

WATER PERMIT NO. 8589-3

Name of Applicant: John Lindstrom

Address: 30524 466th Ave, Beresford SD 57004

Phone: 605 351-5937

Amount of Water Claimed: No add'l cfs

Total Acres: 50

Source of Water Supply: groundwater (one well)

Water to be used for: Irrigation

County: ^{Clay}
Bennett

Type of Waste Disposal System:

Location: 9 miles southwest of Beresford

PRIORITY

Date Received: 2-4-22

Application/License Fee: \$ 700

Corrected Application Received:

Period of Annual Use: May 1 – September 30

Remarks:

Diversion Point: near center of NW 1/4 Sec 16-
T94N-R51W

Land to be Irrigated: S 1/2 SW1/4 Sec 9-T94N-
R51W

Depth of Well: 125 feet deep

Well Driller: Heine Electric and Irrigation

Remarks:

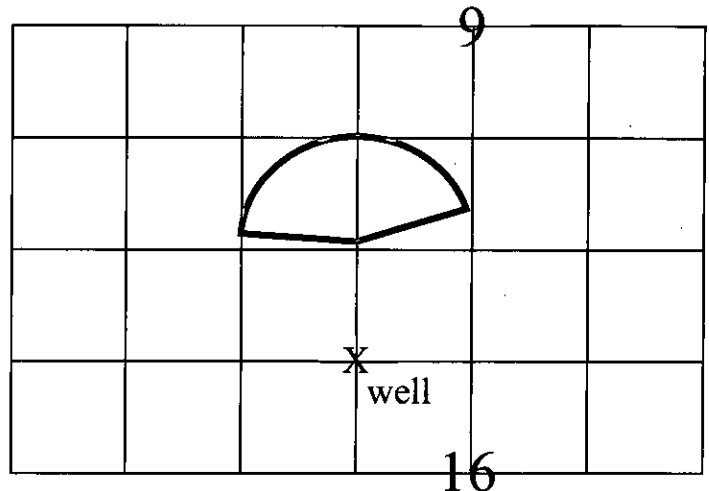
Type of Map: aerial photo

Prepared by:

Reviewed and the Number Assigned on: 2-8-22

By: **Ron Duvall**

Notice of Hearing - date to intervene: _____



**SOUTH DAKOTA
WATER PERMIT NO. 8589-3**

Date of first receipt of application February 4, 2022.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 8589-3 to John Lindstrom, 30524 466th Ave, Beresford SD 57004 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. 8589-3 authorizes irrigation of 50 additional acres from a well authorized by Water Permit No. 8484-3. The well completed into the Lower Vermillion Missouri Aquifer is located near the center of the NW1/4 section 16 and the 50 additional acres are in the S1/2 SW1/4 section 9; all in T94N-R51W. A maximum, combined, pump rate of 1.78 cubic feet of water per second from the well authorized by Permit No. 8484-3 will be used to irrigate the acreage covered by Permit No. 8484-3 plus the 50 additional acres included on this permit. This site is located approximately 9 miles southwest of Beresford SD.
2. The amount of the appropriation may not exceed 2 acre feet annually for each acre of land to which water is actually and beneficially applied for irrigation. The water is to be used during the following described annual period: May 1 – September 30.
3. The date from which applicant may claim right is February 4, 2022.
4. The date of approval of Permit No. 8589-3 is April 4, 2022.
5. One-fifth of the construction is to be completed on or before October 4, 2024.
6. All construction is to be completed on or before April 4, 2027.
7. Water is to be put to beneficial use on or before April 4, 2031.
8. 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 approved under Water Permit Nos. 8484-3 and 8589-3 is located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals 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.
2. This permit is approved subject to the irrigation water use questionnaire being submitted each year.

WATER MANAGEMENT BOARD

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

APR 28 2022
date



FORM 2: Application for irrigation in South Dakota

(type or print)

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>8589-3</u> (office use only)	Hydrologic Unit <u>10170102</u>
	Basin <u>Vermillion River</u>	
	Newspaper <u>Plain Talk</u>	
	<u>Press & Dakotan</u>	

PAID

FEB 4 2022

Ck# 2261

Rec't# _____

Application For Permit To Appropriate Water For Irrigation

 Type of Application: ☒ New ☐ Vested Right ☐ Amendment/Correction to Permit No. _____
 (Use predates Mar 2, 1955)

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

Adding additional acres from existing well1. Name to Appear on Irrigation Permit John Lindstrom

Note: The "Name to Appear on Irrigation Permit" must be the name in which the property to be irrigated is held in.

 Mailing Address 30524 44th Ave Berzford SD 57001
 (Address) (City) (State) (Zip Code)

 Phone _____ Mobile 605-351-5937 Email johnlindstrom@hotmail.com

 2. Amount of water claimed no add'l *CFS or ***GPM ***AF Total Acreage 50
 (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use if applicable)
3. Source of water supply existing well under 8484-3
 4. Location of point of diversion NE 1/4 Section 16 T94N R51W
NW (example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)
County Clay5. County or counties where water will be used Clay6. Annual period during which water is to be used May 1 - September 30
 7. List below each forty acre division, or lot, or fraction thereof and show number of acres to be irrigated in each.
 (Attach sheet if more space is needed)

Land Description	Acres	Land Description	Acres
<u>SW 1/4 SW 1/4 Section 9 T94N R51W</u>	<u>30</u>	<u>SE 1/4 SW 1/4 Section 9 T94N R51W</u>	<u>20</u>

8. Give a description of the project. (Attach sheet if more space is needed)

Center pivot on 80 acres windshield,
Minus building site so under 50 acres
Piping water from existing well 1/4 from south
Map attached

RECEIVED

FEB 04 2022

WATER RIGHTS
PROGRAM
 I, John Lindstrom Owner, 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 _____ Have test holes been drilled ☐ Yes ☐ No Drilled by _____
(if yes, please provide copies of logs)

b) If existing wells, how many 1 Provide copy of log(s), if available. Drilled by permit 8484-3

For either Existing or Proposed Wells:

c) Well Depth (required) _____ Depth to Top of Water Bearing Material _____ Depth to Water from Surface _____

d) Distance to nearest domestic well on applicant's property _____ Property owned by others _____

2. Wastewater Disposal System Information

a) Type of System (i.e. septic tank, drain field) _____

b) System Capacity (gallons) _____ Year Constructed _____

c) Connected to the City of _____ Sanitary System

3. Dugout Information

a) Surface Dimensions _____ Depth _____

b) Depth to water (ground surface to water level) _____

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)

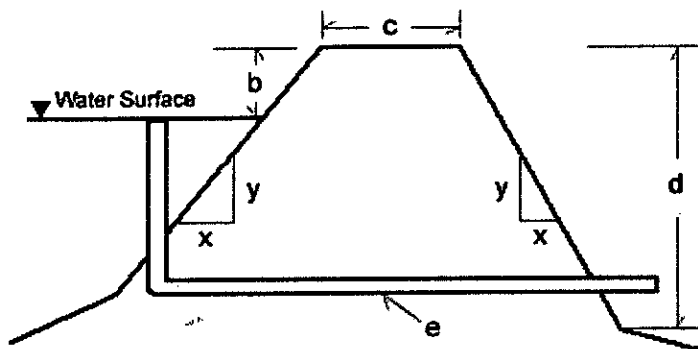
Upstream _____

Downstream _____

h) Surface Area of Impoundment _____

i) Storage _____ Acre Feet

j) Drainage Area Above Dam _____ Acres



Untitled Map

Write a description for your map.

