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15
MAY 19 2023

OFFICE OF
WATER

Mail to: SD DANR, Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>8763-3</u> Hydrologic Unit <u>10170102</u> Basin <u>Vermillion</u> Newspaper <u>Turner City New Era</u> <u>297-4419 (Thurs)</u> <u>Yankton Daily Press & Dakotan</u> <u>605-7811</u> (office use only)
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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.)

- Name to Appear on Water Permit B & K Dairy Farms, LLC
Mailing Address 45144 289th St. Viborg SD 57070
(Address) (City) (State) (Zip Code)
Phone _____ Mobile 509-840-9284 Email tricrossdairy@gmail.com
- Amount of water claimed 1.11 *CFS or 500 **GPM and 480 ***AF or 240 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
- Source of water supply Well
- Location of point of diversion 1 well in SW 1/4 Section 20-T97N-R53W County Turner
(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? E 1/2 SW 1/4 Section 24 T97N-R54W
(example - NW1/4 section 12-T104N-R53W)
- County or counties where water will be used Turner
- Annual period during which water is to be used Year-round
- 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)
We are looking to supplement our existing wells @ the dairy.

I, Tom Koelhaas, Member, 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) 250' 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) Manure Lagoons

b) System Capacity (gallons) 80,000,000 Year Constructed 2017

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)

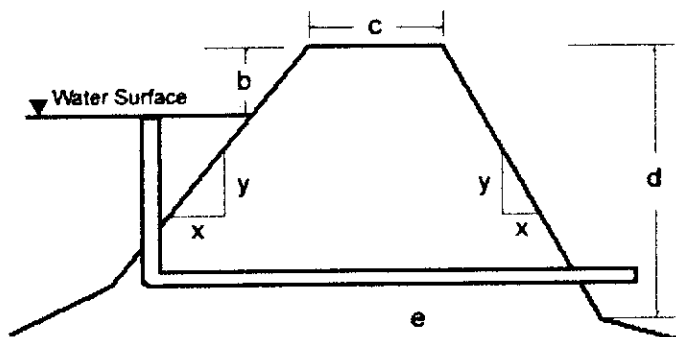
Upstream _____

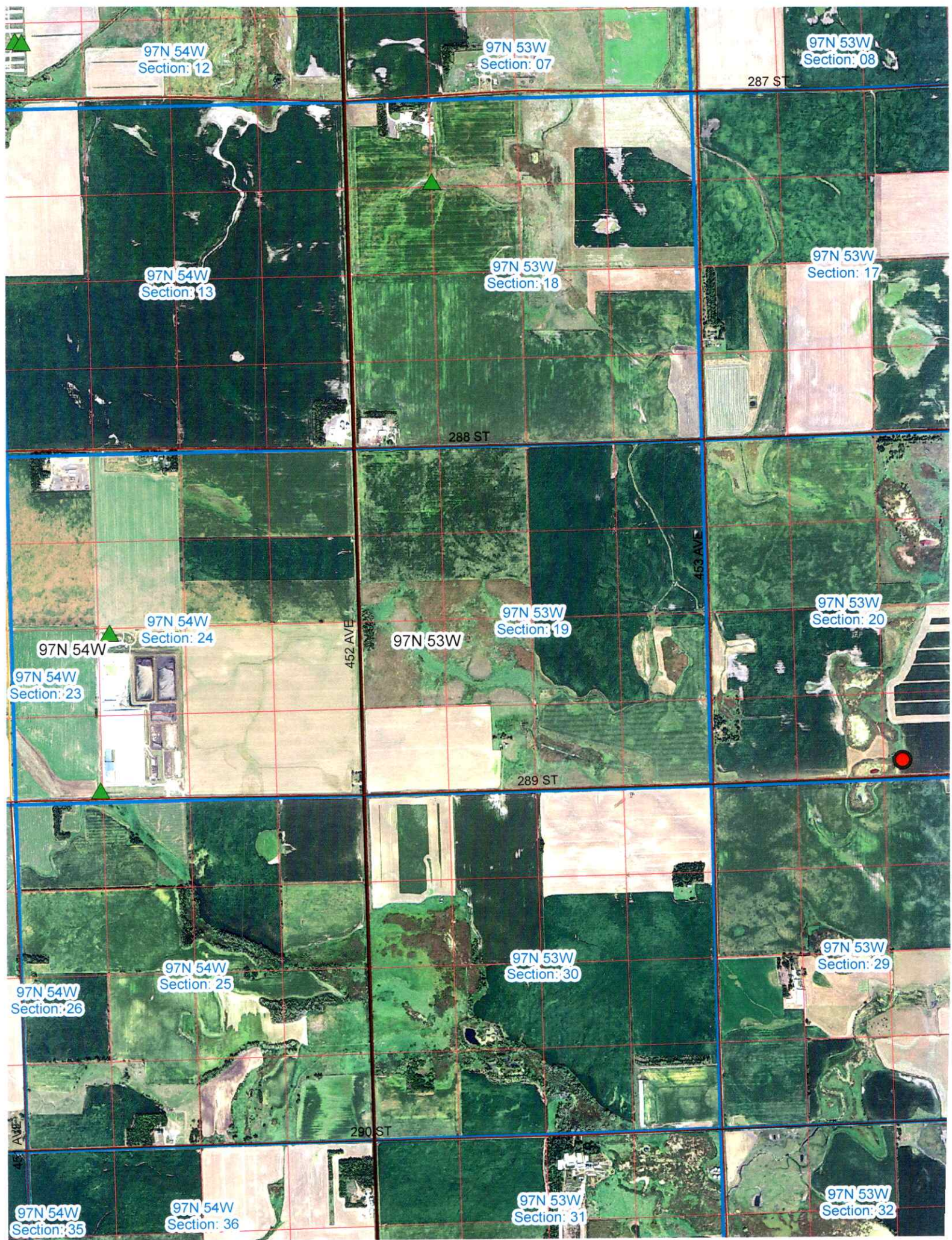
Downstream _____

h) Area of Impoundment _____

i) Storage _____ Acre Feet

j) Drainage Area Above Dam _____ Acres





97N 54W
Section: 12

97N 53W
Section: 07

97N 53W
Section: 08

287 S

97N 54W
Section: 13

97N 53W
Section: 18

97N 53W
Section: 17

288 ST

97N 54W
Section: 24

97N 53W
Section: 19

97N 53W
Section: 20

97N 54W

97N 54W
Section: 23

97N 53W

289 ST

97N 54W
Section: 25

97N 53W
Section: 30

97N 53W
Section: 29

97N 54W
Section: 26

290 ST

97N 53W
Section: 31

97N 53W
Section: 32

97N 54W
Section: 35

97N 54W
Section: 36

Proposed well site

SE 1/4 Section 20-T97N-R53W
Turner County

288th St

288th St

453rd Ave

453rd Ave

40

40

289th St

40

33

2000 ft



Legend

 Proposed Well

Proposed Well

Google Earth



531812239

ANNUAL REPORT

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

Domestic Limited Liability Company
SDCL 47-34A-211; 59-11-24, 24.1

Filing Fee: \$50

2023

FILING YEAR

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

Total Fee: \$50

1. Business ID and Name:

DL043702
BUSINESS ID

B & K DAIRY FARMS, LLC
BUSINESS NAME

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

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

Actual Street Address

**29770 EAST HIGHWAY 4
FARMINGTON, CA 95230**

Mailing Address

**29770 EAST HIGHWAY 4
FARMINGTON, CA 95230**

4. The South Dakota Registered Agent's Name:

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

(a) The South Dakota Noncommercial Registered Agent's name

Name **Tom Koolhaas**

Actual Street Address in this State

**45144 289TH AVE
VIBORG, SD 57070**

Mailing Address in this State

**45144 298TH AVE
VIBORG, SD 57070**

5. If the LLC is manager-managed, list the names and addresses of its Managers. SDCL 59-11-24. If the LLC is member-managed, this section may be left blank.

6. 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 criminal penalty (SDCL 22-39-36).

04/19/2023

Dated

Email (Optional)

Tom Koolhaas

Signature of an Authorized Person

Tom Koolhaas

Printed Name

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date May 15, 2023

RECEIVED OF Tri-Cross Dairy 45144 289th St., Viborg SD 57070

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

Fee for Application for Permit No. <u>8763-3</u> to Appropriate Water, to construct and to put water to beneficial use	\$ <u>950.00</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>8763-3</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>1150.00</u>

By Eric Gronlund
Chief Engineer
EM

Tri- Cross Dairy 280' Test Hole # 1

Viborg SD GPS N43 11.9570 W97 7.8280

Formation	From	To
Top soil	0	3
Clay brown	3	23
Clay blue	23	46
Clay blue pebbly	46	62
Gravel w/ chalk	62	71
Clay blue sandy- rock @ 77	71	78
Clay blue sandy pebbly w/ chalk fragments	78	82
Clay blue gravelly	82	93
Sand fine	93	100
Clay gray	100	122
Clay w/ gravel layers	122	124
Clay gray sandy	129	133
Gravel w/ a few lay layers	133	141
Gravel	141	154
Sand and gravel	154	165
Clay	165	170
Gravel clay layers- lots of chalk fragments	170	176
Gravel	176	197
Clay chalk mix w/ sand	197	202
Sand	202	206
Clay very layered with sand lots of coal	206	216
Sand gravel- lots of coal	216	244
Coal w/ sand – very firm sand	244	266
Sand some gravel	266	270
Gravel	270	271
Clay gray rocky	271	280

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OCT 31 2023
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WATER

452 Ave

289th St

Tri Cross Dairy

Proposed



**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. 8763-3, B & K Dairy**

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. 8763-3, B & K Dairy Farms, LLC, c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070.

The Chief Engineer is recommending DEFERRAL of Application No. 8763-3 for up to two years to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri:West aquifer and time for recently issued water permits to be developed. Observation wells in this area have shown sharp decline in water levels in recent years. In addition, there are three water permits from this aquifer that have not been developed and the effects of this potential pumping on water levels in the aquifer can not be determined.

After two years, the Board will reconsider the application based on any additional data provided by the applicant and measured water levels in area observation wells. The applicant may request the application be brought before the Board prior to expiration of the two year deferral period if they can show unappropriated water is available and the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights. The burden of proof is on the applicant to show the criteria for issuance of a water permit are met.

At the Water Management Board hearing to be scheduled on this matter, the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing. If you intend to oppose this DEFERRAL recommendation, the public notice of hearing will provide details on filing a petition in opposition to the chief engineer's recommendation.

See report on application for additional information.

Eric Gronlund, Chief Engineer
January 11, 2024

REPORT TO THE CHIEF ENGINEER
ON
WATER PERMIT APPLICATION NO. 8763-3
FOR
B&K DAIRY FARMS LLC
C/O TOM KOOLHAAS
DECEMBER 20, 2023

Water Permit Application No. 8763-3 proposes to appropriate 480 acre-feet of water annually (ac-ft/yr) at a maximum instantaneous diversion rate of 1.11 cubic feet of water per second (cfs) from one well (approximately 270 feet deep) to be completed into the Upper Vermillion Missouri: West (UVM:W) aquifer. The well is to be located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 20-T97N-R53W for commercial use in a dairy operation located in the E $\frac{1}{2}$ SW $\frac{1}{4}$ Section 24-T97N-R54W. The proposed well location is approximately 3 miles northwest of Viborg, SD in Turner County.

AQUIFER: Upper Vermillion Missouri: West (UVM:W)

Aquifer Characteristics:

The Upper Vermillion Missouri aquifer is a Quaternary aged buried glacial outwash aquifer composed of fine to coarse sand and gravel with intermixed layers of clay (Holmes and Filipovic, 2015; Water Rights, 2023f). The Upper Vermillion Missouri aquifer has been divided into three management units: North, South, and West (Buhler, 2014). The proposed diversion point for Application No. 8763-3 is in the West management unit of the Upper Vermillion Missouri aquifer (UVM:W). Buhler (2014) with data from the SD DANR-Geological Survey partially re-delineated the southern portion of the extent of the UVM:W aquifer from previous work done by Buhler (2012) (see Figure 1). Buhler's 2012 mapping of the Upper Vermillion Missouri aquifer did not include management units. Thus, the southern boundary of the UVM:W aquifer from Buhler's 2012 mapping as shown in Figure 1 will be based on the Buhler 2014 mapping.

The Buhler 2012 mapped areal extent of the UVM:W aquifer is approximately 50,280 acres. The Buhler 2014 mapped areal extent is approximately 19,600 acres. The 2014 mapping of the UVM:W aquifer did not extend all the way to the northwest as previously mapped (Buhler, 2012). Due to the limited test hole drilling done in that portion of the aquifer as part of the DANR-Geological Survey study (Holmes and Filipovic, 2015), the UVM:W aquifer likely extends further in that direction than what Buhler mapped in 2014. However, based on limited availability of geologic data, it is uncertain how far to the northwest the aquifer extends beyond the 2014 Buhler mapping. Buhler (2014) noted that the aquifer in the area of TU-90A and TU-82A and extending north (see Figure 1) should be considered hydrologically distinct from the UVM:W based on a constriction in the bedrock channel and profiles of the potentiometric surface in the area. This is supported by observation well water level data for observation wells TU-82A, TU-90A, TU-83A, MC-83JR and MC-83G (see Figure 2 for example of this behavior) having similar hydrograph shapes to each other, which are significantly different than observation wells TU-77S and TU-77T (see Figure 4) as well as destroyed observation well TU-77Z. All three of those wells (TU-77Z, TU-77T, and TU-77S) share a similar pattern of water levels. Observation well HT-81A (see Figure 3) has a different water level shape than either grouping of observation wells and the lithologic data to the northwest of the Buhler 2014 mapping is also different. Thus, only the water rights/permits and observation wells within the Buhler 2014 aquifer mapping will be considered in this report. The water rights/permits and future use permits in the vicinity of TU-82A and TU-

90A while labeled as UVM:W were assigned an aquifer at that time with significantly less hydrologic and geologic data than currently available. The aquifer assignment for those permits should be reconsidered.

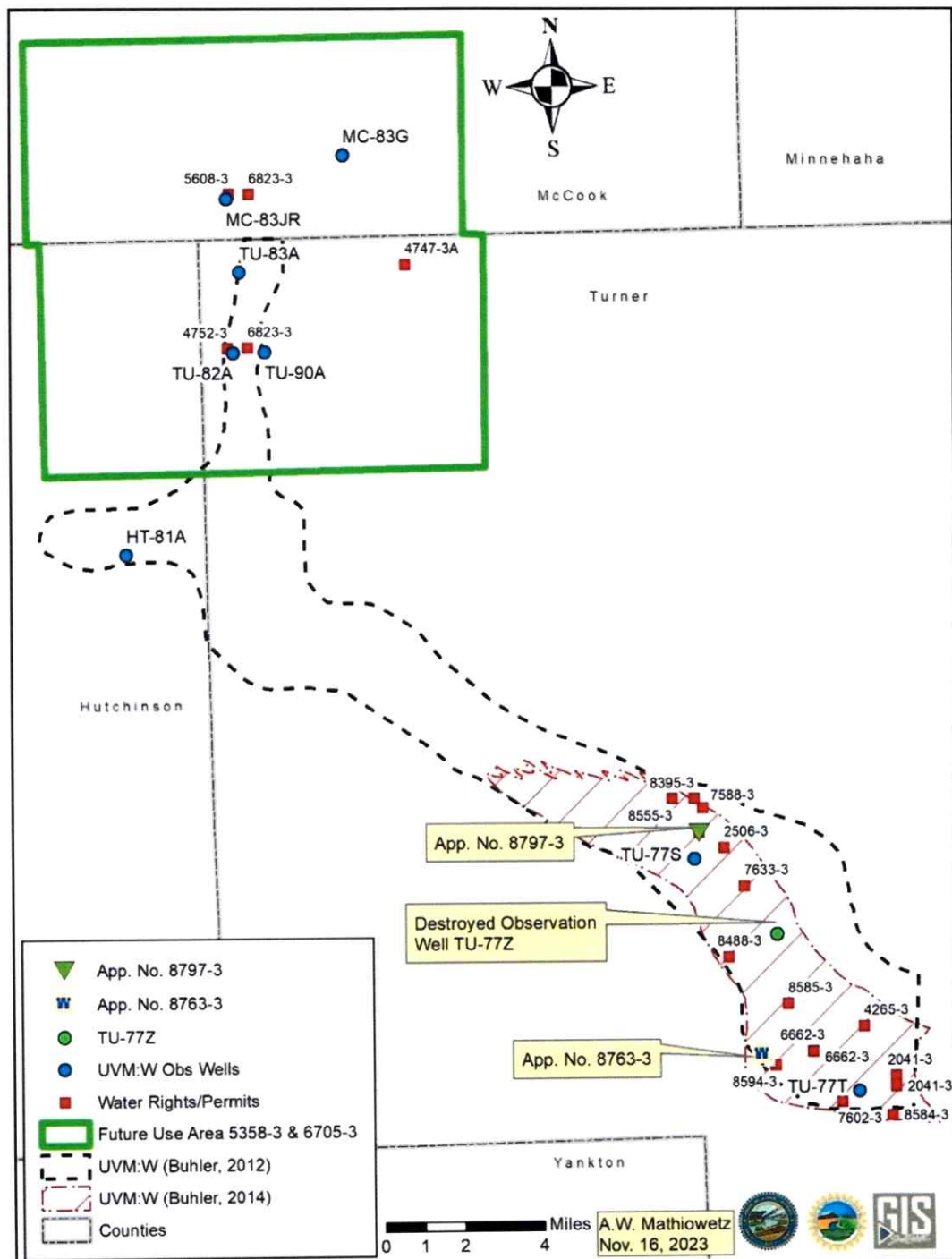


Figure 1- Approximate areal extent of UVM:W aquifer from Buhler's 2012 and 2014 mappings with observation wells, water rights/permits, and future use area (Water Rights, 2023d and 2023e) currently labeled as completed into the UVM:W aquifer

