe _____ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>PIPEWEIGHT</th> <th>DIAMETER</th> <th>FROM</th> <th>TO</th> <th>HOLE DIAMETER</th> </tr> </thead> <tbody> <tr> <td><u>36 LB/FT</u></td> <td><u>9.625 IN</u></td> <td><u>0 FT</u></td> <td><u>40 FT</u></td> <td><u>13.5 IN</u></td> </tr> <tr> <td><u>23 LB/FT</u></td> <td><u>7 IN</u></td> <td><u>+2 FT</u></td> <td><u>630 FT</u></td> <td><u>8.875 IN</u></td> </tr> <tr> <td><u>O.H LB/FT</u></td> <td><u>IN</u></td> <td><u>630 FT</u></td> <td><u>645 FT</u></td> <td><u>8.875 IN</u></td> </tr> </tbody> </table> GROUTING DATA: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Grout Type</th> <th>No. of Sacks</th> <th>Grout Weight</th> <th>From</th> <th>To</th> </tr> </thead> <tbody> <tr> <td><u>cement</u></td> <td><u>18</u></td> <td><u>15.0 Lb/gal</u></td> <td><u>0.0 Ft</u></td> <td><u>40.0 Ft</u></td> </tr> <tr> <td><u>cement</u></td> <td><u>135</u></td> <td><u>15.0 Lb/gal</u></td> <td><u>0.0 Ft</u></td> <td><u>630.0 Ft</u></td> </tr> </tbody> </table> Describe grouting procedure <u>Pressure grouted through casing</u> SCREEN: ☐ Perforated pipe ☐ Manufactured Diameter _____ Inches Length _____ Feet Material _____ Slot Size _____ Set From _____ Feet to _____ Feet Other information _____ WAS A PACKER OR SEAL USED? ☐ Yes ☒ No If so, what material? _____ Describe packer(s) and location _____ DISINFECTION: Was well disinfected upon completion? ☒ Yes, How? <u>Chlorine solution</u> ☐ No, Why Not? _____ Lab sample sent to for water quality analysis _____	PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER	<u>36 LB/FT</u>	<u>9.625 IN</u>	<u>0 FT</u>	<u>40 FT</u>	<u>13.5 IN</u>	<u>23 LB/FT</u>	<u>7 IN</u>	<u>+2 FT</u>	<u>630 FT</u>	<u>8.875 IN</u>	<u>O.H LB/FT</u>	<u>IN</u>	<u>630 FT</u>	<u>645 FT</u>	<u>8.875 IN</u>	Grout Type	No. of Sacks	Grout Weight	From	To	<u>cement</u>	<u>18</u>	<u>15.0 Lb/gal</u>	<u>0.0 Ft</u>	<u>40.0 Ft</u>	<u>cement</u>	<u>135</u>	<u>15.0 Lb/gal</u>	<u>0.0 Ft</u>	<u>630.0 Ft</u>	Well Owner: <u>Butler Machinery Co.</u> Business Name: <u>Butler Machinery Co.</u> Address: <u>3601 Deadwood Ave</u> City, State, Zip: <u>Rapid City, SD 57702</u> WELL LOG: <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">FORMATION</th> <th colspan="2">DEPTH</th> </tr> <tr> <th>FROM</th> <th>TO</th> </tr> </thead> <tbody> <tr> <td><u>fill - Gypsum boulders</u></td> <td><u>0.0</u></td> <td><u>12.0</u></td> </tr> <tr> <td><u>Spearfish</u></td> <td><u>12.0</u></td> <td><u>371.0</u></td> </tr> <tr> <td><u>Minnekahta</u></td> <td><u>371.0</u></td> <td><u>412.0</u></td> </tr> <tr> <td><u>Opeche</u></td> <td><u>412.0</u></td> <td><u>531.0</u></td> </tr> <tr> <td><u>Minnelusa</u></td> <td><u>531.0</u></td> <td><u>645.0</u></td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> STATIC WATER LEVEL <u>72.0</u> FEET If flowing: closed in pressure _____ PSI GPM flow _____ through _____ Inch pipe Controlled by ☐ Valve ☐ Reducers ☐ Other _____ Reduced flow rate _____ GPM Can well be completely shut in? _____ WELL TEST DATA: ☐ Pumped Describe: <u>220 ft 0.5 hr. 19 GPM,</u> <u>320 ft 0.5 hr. 30 GPM</u> <u>420 ft 0.5 hr. 38 GPM</u> ☐ Bailed ☒ Air ☐ Other Pumping Level Below Land Surface <table border="1" style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td><u>620.0</u> Ft. After</td> <td><u>1.0</u> Hrs. pumped</td> <td><u>47.0</u> GPM</td> </tr> <tr> <td><u>645.0</u> Ft. After</td> <td><u>2.0</u> Hrs. pumped</td> <td><u>50.0</u> GPM</td> </tr> </tbody> </table> If pump installed, pump rate: _____ GPM REMARKS <u>well test data continued.. 