Legend

-  Dalesburg Baptist Church Beresford, SD
-  Feature 1

Sata 42 SW 44 section 9

T94N R51W Clay County

47 acres

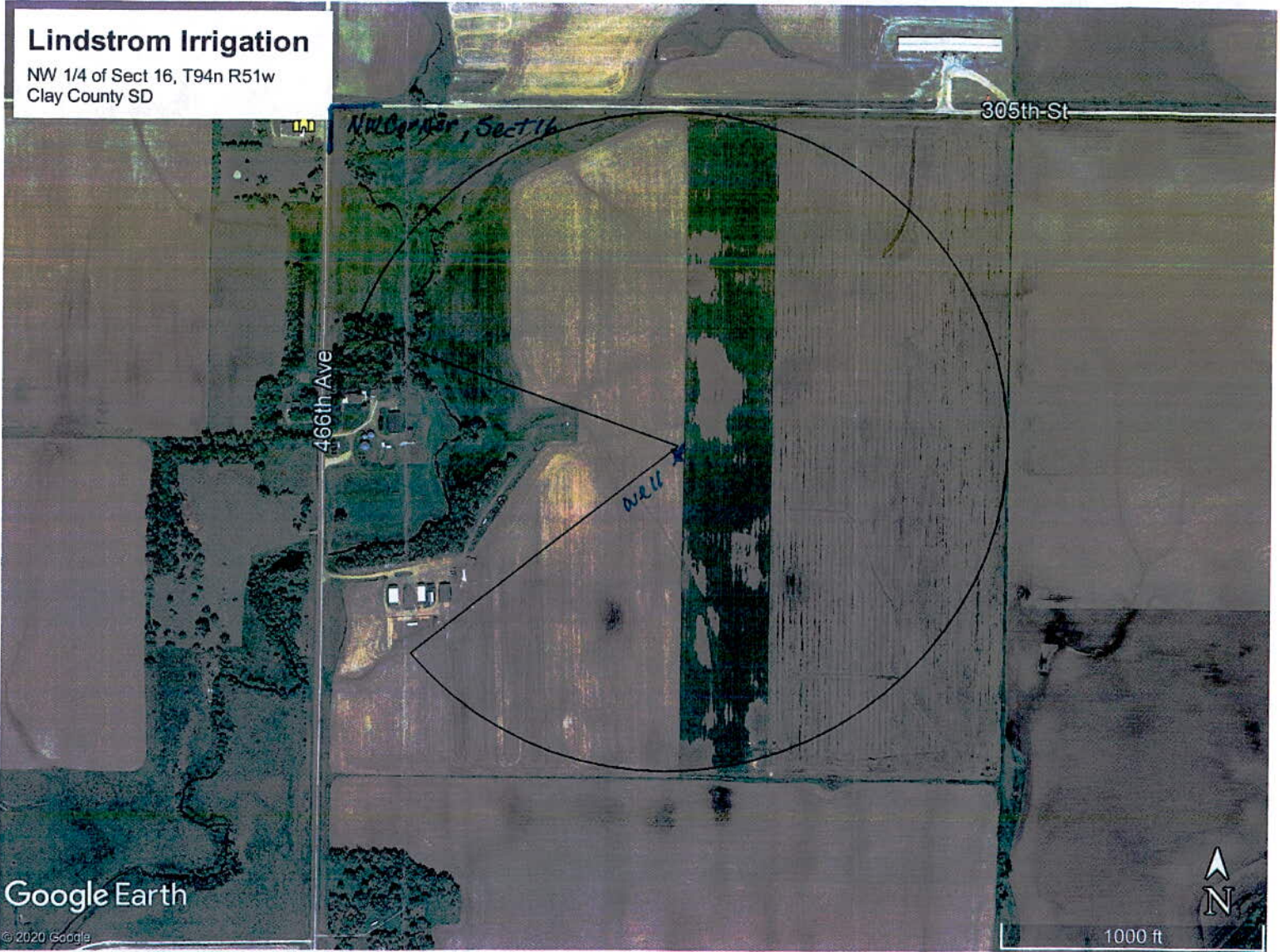
↓
well



1000 ft

Lindstrom Irrigation

NW 1/4 of Sect 16, T94n R51w
Clay County SD



Duvall, Ron

From: john lindstrom <johntlindstrom@hotmail.com>
Sent: Tuesday, February 8, 2022 11:35 AM
To: Duvall, Ron
Subject: Re: [EXT] Water Permit Application to add 50 acres in sec 9-T94N-R51W

Ron,

I intend to use the existing permitted amount and remain at combined total of 800 gpm.

Heine Electric and Irrigation drilled the existing well in the fall of 2021.

Heine Electric and Irrigation
31585 460th Ave, Vermillion, SD 57069
605-670-9567

Thanks,
John Lindstrom

From: Duvall, Ron <Ron.Duvall@state.sd.us>
Sent: Tuesday, February 8, 2022 11:21 AM
To: johntlindstrom@hotmail.com <johntlindstrom@hotmail.com>
Cc: Schlaak, Karen <Karen.Schlaak@state.sd.us>
Subject: Water Permit Application to add 50 acres in sec 9-T94N-R51W

John,

We received your application and \$700.00 fee. I have some questions that need to be answered and then we can start working on processing your application. You did not identify a pump rate on the application but did indicate you intend to use the well that was permitted under No. 8484-3. [8484-3.pdf \(sd.gov\)](#) The following snip is from the permit that was issued.

1. Water Permit No. 8484-3 appropriates 1.78 cubic feet of water per second (cfs) from one well to be completed the Lower Vermillion Missouri Aquifer (125 feet deep) located in the approximate center of the NW 1/4 Section for irrigation of 120 acres located in the NW 1/4 Section 16; all in T94N-R51W. This site is located approximately 12 miles northeast of Vermillion SD.

The permit was issued for 1.78 cfs which equates to 800 gallons per minute. Do you intend to increase this existing permitted amount or remain at a combined total of 800 gpm? By statute for irrigation of 50 acres the pump rate could be increased by 320 gallons per minute (gpm). However, there is also provision in statute to go above an additional 320 gpm due to the method of irrigation (in this case a pivot swinging a partial circle but still needing the full operating gpm as if it is swinging a full circle). Also, has the well for No. 8484-3 been drilled yet? If so, have you received a well completion report from the well driller?

Thank you,

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



DANR
SOUTH DAKOTA

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date February 4, 2022

RECEIVED OF John T Lindstrom 30524 466th Ave. Beresford SD 57004

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

Fee for Application for Permit No. <u>8589-3</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>8589-3</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

vm



**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. 8589-3, John Lindstrom**

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Chief Engineer, Water Rights Program, Department of Environment and Natural Resources concerning Water Permit Application No. 8589-3, John Lindstrom, 30524 466th Avenue, Beresford SD 57004.

The Chief Engineer is recommending APPROVAL of Application No. 8589-3 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 approved under Water Permit Nos. 8484-3 and 8589-3 is located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals 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.
2. This Permit is approved subject to the irrigation water use questionnaire being submitted each year.

See report on application for additional information.

Eric Gronlund, Chief Engineer
March 14, 2022

Report to the Chief Engineer
On Water Permit Application No. 8589-3

John Lindstrom

March 14, 2022

Water Permit Application No. 8589-3 proposes to irrigate 50 acres located in the S $\frac{1}{2}$ SW $\frac{1}{4}$ of Section 9-T94N-R51W from one well authorized by Water Permit No. 8484-3. The well authorized by Water Permit No. 8484-3 is to be completed into the Lower Vermillion Missouri aquifer (approximately 125 feet deep) and located near the center of the NW $\frac{1}{4}$ of Section 16-T94N-R51W.

If approved, Water Permit Application No. 8589-3 and Water Permit No. 8484-3 will collectively authorize a maximum instantaneous diversion rate of 1.78 cubic feet of water per second (cfs) from one well to be completed into the Lower Vermillion Missouri aquifer for the irrigation of 170 acres.

The site of interest is located in Clay County approximately nine miles southwest of Beresford, SD.

AQUIFER: Lower Vermillion Missouri (LVM)

HYDROGEOLOGY:

The Lower Vermillion Missouri aquifer is a buried glacial outwash that was deposited by meltwater streams beyond the margin of active glacial ice (Stephens, 1967). The aquifer materials range in size from a coarse sand to a coarse gravel (Niehus, 1994). The Lower Vermillion Missouri aquifer is hydrologically connected to the Upper Vermillion Missouri: South aquifer to the north, the Missouri: Elk Point aquifer to the south, the underlying Dakota aquifer and the Vermillion River (Buhler, 2014; Mathiowetz, 2018; Niehus, 1994; Stephens, 1967). The Lower Vermillion Missouri aquifer and the Missouri: Elk Point aquifer are essentially one continuous outwash deposit that was identified by Hedges and others (1982) at the aquifer boundary transition from primarily buried outwash (Lower Vermillion Missouri aquifer) to primarily unburied outwash (Missouri: Elk Point aquifer).

A boundary between the Upper Vermillion Missouri aquifer and Lower Vermillion Missouri aquifer has been delineated by Hedges and others (1982); however, more recent investigations have concluded the Upper Vermillion Missouri: South (UVM:S) aquifer extends an unspecified distance further south than what was delineated by Hedges and others (1982) (Buhler, 2014; Holmes and Filipovic, 2015). Figure 1 displays a map of the historic Lower Vermillion Missouri aquifer boundary approximated by Hedges and others (1982) with a portion of the Upper Vermillion Missouri: South aquifer estimated by Buhler (2014). The areal extent of the historic Lower Vermillion Missouri aquifer boundary delineated by Hedges and others (1982) is approximately 124,000 acres (Table 1).