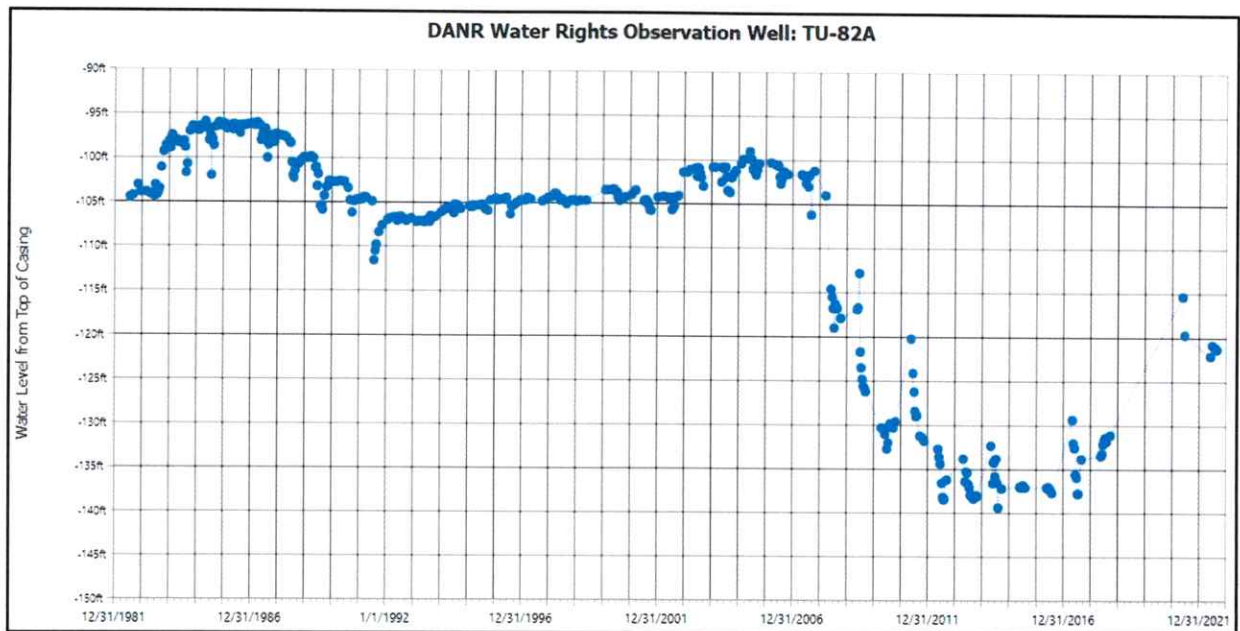


Figure 2- Hydrograph for observation well TU-82A; observation wells TU-90A, TU-83A, MC-83JR and MC-83G all behave in a similar manner (Water Rights, 2023d)

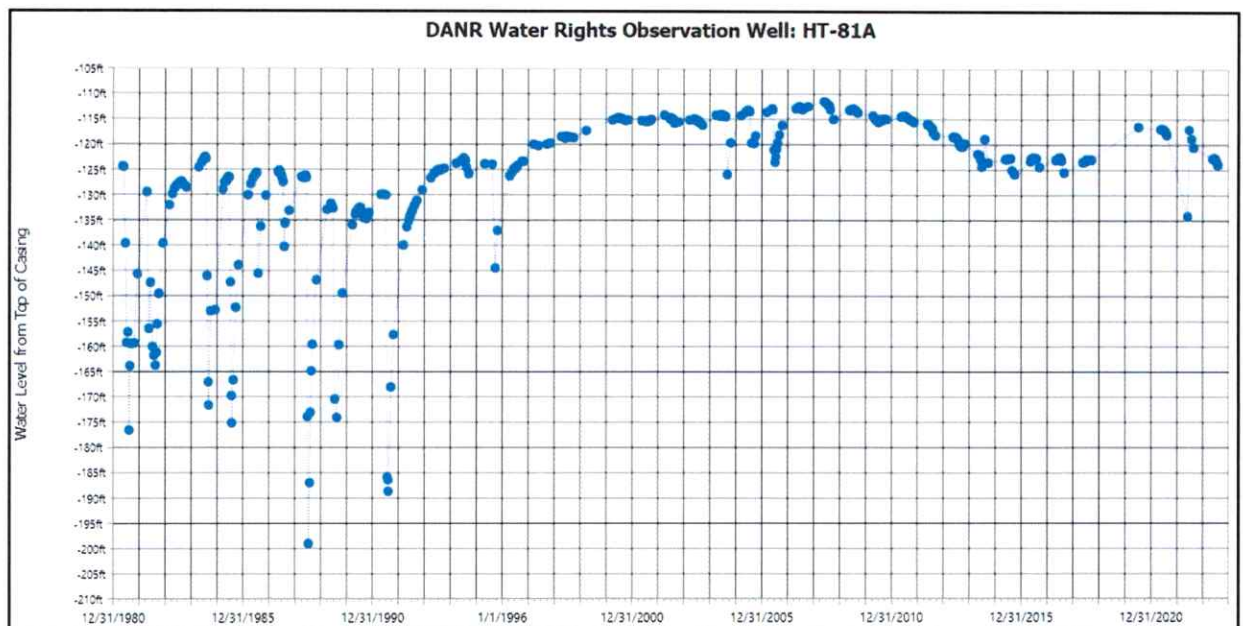


Figure 3- Hydrograph for observation well HT-81A (Water Rights, 2023d)

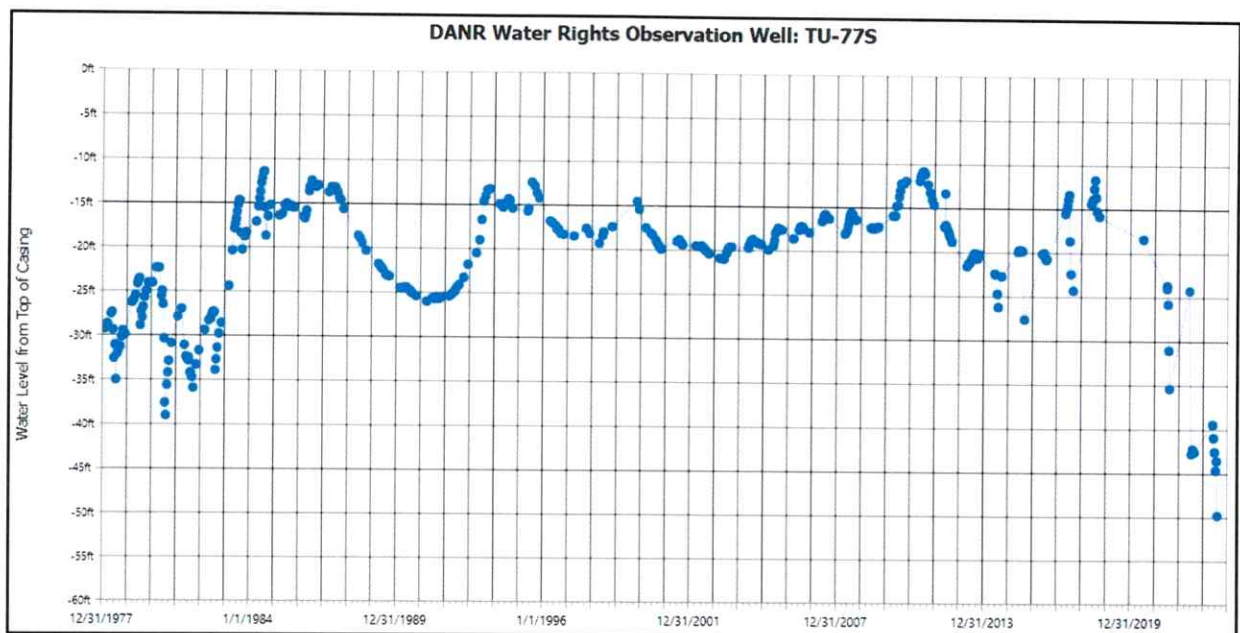


Figure 4- Hydrograph for observation well TU-77S; observation wells TU-77Z and TU-77T all behave in a similar manner (Water Rights, 2023d)

For the remainder of this report, references to the Upper Vermillion Missouri: West aquifer (UVM:W) will specifically mean the Buhler 2014 mapping of the aquifer. The direction of groundwater movement in the UVM:W aquifer is from the northwest to the southeast (Buhler, 2014; Water Rights, 2023d). Review of well completion reports within 0.5 miles of the Buhler 2014 boundary show the aquifer is under confined conditions, generally has a depth to top of aquifer ranging from approximately 30 to 200 feet but may be as shallow as 10 feet along Turkey Ridge Creek, and static water levels ranging from near land surface to 80 feet below grade (Water Rights, 2023f).

Based on local water well completion reports (Water Rights, 2023f) and lithologic logs (SDGS, 2023), the depth to the top of the aquifer is likely to range from 70 to 170 feet below land surface with a likely maximum well depth of 270 feet at the proposed well site. The test hole log included with the application indicated the top of the aquifer starts at 133 feet and extends to 271 feet with several intermixed layers of clay and sandy clay ranging in thickness from 5 to 10 feet. Static water level in the area of this project is expected to be approximately 25 to 35 feet below grade (Water Rights, 2023d).

APPLICABLE SOUTH DAKOTA CODIFIED LAW (SDCL):

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 Upper Vermillion Missouri: West aquifer.

This application proposes to appropriate water from the Upper Vermillion Missouri: West 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 Greenhorn Formation is a Cretaceous-aged formation. The Upper Vermillion Missouri: West aquifer is not older or stratigraphically lower than the Greenhorn Formation (Fahrenbach et al, 2010). Furthermore, the applicant is not a water distribution system as defined by SDCL 46-1-6(17). Therefore, the balance between recharge to and withdrawals from the Upper Vermillion Missouri: West aquifer must be considered for this application.

Hydrologic Budget:

Recharge

Recharge to the Upper Vermillion Missouri: West (UVM:W) aquifer occurs through leakage from fractures in the Sioux Quartzite, outflow from the adjacent portions of the Niobrara aquifer, and direct infiltration of precipitation where the aquifer may be near land surface (Holmes and Filipovic, 2015; Kilts, 2023; Lindgren and Hansen, 1990). A specific recharge rate to the UVM:W aquifer has not been calculated. Furthermore, there is not an up-to-date full delineation of the aquifer available due to limited lithologic and water level data in some areas. Hedges and others (1985) indicated a range of 0.15 to 0.6 inches per year to be a reasonable recharge rate to buried confined aquifers such as the UVM:W aquifer. Using the 2014 mapped area from Buhler, that would be a range of 245 to 980 acre-feet per year (ac-ft/yr).

Buhler (2014) completed a flow-net analysis for what he called groundwater outflow at the southeastern end of the UVM:W aquifer for a single year using January 2014 water level measurements. Buhler (2014) stated “The amount of groundwater outflow from a management unit represents the volume of water recharging the unit that exceeds discharges from the unit.” Groundwater outflow from an aquifer is an analog for recharge. It typically provides a scale to the amount of recharge to smaller aquifers such as the UVM:W aquifer. What that means is while it is not truly a “recharge rate,” groundwater outflow represents recharge rate and provides information on the amount of potential development an aquifer can sustain without becoming over appropriated. The groundwater outflow was calculated using the below equation.

$$Q = kAI * 0.0084$$

Where:

Q= flow (ac-ft/yr)

k= hydraulic conductivity (ft/d)

A= area (ft²)

I= hydraulic gradient (ft/ft)

0.0084= conversion constant

It would be more accurate to call Buhler's (2014) "groundwater outflow" "aquifer intra-flow" because the observation wells used to calculate this value are both within the same aquifer. However, due to the location of the down gradient observation well, TU-77T, near the discharge area of the aquifer, it is reasonable to consider this aquifer intra-flow to be representative of the groundwater outflow. The term groundwater outflow will be used for the remainder of this report. Buhler's (2014) estimated groundwater outflow was 2,681 ac-ft/yr using water level data from observation wells TU-77Z and TU-77T. It should be noted there are appropriations down gradient of TU-77T. At the time of Buhler's (2014) report, Water Right Nos. 2041-3 for the City of Viborg and 4265-3 for James D Bondesen were located down gradient from TU-77T. The City of Viborg has been partially or completely using rural water since 1985 (McIntire, 2023). Water Right No. 4265-3 is an irrigation water right which reported pumping approximately 24 ac-ft in 2013. Accounting for that irrigation use, Buhler's (2014) groundwater outflow should be 2,657 ac-ft/yr.

Observation wells TU-77Z and TU-77T were 4.45 miles apart and were the two closest observation wells to the discharge area of the UVM:W aquifer. Observation well TU-77Z was destroyed by road construction in 2018. The outflow for every year using the data nearest to June 1, ranging between May 1 to June 30, and on consecutive days if same day readings were not available, were used to calculate the gradient between TU-77Z and TU-77T as well as currently existing wells TU-77S and TU-77T (7.1 miles apart). June 1 was chosen because it is typically before the irrigation season begins, and so there should be minimal impacts on artesian head pressure from seasonal pumping for irrigation. The values of k (277 ft/day) and A (2,173,880 ft²) from Buhler (2014) were also used. The estimated pumpage by the City of Viborg was accounted for in the pre-1986 calculation by assuming pumping at their permitted diversion rate, 0.96 cfs, for 60% of the time. This is likely an overestimate due to the relatively small size of the city of Viborg. However, this method has been developed and used by the Water Rights Program and accepted by the Water Management Board. Furthermore, the reported pumpage by Water Right No. 4265-3 was also subtracted out from the calculated groundwater outflow values since both are down gradient from TU-77T.

The average groundwater outflow, when not subtracting the down gradient pumpage, using the gradients between TU-77Z and TU-77T is approximately 3,179 ac-ft/yr. Using the gradients between TU-77S and TU-77T, the average groundwater outflow is 2,438 ac-ft/yr across their respective periods of record. When subtracting the yearly down gradient pumpage previously mentioned, those averages become 3,062 ac-ft/yr and 2,329 ac-ft/yr, respectively. It is likely the actual outflow from the aquifer is somewhere in the range of the latter groundwater outflow values and could be higher or lower. Table 1 shows the numbers used in the calculation for average groundwater outflow when not accounting for the down gradient water pumpage. The approximate groundwater outflow volumes minus the down gradient water pumpage are shown in Figure 5. Gaps in the data are where no data was available to meet the above criteria for calculation.

Table 1- Groundwater outflow at the southeastern portion of the UVM:W aquifer (Buhler, 2014; Water Rights, 2023d)

Gradient Data Source	A, Area (ft ²)	I, Hydraulic Gradient (ft/ft)	k, Hydraulic Conductivity (ft/day)	Q, Flow (ac-ft/yr)
Buhler, 2014	2,173,880	0.00053	277	2,681
TU-77Z to TU-77T (1978-2018)	2,173,880	0.000628	277	3,179
TU-77S to TU-77T (1978-2023)	2,173,880	0.000482	277	2,438

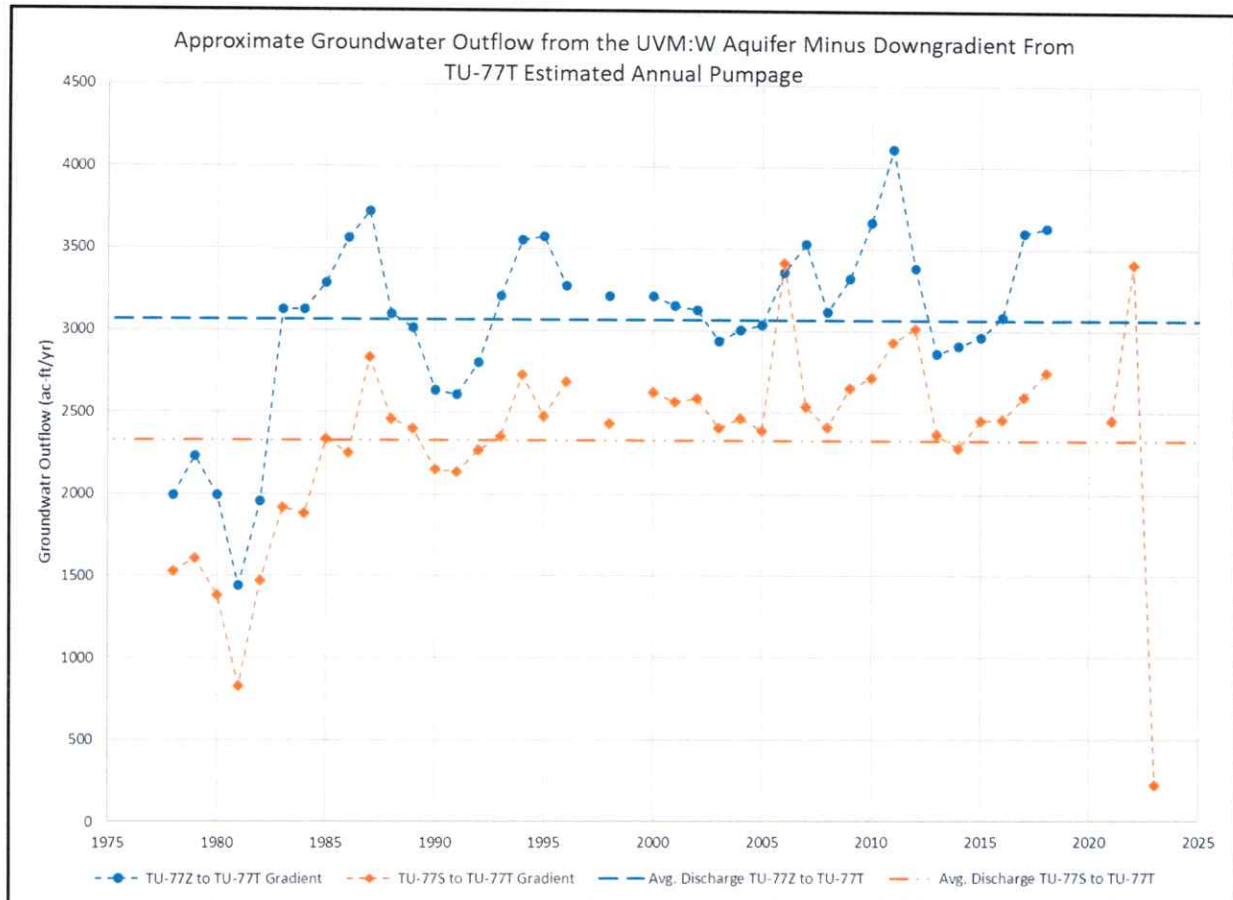


Figure 5- Approximate groundwater outflow from the UVM:W aquifer (Water Rights, 2023d) minus pumpage down gradient from TU-77T based on the hydraulic gradients from TU-77Z to TU-77T and TU-77S to TU-77T

The groundwater outflow for 2023 using the TU-77S to TU-77T gradient is a suspect value based on unusually low water level readings measured for TU-77S (see Figure 4). The new pumping authorized near TU-77S by irrigation Water Permit No. 8555-3, approximately 1.6 miles northwest, and for dairy use under Water Permit No. 8395-3, 1.5 miles north, may have had significant influence on the artesian head pressure in the observation well. Continued monitoring of the observation well will need to be done to determine if the 2023 data is accurate and verify if the water level stabilizes in response to nearby pumping. However, it has been included for this analysis. This flow net analysis shows the 0.15 to 0.6 in/yr recharge rate for buried confined aquifers without a specific recharge rate estimate from Hedges and others (1985) is on the low side of actual average annual recharge to the aquifer.

