

WATER PERMIT NO. 8795-3

Name of Applicant: **Brookings Municipal Utilities**

Address: **525 Western Avenue, Brookings SD 57006**

Phone: **605-692-6325**

Amount of Water Claimed: **5.57 cfs**

Total Acres: **N/A**

Source of Water Supply: **Groundwater**

Water to be used for: **Municipal**

County: **Brookings**

Type of Waste Disposal System:

Location: **Approximately 1/2 mile east of Brookings SD**

PRIORITY Date Received: **08-03-2023**

Application/License Fee: **\$2,850.00**

Corrected Application Received: **09-01-2023**

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

Remarks:

Diversion Point: **S 1/2 SE 1/4 Section 29-T110N-R49W**

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

Depth of Well: **70**

Well Driller: **GeoTek Engineering**

Remarks:

Type of Map: **aerial**

			29		

Reviewed and the Number Assigned on: **09-05-2023**

By: **Rachel Rodriguez**

Notice of Hearing - date to intervene: _____

**SOUTH DAKOTA
WATER PERMIT NO. 8795-3**

Date of first receipt of application August 3, 2023.

Date of return to applicant for corrections, amendments, or changes September 1, 2023.

Date of receipt of corrected application September 5, 2023.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 8795-3 to Brookings Municipal Utilities, 525 Western Avenue, Brookings SD 57006 authorizing the construction of the water use system and the placing of water to beneficial use subject to the following limitations, conditions and qualifications:

1. Water Permit No. 8795-3 authorizes construction and place to beneficial use 2,426 acre-feet of water annually at a maximum pump rate of 5.57 cubic feet of water per second from three wells to be completed into the Big Sioux: Aurora Aquifer (approximately 70 feet deep) located in the S 1/2 SE 1/4 Section 29-T110N-R49W for municipal use. This water is appropriated and reserved by Future Use Permit No. 1598-3. The well sites are located approximately one-half mile east of Brookings SD.
2. The water appropriated shall be used for the purpose of municipal use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date of approval of Permit No. 8795-3 is November 6, 2023.
5. The date from which applicant may claim right is June 28, 1968 (established by Future Use Permit No. 1598-3).
6. One-fifth of the construction is to be completed on or before May 6, 2026.
7. All construction is to be completed on or before November 6, 2028.
8. Water is to be put to beneficial use on or before November 6, 2032.
9. Water rights obtained in compliance with the laws of the State of South Dakota may not be unlawfully impaired by this appropriation.

QUALIFICATIONS

1. The wells approved under Water Permit No. 8795-3 are located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals under this Permit shall be controlled so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Big Sioux: Aurora Aquifer.
3. Water Permit No. 8795-3 authorizes a total annual diversion of up to 2,426 acre-feet of water.

WATER MANAGEMENT BOARD

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

JAN 02 2024

date



RECEIVED

AUG 03 2023

OFFICE OF
WATER

Mail to: SD DANR, Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>8795-3</u> Hydrologic Unit <u>10170202</u>
	Basin <u>Midde Big Sioux</u>
	Newspaper <u>Brookings Register</u>
	(office use only)

Application for Permit to Appropriate Water in South Dakota

Check use(s) of water:

☒
☐
☐

Municipal
Rural Water System
Domestic (over 18 gpm)

☐
☐
☐

Water Distribution System
Commercial
Industrial

☐
☐
☐

Recreational
Fish & Wildlife
Other

☐
☐

Institutional
Geothermal

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. 1598-3

Amendment/Correction to Permit No. _____

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

1. Name to Appear on Water Permit Brookings Municipal Utilities

Mailing Address 525 Western Avenue Brookings SD 57006
(Address) (City) (State) (Zip Code)

Phone 605-692-6325 Mobile _____ Email ewitt@swiftel-bmu.com

2. Amount of water claimed 5.57*CFS or 2,500 **GPM and 2,426 ***AF or _____ Gallons
Flow rate and volume are both required. (*Cubic Feet per Second) (**Gallons per Minute) (***)Acre Feet - storage capacity of dam/dugout or annual use)

3. Source of water supply Big Sioux: Aurora 110N 1 well SW 1/4 SE 1/4, 2 wells SE 1/4 SE 1/4

4. Location of point of diversion 3 wells in S1/2SE1/4 section 29-T100N-R49W County Brookings
(example - 3 wells in SW1/4 NE1/4 section 12-T104N-R53W)

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

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

5. County or counties where water will be used Brookings County

6. Annual period during which water is to be used Year-round

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

The attached Map illustrates the proposed drilling location for the three wells. Please see attached the borehole log nos. 22-7 through 22-16. Proposed locations for 3 wells are Boring nos. 22-12, 22-14, and 22-15.

Eric Witt, P.E.
Brookings Municipal Utilities
W/WW & Engineering Manager

I, Eric Witt, 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 3 Have test holes been drilled? ☒ Yes ☐ No Drilled by Geotek
(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) 70 Depth to Top of Water Bearing Material 6 - 15 Depth to Water from Surface 8 - 17

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

2. Wastewater Disposal System Information

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

b) System Capacity (gallons) _____ Year Constructed _____

c) Connected to the City of _____ Sanitary System

3. Dugout Information

a) Surface Dimensions _____ Depth _____

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

4. Water Storage Dams

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

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

b) Freeboard _____

c) Crest Width _____

Crest Length _____

d) Height _____

e) Primary Outlet Capacity _____

If pipe, diameter _____

f) Secondary Spillway Capacity _____

Spillway Width _____

g) X & Y Slope (e.g. 3 to 1 is a typical slope)