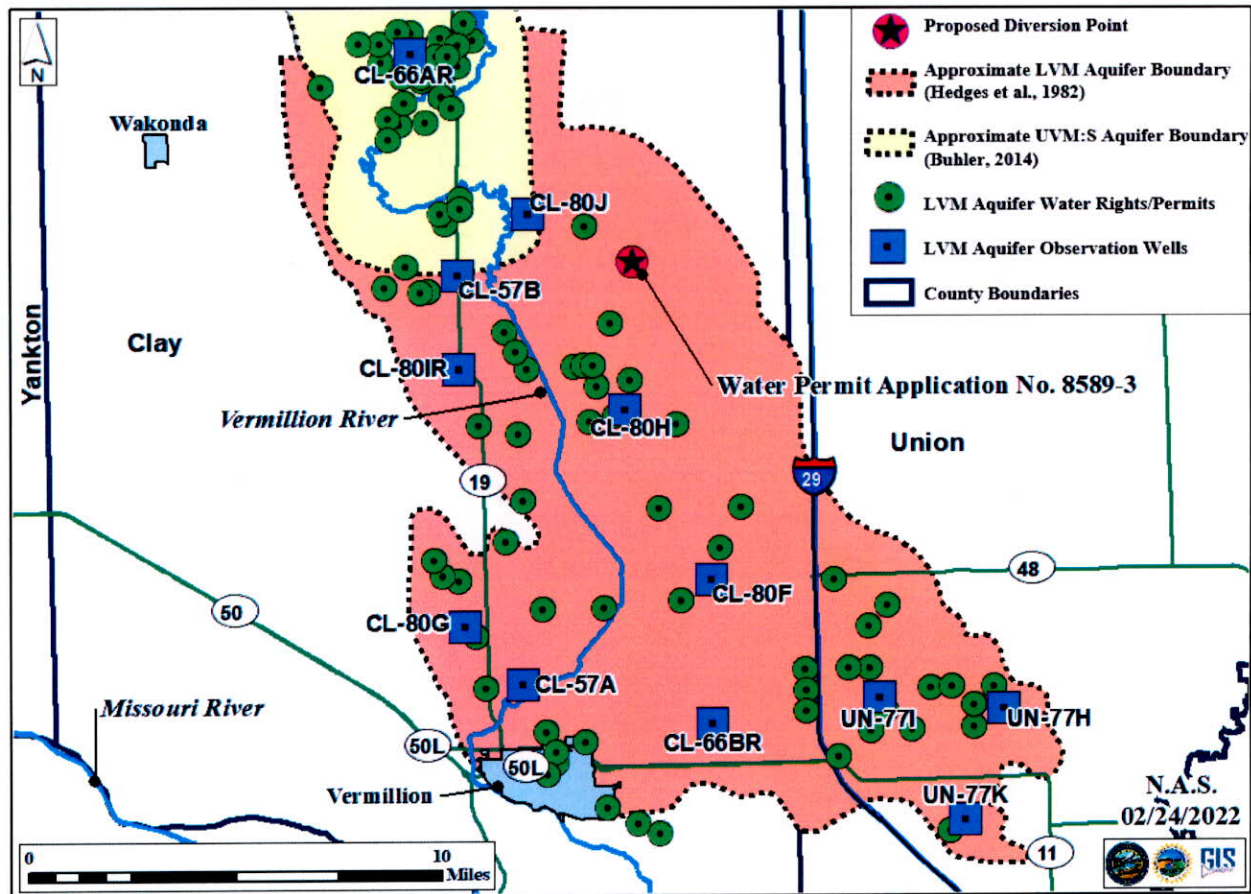


Figure 1. Map of the approximate LVM aquifer boundary delineated by Hedges and others (1982) with a portion of the UVM:S aquifer boundary estimated by Buhler (2014), the location of the proposed diversion point for Water Permit Application No. 8589-3, and the LVM aquifer water rights/permits and observation wells (Water Rights, 2022b and 2022c)

Figure 2 displays the current aquifer boundary for the Lower Vermillion Missouri aquifer (modified from Mathiowetz, 2018). Mathiowetz (2018) delineated the current Lower Vermillion Missouri aquifer boundary essentially by subtracting Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer from the historic aquifer boundary estimated by Hedges and others' (1982). Additionally, the first occurrence of aquifer materials maps for Clay and Union County were utilized in delineating the current aquifer boundary (Jensen, 2000; McCormick, 2004; Mathiowetz, 2020). The areal extent of the Lower Vermillion Missouri aquifer is approximately 106,000 acres (Table 1) (Mathiowetz, 2018).

The Lower Vermillion Missouri aquifer is primarily under confined conditions but can be locally unconfined, particularly near the Vermillion River floodplain (see Figure 2) (Niehus, 1994; Stephens, 1967). The alluvium, outwash, and sand and gravel deposits (0 to 50 feet below grade) mapped by Jensen (2000) along the Vermillion River are assumed to be unconfined portion of the Lower Vermillion Missouri aquifer (see Figure 2). In its entirety, the areal extent of the unconfined portion of the Lower Vermillion Missouri aquifer is approximately 23,000 acres (modified from Jensen, 2000; modified from Stonesifer, 2013). The unconfined portion of the Lower Vermillion Missouri aquifer that is located outside of Buhler's (2014) delineation of

Upper Vermillion Missouri: South aquifer is approximately 12,000 acres (Table 1) (modified from Jensen, 2000; modified from Stonesifer, 2013).

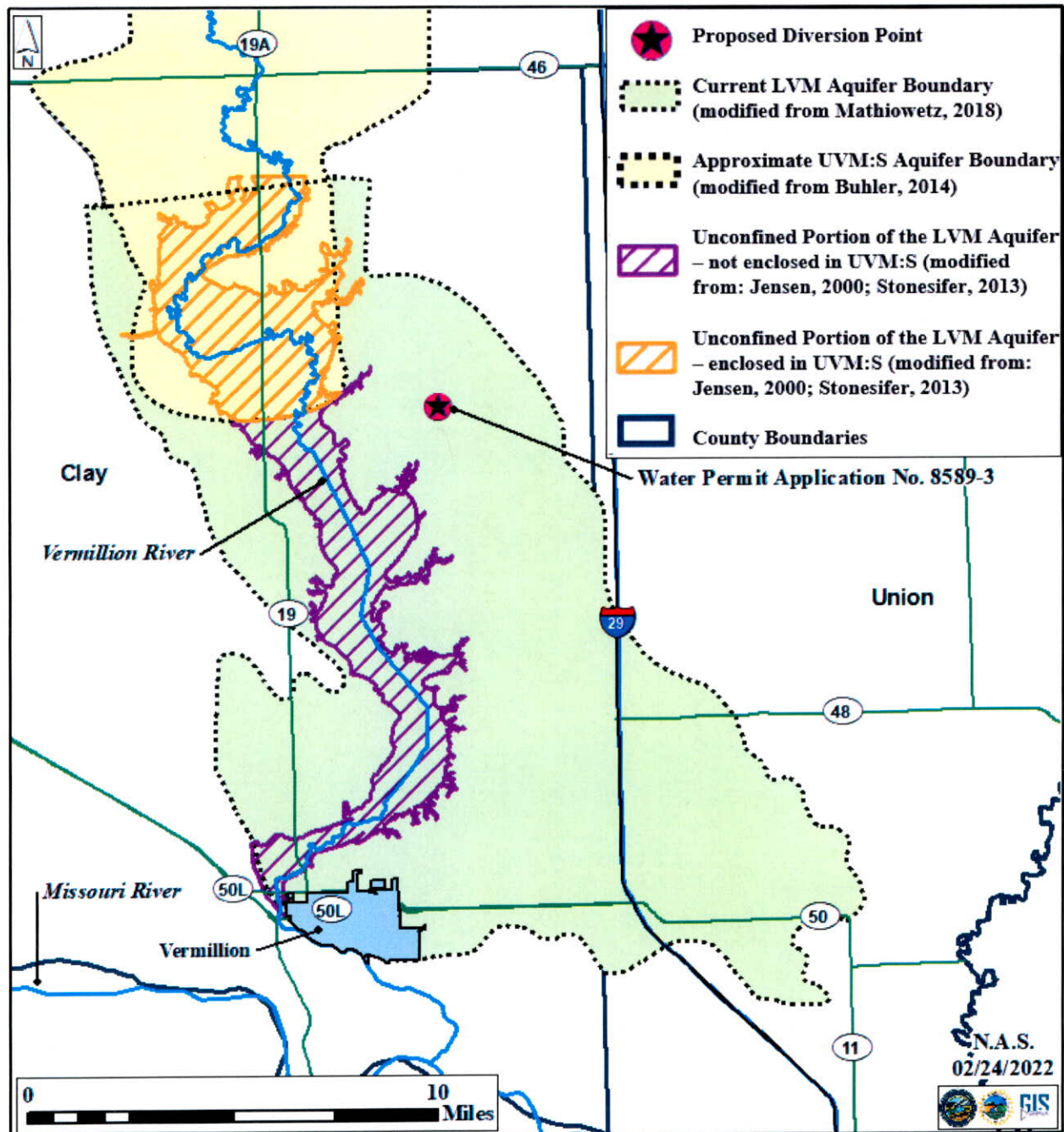


Figure 2. Map of the current LVM aquifer boundary (modified from Mathiowetz, 2018) with the portion of the UVM:S aquifer estimated by Buhler (2014), the estimated unconfined portion of the LVM aquifer (modified from Jensen, 2000; modified from Stonesifer, 2013), and the location of the proposed diversion point for Water Permit Application No. 8589-3

Table 1. Estimated areal extent for the historic LVM aquifer boundary (Hedges et al., 1982), the portion of the UVM: S aquifer that overlies the historic LVM aquifer boundary (Buhler, 2014), the current LVM aquifer boundary (Mathiowetz, 2018), and the unconfined portion of the LVM aquifer along the Vermillion River (modified from Jensen, 2000; modified from Stonesifer, 2013)

Delineation	Estimated Areal Extent (acres)
Historic Lower Vermillion Missouri Aquifer (modified from Hedges et al., 1982)	124,000
Upper Vermillion Missouri: South Aquifer (UVM:S) (modified from Buhler, 2014) - portion that overlies LVM aquifer boundary estimated by Hedges and others (1982)	18,000
Current Lower Vermillion Missouri Aquifer * (Mathiowetz, 2018)	106,000
Unconfined Portion of Lower Vermillion Missouri Aquifer - not enclosed in UVM:S (Buhler, 2014) (modified from Jensen, 2000; modified from Stonesifer, 2013)	12,000
*Estimated by subtracting UVM: S aquifer boundary (Buhler, 2014) from historic boundary (Hedges et al., 1982)	

In Clay County, the Lower Vermillion Missouri aquifer is approximately 100 feet thick on average, with a documented maximum thickness of 170 feet (Stephens, 1967). Hedges and others (1982) estimated the Lower Vermillion Missouri aquifer to contain approximately 1,512,000 acre-feet of recoverable water in storage in Clay County. The direction of groundwater movement in the Lower Vermillion Missouri aquifer is generally to the south (Niehus, 1994).