A direct comparison of groundwater outflow to withdrawals from an aquifer must be taken in the context of year-to-year changes in weather, total withdrawals, and location of withdrawals, because those factors can affect water levels in the observation wells, especially confined aquifer observation wells such as TU-77S and TU-77T, which in turn can have significant effects on the calculations for groundwater outflow, see Figures 4 and 5.

Discharge

Discharge from the UVM:W aquifer is primarily through well withdrawals and natural discharge into the Upper Vermillion Missouri: South aquifer, but there may also be evapotranspiration in areas where the aquifer may be at or near land surface along Turkey Ridge Creek (Buhler, 2014; Lindgren and Hansen, 1990; SDGS, 2023; Water Rights, 2023f). Currently, there are 14 water rights/permits authorized to withdraw water from the UVM:W aquifer, again only considering the Buhler 2014 mapped area (see Table 2). Also, Application No. 8797-3 for Donald D. Benson proposes to irrigate up to 65 acres from the UVM:W aquifer but has a priority date senior to this application.

Table 2 lists the water rights/permits authorized to appropriate water from the UVM:W aquifer (Water Rights, 2023e) For Water Permit No. 8395-3, the permitted annual volume limit was listed. For Water Right No. 6662-3 which is limited only by diversion rate, it was assumed full time pumping. This was done because it is a dairy and typically uses water year-round. This is likely to be an overestimate. Historically, the Water Rights Program would estimate use at 60% full time pumping. Using full time pumping was deemed reasonable because Water Permit No. 8395-3 for another dairy in the same aquifer has a permitted volume that assumes pumping 95% of the time. Water Right No. 2041-3 for the City of Viborg is assumed to be zero pumpage because the city is connected to rural water and maintains their wells for standby purposes (Drinking Water, 2023). The estimated annual non-irrigation water use is likely to be less than 557 ac-ft/yr as Water Right No. 6662-3 is unlikely to be pumping 24 hours per day. This application proposes to appropriate 480 ac-ft/year. If approved, that would make the estimated annual non-irrigation water use 1,037 ac-ft/yr.

Table 2-Water rights/permits from the UVM:W aquifer (Water Rights, 2023e)

PERMIT NO.	NAME	COUNTY	PRIORITY DATE	STATUS	USE	CFS	ACRES	NON-IRR PERMITTED/ ESTIMATED VOL. (AC-FT/YR)
2041-3	CITY OF VIBORG	TU	12/13/1960	LC	MUN	0.96		0*
2506-3	JAMES REINERS	TU	10/23/1975	LC	IRR	1.5	143	
4265-3	JAMES D BONDESEN	TU	03/27/1978	LC	IRR	0.73	51	
6662-3	VANNORSDEL'S DAIRY	TU	09/16/2008	LC	COM/DOM /LCO	0.134		97.1**
7535-3***	DONALD BENSON	TU	11/30/2012	PE	IRR	1.78	65	
7588-3	MIKOTA HOLDINGS	TU	12/26/2012	PE	IRR	1.78	160	
7602-3	MICHAEL D STEVENS	TU	12/28/2012	PE	IRR	1.89	132	
7633-3	SMIT FAMILY FARMS LLC	TU	01/14/2013	PE	IRR	1.78	152	
8395-3	FULL CIRCLE DAIRY LLC	TU	03/11/2019	PE	COM/DOM /LCO	0.67		460
8488-3	BRETT PETERSEN	TU	02/08/2021	PE	IRR	1.78	80	
8555-3	JON MILLER	TU	10/25/2021	PE	IRR	2.22	320	
8584-3	SHAWN VANNORSDEL	TU	01/21/2022	PE	IRR	2.22	156	
8585-3	ALLEN VANNORSDEL	TU	01/21/2022	PE	IRR	2.22	156	
8594-3	MERLIN VANNORSDEL	TU	02/11/2022	PE	IRR	2.22	156	
TU= Turner, LC= Water Right, PE= Water Permit, MUN= Municipal, IRR= Irrigation, COM= Commercial, DOM= Domestic, LCO= Livestock Confinement Operation, *= Connected to rural water system, **= 100% full time pumping, ***= to be cancelled for non-construction						TOTAL		557.1

Table 3 shows the reported irrigation pumpage along with permitted acres and application rate per permitted acre for each year from 1979 through 2022. This data is reiterated in Figure 6. The table also includes an average permitted acres and application rate per permitted acre from 2013 to 2022 excluding acres and thus the application rate for systems reported as not constructed during that time period. Over the period of record irrigation usage and application rate per permitted acre has increased especially starting in 2012 to present. This makes sense because 2012 was a drought year and there were a number of permits approved in 2014 following Buhler's (2014) report and again in 2021 and 2022. In 2022, there were 7 irrigation water rights/permits authorizing the irrigation of 756 acres reporting no pumpage. The primary reason was for non-construction, 6 of the 7 of the irrigation system. Four of those permits were approved in either 2021 or 2022.

Table 3- Reported irrigation pumpage from the UVM:W aquifer with permitted acres and application rate (inches) per permitted acre (Water Rights, 2023b and 2023e)

Year	Reported Pumpage (ac-ft/yr)	Permits Reporting	Permitted Acres	App. Rate per Permitted Acre	Year	Reported Pumpage (ac-ft/yr)	Permits Reporting	Permitted Acres	App. Rate Inches per Permitted Acre
1979	39.78	4	943	0.5	2003	35.91	3	294	1.5
1980	99.42	4	943	1.3	2004	66.29	2	194	4.1
1981	18.56	3	943	0.2	2005	1.66	2	194	0.1
1982	53.03	3	943	0.7	2006	66.29	2	194	4.1
1983	185.62	3	943	2.4	2007	116.67	2	194	7.2
1984	40	4	943	0.5	2008	0	2	194	0.0
1985	3	3	943	0.0	2009	0	2	194	0.0
1986	0	4	943	0.0	2010	0	2	194	0.0
1987	110	3	943	1.4	2011	0	2	194	0.0
1988	1.4	4	943	0.0	2012	49.72	2	194	3.1
1989	39	4	794	0.6	2013	24.31	2	194	1.5
1990	0	4	794	0.0	2014	145.98	7	859	2.0
1991	0	4	794	0.0	2015	118.5	7	859	1.7
1992	0	4	794	0.0	2016	179.01	7	859	2.5
1993	0	2	194	0.0	2017	199.93	7	859	2.8
1994	0	2	194	0.0	2018	42.72	7	859	0.6
1995	0	2	194	0.0	2019	0	7	859	0.0
1996	88.38	2	194	5.5	2020	294.72	7	859	4.1
1997	0	2	194	0.0	2021	255.32	8	939	3.3
1998	0	3	294	0.0	2022	701.47	11	1571	5.4
1999	0	3	294	0.0	Avg.	69.3	3.8	586.4	1.4
2000	13.92	3	294	0.6	Avg. 2013-2022	196.2	7	871.7	2.4
2001	19.89	3	294	0.8	Avg. 1979-2012	32.0	2.9	502.5	1.1
2002	39.77	3	294	1.6	Avg. 2013-2022 excluding systems reported as not constructed			482.6	4.6

Currently, there are 11 irrigation water rights/permits authorizing the irrigation of 1,571 acres (Water Rights, 2023e). There are six water rights/permits reporting as not constructed on the 2022 irrigation questionnaire, Water Right No. 2506-3, possibly subject to cancellation due to abandonment, and Water Permit Nos. 7535-3, 8488-3, 8584-3, 8585-3, and 8594-3. Water Permit No. 7535-3 authorizes the irrigation of the same acres as Permit Application No. 8797-3 proposes to irrigate and will be cancelled if that application is approved. These water rights/permits authorize the irrigation of 756 acres. If these irrigation systems were developed, excluding Water Permit No. 7535-3, and assuming an application rate per permitted acre of 4.6 in/yr, the average application rate per permitted acre excluding non-constructed systems from 2013 through 2022, the remaining 5 systems would be estimated to pump approximately 265 ac-ft/yr. Application No. 8797-3, if approved, would be estimated to pump approximately 25 ac-ft/yr. The average reported irrigation from 2013 to 2022 plus the estimated future use by systems reporting as not constructed, plus estimated future use by Application No. 8797-3 is approximately 486 ac-ft/yr.

However, it is more reasonable to apply the application rate per permitted acre excluding systems reporting as not constructed over the last 10 years to the total permitted acres for the aquifer. Applying the 4.6 in/yr per permitted acre application rate to the 1,506 currently permitted acres,

not including the 65 acres permitted under Water Permit No. 7535-3 for above discussed reasons, is approximately 577 ac-ft/yr. The 577 ac-ft/yr is likely a more representative value of estimated annual irrigation pumpage for the future rather than taking the 2013-2022 average plus the application rate applied to the acreage for the systems reporting as not constructed.

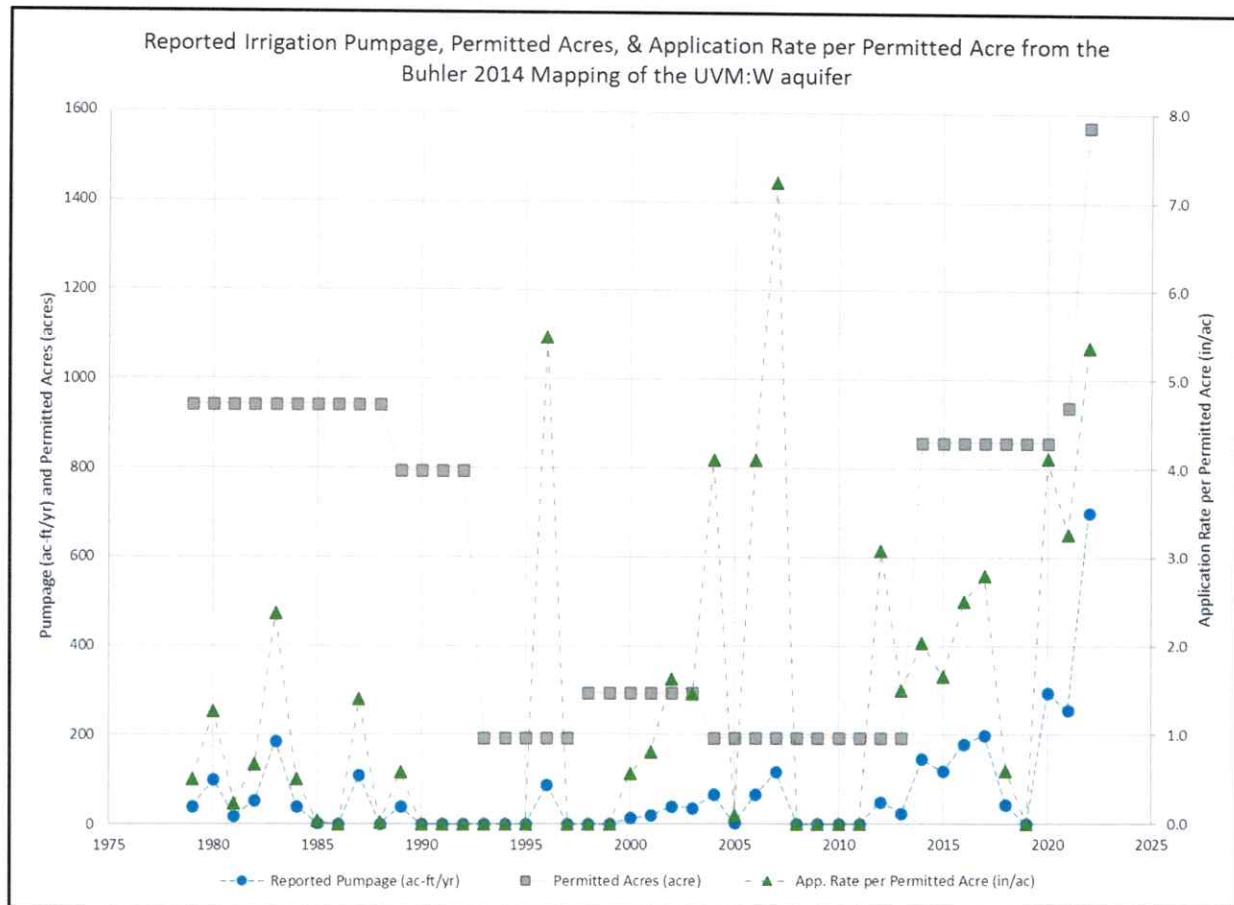


Figure 6- Reported irrigation pumpage, permitted acres and application rate per permitted acre for the UVM:W aquifer from 1979-2022 (Water Rights, 2023b and 2023e)

There are also domestic wells completed into the UVM:W aquifer that do not require a water right/permit, so the withdrawal amount for those wells is unknown (Water Rights, 2023f). Withdrawals from domestic wells on an average annual basis are not considered a significant portion of the hydrologic budget due to their relatively low diversion rate and the availability of rural water in the area where the UVM:W aquifer is located.

Hydrologic Budget

Table 4 shows current estimates for average annual water use plus the proposed use by this application and Water Permit Application No. 8797-3. Using Hedges and others (1985) recharge rate range for buried confined aquifers, leads to an estimated recharge rate range of 245 to 980 ac-ft/yr. Review of groundwater outflow, which can be used as an analog for recharge, shows over the period of record an average outflow ranging from 2,329 to 3,062 ac-ft/yr. However, there has been a significant recent downward trend in the groundwater outflow, see Figure 5. This recent change may be due to development within approximately 1.5 miles of observation well TU-77S which is used for the groundwater outflow calculations.

Table 4- Water use estimates

Use Type	Volume (ac-ft/yr)
Irrigation, 4.6 in/yr on 1,506 permitted acres, not including Water Permit No. 7535-3	577
Non-Irrigation	557
<i>Total</i>	<i>1,134</i>
App. No. 8797-3	25
App. No. 8763-3	480
Grand Total	1,639

Observation Well Data:

Administrative Rule of South Dakota Section 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 information on how the aquifer reacts to regional climatic conditions and local pumping. The Water Rights Program maintains two observation wells within the Buhler 2014 mapping of the UVM:W aquifer. There is also a destroyed observation well, TU-77Z (see Figure 1). Observation well TU-77Z was destroyed in 2018 for road construction. The hydrographs for these observation wells are shown in Figure 7.

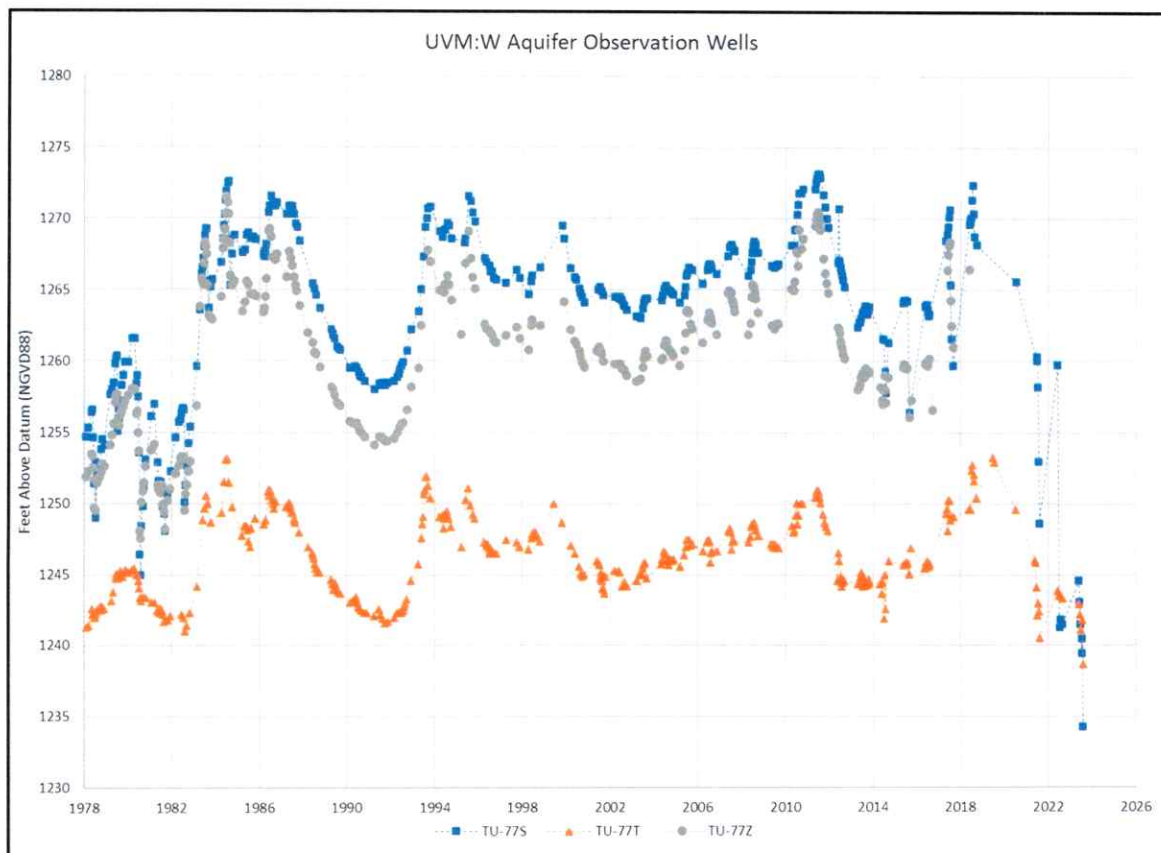


Figure 7- UVM:W aquifer observation well data (Water Rights, 2023d)

Observation well TU-77T shows relatively stable water levels over its period of record. The record low recorded water level was August 2, 2023. It should be noted 2023 has been a drought year during the irrigation season. Observation well TU-77S has a relatively stable water level across the period of record until 2021. Since that time, there has been a steep decline in water levels from the June 29, 2021, measurement to the most recent measurement, August 1, 2023, of approximately 26 feet. There was some spring recovery of water levels as measured in June 2022 and May 2023. The 2022 and 2023 measurements for observation well TU-77S are somewhat suspect at this time because of their significant difference in water level decline over the last several years compared to TU-77T. Additional measurements into the next several years are required to verify the validity of those measurements.