520 ft. 0.5 hr. 46 GPM</u> <u>PERMIT NO. 2872-2</u> This well was drilled under license # <u>331</u> And this report is true and accurate. Drilling firm: <u>TAYLOR DRILLING CO.</u> Signature of License Representative: _____ Signature of Well Owner or Equitable Property Holder: _____ Date: _____	FORMATION	DEPTH		FROM	TO	<u>fill - Gypsum boulders</u>	<u>0.0</u>	<u>12.0</u>	<u>Spearfish</u>	<u>12.0</u>	<u>371.0</u>	<u>Minnekahta</u>	<u>371.0</u>	<u>412.0</u>	<u>Opeche</u>	<u>412.0</u>	<u>531.0</u>	<u>Minnelusa</u>	<u>531.0</u>	<u>645.0</u>										<u>620.0</u> Ft. After	<u>1.0</u> Hrs. pumped	<u>47.0</u> GPM	<u>645.0</u> Ft. After	<u>2.0</u> Hrs. pumped	<u>50.0</u> GPM
PIPEWEIGHT	DIAMETER	FROM	TO	HOLE DIAMETER																																																																			
<u>36 LB/FT</u>	<u>9.625 IN</u>	<u>0 FT</u>	<u>40 FT</u>	<u>13.5 IN</u>																																																																			
<u>23 LB/FT</u>	<u>7 IN</u>	<u>+2 FT</u>	<u>630 FT</u>	<u>8.875 IN</u>																																																																			
<u>O.H LB/FT</u>	<u>IN</u>	<u>630 FT</u>	<u>645 FT</u>	<u>8.875 IN</u>																																																																			
Grout Type	No. of Sacks	Grout Weight	From	To																																																																			
<u>cement</u>	<u>18</u>	<u>15.0 Lb/gal</u>	<u>0.0 Ft</u>	<u>40.0 Ft</u>																																																																			
<u>cement</u>	<u>135</u>	<u>15.0 Lb/gal</u>	<u>0.0 Ft</u>	<u>630.0 Ft</u>																																																																			
FORMATION	DEPTH																																																																						
	FROM	TO																																																																					
<u>fill - Gypsum boulders</u>	<u>0.0</u>	<u>12.0</u>																																																																					
<u>Spearfish</u>	<u>12.0</u>	<u>371.0</u>																																																																					
<u>Minnekahta</u>	<u>371.0</u>	<u>412.0</u>																																																																					
<u>Opeche</u>	<u>412.0</u>	<u>531.0</u>																																																																					
<u>Minnelusa</u>	<u>531.0</u>	<u>645.0</u>																																																																					
<u>620.0</u> Ft. After	<u>1.0</u> Hrs. pumped	<u>47.0</u> GPM																																																																					
<u>645.0</u> Ft. After	<u>2.0</u> Hrs. pumped	<u>50.0</u> GPM																																																																					

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