No water well or test hole completion report was submitted with Water Permit Application No. 8589-3. There is a test hole completion report on file that was submitted with Water Permit No. 8484-3 for an existing test hole (drilled 131 feet deep on September 29, 2014) located in the SE $\frac{1}{4}$ NW $\frac{1}{4}$ of Section 16-T94N-R51W. The test hole completion report lists “topsoil, dark brown” from 0 to 2 feet below the ground surface, “Clay, yellow-brown, silty, pebbly” from 2 to 44 feet, “gravel, coarse” from 44 to 46 feet, “Clay, yellow brown, silty, pebbly” from 46 to 50 feet, “clay, gray, soft silty” from 50 to 61 feet, “gravel, sand, very rocky” from 61 to 125 feet, and “Shale, gray, soft, sticky” from 125 to 131 feet. A well completion report on file with the DANR-Water Rights Program for an existing domestic well completed into the Lower Vermillion Missouri aquifer, maintained by the applicant, and located approximately 0.2 miles southeast of the proposed diversion point lists “topsoil, dark brown” from 0 to 2 feet below the ground surface, “Clay, yellow-brown, silty, pebbly” from 2 to 30 feet, “Clay, gray, silty, pebbly” from 30 to 100 feet, “rocks” from 100 to 115 feet, “gravel, coarse” from 115 to 132 feet, and “Shale, gray, soft, sticky” from 132 to 142 feet (Water Rights, 2022d). The well was screened from 101 to 131 feet below the ground surface and had a static water level of 89 feet at the time of completion (September 26, 2014) (Water Rights, 2022d). Based on the test hole completion report submitted with Water Permit No. 8484-3, well completion reports on file, and lithologic logs on file for nearby observation wells, the Lower Vermillion Missouri aquifer is expected to be confined at the proposed diversion point (SDGS, 2022; Water Rights, 2022b and 2022d).

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 Lower Vermillion Missouri aquifer.

WATER AVAILABILITY:

Water Permit Application No. 8589-3 proposes to appropriate water from the Lower Vermillion Missouri aquifer. 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 Lower Vermillion Missouri aquifer is not older than or stratigraphically lower than the Greenhorn Formation (Fahrenbach et al., 2010), and 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 Lower Vermillion Missouri aquifer must be considered.

HYDROLOGIC BUDGET:

Recharge

Recharge to the Lower Vermillion Missouri aquifer occurs through seepage from the Vermillion River, groundwater inflow from the Upper Vermillion Missouri aquifer, and leakage from the underlying Dakota aquifer (Niehus, 1994; Stephens, 1967). The Lower Vermillion Missouri aquifer may also receive some recharge from the infiltration of precipitation, particularly near the unconfined portion of the aquifer in the Vermillion River floodplain (Niehus, 1994).

Using observation well analysis, Hedges and others (1985) estimated a recharge rate to the unconfined portion of the Lower Vermillion Missouri aquifer to be approximately 3.8 inches per year. Stonesifer (2013) recalculated Hedges and others (1985) estimated recharge rate to be approximately 4.58 inches per year using observation well analysis with additional years of data. Stonesifer (2013) noted recharge and discharge/withdrawals occur concurrently. This results in the calculated recharge rate estimated by using Hedges and other’s (1985) method, being less than the actual recharge rate, because Hedges and others (1985) are only accounting for the recharge rate in excess of discharge plus withdrawals. The unconfined portion of the Lower Vermillion Missouri aquifer underlies approximately 12,000 acres (modified from Jensen, 2000;

modified from Stonesifer, 2013). Using Stonesifer's (2013) recharge rate multiplied by the areal extent estimation, the average annual recharge rate to the unconfined portion of the Lower Vermillion Missouri aquifer is approximately 4,580 acre-feet per year.

For this analysis, it is assumed that the confined portion of the Lower Vermillion Missouri aquifer recharges at a similar rate and is hydrologically similar to the confined portion of the Upper Vermillion Missouri aquifer. Using regional flow-net analysis, Hedges and others (1985) estimated a recharge rate to the Upper Vermillion Missouri aquifer, which is primarily confined, to be approximately 0.25 inches per year. This recharge rate is lower than the average recharge rate estimated for other buried and confined aquifers in eastern South Dakota (Hedges et al., 1985). It is worth noting that recharge rates calculated using regional flow-net analysis are suspect and conclusions based on this method are questionable (Hedges et al., 1985). The confined portion of the Lower Vermillion Missouri aquifer underlies approximately 94,000 acres. Using Hedges and others' (1985) recharge rate multiplied by the areal extent estimation, the average annual recharge rate to the confined portion of the Lower Vermillion Missouri aquifer is approximately 1,958 acre-feet per year. In its entirety, the average annual recharge rate to the Lower Vermillion Missouri aquifer (within the historic Lower Vermillion Missouri aquifer boundary delineated by Hedges and others' (1982) minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer boundary) (confined and unconfined portions) is approximately 6,538 acre-feet per year.

Discharge

Discharge from the Lower Vermillion Missouri aquifer occurs through well withdrawals, groundwater outflow to the Missouri: Elk Point aquifer, and seepage to the Vermillion River when the stage of the river is lower than the potentiometric surface of the aquifer (Niehus, 1994; Water Rights, 2022c and 2022d).

There are 88 water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within the historic aquifer boundary delineated by Hedges and others (1982), with 59 of those water rights/permits within the historic aquifer boundary minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer (Water Rights, 2022c). This results in 29 water rights/permits within the Lower Vermillion Missouri aquifer boundary delineated by Hedges and others (1982) that are also within the Upper Vermillion Missouri: South aquifer boundary identified by Buhler (2014) that are still labeled as withdrawing water from the Lower Vermillion Missouri aquifer.

Table 2 summarizes the estimated average annual withdrawal rate for the non-irrigation water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within the historic aquifer boundary (Hedges et al., 1982), and within the historic aquifer boundary minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer. The estimated annual use for each water right/permit was determined by their limiting 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. 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, 2022c). There are seven non-irrigation water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within the historic aquifer boundary delineated by Hedges and others (1982). There are five non-irrigation water rights/permits authorized to appropriate water within the historic Lower Vermillion Missouri aquifer boundary minus the Upper Vermillion Missouri: South aquifer delineated by Buhler (2014). The estimated average annual withdrawals from the Lower Vermillion Missouri aquifer by non-irrigation water rights/permits within the historic aquifer boundary is approximately 1,224.4 acre-feet per year, and approximately 48.6 acre-feet per year within the historic aquifer boundary minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer (Table 2) (Water Rights, 2022c).

Table 2. Estimated average annual water use from the non-irrigation water rights authorized to appropriate water from the LVM aquifer within the historic aquifer boundary (Hedges et al., 1982), and within the historic aquifer boundary minus Buhler's (2014) delineation of the UVM:S aquifer (Water Rights, 2022c)

Permit No.	Name	Use	Status	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet)	Estimated Use (acre-feet/year)
1870-3	USD Facilities MGMT	INS	LC	0.03		13.0
6397-3	SD Dept of Transportation	INS	LC	0.033		14.3
8222-3	Southeast Farmers COOP	COM	PE	0.167	18.4	18.4
8257-3	Thein Well Co Inc	COM	PE	0.089	1	1
8479-3	Concrete Materials	IND	PE	0.133	1.84	1.84
					Total:	48.6
3905-3*	Clay Rural Water System Inc	RWS	LC	2		868.8
5979-3*	Clay Rural Water System Inc	RWS	LC	2	307	307
					Total:	1,175.8
* Within aquifer boundary delineated by Hedges and others' (1982) and Buhler's (2014) UVM:S boundary						
LC: Licensed Water Right, PE: Water Permit, COM: Commercial, INS: Institutional, RWS: Rural Water System						

There are 81 irrigation water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within Hedges and others' (1982) historic aquifer boundary (Table 3) (Water Rights, 2022c). Irrigation water rights/permits have been typically required to report their annual usage on an irrigation questionnaire since 1979. However, Water Permit Nos. 8459-3, 8482-3, and 8484-3, were approved in 2020 or 2021, and have not submitted an irrigation questionnaire form yet (Water Rights, 2022a and 2022c). Water Permit Nos. 8459-3, 8482-3, and 8484-3 collectively authorize the irrigation of 276 acres (Water Rights, 2022c). Generally, irrigators using center pivots in eastern South Dakota apply less than one foot of water per acre per year. 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 Permit Nos. 8459-3, 8482-3, and 8484-3. When applying one foot of water over the 276 acres currently authorized to be irrigated under Water Permit Nos. 8459-3,

8482-3, and 8484-3, the estimated annual withdrawal rate is approximately 276 acre-feet per year (Water Rights, 2022c). These three permits account for the difference with the number of currently authorized irrigation water rights/permits (81 water rights/permits), compared to the 78 water right/permits listed as reporting in 2020 on Table 3 (Water Rights, 2022c). The average annual withdrawal rate for the Lower Vermillion Missouri aquifer irrigation water rights/permits within the historic aquifer boundary that have reported over the period of record (1979 to 2019) is approximately 1,728.8 acre-feet per year (Table 3) (Water Rights, 2022a). The estimated average annual withdrawal rate for the Lower Vermillion Missouri aquifer irrigation water rights/permits within the historic aquifer boundary that have reported over the period of record (1979 to 2019) calculated on Table 3, plus the estimated use for Water Permit Nos. 8459-3, 8482-3, and 8484-3, is approximately 2,005 acre-feet per year (Water Rights, 2022a).

There are 54 irrigation water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within the current aquifer boundary, which was compiled by removing the water rights/permits that are within the Upper Vermillion Missouri: South aquifer identified by Buhler (2014) from the historic aquifer boundary estimated by Hedges and others (1982) (Table 3) (Water Rights, 2022c). The estimated average annual withdrawal rate for the Lower Vermillion Missouri aquifer irrigation water rights/permits within the historic aquifer boundary minus the Upper Vermillion Missouri: South aquifer delineated by Buhler (2014), that have reported over the period of record (1979 to 2019), plus the estimated use for Water Permit Nos. 8459-3, 8482-3, and 8484-3, is approximately 1,485 acre-feet per year (Table 3) (Water Rights, 2022a).