Observation well TU-77S is upgradient of TU-77T in terms of general water movement within the aquifer. That means the water level for TU-77S, when viewed in terms of elevation, should be above the water levels in TU-77T. For 2023 and measurements on the same day or consecutive days, from the first measurement on May 23 through the third measurement on June 20, TU-77S had a water level elevation measurement ranging from 1.65 to 0.36 feet above the water level elevation measurement of TU-77T. For the 4th and 5th measurements, July 18 and August 1 and 2, 2023, TU-77S had water level measurements ranging from 1.31 to 4.48 feet below TU-77T. That would be a reversal of the gradient within the aquifer which could indicate no groundwater outflow from the aquifer was occurring at that time.

Water Availability

When comparing the shape of the groundwater outflow chart (Figure 5) and the observation well hydrographs (Figure 7), the similar shapes are obvious. That makes sense because the water level elevations (Figure 7) and the difference between those values are used to estimate the groundwater outflow (Figure 5). The reduction or even elimination of groundwater outflow from an aquifer means that it is possible recharge to the aquifer is equal to or less than withdrawals from the aquifer. While previous Water Management Board and court decisions (Circuit Court of South Dakota, Sixth Judicial Circuit, 2005; Circuit Court of South Dakota, First Judicial Circuit, 2012) have relied upon or stated that average annual recharge and average annual withdrawals should be considered, it is necessary to also consider the context of development that is currently occurring from the aquifer.

There are a number of recently approved water permits that have yet to develop and are therefore not accounted for in the average reported pumpage from the aquifer. There was a significant decline of groundwater outflow from the aquifer for 2023 (see Figure 5). The estimated groundwater outflow for 2023 was approximately 222.6 ac-ft/yr. As previously stated, there are a number of irrigation water rights/permits that are yet to develop and would increase pumping from the aquifer if developed.

Average numbers take time to develop. Likely pumpage by irrigation users can be projected by calculating the application rate per permitted acre (Table 3). The average reported irrigation across the last 10 years is 196.2 ac-ft/yr. When accounting for all currently approved irrigation permits, both developed and yet to be developed, by multiplying the permitted acres times the application rate per permitted acre for developed systems, 4.6 inches/acre, the likely average annual irrigation pumpage assuming development of all the currently non-developed irrigation water rights/permits

and continued usage by all of the developed permits is 577 ac-ft/yr. That is a significant increase over the current average annual irrigation pumpage.

There are two separate primary factors to consider in this instance when determining if there is unappropriated water available for this proposed appropriation. First, there has been a recent change in groundwater levels (see TU-77S in Figure 7) and thus the estimated groundwater outflow from the aquifer. This may have been caused by drought conditions or recent nearby development of appropriative permits affecting artesian head pressure in the aquifer. Second, there are a number of irrigation water permits that are yet to fully develop and thus are not properly accounted for in the average annual pumpage from the aquifer. Most of the undeveloped permits have 3 to 4 years left in their respective development periods. When considering these factors, there may not be unappropriated water available for this application or Application No. 8797-3. It may be prudent to defer this application and Application No. 8797-3 for such time as to allow the development of the currently permitted water rights/permits and for continued monitoring of the water levels in the observation wells.

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

The nearest water right/permit from the UVM:W aquifer to the proposed well location is Water Permit No. 8594-3 approximately 0.43 miles southeast (Water Rights, 2023e). The next nearest is Water Right No. 6662-3 approximately 1.28 miles east of the proposed well site (Water Rights, 2023e). Observation well TU-77T is located 2.6 miles southeast of the proposed well site (Water Rights, 2023d).

The nearest domestic wells likely completed into the UVM:W aquifer are located approximately 0.6 miles east and 0.8 miles south of the proposed well site (Water Rights, 2023f). The well to the east was completed in 1981 and designated for domestic use. The top of aquifer was at 60 feet with an aquifer thickness of 26 feet and a depth to static water level of 40 feet. The well to the south was completed in 1977 and designated for domestic use. The top of the aquifer was at 130 feet with an aquifer thickness of 37 feet and a depth to static water level of 70 feet. The locations of domestic wells are based on the location provided by the well driller on the water well completion report. It is possible there are other domestic use UVM:W aquifer wells in the area of the applicant's proposed well site that are not on file with the Water Rights Program.

The UVM:W aquifer is under confined conditions at the applicant's proposed well site (Water Rights, 2023f). Since the aquifer is confined, drawdown can extend some distance from a well. However, the exact drawdown behavior cannot be determined without an aquifer performance test. The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has promulgated 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 (Water Rights, 1995). The Board adopted the Findings of Fact 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).

Observation well TU-77T is located within approximately one mile of three high capacity (diversion rate greater than 0.2 cfs) water rights/permits. They are Water Right No. 2041-3 and Water Permit Nos. 7602-3 and 8584-3 (Water Rights, 2023e). However, Water Right No. 2041-3 for the City of Viborg is not actively used, and Water Permit No. 8584-3 was not developed as of the end of 2022. The hydrograph for TU-77T is shown in Figure 7. The lowest recorded water level is approximately 41.9 feet below land surface. The top of the aquifer is likely at 106 feet below grade, but it should be noted sand and gravel was encountered in the drill hole from 57 to 62 feet and 64 to 71 feet below grade. Those sand and gravel sections may be hydrologically connected to the much deeper section that primarily comprises the aquifer. The static water level in TU-77T ranges from approximately 28 feet to 43 feet below ground surface. That means at the lowest recorded water level, there was still approximately 63 feet of artesian head pressure above the top of the aquifer.

A review of the Turner County complaint file showed one complaint filed regarding potential well interference from wells completed into the UVM:W aquifer (Water Rights, 2023a). In July 2022 a well owner with a well located in Sec. 6-T97N-R53W, approximately 3.8 miles northwest of the proposed well site and 1.4 miles south of observation well TU-77S, stated the well was not pumping water for his cattle. No well completion report was found for the well; however, it was reported as 7 to 15 years old so a well completion report should have been filed. The well owner believed the well to be 160 feet deep with a pump setting of 60 feet. The well owner stated the well had pumped all winter and spring but had ceased pumping in the past 2-3 weeks. Review of the hydrograph for TU-77S showed the static water level at that time was approximately 40 feet below grade and had a similar surface elevation as the non-pumping well. The nearest appropriative pumping was under Water Permit No. 7633-3 approximately 1.3 miles northeast of the non-pumping well. The non-pumping well is located near the mapped edge of the aquifer and possibly has greater than expected drawdown when pumping. Based on the available information, it was determined the non-pumping well was not unlawfully impaired by appropriative pumping in the area.

There have been no significant impacts to the water level in TU-77T. However, there was a notable decline in water level in TU-77S. With that in mind, some existing well owners may need to install or lower pumps depending on the specific characteristics of the UVM:W aquifer at their location. When considering the statutes (SDCL 46-1-4 and 46-6-6.1), rule (ARSD 74:02:04:20(7)), the amount of artesian head pressure at the proposed well site for this application (approximately 63 feet), and the lack of substantiated well interference complaints in the area of this application from the UVM:W aquifer, there is a reasonable probability that any drawdown created by using this proposed diversion will not cause an unlawful impairment on existing water rights/permits with adequate wells or adequate domestic wells. However, if this application is approved, it should include the standard qualification requiring the applicant to control their pumping as to not cause

a reduction of needed water supplies in adequate domestic wells or adequate wells having a prior water right.

CONCLUSIONS:

1. Water Permit Application No. 8763-3 proposes to appropriate 480 ac-ft/yr at a maximum instantaneous diversion rate of 1.78 cfs from one well to be completed into the Upper Vermillion Missouri: West aquifer for commercial use in a dairy operation.
2. Based on lithologic logs, well completion reports, and previous mapping of the aquifer and its potential areal extent, this report only considered the Buhler 2014 mapped areal extent, and the water rights/permits, observation wells and other wells completed within or near that areal extent.
3. An analysis of the estimated recharge to the aquifer, estimated groundwater outflow from the aquifer, average water pumpage from the aquifer, likely water pumpage from the aquifer if currently approved water rights/permits are fully developed and put water to use, and observation well data has determined there may not be water available from the aquifer to support this proposed appropriation.
4. Based on the currently best available information, it may be prudent to defer Application No. 8763-3 to allow time for currently approved water rights/permits to fully develop while monitoring water levels in the observation wells.
5. There is a reasonable probability that use from this proposed diversion will not unlawfully impair existing appropriative or domestic users with adequate wells.



Adam Mathiowetz, PE
SD DANR-Water Rights Program

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Affidavit of Publication

STATE OF SOUTH DAKOTA
COUNTY OF TURNER

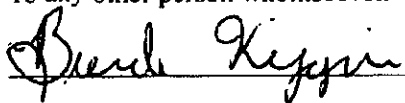
I, Brenda Kiggins of New Century Press, publisher of The New Era, which is a weekly newspaper of general circulation, Printed and published in the City of Parker, in said County of Turner., and has been such legal newspaper during the times here in after mentioned; that the said newspaper has been in existence as such legal newspaper for more than one year prior to the publication of the notice here unto attached, and has during all of said publication of the notice hereunto attached, and has during all of said time had, and now has, more than 200 bona fide subscribers; that the undersigned, the affiant, is the Office Assistant of the said newspaper, in charge of the advertisement department thereof and has personal knowledge of all the facts stated in this affidavit and the advertisement headed:

N0125-1 Notice of Hearing on Application No 8763-3

Once printed copy of hereto attached, is printed and published in the said newspaper for one week, to wit:

On Thursday, the 25th day of January 2024

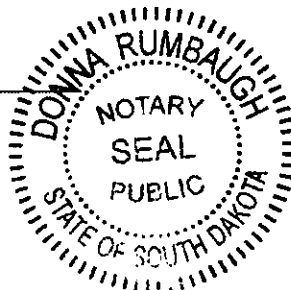
That \$69.44 being the full amount of the fees for publication of the attached notices insure solely for the benefits of the publishers of the said newspaper, that no arrangement or understanding for a division thereof has been made with any other person and that no part thereof has been agreed to be paid To any other person whomsoever.



Subscribed and sworn to before me this 26th day of January 2024



Notary Public, State of South Dakota
My Commission Expires August 11, 2029



Publication Fee...\$69.44
Notary Fee...\$
Total ...\$69.44

**NOTICE OF HEARING on
Application No. 8763-3 to
Appropriate Water**

Notice is given that B & K Dairy Farms, LLC, c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070 has filed an application for a water permit to appropriate 480 acre-feet of water annually at a maximum pump rate of 1.11 cubic feet of water per second (cfs) from one well to be completed into the Upper Vermillion: West Aquifer (up to approximately 270 feet deep) located in the SW 1/4 SE 1/4 Section 20-T97N-R53W for commercial use in a dairy operation located in the E 1/2 SW 1/4 Section 24-T97N-R54W. This site is located approximately 3 miles northwest of Viborg SD.

South Dakota Codified Law (SDCL) 46-2A-4(10) provides that "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 Chief Engineer's recommendation and no hearing may be held before the board, unless the Chief Engineer makes a finding that an application, even if uncontested, presents important issues of public policy or public interest that should be heard by the board." In this case, the Chief Engineer finds that this application presents important issues of public interest that should be heard by the Water Management Board.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends DEFERRAL of Application No. 8763-3 for up to two years to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West aquifer and time for recently issued water permits to be developed. Observation wells in this area have shown sharp decline in water levels in recent years. In addition, there are three water permits from this aquifer that have not been developed and the effects of this potential pumping on water levels in the aquifer cannot be determined.

The Water Management Board will consider this application at 9:45 AM (Central Time) on March 6, 2024, in the Matthew Training Center, Joe Foss Bldg., 523 E. Capitol Ave., Pierre SD. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing.

Any person who intends to participate in the hearing 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 February 5, 2024.

The petition shall be in writing and 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. The hearing is an adversary proceeding and any party has the right to be present at the hearing and to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised at the hearing and decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law.

The March hearing date will be automatically delayed for at least 20 days upon written request

to the Chief Engineer from the applicant or any person who has filed a petition to oppose the application. The request for an automatic delay must be filed by February 5, 2024. If an automatic delay is requested, the hearing will be rescheduled for a future Board meeting and personal notice will be provided to the applicant and all petitioners regarding the time, date, and location.

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 February 5, 2024.

Notice is given to individuals with disabilities that the meeting is being held in a physically accessible location. Individuals requiring assistive technology or other services in order to participate in the meeting or materials in an alternate format should contact Brian Walsh, Nondiscrimination Coordinator, by calling (605) 773-5559 or by email at Brian.Walsh@state.sd.us as soon as possible but no later than two business days prior to the meeting in order to ensure accommodations are available.

Under SDCL 1-26-17(7) notices must state that "if the amount in controversy exceeds \$2,500.00 or if a property right may be terminated, any party to the contested case may require the agency to use the Office of Hearing Examiners by giving notice of the request to the agency no later than ten days after service of a notice of hearing issued pursuant to SDCL 1-26-17." This is a Notice of Hearing, service is being provided by publication, and the applicable date to give notice to the Chief Engineer is February 5, 2024. However, since this particular matter is a water permit application and not a monetary controversy in excess of \$2,500.00 or termination of a property right the Chief Engineer disputes the applicability of this provision and maintains that the hearing must be conducted by the Board.

As applicable, the following provides the legal authority and jurisdiction under which the hearing will be held and the particular statutes and rules pertaining to this application: SDCL 1-26-16 thru 1-26-28; SDCL 46-1-1 thru 46-1-9, 46-1-13 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-17; 46-2A-1 thru 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21, 46-2A-23; 46-5-1.1, 46-5-2 thru 46-5-26, 46-5-30.2 thru 46-5-30.4, 46-5-31, 46-5-32 thru 46-5-34.1, 46-5-38 thru 46-5-39, 46-5-46, 46-5-47, 46-5-49; 46-6-1 thru 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14, 46-6-21, 46-6-26; and Board Rules ARSD 74:02:01:01 thru 74:02:01:25.02; 74:02:01:35.01.

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AFFIDAVIT OF PUBLICATION

YANKTON DAILY PRESS AND DAKOTAN

RECEIVED

JAN 29 2024

OFFICE OF
WATER

B&K DAIRY FARMS INC
45144 289TH ST
VIBORG SD 57070

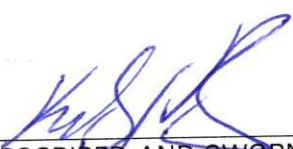
STATE OF SOUTH DAKOTA
COUNTY OF YANKTON

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
NOTICE OF HEARING ON APPL

TAKEN FROM THE PAPER, IN WHICH IT WAS LAST PUBLISHED IN THE
NEWSPAPER ON THE 25th DAY OF January, 2024
THAT THE FULL AMOUNT OF THE FEE CHARGED FOR THE PUBLICATION
OF SAID NOTICE TO WIT \$72.80 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: 01/25/2024

FILED ON: 01/25/2024


SUBSCRIBED AND SWORN TO BEFORE ME THIS 25th DAY OF January, 2024


NOTARY PUBLIC, SOUTH DAKOTA
MY COMMISSION EXPIRES 12/15/2029



Ad text : NOTICE OF HEARING on
Application No. 8763-3 to
Appropriate Water

Notice is given that B & K Dairy Farms, LLC., c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070 has filed an application for a water permit to appropriate 480 acre-feet of water annually at a maximum pump rate of 1.11 cubic feet of water per second (cfs) from one well to be completed into the Upper Vermillion: West Aquifer (up to approximately 270 feet deep) located in the SW 1/4 SE 1/4 Section 20-T97N-R53W for commercial use in a dairy operation located in the E 1/2 SW 1/4 Section 24-T97N-R54W. This site is located approximately 3 miles northwest of Viborg SD.

South Dakota Codified Law (SDCL) 46-2A-4(10) provides that "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 Chief Engineer's recommendation and no hearing may be held before the board, unless the Chief Engineer makes a finding that an application, even if uncontested, presents important issues of public policy or public interest that should be heard by the board." In this case, the Chief Engineer finds that this application presents important issues of public interest that should be heard by the Water Management Board.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends DEFERRAL of Application No. 8763-3 for up to two years to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West aquifer and time for recently issued water permits to be developed. Observation wells in this area have shown sharp decline in water levels in recent years. In addition, there are three water permits from this aquifer that have not been developed and the effects of this potential pumping on water levels in the aquifer cannot be determined.

The Water Management Board will consider this application at 9:45 AM (Central Time) on March 6, 2024, in the Matthew Training Center, Joe Foss Bldg, 523 E. Capitol Ave., Pierre SD. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing.

Any person who intends to participate in the hearing 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 February 5, 2024.