There are domestic wells completed into the Lower Vermillion Missouri aquifer that do not require a water right/permit, so the withdrawal amount for domestic use is unknown (Water Rights, 2022d). Since the introduction of rural water systems, many domestic wells are likely no longer in use or are not being used as primary water sources. Due to their relatively low diversion rates and the availability of rural water, withdrawals from domestic wells are not considered to be a significant portion of the hydrologic budget for the Lower Vermillion Missouri aquifer.

Hydrologic Budget Summary

The average annual recharge rate to the unconfined portion of the Lower Vermillion Missouri aquifer is approximately 4,580 acre-feet per year. The average annual recharge rate to the confined portion of the Lower Vermillion Missouri aquifer is approximately 1,958 acre-feet per year. In its entirety, the average annual recharge rate to the Lower Vermillion Missouri aquifer (within the historic Lower Vermillion Missouri aquifer boundary delineated by Hedges and others' (1982) minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer boundary) is approximately 6,538 acre-feet per year.

Based on the historic aquifer boundary delineation (Hedges et al., 1982), the average annual withdrawal rate from the Lower Vermillion Missouri aquifer totals approximately 3,279.4 acre-feet per year: non-irrigation: 1,224.4 acre-feet/year; irrigation: 2,005 acre-feet/year; Water Permit Application No. 8589-3 (if approved, assuming one-foot application rate per acre), 50 acre-feet/year.

Based on the historic Lower Vermillion Missouri aquifer boundary minus the Upper Vermillion Missouri: South aquifer delineated by Buhler (2014), the average annual withdrawal rate from the Lower Vermillion Missouri aquifer totals approximately 1,583.6 acre-feet per year: non-irrigation: 48.6 acre-feet/year; irrigation: 1,485 acre-feet/year; Water Permit Application No. 8589-3 (if approved, assuming one-foot application rate per acre), 50 acre-feet/year.

The average annual recharge rate to the Lower Vermillion Missouri aquifer (within the historic Lower Vermillion Missouri aquifer boundary delineated by Hedges and others' (1982) minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer boundary) is higher than the withdrawal rates estimated for the historic Lower Vermillion Missouri aquifer boundary, and the historic Lower Vermillion Missouri aquifer boundary minus the Upper Vermillion Missouri: South aquifer delineated by Buhler (2014). Based on the hydrologic budget, there is a reasonable probability unappropriated water is available from the Lower Vermillion Missouri aquifer for the proposed appropriation.

Table 3. Reported irrigation use from LVM aquifer for water rights/permits within the historic aquifer boundary, and the historic aquifer boundary minus Buhler's (2014) delineation of the UVM:S aquifer (Water Rights, 2022a)

Historical Boundary of LVM aquifer (Hedges et al., 1982)			Historical Boundary of LVM aquifer (Hedges et al., 1982) Excluding UVM: S Aquifer Boundary (Buhler, 2014)		
Year	No. of Permits	Reported Pumpage (acre-feet)	Year	No. of Permits	Reported Pumpage (acre-feet)
1979	49	1,163	1979	41	1,008.40
1980	47	2,417	1980	39	2,198.25
1981	49	1,543	1981	40	1,500
1982	37	870.04	1982	28	788.17
1983	38	716.3	1983	29	716.3
1984	47	691	1984	38	669
1985	46	1,328.20	1985	37	1,147.20
1986	45	1,047.50	1986	36	937.5
1987	37	1,115	1987	28	934
1988	38	2,083.80	1988	29	1,617.10
1989	38	2,301.20	1989	29	1,705.20
1990	38	2,113.20	1990	29	1,496.20
1991	39	1,670.10	1991	30	1,254.10
1992	39	168.8	1992	30	133.7
1993	39	0	1993	30	0
1994	39	517.28	1994	30	348.85
1995	37	506.61	1995	29	485.77
1996	36	997.6	1996	28	698.87
1997	36	1,085	1997	28	826
1998	36	1,032.91	1998	27	862.55
1999	38	900.63	1999	28	698.89
2000	38	2,041.72	2000	28	1,726.04
2001	38	2,036.96	2001	28	1,932.97
2002	40	1,762.32	2002	30	1,341.48
2003	40	1,800.56	2003	30	1,630.17
2004	39	1,747.48	2004	29	1,346.60
2005	45	1,410.24	2005	29	1,209.63
2006	43	2,674.51	2006	28	1,881.28
2007	50	2,909.12	2007	26	1,327.02
2008	55	4,301.25	2008	28	911.87
2009	58	482.64	2009	30	460.77
2010	59	144.56	2010	30	133.95
2011	62	2,195.06	2011	33	1,219.42
2012	61	7,759.51	2012	33	3,355.27
2013	71	4,109.10	2013	45	2,856.49
2014	75	1,576.28	2014	48	1,006.38
2015	78	1,925.76	2015	50	1,473.52
2016	79	2,187.54	2016	51	1,779.00
2017	79	3,156.60	2017	51	2,439.28
2018	79	427.68	2018	52	419.39
2019	79	339.6	2019	52	332.97
2020	78	3,353.21	2020	51	1,972.48
Min	36	0	Min	26	0
Max	79	7,759.5	Max	52	3,355.3
Avg	49.9	1,728.8	Avg	34	1,209.1

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 DNR-Water Rights Program monitors ten observation wells completed into the Lower Vermillion Missouri aquifer plus two other observation wells (CL-80J and CL-66AR) that are within the historic aquifer boundary delineated by Hedges and others (1982) but are now within the Upper Vermillion Missouri: South aquifer boundary as defined by Buhler (2014) (Water Rights, 2022b). The Lower Vermillion Missouri aquifer observation wells that are completed within the within the historic Lower Vermillion Missouri aquifer boundary delineated by Hedges and others' (1982) minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer boundary are UN-77I, UN-77H, UN-77K, CL-80G, CL-57A, CL-66BR, CL-80F, CL-80H, CL-80IR, and CL-57B (Water Rights, 2022b). The three closest observation wells to the proposed diversion point are CL-80H (approximately 3.5 miles south), CL-57B (approximately 4.2 miles west) and CL-80IR (approximately 5 miles southwest) (as shown in Figure 6) (Water Rights, 2022b and 2022c). The hydrographs for these observation wells are displayed in Figures 3 to 5 (Water Rights, 2022b). CL-80J is located approximately 2.5 miles northwest of the proposed diversion point but since the observation well is within the Upper Vermillion Missouri: South aquifer boundary as defined by Buhler (2014) it will not be included in this analysis (as shown in Figure 6). 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. It is worth noting the hydrograph titles state DENR Water Rights Observation Well on the hydrographs when the titles should say DNR Water Rights Observation Well on the hydrographs.

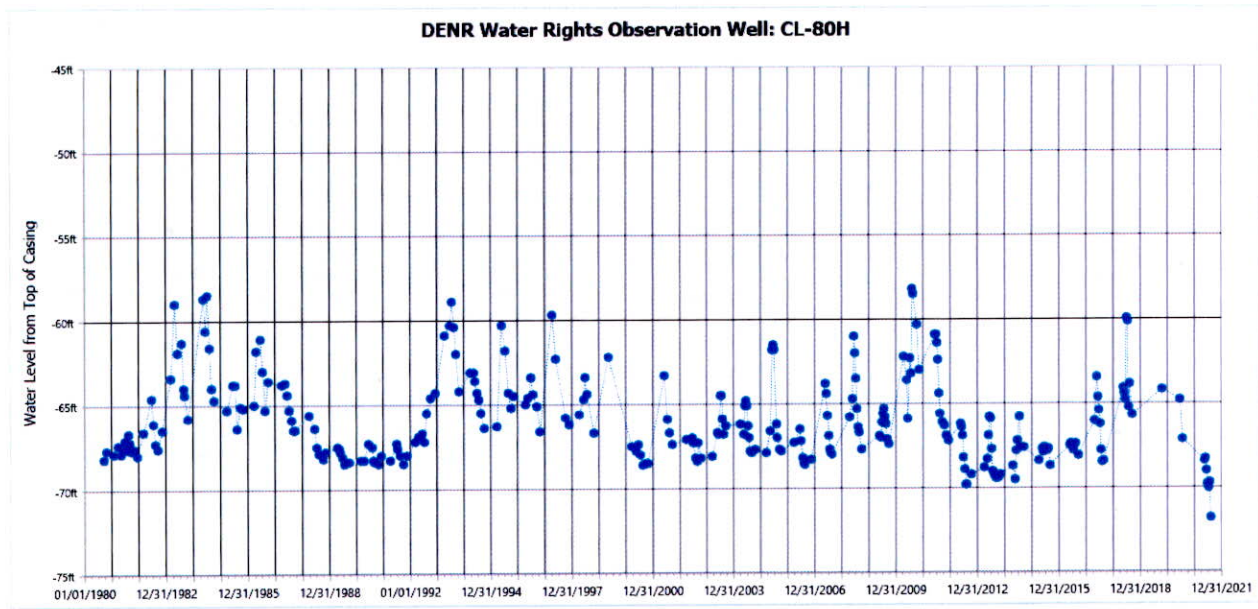


Figure 3. Hydrograph for observation well CL-80H (Water Rights, 2022b)

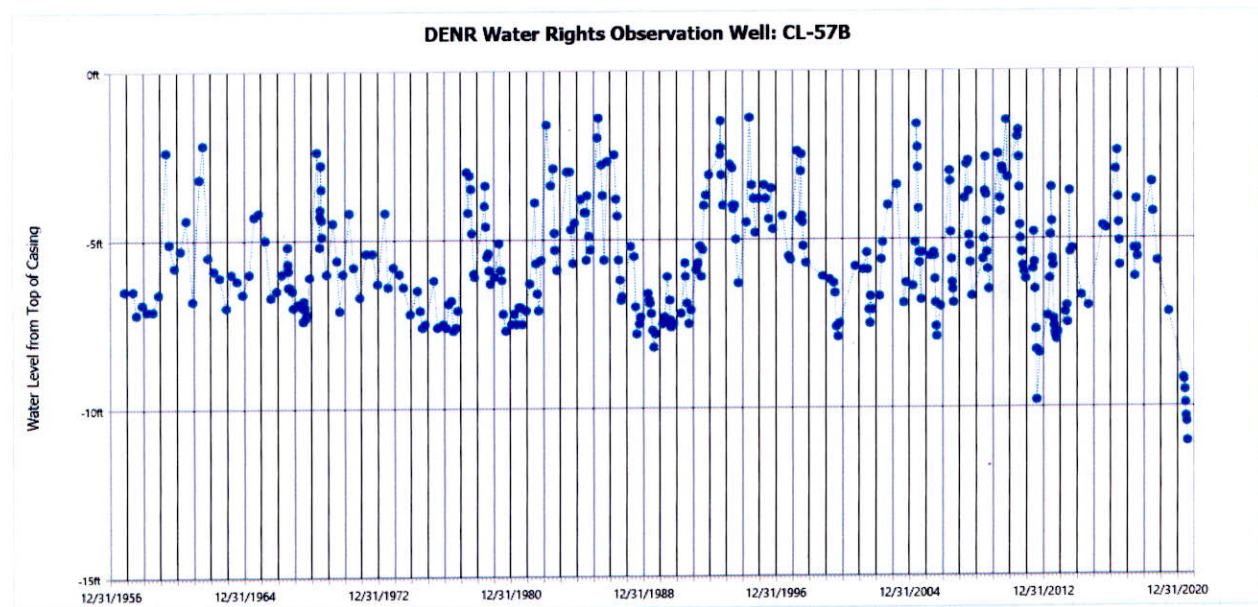


Figure 4. Hydrograph for observation well CL-57B (Water Rights, 2022b)

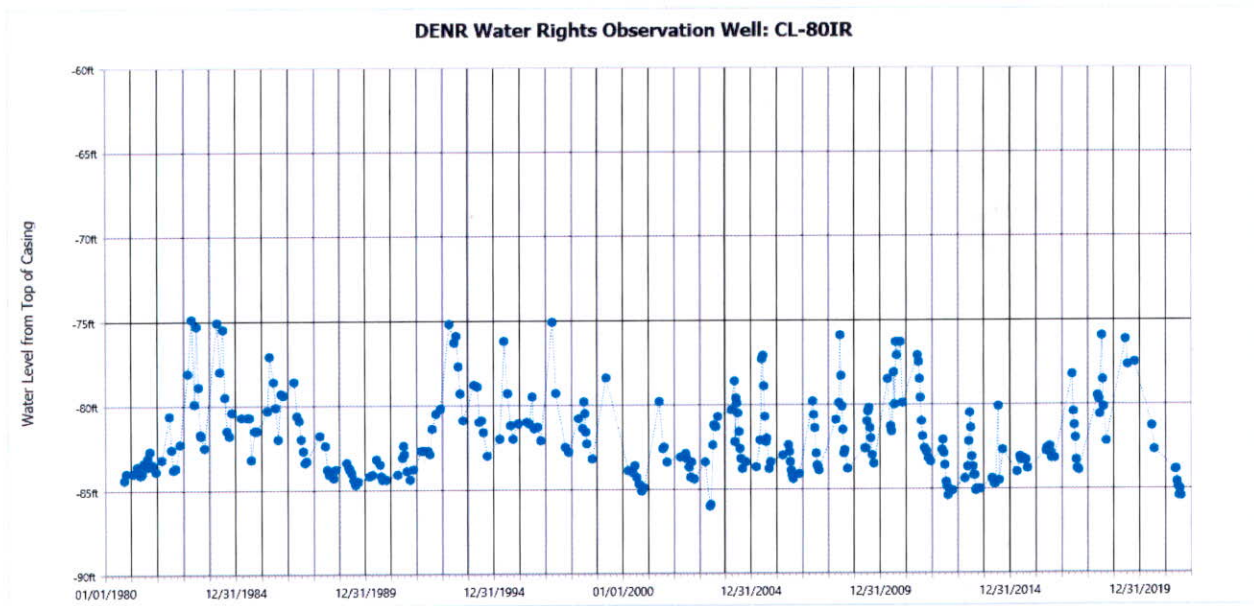


Figure 5. Hydrograph for observation well CL-80IR (Water Rights, 2022b)

The hydrographs for the observation wells display generally stable water levels over their respective periods of record. The hydrographs for these three observation wells were compared to the hydrographs for the other observation wells completed into the Lower Vermillion Missouri aquifer and each displayed a relatively similar trend as shown on the hydrographs displayed in Figures 3 to 5 (Water Rights, 2022b). The hydrographs for the Lower Vermillion Missouri 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 between irrigation seasons. 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 Lower Vermillion Missouri 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. It is worth noting the most recent water level readings for the Lower Vermillion Missouri aquifer observation wells are approximately the lowest readings on the hydrographs displayed in Figures 3 to 5. These water level readings are not of concern at this time as they were measured during the middle of the irrigation season in 2021 (Water Rights, 2022b).

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

Currently, there are 59 water rights/permits authorized to appropriate water from the Lower Vermillion Missouri aquifer within the historic aquifer boundary minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer (Water Rights, 2022c). The closest water right/permit to the proposed diversion point is Water Right No. 3571-3, which is held by Roy Johnson Estate. The diversion point for Water Right No. 3571-3 is located approximately 1.4 miles northwest of the proposed diversion point for this application (Table 4) (Figure 6) (Water Rights, 2022c). It is worth noting only the Lower Vermillion Missouri aquifer water rights/permits that are within the historic aquifer boundary minus Buhler's (2014) delineation of the Upper Vermillion Missouri: South aquifer were included as the nearby permits listed on Table 4.

There are domestic wells on file with the DANR-Water Rights Program that are completed into the Lower Vermillion Missouri aquifer, with the closest domestic well on file (not held by the applicant) approximately 0.7 miles southwest of the proposed diversion point (Water Rights, 2022d). There could potentially be other domestic wells completed into the Lower Vermillion Missouri aquifer near the proposed diversion point that are not on file with the DANR-Water Rights Program.

The Lower Vermillion Missouri aquifer is primarily under confined conditions but can be locally unconfined particularly near the Vermillion River floodplain (Nichus, 1994; Stephens, 1967). Based on the test hole completion report submitted with Water Permit No. 8484-3, well completion reports on file, and lithologic logs on file for nearby observation wells, the Lower Vermillion Missouri aquifer is expected to be confined at the proposed diversion point (SDGS, 2022; Water Rights, 2022b and 2022d). The 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 Lower Vermillion Missouri aquifer near permitted/licensed diversion points can provide some insight on how the aquifer responds to pumping.

Table 4. Water rights/permits authorized to withdraw water from the LVM aquifer within approximately five miles of the proposed diversion point, as shown in Figure 6 (Water Rights, 2022c)

Permit No.	Name	Status	Use	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet)
2807-3	Abild - Wells Farms	LC	IRR	1.3	n/a
2978-3	Arden S Abild	LC	IRR	1.97	n/a
3037-3	Abild - Wells Farms	LC	IRR	1	n/a
3039-3	Ronald Alfred Johnson	LC	IRR	2	n/a
3571-3	Roy Johnson Estate	LC	IRR	3.54	n/a
6303-3	Thelma R & Ronald Lind	LC	IRR	1.78	n/a
7217-3	Thelma R & Ronald Lind	LC	IRR	3.34	n/a
7233-3	Norman Kramer	PE	IRR	1.56	n/a
7504-3	Steven Andrews	PE	IRR	1.78	n/a
7562-3	John T Lindstrom	LC	IRR	1.33	n/a
7631-3	Gregoire Farms	LC	IRR	1.61	n/a
7632-3	Gregoire Farms	PE	IRR	4.44	n/a
7642-3	Tom Austin	LC	IRR	1.22	n/a
7679-3	Scott Heritage Farms LLP	PE	IRR	1.67	n/a
7836-3	Craig L Nelson	LC	IRR	1.78	n/a
8257-3	Thein Well Co Inc	PE	COM	0.089	1
8484-3	John & Dean Lindstrom	PE	IRR	1.78	n/a
LC: Licensed Water Right; PE: Water Permit; COM: Commercial; IRR: Irrigation					