The petition shall be in writing and 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. The hearing is an adversary proceeding and any party has the right to be present at the hearing and to be represented by a lawyer. These and other due process rights will be forfeited if they are not exercised at the hearing and decisions of the Board may be appealed to the Circuit Court and State Supreme Court as provided by law.

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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 February 5, 2024.

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As applicable, the following provides the legal authority and jurisdiction under which the hearing will be held and the particular statutes and rules pertaining to this application: SDCL 1-26-16 thru 1-26-28; SDCL 46-1-1 thru 46-1-9, 46-1-13 thru 46-1-16; 46-2-3.1, 46-2-9, 46-2-11, 46-2-17; 46-2A-1 thru 46-2A-12, 46-2A-14, 46-2A-15, 46-2A-20, 46-2A-21, 46-2A-23; 46-5-1.1, 46-5-2 thru 46-5-26, 46-5-30.2 thru 46-5-30.4, 46-5-31, 46-5-32 thru 46-5-34.1, 46-5-38 thru 46-5-39, 46-5-46, 46-5-47, 46-5-49; 46-6-1 thru 46-6-3.1, 46-6-6.1, 46-6-10, 46-6-13, 46-6-14, 46-6-21, 46-6-26; and Board Rules ARSD 74:02:01:01 thru 74:02:01:25.02; 74:02:01:35.01.

Published once at the total approximate cost of \$72.80 and can be viewed free of charge at www.sdpublicnotices.com

Published January 25, 2024.

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, January 12, 2024 10:20 AM
To: Tricross Dairy
Subject: 8763-3 B & K Dairy Farms LLC - Public Notice
Attachments: 8763-3 Rec.pdf; Ltr.pdf; PubNotice.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.

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



Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, January 12, 2024 8:57 AM
To: New Era
Subject: 8763-3 B & K Dairy Farms LLC - Public Notice
Attachments: 8763-3 public.wmb_final.docx; FORM8.FRM.doc

Attached is a notice to be published on January 25, 2024.

B & K Dairy Farms, LLC., c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070, (509-840-9284)
tricrossdairy@gmail.com 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



Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, January 12, 2024 8:58 AM
To: Kelly Kronaizl
Subject: 8763-3 B & K Dairy Farms LLC - Public Notice
Attachments: 8763-3 public.wmb_final.docx; FORM8.FRM.doc

Attached is a notice to be published on January 25, 2024 Daily Press & Dakotan.

B & K Dairy Farms, LLC., c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070, (509-840-9284)
tricrossdairy@gmail.com 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





**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.**

January 12, 2024

B & K Dairy Farms, LLC.
c/o Tom Koolhaas
45144 289th Street
Viborg SD 57070

Dear Mr. Koolhaas:

Water Permit Application No. 8763-3 for commercial use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the New Era printed in Parker SD (Ph # 605 297-4419) and the Daily Press & Dakotan printed in Yankton SD (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,

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 HEARING on Application No. 8763-3 to Appropriate Water

Notice is given that B & K Dairy Farms, LLC., c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070 has filed an application for a water permit to appropriate 480 acre-feet of water annually at a maximum pump rate of 1.11 cubic feet of water per second (cfs) from one well to be completed into the Upper Vermillion: West Aquifer (up to approximately 270 feet deep) located in the SW 1/4 SE 1/4 Section 20-T97N-R53W for commercial use in a dairy operation located in the E 1/2 SW 1/4 Section 24-T97N-R54W. This site is located approximately 3 miles northwest of Viborg SD.

South Dakota Codified Law (SDCL) 46-2A-4(10) provides that “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 Chief Engineer’s recommendation and no hearing may be held before the board, unless the Chief Engineer makes a finding that an application, even if uncontested, presents important issues of public policy or public interest that should be heard by the board.” In this case, the Chief Engineer finds that this application presents important issues of public interest that should be heard by the Water Management Board.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends DEFERRAL of Application No. 8763-3 for up to two years to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West aquifer and time for recently issued water permits to be developed. Observation wells in this area have shown sharp decline in water levels in recent years. In addition, there are three water permits from this aquifer that have not been developed and the effects of this potential pumping on water levels in the aquifer cannot be determined.

The Water Management Board will consider this application at **9:45 AM** (Central Time) on **March 6, 2024**, in the Matthew Training Center, Joe Foss Bldg, 523 E. Capitol Ave., Pierre SD. The Chief Engineer's recommendation is not final or binding upon the Board. The Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing.

Any person who intends to participate in the hearing 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 **February 5, 2024**.

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The **March** hearing date will be automatically delayed for at least 20 days upon written request to the Chief Engineer from the applicant or any person who has filed a petition to oppose the application. The request for an automatic delay must be filed by **February 5, 2024**. If an automatic delay is requested, the hearing will be rescheduled for a future Board meeting and personal notice will be provided to the applicant and all petitioners regarding the time, date, and location.

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Published once at an approximate cost of _____.



**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**

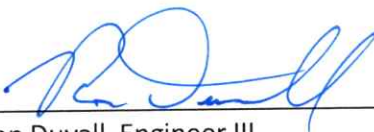
Pursuant to SDCL § 46-2A-4, public notice of the following application was posted on the DANR web site at <https://danr.sd.gov/public>. The posted public notice is the same notice as published in the pertinent newspaper(s) and a copy of the public notice is maintained in the application file. If the 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.: 8763-3

Name of Applicant: B & K Dairy Farms, LLC, Tom Koolhaas

Date of Posting: 1/23/2024

Date of Removal:



Ron Duvall, Engineer III

8/26/2024

Date

Subscribed and sworn to before me, a notary public, this 26th day of August, 2024.



Notary Public - South Dakota
My commission expires:

(SEAL)

Rachel Rodriguez
My Commission Expires
May 16, 2029





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

March 15, 2024

NOTICE OF ENTRY OF ORDER

TO: B & K Dairy Farms, LLC
45144 289th St
Viborg SD 57070

Jennifer L. Verleger, Assistant Attorney General
1302 East Highway 14, Suite 1
Pierre SD 57501-8501

FROM: Eric Gronlund, Chief Engineer 
SD DANR, Water Rights Program

SUBJECT: Deferral of Water Permit Application No. 8763-3, B & K Dairy Farms, LLC

Notice is given that on March 6, 2024, the Water Management Board deferred Water Permit Application No. 8763-3 for up to two years as recommended by the Chief Engineer.

As noted in the Chief Engineer's recommendation, deferral of this application is to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West Aquifer and time for recently issued water permits to develop. The recent sharp decline in nearby observation wells presents water availability concerns.

Prior to expiration of the two-year deferral, this permit may be brought back before the Board for further consideration if the applicant provides additional data showing unappropriated water is available and the proposed diversion can be developed without unlawful impairment to existing domestic water users and water permits/rights. The burden of proof is on the applicant to show the criteria for issuance of a water permit are met.

C: David McVey, Assistant Attorney General

CERTIFICATION

The undersigned hereby certifies under the penalty of perjury that a true and correct copy of a Notice of Entry of Order dated March 15, 2024, regarding deferral of Water Permit Application No. 8763-3 – B & K Dairy Farms, LLC, was served upon the following by enclosing the same in envelopes with first class postage prepaid, and depositing said envelopes in the United States mail on March 15, 2024.

B & K Dairy Farms, LLC
45144 289th St
Viborg SD 57070

Above also Sent Inter-office to:

Jennifer L. Verleger, Assistant Attorney General
1302 East Highway 14, Suite 1
Pierre SD 57501-8501

David McVey, Assistant Attorney General
1302 East Highway 14, Suite 1
Pierre SD 57501-8501

Carl D. Dell

Amanda Dewell
Water Rights Program, DANR

[illegible]

Sworn to, before me, this 15th day of March, 2024.

Wanda Amick

Wanda Amundson
Notary Public
My Commission expires July 28, 2028

Wanda Amundson
My Commission Expires
July 28, 2028



SUPPLEMENTARY REPORT
ON DEFERRED WATER PERMIT APPLICATIONS
8763-3 B&K DAIRY FARMS LLC;
8797-3 DONALD D BENSON;
8817-3 MERLIN VANNORSDEL
APRIL 14, 2026

Water Permit Application Nos. 8763-3, 8797-3, and 8817-3 all proposed to appropriate water from the Upper Vermillion Missouri: West aquifer. Water Permit Application Nos. 8763-3 and 8797-3 were deferred for up to two years at the March 2024, Water Management Board meeting and Permit Application No. 8817-3 was deferred for up to two years at the May 2024, Water Management Board meeting. Based on a sudden drop in observation well water levels, it was determined that unappropriated water may not be available for these three applications (Mathiowetz, 2023a and 2023b). The Chief Engineer recommended deferral for up to two years to monitor observation well water levels and allow more recently permitted systems to develop and place water to beneficial use. Furthermore, the DNR-Geological Survey had been engaged to conduct a study of the Upper Vermillion Missouri: West aquifer to assist with delineating the aquifer beyond what had been done previously (Buhler, 2014; Holmes and Filipovic, 2015).

Water Permit Application No. 8763-3 proposes to appropriate up to 480 acre-feet of water annually (ac-ft/yr) at a maximum instantaneous diversion rate of 1.11 cubic feet of water per second (cfs) from one well (approximately 270 feet deep) to be completed into the Upper Vermillion Missouri: West (UVM:W) aquifer. The well is to be located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 20-T97N-R53W for commercial use in a dairy operation located in the E $\frac{1}{2}$ SW $\frac{1}{4}$ Section 24-T97N-R54W. The proposed well location is approximately 3 miles northwest of Viborg, SD in Turner County.

Water Permit Application No. 8797-3 proposes to irrigate 65 acres at a maximum instantaneous diversion rate of 1.78 cfs from one well (approximately 222 feet deep) to be completed into the Upper Vermillion Missouri: West aquifer and located in the SW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 30 with the land to be irrigated located in the NW $\frac{1}{4}$ Section 30; all in T98N-R53W in Turner County. The applicant is requesting a diversion rate greater than the statutory limit of 1 cfs per 70 acres. The site is located approximately four miles west of Hurley, SD.

Water Permit Application No. 8817-3 proposes to add 91 acres to the irrigated area authorized by Water Permit No. 8594A-3. Water Permit No. 8594A-3 amends Water Permit No. 8594-3 to change the location of the diversion point and acres to be irrigated. Water Permit No. 8594-3 authorizes a maximum instantaneous diversion rate of 2.22 cfs from one well in the NE $\frac{1}{4}$ Section 29 to be completed into the Upper Vermillion Missouri: West aquifer for the irrigation of 156 acres located in the NE $\frac{1}{4}$ Section 29; all in T97N-R53W. Water Permit No. 8594A-3 changed the location of the well, still to be completed into the Upper Vermillion Missouri: West aquifer (approximately 214 feet deep), to the E $\frac{1}{4}$ quarter corner of Section 21 for the irrigation of 156 acres located in the E $\frac{1}{2}$ Section 21; all in T97N-R53W. Water Permit Application No. 8817-3 proposes to irrigate an additional 91 acres in the E $\frac{1}{2}$ Section 21 with no increase in the maximum instantaneous diversion rate from the well to be located near the E $\frac{1}{4}$ quarter corner of Section 21; all in T97N-R53W.

AQUIFER: Upper Vermillion Missouri: West (UVM:W)

Aquifer Characteristics:

The Upper Vermillion Missouri aquifer is a Quaternary aged buried glacial outwash aquifer composed of fine to coarse sand and gravel with intermixed layers of clay (Holmes and Filipovic, 2015; Water Rights, 2026e). The Upper Vermillion Missouri aquifer has been divided into three management units: North, South, and West (Buhler, 2014). The diversion points for Water Permit Application Nos. 8763-3, 8797-3, and 8817-3 are all within the Upper Vermillion Missouri: West aquifer (UVM:W). There have been three primary delineations of the UVM:W aquifer: a 2012 and a 2014 mapping by Water Rights staff engineer Buhler, and an in progress preliminary delineation that is close to finalization by DANR-Geological Survey staff (Vinke, 2025). Figure 1 shows all three delineations as well as current UVM:W water rights/permits, deferred applications, and UVM:W observation wells. Buhler (2014), with data from the SD DANR-Geological Survey, partially re-delineated the southern portion of the extent of the UVM:W aquifer from previous work done by Buhler (2012) (see Figure 1). Buhler's 2012 mapping of the Upper Vermillion Missouri aquifer did not include management units and extended much further northwest. Thus, the southern boundary of the UVM:W aquifer from Buhler's 2012 mapping as shown in Figure 1 will be based on the Buhler 2014 mapping.

Buhler made two separate mappings of the Upper Vermillion Missouri: West aquifer (Buhler, 2012 and 2014). The newer mapping (Buhler, 2014) was based primarily on a SD DANR-Geological Survey study (Holmes and Filipovic, 2015) of the entire Upper Vermillion Missouri aquifer that was in progress when Buhler completed his 2014 report. Based on the remapping by Buhler in 2014, the 2015 Holmes and Filipovic aquifer study report, well completion reports (Water Rights, 2026d), and lithologic logs on file with the SD Geological Survey (SDGS, 2026), it was determined the most northwestern observation wells (Water Rights, 2026b), water rights/permits, and future use permits (Water Rights, 2026c) as well as the western half of the 2012 Buhler mapped extent of the Upper Vermillion Missouri: West aquifer are separate from the Buhler 2014 mapping of the aquifer. This is further supported by an ongoing study by the DANR-Geological Survey Program (Vinke, 2025). Thus, only the water rights/permits and the observations wells within the 2014 Buhler mapped extent of the Upper Vermillion Missouri: West aquifer will be considered in this report. A more in-depth discussion regarding delineations of the Upper Vermillion Missouri: West aquifer is available in the report for Water Permit Application No. 8797-3 (Mathiowetz, 2023a). The approximate areal extent of the Buhler 2014 Upper Vermillion Missouri: West aquifer was approximately 50,280 acres. The in-progress delineation (Vinke, 2025) has an areal extent of approximately 13,770 acres. This is subject to change as the study is finalized but is not expected to change significantly at this time (Vinke, 2025).

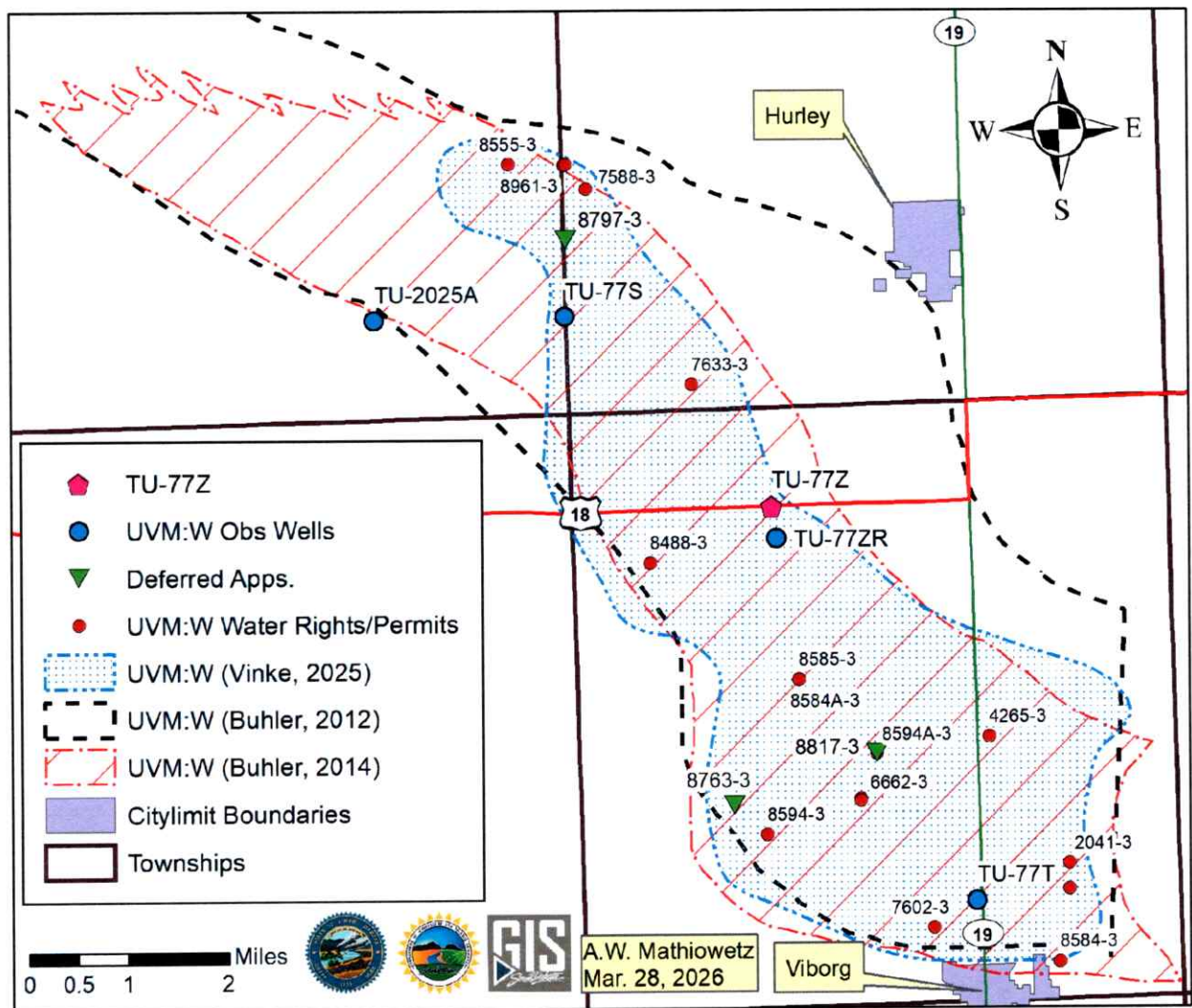


Figure 1- Historical delineations of the Upper Vermillion Missouri: West (UVM:W) aquifer, deferred applications, current water rights/permits, and observation wells currently labeled as completed into the UVM:W aquifer (Water Rights, 2026c and 2026d)

Table 1- Water rights/permits and deferred applications shown in Figure 1 (Water Rights, 2026d)

Permit No.	Name	Priority Date	Status	Use	CFS	Acres	Non-Irr Permitted/ Estimated Vol. (ac-ft/yr)
2041-3	City of Viborg	12/13/1960	LC	MUN	0.96	n/a	0*
4265-3	James D Bondesen	03/27/1978	LC	IRR	0.73	51	
6662-3	Vannorsdel's Inc	09/16/2008	LC	COM/DOM /LCO	0.134	n/a	97.1**
7588-3	Paul Petersen	12/26/2012	LC	IRR	1.77	124	
7602-3	Michael D Stevens	12/28/2012	PE	IRR	1.89	132	
7633-3	Smit Family Trust	01/14/2013	LC	IRR	1.78	136	
8488-3	Brett Petersen	02/08/2021	PE	IRR	1.78	80	
8555-3	Jon Miller	10/25/2021	PE	IRR	2.22	320	
8584-3	Shawn Vannorsdel	01/21/2022	PE	IRR	2.22	156	
8584A-3***	Allen Vannorsdel	01/21/2022	PE	IRR	0	0	
8585-3	Allen Vannorsdel	01/21/2022	PE	IRR	2.22	156	
8594-3	Merlin Vannorsdel	02/11/2022	PE	IRR	2.22	156	
8594A-3***	Merlin Vannorsdel	02/11/2022	PE	IRR	0	0	
8961-3	Full Circle Dairy LLC	06/02/2025	LC	COM	1.35	n/a	460
8763-3	<i>B & K Dairy Farms LLC</i>	<i>05/15/2023</i>	<i>DF</i>	<i>COM</i>	<i>1.11</i>	<i>n/a</i>	<i>480</i>
8797-3	<i>Donald Benson</i>	<i>11/11/2023</i>	<i>DF</i>	<i>IRR</i>	<i>1.78</i>	<i>65</i>	
8817-3	<i>Merlin Vannorsdel</i>	<i>01/11/2024</i>	<i>DF</i>	<i>IRR</i>	<i>n/a</i>	<i>91</i>	
TU= Turner, LC= Water Right, PE= Water Permit, MUN= Municipal, IRR= Irrigation, COM= Commercial, DOM= Domestic, LCO= Livestock Confinement Operation, *= Connected to rural water system, **= 100% full time pumping, ***= change of acres and diversion point for preceding permit							

APPLICABLE SOUTH DAKOTA CODIFIED LAW (SDCL):

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 based on the extra two years of observation well data and will reassess the

potential for unlawful impairment of existing domestic water uses and water rights within the Upper Vermillion Missouri: West aquifer.