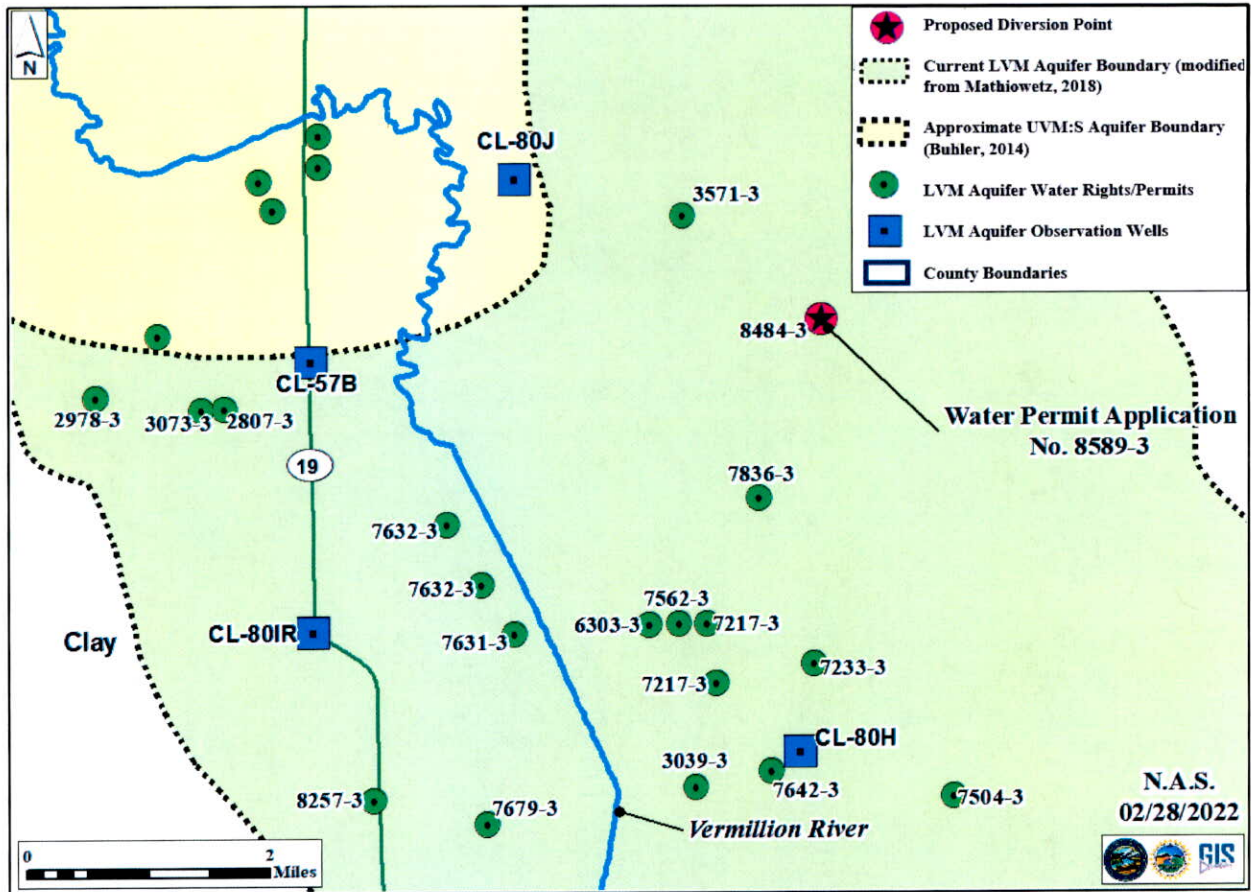


Figure 6. Location of the proposed diversion point for Water Permit Application No. 8589-3 with the LVM aquifer water rights/permits and observation wells within approximately five miles of the proposed diversion point (Water Rights, 2022b and 2022c)

Observation well CL-80IR (approximately 5 miles southwest of the proposed diversion point) has seven high-yield (assumed to be a well with an authorized diversion rate greater than 0.2 cfs) irrigation wells within approximately two miles of it (Water Rights, 2022b and 2022c). The drawdown from pumping is shown on the hydrograph for CL-80IR, along with the aquifer returning to pre-pumping conditions between irrigation seasons (Figure 5) (Water Rights, 2022b). The lithologic log on file for CL-80IR noted the well was drilled 182 feet deep with the top of aquifer at 90 feet below the ground surface (SDGS, 2022). The lowest recorded static water level on the hydrograph is approximately 86 feet, which indicates there was still approximately four feet of artesian head pressure in CL-80IR even during drier periods when high-yield irrigation wells are expected to be pumping more water (Water Rights, 2022b).

In Clay County, the Lower Vermillion Missouri aquifer has an average saturated thickness of approximately 100 feet (Stephens, 1967). Within approximately one mile of the proposed diversion point, the saturated aquifer thickness ranges between 30 to 35 feet (Water Rights, 2022d). This would 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 is not expected to

unlawfully impair nearby adequate wells. In Clay and Union Counties, there are no complaints on file with the DNR-Water Rights Program regarding well interference for adequate wells completed into the Lower Vermillion Missouri aquifer (Water Rights, 2022e).

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 Lower Vermillion Missouri 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 saturated aquifer thickness of the Lower Vermillion Missouri aquifer in Clay County, and the lack of well interference complaints for adequate wells completed into the Lower Vermillion Missouri aquifer in Clay and Union Counties, 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 water right/permit holders and domestic users.

CONCLUSIONS:

1. Water Permit Application No. 8589-3 proposes to irrigate 50 acres from one well authorized by Water Permit No. 8484-3. The well authorized by Water Permit No. 8484-3 is to be completed into the Lower Vermillion Missouri aquifer (approximately 125 feet deep).
2. If approved, Water Permit Application No. 8589-3 and Water Permit No. 8484-3 will collectively authorize a maximum instantaneous diversion rate of 1.78 cfs from one well to be completed into the Lower Vermillion Missouri aquifer for the irrigation of 170 acres. The site of interest is located in Clay County approximately nine miles southwest of Beresford, SD.
3. Based on the hydrologic budget and observation well data, there is a reasonable probability that unappropriated water is available from the Lower Vermillion Missouri aquifer to supply the proposed appropriation.
4. There is a reasonable probability that the proposed diversion by Water Permit Application No. 8589-3 will not unlawfully impair adequate wells for existing water right/permit holders and domestic users.

Nakaila Steen

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

Reviewed by:

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

References

- Buhler, K.A., 2014. Report to the Chief Engineer on 21 Water Permit Applications from the Upper Vermillion Missouri Aquifer. SD DANR – Water Rights Program, Joe Foss Bldg., Pierre, SD.
- Fahrenbach, M.D., Steece, F.V., Sawyer, J.F., McCormick, K.A., McGillivray, G.L., Schulz, L.D., and Redden, J.A. 2010. South Dakota Stratigraphic Correlation Chart. Oil and Gas Investigations 3. SD DANR-Geological Survey, Vermillion, SD.
- Hedges, L.S., Allen, J., Holly, D.E., 1985. Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa, Task 7: Ground Water Recharge; United States Army Corps of Engineers Contract DACW 45-80-C-0185.

- Hedges, L.S., Burch, S.L., Iles, D.L., Barari, R.A., and Schoon, R.A., 1982. Evaluation of Ground-Water Resources Eastern South Dakota and Upper Big Sioux River, South Dakota and Iowa. Task 1: Bedrock Topography and Distribution, Task 2: Extent of Aquifers, Task 3: Ground-Water Storage, Task 4: Computerized Data Base, Final Report. U.S. Army Corps of Engineers Contract DACW 45-80-C-0185.
- Holmes, S.L. and Filipovic, D., 2015. Hydrogeologic Investigations of the Upper Vermillion Missouri Aquifer. Open-File Report 93-UR. SD DANR - Geological Survey. Vermillion, SD.
- Jensen, A.R., 2000. First Occurrence of Aquifer Materials in Clay County, South Dakota. SD DANR- Geological Survey Aquifer Materials Map 1. Vermillion, SD.
- Mathiowetz, A., 2018. Report to the Chief Engineer on Water Permit Application 8335-3. SD DANR - Water Rights Program, Joe Foss Bldg., Pierre, SD.
- Mathiowetz, A., 2020. December 22. Personal Communication. Natural Resources Engineer III, DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.
- McCormick, K.A., 2004. First Occurrence of Aquifer Materials in Union County, South Dakota. SD DANR- Geological Survey Aquifer Materials Map 18. Vermillion, SD.
- Niehus, C.A., 1994. Water Resources of Lincoln and Union Counties, South Dakota. U.S. Geological Survey Water-Resources Investigations Report 93-4195. U.S. Geological Survey. Rapid City, SD.
- SDGS, 2022. South Dakota Geological Survey Lithologic Logs Database. Accessed February 28, 2022. <http://cf.sddanr.net/lithdb/>.
- Stonesifer, J.R., 2013. Report to the Chief Engineer on Water Permit Application 7918-3. SD DANR - Water Rights Program, Joe Foss Bldg., Pierre, SD.
- Stephens, J.C., 1967. Geology and Water Resources of Clay County, South Dakota; Part II Water Resources. Bulletin 19. SD DANR - Geological Survey. Vermillion, SD.
- Water Rights, 1995. Findings of Fact, Conclusions of Law, and Final Decision in the Matter of Water Permit Application No. 2313-2, Coca-Cola Bottling Company of the Black Hills. DANR-Water Rights Program file for Water Right No. 2313-2. Pierre, SD.
- Water Rights, 2022a. "1979-2020 Irrigation Summaries by Aquifer", SD DANR-Water Rights Program, Joe Foss Building, Pierre, SD.
- Water Rights, 2022b. Observation Well Data, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.
- Water Rights, 2022c. Water Right/Permit Files, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.
- Water Rights, 2022d. Well Completion Reports, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.
- Water Rights, 2022e. County Files, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.

Schlaak, Karen

From: Schlaak, Karen
Sent: Tuesday, March 15, 2022 1:20 PM
To: johntlindstrom@hotmail.com
Subject: Water Permit Application No. 8589-3
Attachments: 3048.pdf

Attached is a copy of the report, chief engineer 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 being mailed to you today.