These applications propose to appropriate water from the Upper Vermillion Missouri: West aquifer. The probability of unappropriated water 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 Greenhorn Formation is a Cretaceous aged Formation. The Upper Vermillion Missouri: West is a quaternary aged formation and thus, younger and stratigraphically above the Greenhorn Formation (Fahrenbach et al, 2010). Furthermore, the applicants are not water distribution systems as defined in SDCL 46-1-6(17). Therefore, the balance between recharge to and withdrawals from the Upper Vermillion Missouri: West aquifer need to be considered.

Pursuant to SDCL 46-5-6, the diversion rate for an irrigation appropriation cannot be in excess of 1 cfs per 70 acres or the equivalent thereof. The statute provides that: “The Water Management Board may allow a greater diversion, in volume or rate or both, if the method of irrigation, any time constraints on diversion or water, or the type of soil so requires.” Application No. 8797-3 is requesting an instantaneous diversion rate of 1.78 cfs for the irrigation of 65 acres or the equivalent of 1.92 cfs per 70 acres. No specific reason for the request was provided on the application. However, based on the provided map, the center pivot irrigation system appears to be making a partial rotation. Center pivot irrigation systems require a certain diversion rate to operate properly whether making a partial or full rotation. This reason has been accepted by the Water Management Board and the Water Rights Program in the past.

Water Availability:

There are three currently deferred applications described in Table 1. Since the deferral of these three applications, there have been two permits, Water Permit Nos. 8584A-3 and 8961-3, both of which were approved uncontested. Water Permit No. 8584A-3 authorizes a change of diversion point and acres to be irrigated as authorized by Water Permit No. 8584A-3. Water Permit No. 8961-3 authorizes an increase of diversion rate, but not annual volume authorized under Water Right No. 8395-3. Neither water permit increased annual appropriation from the aquifer which was the reason for the deferral of Water Permit Application Nos. 8763-3, 8797-3, and 8817-3. Therefore, Water Permit Nos. 8584A-3 and 8961-3 could be approved while these three applications were deferred.

Hydrologic Budget

Recharge

The Upper Vermillion Missouri: West (UVM:W) aquifer is recharged through leakage from fractures in the Sioux Quartzite, outflow from the adjacent portions of the Niobrara aquifer, and direct infiltration of precipitation where the aquifer may be near land surface (Holmes and Filipovic, 2015; Kilts, 2023; Lindgren and Hansen, 1990). A specific recharge rate to the UVM:W aquifer has not been calculated. The most current delineation is still in progress but is not expected to change significantly (Vinke, 2025). That delineation (Vinke, 2025) is approximately 13,770 acres. Hedges and others (1985) indicated a range of 0.15 to 0.6 inches per year to be a reasonable recharge rate to buried confined aquifers such as the UVM:W aquifer. Using the in-progress delineation (Vinke, 2025), that would be a range of approximately 172 to 344 acre-feet per year (ac-ft/yr). That range does not agree with historic pumping information compared to observation well data. Nor does it agree with the flow-net analysis conducted by Buhler (2014) and Mathiowetz (2023a).

Buhler (2014) completed a flow-net analysis for what he called “groundwater outflow” at the southeastern end of the UVM:W aquifer for a single year using January 2014 water level measurements. Buhler (2014) stated “The amount of groundwater outflow from a management unit represents the volume of water recharging the unit that exceeds discharges from the unit.” Groundwater outflow from an aquifer is an analog for recharge. It typically provides a scale to the amount of recharge to smaller aquifers such as the UVM:W aquifer. What that means is while it is not truly a “recharge rate,” groundwater outflow offers insight into recharge rate and provides information on the amount of potential development an aquifer can sustain without becoming over appropriated. The groundwater outflow was calculated using the equation below.

$$Q=kAI*0.0084$$

Where:

Q= flow (ac-ft/yr)

k= hydraulic conductivity (ft/d)

A= area (ft²)

I= hydraulic gradient (ft/ft)

0.0084= conversion constant

Mathiowetz (2023a) recognized that because the cross-section and the downgradient observation well, TU-77T, for Buhler’s (2014) “groundwater outflow” was upgradient from several diversions from the UVM:W aquifer and upgradient from the actual boundary of the aquifer; although, only slightly, it should be considered “aquifer intra-flow.” However, due to the location of the down gradient observation well, TU-77T, near the discharge area of the aquifer, it is reasonable to consider this aquifer intra-flow to be representative of the groundwater outflow. The term groundwater outflow will be used for the remainder of this report. Buhler’s (2014) estimated groundwater outflow was 2,681 ac-ft/yr using water level data from observation wells TU-77Z and TU-77T. At the time of Buhler’s (2014) report, Water Right Nos. 2041-3 for the City of Viborg and 4265-3 for James D Bondesen were located down gradient from TU-77T. The City of Viborg has been partially or completely using rural water since 1985 (McIntire, 2023). Water Right No. 4265-3 is an irrigation water right which reported pumping approximately 24 ac-ft in 2013. Accounting for that irrigation use, Buhler’s (2014) groundwater outflow should be 2,657 ac-ft/yr.

Table 2 shows the Buhler 2014, and calculations for groundwater outflow that were updated in 2023 as part of the report for Deferred Application No. 8797-3, and the value using data through 2025 (the most recent data that aligns with the method described in 8797-3 (Mathiowetz, 2023a) for selecting dates of readings. Note the top of the casing for TU-77S, TU-77T, and TU-77ZR were surveyed in the summer of 2025. The more accurate top of casing elevation affects the calculations. This accounts for the changes over the same time periods from the 2023 Mathiowetz calculations and calculations done today. At the time of the outflow calculations, Mathiowetz (2023a) noted:

“The average groundwater outflow, when not subtracting the down gradient pumpage, using the gradients between TU-77Z and TU-77T is approximately 3,179 ac-ft/yr. Using the gradients between TU-77S and TU-77T, the average groundwater outflow is 2,438 ac-ft/yr across their respective periods of record. When subtracting the yearly down gradient pumpage previously mentioned, those averages become 3,062 ac-ft/yr and 2,329 ac-ft/yr, respectively. It is likely the actual outflow from the aquifer is somewhere in the range of the latter groundwater outflow values and could be higher or lower.”

Mathiowetz (2023a) also stated new pumping near TU-77S, which reduced the artesian head pressure in the well at the time of the report created potentially suspect readings in the observation well water level. Those measurements have since been confirmed as reasonable. Mathiowetz (2023a) went on to state the estimated recharge rate range from Hedges and others (1985) discussed earlier are likely on the low side of the recharge rate to the UVM:W aquifer. That conclusion still holds true.

A direct comparison of groundwater outflow to withdrawals from an aquifer must be taken in the context of year-to-year changes in weather, total withdrawals, and location of withdrawals, because those factors can affect water levels in the observation wells, especially confined aquifer observation wells such as TU-77S and TU-77T, which in turn can have significant effects on the calculations for groundwater outflow. Furthermore, the outflow, while averaged across the period of record, still only represents outflow in late spring/early summer which in theory is as close to static conditions the aquifer can experience. Since TU-77ZR is a new observation well and is the best well to use for the upgradient portion of the outflow calculation, a longer period of record is needed to determine whether the outflow calculation of 1,215.9 ac-ft is representative of a long-term trend or not (see Table 2).

Buhler (2014) estimated an average hydraulic conductivity (k) for the entire Upper Vermillion Missouri (277 ft/d) using data from just 24 appropriative wells. Appropriative wells tend to be more representative of the characteristics of the most productive areas of the aquifer, which results in a somewhat higher hydraulic conductivity than a true average for the aquifer. Additionally, a comment on the cross-section for this area suggests the aquifer materials could contain more clay than what is typical of the rest of the aquifer, which suggests that the volume of water that can be transmitted through the cross section annually might be lower than what is estimated using the average hydraulic conductivity from Buhler (2014). However, information is not available to calculate a more representative hydraulic conductivity for the cross section. This further emphasizes that the outflows are estimates and the importance of directly using the observation

wells to monitor the response of the aquifer to additional development when managing water availability in this aquifer.

Furthermore, the “groundwater outflow” calculations are based on as close to aquifer static conditions, pre-irrigation season as possible. This means the outflow estimate does not fully account for how irrigation withdrawals would reduce the outflow calculations. Thus, the “groundwater outflow” estimates shown in Table 2 are likely closer to maximum values on an average basis.

Table 2- Groundwater outflow calculations at the southeastern portion of the UVM:W aquifer (Buhler, 2014; Mathiowetz, 2023a)

Gradient Data Source	A, Area (ft²)	I, Hydraulic Gradient (ft/ft)	k, Hydraulic Conductivity (ft/day)	Q, Flow (ac-ft/yr)
Buhler, 2014	2,173,880	0.00053	277	2,680.8
TU-77Z to TU-77T (1978-2018, pre-survey; Mathiowetz, 2023a)	2,173,880	0.000628432	277	3,178.7
TU-77S to TU-77T (1978-2023, pre-survey; Mathiowetz, 2023a)	2,173,880	0.000481919	277	2,437.6
TU-77Z to TU-77T (1978-2018, updated survey)	2,173,880	0.000426206	277	2,155.8
TU-77S to TU-77T (1978-2023, updated survey)	2,173,880	0.000413702	277	2,092.6
TU-77S to TU-77T (1978-2025, updated survey)	2,173,880	0.000392206	277	1,983.9
TU-77S to TU-77T (2014-2018, 2021-2025 [last 10 yrs. of available data, updated survey])	2,173,880	0.000287610	277	1,454.8
TU-77ZR to TU-77T (2025, updated survey)	2,173,880	0.000240384	277	1,215.9

Figure 2 shows the annual calculations of aquifer outflow using the updated top of casing survey for TU-77S to TU-77Z and the outflow value for TU-77ZR to TU-77T. The calculated aquifer outflow was relatively stable until the period between 2018 and 2021. A decline started during that period. The decline lines up with the lower water level trend shown in the observation well water level data, see Figure 2 (Water Rights, 2023c). That change is expected because outflow calculations are reliant on observation well water level data.

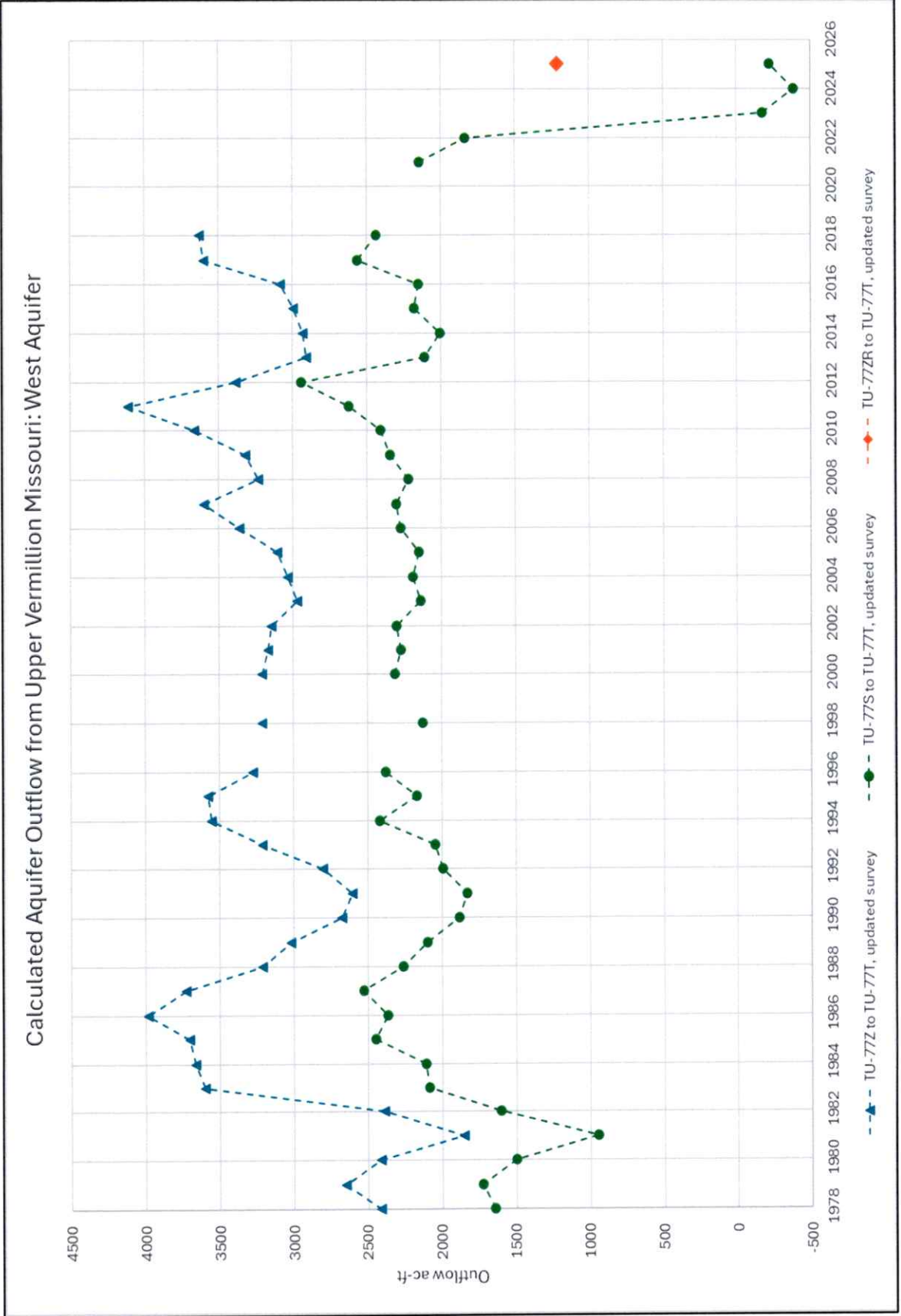


Figure 2- Calculated aquifer outflow using updated top of well casing elevation surveys

Discharge

Discharge from the UVM:W aquifer is primarily through well withdrawals and natural discharge into the Upper Vermillion Missouri: South aquifer, but there may also be evapotranspiration in areas where the aquifer may be at or near land surface along Turkey Ridge Creek (Buhler, 2014; Lindgren and Hansen, 1990; SDGS, 2026; Water Rights, 2026e). Currently, there are 14 water rights/permits authorized to withdraw water from the UVM:W aquifer (see Table 1). However, two permits, Permit Nos. 8584A-3 and 8594A-3, authorize a change of diversion point and acres for their preceding permits, Permit Nos. 8584-3 and 8594-3, and not additional withdrawals (Water Rights, 2026d). There are three deferred applications (see Table 1).

Of the three non-irrigation permits, Water Right Nos. 2041-3 and 6662-3 do not report annual withdrawal to the Water Rights Program, but Water Permit No. 8961-3 does. Water Permit No. 8961-3 authorized an increase of diversion rate and an additional well to what was authorized by Incorporated Permit No. 8395-3. Historically, Incorporated Permit No. 8395-3 reported withdrawing near their permitted volume and thus 8961-3 will be assumed to withdraw the permitted volume. Water Right No. 2041-3 is held by the City of Viborg, but the city receives all their water from TM Rural Water System (Drinking Water, 2026). To ensure the greatest accuracy when reviewing the hydrologic budget of the UVM:W aquifer, Water Right Nos. 2041-3 and 6662-3 should be amended to include a qualification to report annual withdrawals to the Chief Engineer. Table 1 shows that under current appropriation, the average annual withdrawal by non-irrigation appropriations is estimated to be 557.1 ac-ft/yr with one deferred application requesting an additional 480 ac-ft/yr (see Table 1) (Water Rights, 2026d). The estimated average annual use for Water Right No. 6662-3 was assumed to be 100% pumping since it is for a beef feedlot operation.

Currently, there are 11 irrigation water rights/permits, of which two are for changing location of diversion point and/or acres, authorizing the irrigation of 1,311 acres with two deferred irrigation applications requesting to irrigate an additional 156 acres (see Table 1) (Water Rights, 2026d). At the time of submittal of the 2025 irrigation questionnaires, Water Permit No. 8488-3 reported use abandoned. While the permit has not yet been cancelled, it is likely subject to cancellation and thus will not be accounted for in the irrigation usage data.

The average application rate per permitted acre for developed systems in the aquifer from 2016-2025, which reflects current conditions better than the entire historic average that includes non-developed systems, is 5.0 inches per permitted acre (in/ac). Table 3 shows the historic reported irrigation pumpage, along with several averages including an average application rate for developed permits per permitted acres. Water Permit No. 8584-3 was amended by Water Permit No. 8584A-3 in early 2026 to relocate the diversion point and irrigated acres before Water Permit No. 8584-3 was developed. Water Permit No. 8584-3 authorizes the irrigation of 156 acres (Water Rights, 2026d). Assuming the application rate for 2016-2025 developed systems per permitted acre, 5.0 in/ac, the average annual irrigation usage under Water Permit No. 8584A-3 is expected to be approximately 65 ac-ft/yr. The estimated average annual use if all currently permitted acres excluding Water Permit No. 8488-3 as explained above (1,231 acres) were irrigated at the rate of 5.0 in/ac would be approximately 513 ac-ft/yr. Including Water Permit No. 8488-3 (1,311 acres) would be approximately 546 ac-ft/yr. Table 3 shows the average reported total irrigation pumpage over the last 10 years of reported data is approximately 204 to 237 ac-ft/yr less than a likely average annual maximum irrigation withdrawal (546 ac-ft/yr). Table 4 shows the estimated average annual

application rates for the currently permitted irrigation. Deferred Application Nos. 8797-3 and 8817-3 propose to irrigate 156 acres. Assuming the 5.0 in/ac application rate would be 65 ac-ft/yr.

Table 3- Reported irrigation pumpage from the UVM:W aquifer with permitted acres and application rate (inches) per permitted acre (Water Rights, 2026b and 2026d)

Year	Reported Pumpage (ac-ft/yr)	Permits Reporting	Permitted Acres	App. Rate per Permitted Acre	Year	Reported Pumpage (ac-ft/yr)	Permits Reporting	Permitted Acres	App. Rate per Permitted Acre
1979	39.8	4	943	0.5	2004	66.3	2	194	4.1
1980	99.4	4	943	1.3	2005	1.7	2	194	0.1
1981	18.6	3	943	0.2	2006	66.3	2	194	4.1
1982	53.0	3	943	0.7	2007	116.7	2	194	7.2
1983	185.6	3	943	2.4	2008	0.0	2	194	0.0
1984	40.0	4	943	0.5	2009	0.0	2	194	0.0
1985	3.0	3	943	0.0	2010	0.0	2	194	0.0
1986	0.0	4	943	0.0	2011	0.0	2	194	0.0
1987	110.0	3	943	1.4	2012	49.7	2	194	3.1
1988	1.4	4	943	0.0	2013	24.3	2	194	1.5
1989	39.0	4	794	0.6	2014	146.0	7	859	2.0
1990	0.0	4	794	0.0	2015	118.5	7	859	1.7
1991	0.0	4	794	0.0	2016	179.0	7	859	2.5
1992	0.0	4	794	0.0	2017	199.9	7	859	2.8
1993	0.0	2	194	0.0	2018	42.7	7	859	0.6
1994	0.0	2	194	0.0	2019	0.0	7	859	0.0
1995	0.0	2	194	0.0	2020	294.7	7	859	4.1
1996	88.4	2	194	5.5	2021	255.3	8	939	3.3
1997	0.0	2	194	0.0	2022	701.5	11	1571	5.4
1998	0.0	3	294	0.0	2023	626.3	11	1571	4.8
1999	0.0	3	294	0.0	2024	475.8	10	1506	3.8
2000	13.9	3	294	0.6	2025	321.2	9	1311	2.9
2001	19.9	3	294	0.8	Avg. 1979-2025	95.2	4.2	642.4	1.5
2002	39.8	3	294	1.6	Avg. 2016-2025	309.36	8.4	1119.3	3.0
2003	35.9	3	294	1.5	Avg. 2016-2025 excluding non-constructed systems			694.2	5.0

Table 4- Estimated average annual irrigation withdrawals based on average application rates (Water Rights, 2026b and 2026d)

Category	Currently Permitted Acres	App. Rate (in/ac)	Est. Avg. Withdrawal (ac-ft/yr)
Avg. 2016-2025	1311	3	327.8
Avg. 2016-2025 excluding non-constructed systems	1311	5	546.3
Avg. 2016-2025 excluding non-constructed systems and Water Permit No. 8488-3	1231	5	512.9

Hydrologic Budget

Table 5 shows the current estimates for average annual withdrawal and estimated withdrawal, if the three currently deferred applications were to be approved. Average annual withdrawals by current permits are approximately 1,103 ac-ft/yr with an estimate of 1,648 ac-ft/yr if these deferred applications are approved. Based on Hedges and others (1985), the estimated average annual

recharge rate ranges from 245 to 980 ac-ft/yr. However, current information suggests the actual recharge rate to the aquifer is slightly higher than the Hedges and others (1985) estimated rate range.

Table 5- Estimated average annual withdrawals

Use Type	Volume (ac-ft/yr)
Irrigation, 5.0 in/yr on 1,311 permitted acres	546.3
Non-Irrigation	557.1
Subtotal	1103.4
Deferred Irrigation Apps. (8797-3 & 8817-3)	65
Deferred Non-irrigation App. (8763-3)	480
Grand Total	1648.4

The most recent groundwater outflow calculations, with updated survey of well casing tops shown in Table 2 and reiterated in Table 6, ranges from 1,215.9 to 1,983.9 ac-ft/yr. This is lower than the previous calculations (Mathiowetz, 2023a). However, more accurate water level elevations were used and thus these are the more accurate groundwater outflow values. The groundwater outflow is not a recharge rate to the aquifer but provides a sense of the upper scale of potential recharge to the aquifer. However, that number fluctuates year by year. Furthermore, the influence of localized drawdown on observation well measurements can significantly change the calculation. This effect is most dramatically seen in confined aquifers and in the data for TU-77S. Based on the hydrologic budget data, it is not clear if unappropriated water is available. Particularly, since there is limited data for TU-77ZR. Observation well TU-77ZR would be more representative of groundwater outflow calculations than TU-77S because it has less nearby constant pumping and is closer to the outflow area.

Table 6- Most up-to-date groundwater outflow calculations at the southeastern portion of the UVM:W aquifer (Buhler, 2014; Water Rights, 2026c)

Gradient Data Source	A, Area (ft ²)	I, Hydraulic Gradient (ft/ft)	k, Hydraulic Conductivity (ft/day)	Q, Flow (ac-ft/yr)
TU-77S to TU-77T (1978-2025, updated survey)	2,173,880	0.000392206	277	1,983.9
TU-77S to TU-77T (2014-2018, 2021-2025 [last 10 yrs. of available data, updated survey])	2,173,880	0.000287610	277	1,454.8
TU-77ZR to TU-77T (2025, updated survey)	2,173,880	0.000240384	277	1,215.9

Observation Well Data:

Administrative Rule of South Dakota Section 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.

Permit Application Nos. 8763-3, 8797-3, and 8817-3 were deferred primarily based on a significant drop in water level in the observation wells that started in 2021 and continued through when the original reports were written in late 2023 and early 2024. The drop in water levels also affected the calculated aquifer “groundwater outflow” based on those levels. The groundwater outflow is used as an analog for recharge without actually being the estimated average annual recharge. In theory, the amount of groundwater outflow from an aquifer is the amount of recharge in excess of withdrawals based on the snapshot in time at the date the water levels were taken. Thus, the groundwater outflow calculations must be considered in the context of year-to-year changes in weather, total withdrawals, and location of withdrawals in relation to the observation wells, because those factors can affect water levels in the observation wells. Especially in confined aquifer observation wells which are the observation well type of the UVM:W observation wells.

The Water Rights Program currently monitors four observation wells, TU-77S, TU-77T, TU-77ZR, and TU-2025A, labeled as completed into the UVM:W aquifer and monitored one well (TU-77Z) until it was plugged for road construction in 2018. However, the ongoing DANR-Geological Survey study indicates TU-2025A may not be completed into the UVM:W aquifer. Therefore, it will not be considered in this report. Figure 3 shows the hydrographs for the manual and continuous data logger measurements across the entire period of record and Figure 4 just shows 2020 to present measurements (Water Rights, 2026c). Declining water levels that started in late 2020 seem to have stabilized in 2023 and have continued to remain relatively stable. Continued monitoring is warranted at the current level of development to ensure stabilization is consistent and allow for a longer period of record for TU-77ZR to be developed. The more recent water level data shows larger downward spikes on a seasonal basis. This aligns with the increased pumping of permits in close proximity to the observation wells and development of the permits that are relatively new, less than five years old.

The stabilization of the water levels in the observation wells after the sharp decline shows that the increased pumping that started around 2020 just lowered the artesian head pressure in the aquifer but did not significantly decrease the volume of water stored in the aquifer. Artesian head pressure is not truly representative of water in storage in the aquifer. However, a similar observation well water level lowering occurred in the Dolton aquifer approximately 20 miles northwest of the Upper Vermillion Missouri: West aquifer (UVM:W) from the late 1970's to earlier 1990's (Mathiowetz, 2025; Water Rights, 2023c). During that time there was continual pumping by TM Rural Water District and Hansen Rural Water System from the Dolton aquifer. From 1992 to 1996, the decline leveled out as annual withdrawal rates stabilized and then started rising as pumping was reduced from the Dolton aquifer (Mathiowetz, 2025).

Mathiowetz (2025) postulated that average annual recharge to the aquifer was likely approximately equal to the withdrawals during the 1990's stable period after development of the existing permits, and management of pumping from the Dolton aquifer started occurring. The Dolton aquifer is somewhat hydrologically similar to the UVM:W aquifer. Thus, it is reasonable to apply the same base logic. However, there were still permits developing from the aquifer in 2023, and there are still a number of permits that are not fully developed. Furthermore, appropriate use from the

Dolton aquifer is exclusively for rural water systems which means relatively consistent average annual use compared to crop irrigation which fluctuates significantly based on seasonal precipitation, and commodity prices (Water Rights, 2026b and 2026d). When accounting for average annual withdrawals from the UVM:W aquifer that have not been developed and the variability caused by the irrigation pumping from the aquifer, it may not be entirely reasonable to rely on the stabilization in the observation well water levels and calculated groundwater outflow occurring since 2023, because that is a very short period of time without a consistent level of development in the aquifer.

Therefore, based on the observation well data and supported by the hydrologic budget there is not a reasonable probability that unappropriated water is available for these proposed appropriations. These applications should continue to be deferred for sufficient time to allow newer permits to be completely developed and for more comparison between observation wells, TU-77ZR and TU-77T to calculate an average groundwater outflow. While not yet pertinent to this aquifer, using SDCL 46-2A-7 through 46-2A-7.7 as a guide, these applications should be deferred for up to five years when another review of the data will be conducted to determine whether unappropriated water is available.

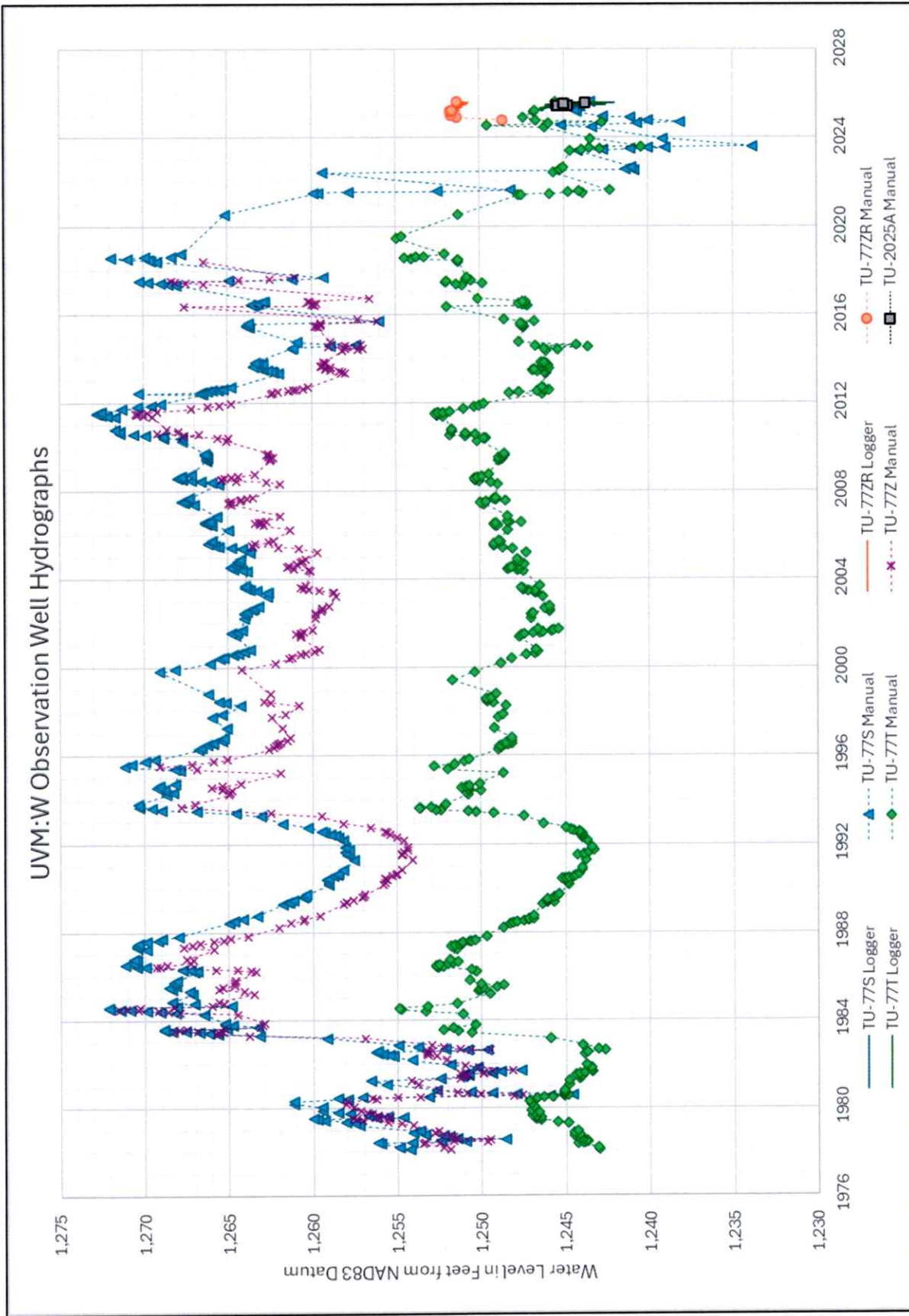


Figure 3- Hydrograph of all UVM:W observation well data (Water Rights, 2026c)

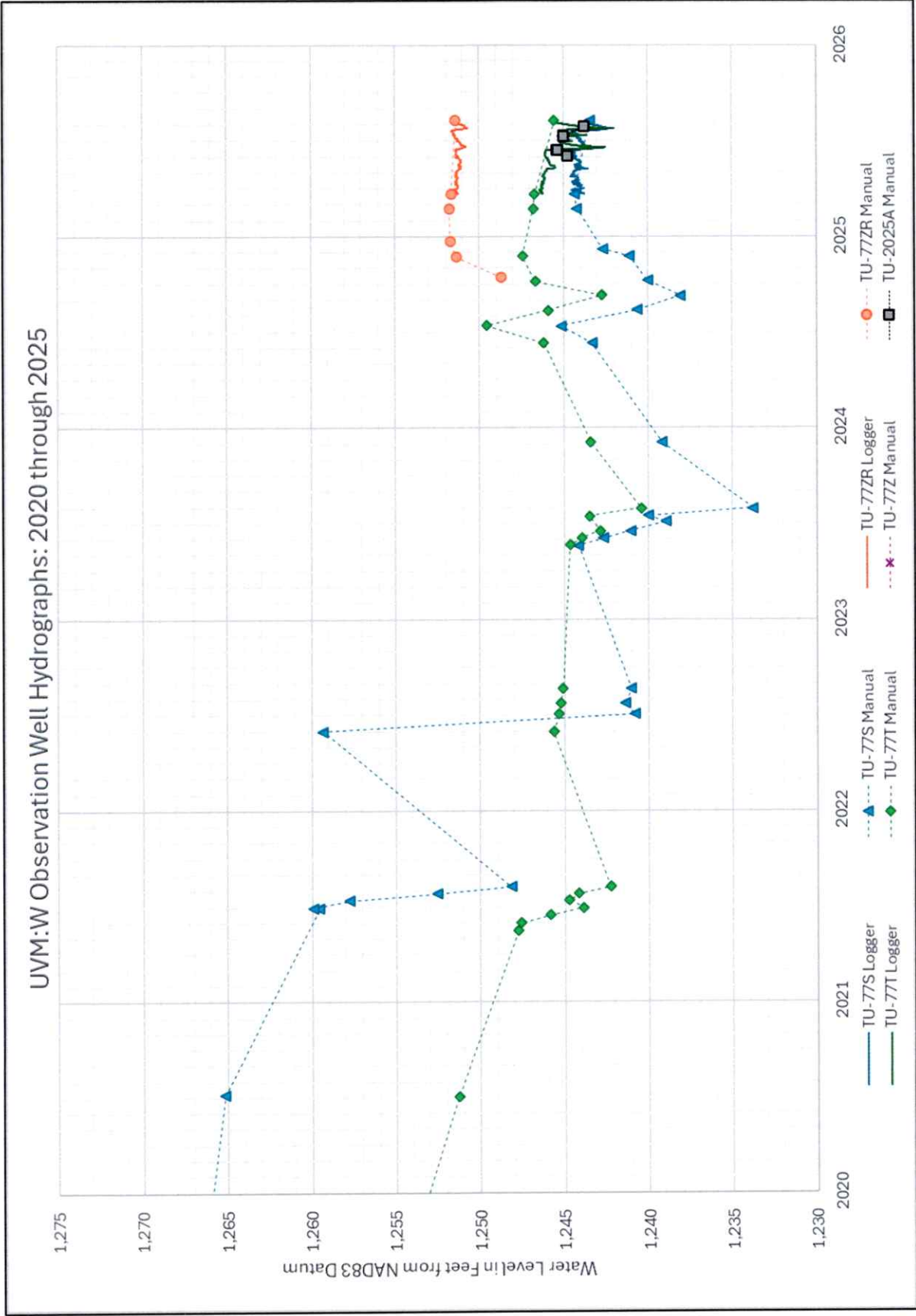


Figure 4- Hydrograph of UVM:W observation well data 2020 through 2025 (Water Rights, 2026c)

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

The nearest well authorized by a water right/permit to Deferred Application No. 8763-3 is Water Permit No. 8594-3 (Water Rights, 2026d). However, the approval of Water Permit No. 8594A-3 moves the diversion point further away (Water Rights, 2026d). The next nearest appropriative wells are approximately 1.3 miles east and authorized by Water Right No. 6662-3 for Vannorsdel's Inc (Water Rights, 2026d). The nearest domestic well on file with the Water Rights Program to the well this application proposes to use is located approximately 0.6 miles east of the applicant's proposed well site (Water Rights, 2026e). The locations of domestic wells are based on the location provided by the well driller on the water well completion report. The locations as filed with the Water Rights Program are not exact locations. It is possible there are other domestic use UVM:W aquifer wells in the area of the applicant's proposed well site that are not on file with the Water Rights Program.