Karen Schlaak
DANR - Water Rights Program
(605) 773-3352
Website: <https://danr.sd.gov>



AFFIDAVIT OF PUBLICATION

YANKTON DAILY PRESS AND DAKOTAN

RECEIVED

MAR 30 2022

WATER RIGHTS
PROGRAM

JOHN T LINDSTROM
30524 466TH AVE
BERESFORD SD 57004

STATE OF SOUTH DAKOTA
COUNTY OF YANKTON

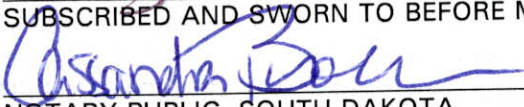
KELLY HERTZ, BEING FIRST DULY SWORN ON OATH DEPOSES
AND SAYS THAT (S)HE IS THE MANAGING EDITOR OF YANKTON
MEDIA INC, A CORPORATION, THE PRINTER AND THE PUBLISHER OF THE
YANKTON DAILY PRESS AND DAKOTAN, A LEGAL DAILY NEWSPAPER
PUBLISHED AND CIRCULATED IN THE CITY OF YANKTON, SAID COUNTY
AND STATE, AND ONE OF THE OFFICIAL NEWSPAPERS OF THE SAID
COUNTY OF FACTS STATED IN THIS AFFIDAVIT; THAT THE ANNEXED
3 + 25 NOTICE OF APPLICATIO

TAKEN FROM THE PAPER, IN WHICH IT WAS LAST PUBLISHED IN THE
NEWSPAPER ON THE 25th DAY OF March, 2022
THAT THE FULL AMOUNT OF THE FEE CHARGED FOR THE PUBLICATION
OF SAID NOTICE TO WIT \$41.12 ENSURES TO THE
BENEFITS OF THE PUBLISHER OF SAID NEWSPAPER AND THAT NO
AGREEMENT AND UNDERSTANDING FOR THE DIVISION THEREOF HAS
BEEN MADE WITH ANY OTHER PERSON, AND THAT NO PART THEREOF
HAS BEEN AGREED TO BE PAID TO ANY PERSON WHOMSOEVER.

PUBLISHED ON: 03/25/2022

FILED ON: 03/25/2022


SUBSCRIBED AND SWORN TO BEFORE ME THIS 25th DAY OF March, 2022


NOTARY PUBLIC, SOUTH DAKOTA
MY COMMISSION EXPIRES 07/04/2026

NOTICE OF APPLICATION NO. 8589-3 to Appropriate Water

Notice is given that John Lindstrom, 30524 466th Ave, Beresford SD 57004 has filed an application for a water permit to irrigate 50 additional acres from a well authorized by Water Permit No. 8484-3. The well completed into the Lower Vermillion Missouri Aquifer is located near the center of the NW1/4 section 16 and the 50 additional acres are in the S1/2 SW1/4 section 9; all in T94N-R51W. A maximum, combined, pump rate of 1.78 cubic feet of water per second from the well authorized by Permit No. 8484-3 will be used to irrigate the acreage covered by Permit No. 8484-3 plus the 50 additional acres included on this application. This site is located approximately 9 miles southwest of Beresford SD.

RECEIVED

MAR 30 2022

WATER RIGHTS
PROGRAM

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8589-3 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 Engineers 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 April 4, 2022.

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 April 4, 2022.

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 \$41.12.

AFFIDAVIT OF PUBLICATION

PLAIN TALK

RECEIVED

MAR 30 2022

WATER RIGHTS
PROGRAM

JOHN LINDSTROM
30524 466TH AVE
BERESFORD SD 57004

STATE OF SOUTH DAKOTA
COUNTY OF CLAY

MICHELE SCHIEVELBEIN, BEING FIRST DULY SWORN ON OATH DEPOSES AND SAYS THAT (S)HE IS THE ADVERTISING DIRECTOR OF YANKTON MEDIA INC, A CORPORATION, THE PRINTER AND THE PUBLISHER OF THE PLAIN TALK, A LEGAL WEEKLY NEWSPAPER PUBLISHED AND CIRCULATED IN THE CITY OF VERMILLION, SAID COUNTY AND STATE, AND ONE OF THE OFFICIAL NEWSPAPERS OF THE SAID COUNTY OF FACTS STATED IN THIS AFFIDAVIT; THAT THE ANNEXED NOTICE OF APPLICATION NO.

TAKEN FROM THE PAPER, IN WHICH IT WAS LAST PUBLISHED IN THE NEWSPAPER ON THE 25th DAY OF March, 2022
THAT THE FULL AMOUNT OF THE FEE CHARGED FOR THE PUBLICATION OF SAID NOTICE TO WIT \$40.64 ENSURES TO THE BENEFITS OF THE PUBLISHER OF SAID NEWSPAPER AND THAT NO AGREEMENT AND UNDERSTANDING FOR THE DIVISION THEREOF HAS BEEN MADE WITH ANY OTHER PERSON, AND THAT NO PART THEREOF HAS BEEN AGREED TO BE PAID TO ANY PERSON WHOMSOEVER.

PUBLISHED ON: 03/25/2022

FILED ON: 03/25/2022



SUBSCRIBED AND SWORN TO BEFORE ME THIS 25th DAY OF March, 2022



NOTARY PUBLIC, SOUTH DAKOTA
MY COMMISSION EXPIRES 07/04/2026

Notice is given that John Lindstrom, 30524 466th Ave, Beresford SD 57004 has filed an application for a water permit to irrigate 50 additional acres from a well authorized by Water Permit No. 8484-3. The well completed into the Lower Vermillion Missouri Aquifer is located near the center of the NW1/4 section 16 and the 50 additional acres are in the S1/2 SW1/4 section 9; all in T94N-R51W. A maximum, combined, pump rate of 1.78 cubic feet of water per second from the well authorized by Permit No. 8484-3 will be used to irrigate the acreage covered by Permit No. 8484-3 plus the 50 additional acres included on this application. This site is located approximately 9 miles southwest of Beresford SD.

RECEIVED

MAR 30 2022

WATER RIGHTS
PROGRAM

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8589-3 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 April 4, 2022.

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 April 4, 2022.

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 on March 25, 2022 at the total approximate cost of \$40.64.

Schlaak, Karen

From: Schlaak, Karen
Sent: Tuesday, March 15, 2022 1:17 PM
To: 'Sam Berres'
Subject: 8589-3, John Lindstrom
Attachments: 8589-3public.short_final.docx; FORM8.FRM.doc

Attached is a notice to be published on March 25, 2022 in the Press & Dakotan.

John Lindstrom, 30524 466th Ave, Beresford SD 57004 (605 351-5937) 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, Pierre SD 57501.

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

Karen Schlaak
DANR - Water Rights Program
(605) 773-3352
Website: <https://danr.sd.gov>



Schlaak, Karen

From: Schlaak, Karen
Sent: Tuesday, March 15, 2022 1:16 PM
To: 'classifieds@plaintalk.net'
Subject: 8589-3, John Lindstrom
Attachments: 8589-3public.short_final.docx; FORM8.FRM.doc

Attached is a notice to be published on March 25, 2022.

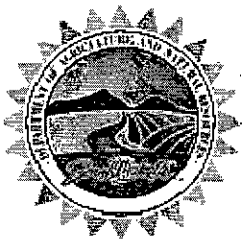
John Lindstrom, 30524 466th Ave, Bersfprd SD 57004 (605 351-5937) has been notified to contact you to authorize publication and arrange for payment.

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

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

Karen Schlaak

DANR - Water Rights Program
(605) 773-3352
Website: <https://danr.sd.gov>





**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 NEWSPAPERS RIGHT AWAY.**

March 15, 2022

John Lindstrom
30524 466th Ave
Beresford SD 57004

Dear Mr. Lindstrom:

Water Permit Application No. 8589-3 for irrigation use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Plain Talk printed at Vermillion (Ph # 605 624-2695) and the Press & Dakotan printed at Yankton (Ph # 605 665-7811). You will need to contact the newspapers 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 newspapers to authorize publication of your Notice and to arrange for payment. Early contact with the papers can eliminate delays. Upon receiving authorization from you, the publishers have been instructed to publish your notice. The newspapers have 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,

Karen Schlaak

Karen Schlaak
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. 8589-3 to Appropriate Water

Notice is given that John Lindstrom, 30524 466th Ave, Beresford SD 57004 has filed an application for a water permit to irrigate 50 additional acres from a well authorized by Water Permit No. 8484-3. The well completed into the Lower Vermillion Missouri Aquifer is located near the center of the NW1/4 section 16 and the 50 additional acres are in the S1/2 SW1/4 section 9; all in T94N-R51W. A maximum, combined, pump rate of 1.78 cubic feet of water per second from the well authorized by Permit No. 8484-3 will be used to irrigate the acreage covered by Permit No. 8484-3 plus the 50 additional acres included on this application. This site is located approximately 9 miles southwest of Beresford SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8589-3 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 April 4, 2022.

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 April 4, 2022.

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_



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

APR 28 2022

John Lindstrom
30524 466th Ave
Beresford SD 57004

Dear Mr. Lindstrom:

Enclosed is Water Permit No. 8589-3 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

October 21, 2025

7562-3, 8589-3, 8484-3
8680-3, 8711-3

John Lindstrom
30536 466th Ave
Beresford SD 57004

Dear Mr. Lindstrom:

Enclosed is a "Notice" dated October 8, 2025, concerning the 2025 Irrigation Questionnaire.

The notice was originally mailed to you at 30524 466th Ave, Beresford SD 57004. The post office notified our office that your address has changed, and your records have been updated accordingly.

This is a time sensitive matter. Please complete and return the enclosed questionnaire or submit your report online at <https://danr.sd.gov/iq/> using this password **WWBPGH**.

If this change of address is in-correct, please contact our office immediately to update your contact information.

Sincerely,

Amanda Dewell
Permitting Administrator
Water Rights Program
605 773-3352
Amanda.Dewell@state.sd.us

enclosures

RECEIVED
OCT 21 2025
11:41 AM
STATE OF SOUTH DAKOTA
DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES
PIERRE, SD 57501-3182
JFL