The nearest appropriative well to the proposed well site for Deferred Application No. 8797-3 is approximately 0.7 miles north and authorized by Water Right No. 7588-3 for Paul Peterson (Water Rights, 2026d). The nearest domestic well on file with the Water Rights Program to the well this application proposes to use is located approximately 0.4 miles west of the applicant's proposed well site (Water Rights, 2026e). The locations of domestic wells are based on the location provided by the well driller on the water well completion report. The locations as filed with the Water Rights Program are not exact locations. It is possible there are other domestic use UVM:W aquifer wells in the area of the applicant's proposed well site that are not on file with the Water Rights Program.

Deferred Application No. 8817-3 proposes to use the well authorized by Water Permit No. 8594A-3 held by the applicant Merlin Vannorsdel (Water Rights, 2026d). The next nearest appropriative wells are approximately 0.5 miles south and authorized by Water Right No. 6662-3 for Vannorsdel's Inc (Water Rights, 2026d). The nearest domestic well on file with the Water Rights Program to the well this application proposes to use is located approximately 0.3 miles southwest of the applicant's proposed well site (Water Rights, 2026e). The locations of domestic wells are based on the location provided by the well driller on the water well completion report. The locations as filed with the Water Rights Program are not exact locations. It is possible there are other domestic use UVM:W aquifer wells in the area of the applicant's proposed well site that are not on file with the Water Rights Program.

The UVM:W aquifer is under confined conditions at all three deferred application's proposed well sites (Water Rights, 2026e). Since the aquifer is confined, drawdown can extend some distance from a well. However, the exact drawdown behavior cannot be determined without an aquifer performance test. The Water Management Board recognizes that putting water to beneficial use requires a certain amount of drawdown to occur. The Board has promulgated 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 (Water Rights, 1995). The Board adopted the Findings of Fact 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). Observation well TU-77S is located within approximately 1.5 miles of four water rights/permits with high capacity, greater than 0.2 cfs, wells. Observation well TU-77S, hydrograph shown in Figures 3 and 4, is 146 feet deep with a depth to top of aquifer of 112 feet but a smaller gravel section from 56 to 61 feet below grade (SDGS, 2026; Water Rights, 2026c). The static water level measured in the well ranges from 7 to 47 feet below ground surface. That means at the lowest recorded water level, there was still approximately 65 feet of artesian head pressure above the top of the aquifer.

A review of the Turner County complaint file showed one complaint filed regarding potential well interference from wells completed into the UVM:W aquifer (Water Rights, 2026a). In July 2022, a well owner with a well located in Sec. 6-T97N-R53W, approximately 2.2 miles south of the well site for Application No. 8797-3, which is the nearest deferred application, and 1.4 miles south of observation well TU-77S, stated the well was not pumping water for his cattle. No well completion report was found for the well; however, it was reported as 7 to 15 years old so a well completion report should have been filed. The well owner believed the well to be 160 feet deep with a pump setting of 60 feet. The well owner stated the well had pumped all winter and spring but had ceased pumping in the past 2-3 weeks. Review of the hydrograph for TU-77S showed the static water level at that time was approximately 40 feet below grade and had a similar surface elevation as the non-pumping well. The nearest appropriative pumping was under Water Permit No. 7633-3 approximately 1.3 miles northeast of the non-pumping well. The non-pumping well is located near the mapped edge of the aquifer and possibly has greater than expected drawdown when pumping. Based on the available information, it was determined the non-pumping well was not unlawfully impaired by appropriative pumping in the area.

There was a notable decline of artesian head pressure in both TU-77S and TU-77T, the water levels have somewhat stabilized since 2023 without dewatering of the actual aquifer material at those locations. However, some existing well owners may need to lower pumps depending on the specific characteristics of the UVM:W aquifer at their location to ensure their pump is at least 20 feet below the top of the saturated aquifer. When considering the statutes (SDCL 46-1-4 and 46-6-6.1), rule (ARSD 74:02:04:20(7)), and the lack of substantiated well interference complaints in the area of these applications from the UVM:W aquifer, there is a reasonable probability that any drawdown created by development of these diversions is not expected to cause an unlawful impairment on existing water rights/permits with adequate wells or adequate domestic wells on an individual basis of drawdown caused by pumping under any one of the individual deferred applications.

However, the overall lowering of the water level in the aquifer, particularly if it gets into dewatering of the saturated aquifer material, which could be caused by over appropriation due to average annual withdrawals exceeding average annual recharge could be considered an unlawful impairment. When considering the observation well data and the hydrologic budget, approval of all three deferred applications may cause further lowering of water levels in the observation wells. This concern means approval of these deferred applications could eventually cause unlawful impairment if withdrawals from the aquifer exceed recharge. Furthermore, there is insufficient observation well data for TU-77ZR and several permits have yet to be developed. Therefore, the potential for unlawful impairment supports the continued deferral of these applications as shown by the observation well water level and hydrologic budget data.

CONCLUSIONS:

1. Water Permit Application Nos. 8763-3, 8797-3, and 8817-3 all propose to appropriate water from the Upper Vermillion Missouri: West aquifer. Water Permit Application Nos. 8763-3 and 8797-3 were deferred for up to two years at the March 2024 Water Management Board meeting and Permit Application No. 8817-3 was deferred for up to two years at the May 2024 Water Management Board meeting. Based on a sudden drop in observation well water levels, it was determined that unappropriated water may not be available for these applications (Mathiowetz, 2023a and 2023b). The Chief Engineer recommended deferral for up to two years to monitor observation well water levels and allow more recently permitted systems to develop and place water to beneficial use. Furthermore, the DNR-Geological Survey had been contacted to conduct a study of the Upper Vermillion Missouri: West aquifer to assist with delineating the aquifer beyond what had been done previously (Buhler, 2014; Holmes and Filipovic, 2015).
2. Water Permit Application No. 8763-3 proposes to appropriate up to 480 acre-feet of water annually (ac-ft/yr) at a maximum instantaneous diversion rate of 1.11 cfs from one well (approximately 270 feet deep) to be completed into the Upper Vermillion Missouri: West (UVM:W) aquifer. The well is to be located in the SW $\frac{1}{4}$ SE $\frac{1}{4}$ Section 20-T97N-R53W for commercial use in a dairy operation located in the E $\frac{1}{2}$ SW $\frac{1}{4}$ Section 24-T97N-R54W. The proposed well location is approximately 3 miles northwest of Viborg, SD in Turner County.
3. Water Permit Application No. 8797-3 proposes to irrigate 65 acres at a maximum instantaneous diversion rate of 1.78 cfs from one well (approximately 222 feet deep) to be completed into the Upper Vermillion Missouri: West aquifer and located in the SW $\frac{1}{4}$ NW $\frac{1}{4}$ Section 30 with the land to be irrigated located in the NW $\frac{1}{4}$ Section 30; all in T98N-R53W in Turner County. The applicant is requesting a diversion rate greater than the statutory limit of 1 cfs per 70 acres. The site is located approximately four miles west of Hurley, SD.
4. Water Permit Application No. 8817-3 proposes to add 91 acres to the irrigated area authorized by Water Permit No. 8594A-3. Water Permit No. 8594A-3 amends Water Permit No. 8594-3 to change the location of the diversion point and acres to be irrigated. Water Permit No. 8594-3 authorizes a maximum instantaneous diversion rate of 2.22 cfs from one well in the NE $\frac{1}{4}$ Section 29 to be completed into the Upper Vermillion Missouri:

West aquifer for the irrigation of 156 acres located in the NE ¼ Section 29; all in T97N-R53W. Water Permit No. 8594A-3 changed the location of the well, still to be completed into the Upper Vermillion Missouri: West aquifer (approximately 214 feet deep), to the E ¼ quarter corner of Section 21 for the irrigation of 156 acres located in the E ½ Section 21; all in T97N-R53W. Water Permit Application No. 8817-3 proposes to irrigate an additional 91 acres in the E ½ Section 21 with no increase in the maximum instantaneous diversion rate from the well to be located near the E ¼ quarter corner of Section 21; all in T97N-R53W.

5. The observation well water level data shows there may not be unappropriated water for these deferred applications (8763-3, 8797-3, and 8817-3). The water level data is supported by the hydrologic budget data.
6. On an individual basis, development of any one of these deferred applications (8763-3, 8797-3, and 8817-3) is not expected to create an unlawful impairment for existing water rights/permits with adequate wells or adequate domestic wells in the area of the specific deferred application. However, development of the remaining undeveloped permits and these three deferred applications may exacerbate the lowering of water levels as shown in the observation well data leading to a potential unlawful impairment.
7. Deferred Application Nos. 8763-3, 8797-3, and 8817-3 should remain in deferred status.
8. While not yet pertinent to this aquifer, using SDCL 46-2A-7 through 46-2A-7.7 as a guide, Deferred Application Nos. 8763-3, 8797-3, and 8817-3 should be deferred for up to five years when another review of the hydrologic budget and observation well water level data can be conducted to determine whether unappropriated water is available.



Adam Mathiowetz, PE
Acting Chief Engineer
SD DANR-Water Rights Program

REFERENCES:

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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. 8763-3, B & K Dairy**

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. 8763-3, B & K Dairy Farms, LLC, c/o Tom Koolhaas, 45144 289th Street, Viborg SD 57070.

The Chief Engineer is recommending DEFERRAL of Application No. 8763-3 for up to five (5) years to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West aquifer. Deferral is necessary to allow time for recently issued permits to be fully developed to establish water level trends in the aquifer. Observation wells in this area have shown sharp decline in water levels in recent years followed by the start of water level stabilization. In addition, since there are several water permits from this aquifer that have not been fully developed, the effects of this potential pumping on water levels in the aquifer cannot be determined.

After five years, the Board will reconsider the application based on any additional data provided by the applicant and measured water levels in area observation wells. The applicant may request the application be brought before the Board prior to expiration of the five-year deferral period if they can show unappropriated water is available and the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights. The burden of proof is on the applicant to show the criteria for issuance of a water permit are met.

At the Water Management Board hearing scheduled on this matter, the Board is authorized to 1) approve, 2) approve with qualifications, 3) defer, or 4) deny this application based on the facts presented at the public hearing. If you intend to oppose this DEFERRAL recommendation, the notice of hearing will provide details on filing a petition in opposition to the Chief Engineer's recommendation.

See report on application for additional information.

Adam Mathiowetz, PE
Acting Chief Engineer
April 14, 2026



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

April 16, 2026

NOTICE OF HEARING

TO: B & K Dairy Farms LLC Emily Greco, Assistant Attorney General
45144 289th St 1302 East Highway 14, Suite 1
Viborg SD 57070 Pierre SD 57501

FROM: Amanda Dewell, Permitting Administrator
SD DANR, Water Rights Program 

SUBJECT: Reconsideration of Water Permit Application No. 8763-3, B & K Dairy Farms, LLC

At the Water Management Board hearing conducted on March 6, 2024, the Board followed the Chief Engineer's recommendation that Application No. 8763-3 be deferred for up to two years. The purpose of the deferral action was to allow for additional monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West Aquifer, due to recent sharp declines in water levels, as well as time for recently issued water permits to fully develop.

Application No. 8763-3 was recently reviewed, and a new report and recommendation, dated April 14, 2026, are enclosed. The acting Chief Engineer is recommending continued **DEFERRAL** for up to 5 years to allow for complete development of recently issued permits, as the potential effects of pumping on water levels in the aquifer cannot be reasonably determined at this time. If you intend to oppose the recommendation, a petition in opposition must be filed by April 27, 2026. A petition form is enclosed for you to use if you intend to oppose the recommendation. If you choose not to oppose the recommendation, no petition is necessary.

The Water Management Board will conduct a hearing to reconsider deferred Application No. 8763-3 at **1:15 PM (Central Time), on Wednesday May 6, 2026**, at the Floyd Matthew Training Center, Joe Foss Building, 523 E Capitol Ave, Pierre SD 57501. The time is an estimate and may be delayed due to prior items on the agenda. Pursuant to SDCL 46-2-9, 46-2-11, and 46-2A-4, the Board has legal authority and jurisdiction to conduct this hearing. The hearing is an adversary proceeding, therefore as a legal entity (B & K Dairy Farms, LLC), the applicant is required to be represented by legal counsel in this administrative process. At the time of reconsideration, the Board will have the authority to approve, approve with qualifications, defer, or deny the application.

Applicable provisions of the public notices published in The New Era and The Yankton Daily Press and Dakotan on January 25, 2024, still apply.

Questions regarding the hearing process may be directed to Amanda Dewell, Permitting Administrator, Water Rights Program, at Amanda.Dewell@state.sd.us or (605) 773-3352.

enclosures

CERTIFICATION

The undersigned hereby certifies under the penalty of perjury that I have personally deposited a true and correct NOTICE OF HEARING dated April 16, 2026, report, recommendation, and applicant's petition form, into the United States Mail in Pierre, South Dakota, first class postage prepaid to the following applicants on April 16, 2026

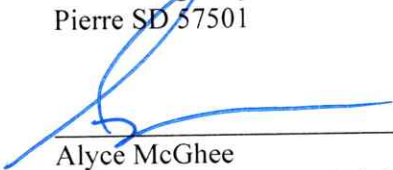
Merlin Vannorsdel
28888 455th Ave
Viborg SD 57070

B&K Dairy Farms LLC
45144 289th St
Viborg SD 57070

Donald Benson
45067 284th St
Hurley SD 57036

Also mailed inter-office to:

Emily Greco, Assistant Attorney General
1302 E Highway 14, Suite 1
Pierre SD 57501


Alyce McGhee
Senior Secretary-Water Rights

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 16th day of April, 2026.


Rachel Rodriguez Notary Public
My Commission expires May 16, 2029





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

May 12, 2026

NOTICE OF ENTRY OF ORDER

TO: B & K Dairy Farms LLC
c/o Thomas Koolhaas
45144 289th St
Viborg SD 57070

Emily Greco, Assistant Attorney General
Legal Counsel for Chief Engineer
1302 East Highway 14, Suite 1
Pierre SD 57501

David McVey
Legal Counsel for Water Management Board
1302 East Highway 14, Suite 1
Pierre SD 57501

FROM: Amanda Dewell, Permitting Administrator
SD DANR – Water Rights Program

SUBJECT: Continued Deferral of Application No. 8763-3, B & K Dairy LLC

Notice is given that on May 7, 2026, the South Dakota Water Management Board deferred Water Permit Application No. 8763-3, for up to two additional years. The two-year deferral is to allow for additional data collection and monitoring of water levels in observation wells completed into the Upper Vermillion Missouri: West Aquifer, as well as time for more recently issued permits to fully develop their corresponding water use systems.

After the two-year deferral period, the Board will reconsider Application No. 8763-3, based on additional data collection, observation well readings, and any additional information provided by the applicant. The applicant may request that the application be brought back before the Board for reconsideration, prior to the expiration of the two-year deferral period; however, regardless of when Application No. 8763-3 is next reviewed, it remains the applicant's responsibility to show that unappropriated water is available and that the proposed diversion can be developed without unlawful impairment to existing domestic water users and senior water rights.

Decisions of the Board may be appealed to Circuit Court and State Supreme Court, as provided by law.

CERTIFICATION

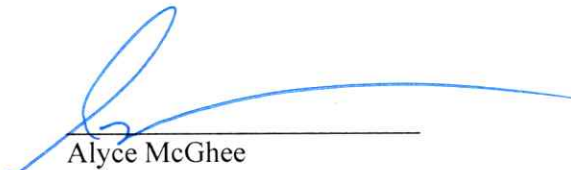
The undersigned hereby certifies under the penalty of perjury that I have personally deposited a true and correct NOTICE OF ENTRY OF ORDER dated May 12, 2026, into the United States Mail in Pierre, South Dakota, first class postage prepaid to the following on May 12, 2026.

B & K Dairy Farms LLC
c/o Thomas Koolhaas
45144 289th St
Viborg SD 57070

Also sent inter-office to:

David McVey
1302 East Highway 14, Suite 1
Pierre SD 57501

Emily Greco
1302 East Highway 14, Suite 1
Pierre SD 57501


Alyce McGhee
Senior Secretary-Water Rights

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

Sworn to, before me, this 12th day of May, 20 26.


Rachel Rodriguez Notary Public
My Commission expires May 16, 2029



8763-3