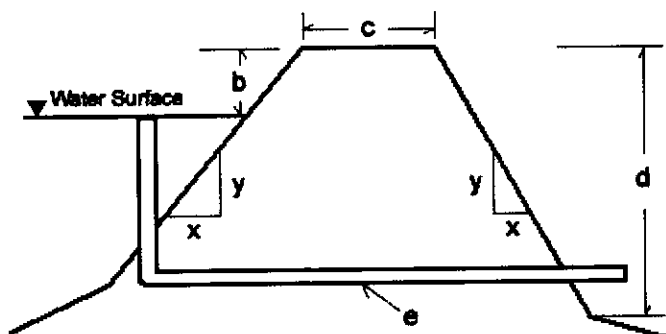
Upstream _____

Downstream _____

h) Area of Impoundment _____

i) Storage _____ Acre Feet

j) Drainage Area Above Dam _____ Acres



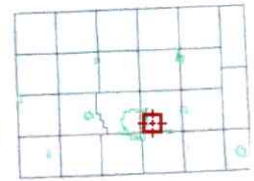
East Wellfield

Proposed New Wells

Township 110 North Range 49 West



Overview



Legend

- Brookings City Limits
- City Limits
- Township Boundary
- Sections
- Quarter
- Quarter-Quarter
- Parcels
- Roads
- County Roads
- Gravel Roads
- Paved Roads

Date created: 5/15/2023

Last Data Uploaded: 5/15/2023 1:04:16 AM

Developed by  Schneider
GEOSPATIAL

Source: <https://beacon.schneidercorp.com/>
HDR accessed website on 5/15/2023

East Wellfield Test Hole Locations



Round One

Boring #	Sand & Gravel Thickness
22-7	9-62
22-8	12-55
22-9	10-45
22-10	9-44
22-11	10-82
22-12	12-57

Round Two

Boring #	Sand & Gravel Thickness
22-13	10-59
22-14	8-58
22-15	7-58
22-16	8-58

Township: 110N 49W
Section: 29
QQ Sect: NENW

Township: 110N 49W
Section: 29
QQ Sect: NWNE

Township: 110N 49W
Section: 29
QQ Sect: NENE

Township: 110N 49W
Section: 28
QQ Sect: NWNW

Township: 110N 49W
Section: 29
QQ Sect: SWNW

Township: 110N 49W
Section: 29
QQ Sect: SENW

Township: 110N 49W
Section: 29
QQ Sect: SWNE

Township: 110N 49W
Section: 29
QQ Sect: SENE

Township: 110N 49W
Section: 28
QQ Sect: SWNW

110N 49W
Section: 29

110N 49W
Section: 28

Township: 110N 49W
Section: 29
QQ Sect: NWSW

Township: 110N 49W
Section: 29
QQ Sect: NESW

Township: 110N 49W
Section: 29
QQ Sect: NWSE

Township: 110N 49W
Section: 29
QQ Sect: NESE

Township: 110N 49W
Section: 28
QQ Sect: NWSW

110N 49W

Township: 110N 49W
Section: 29
QQ Sect: SWSW

Township: 110N 49W
Section: 29
QQ Sect: SESW

Township: 110N 49W
Section: 29
QQ Sect: SWSE

Township: 110N 49W
Section: 29
QQ Sect: SESE

Township: 110N 49W
Section: 28
QQ Sect: SWSW

213 ST

Township: 110N 49W
Section: 32
QQ Sect: NWNW

Township: 110N 49W
Section: 32
QQ Sect: NENW

Township: 110N 49W
Section: 32
QQ Sect: NWNE

Township: 110N 49W
Section: 32
QQ Sect: NENE

Township: 110N 49W
Section: 33
QQ Sect: NWNW

110N 49W
Section: 32

110N 49W
Section: 33

Township: 110N 49W
Section: 32
QQ Sect: SWNW

Township: 110N 49W
Section: 32
QQ Sect: SENW

Township: 110N 49W
Section: 32
QQ Sect: SWNE

Township: 110N 49W
Section: 32
QQ Sect: SENE

Township: 110N 49W
Section: 33
QQ Sect: SWNW



**GEOTEK ENGINEERING
& TESTING SERVICES, INC.**
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 SIOUX FALLS, SD 57104
 (605) 335-5512 Fax (605) 335-0773
 nbierle@geotekeng.com

GEOTECHNICAL TEST BORING LOG

GEOTEK # <u>22-226</u>						BORING NO. <u>22-16 (2 of 2)</u>					
PROJECT <u>North & East Well Fields, Brookings, SD</u>											
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	SURFACE ELEVATION <u>1617.48 ft</u>										
35	SAND: fine to coarse grained, brown, (SP) (Continued from previous page)	COARSE ALLUVIUM			7	BAG					
	SAND: a trace of gravel, fine to coarse grained, brown, (SP)										
40	SAND: with gravel, fine to coarse grained, brown, (SP)				8	SPT					
42	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	30		9	BAG					
45	SAND WITH SILT: with gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM	44		10	SPT					
47	SAND: a trace of gravel, fine to coarse grained, brown, a few layers of coarse gravel or/ cobbles above 55' (SP)	COARSE ALLUVIUM			11	BAG					
					12	BAG					
					13	BAG					
58	LEAN CLAY WITH SAND: a little gravel, brown and gray, (CL)	GLACIAL TILL	21		14	SPT					
62	Bottom of borehole at 62 feet.										
WATER LEVEL MEASUREMENTS				START <u>5-24-22</u> COMPLETE <u>5-24-22 11:50 am</u>							
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 8/18/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # <u>22-226</u>						BORING NO. <u>22-16 (1 of 2)</u>					
PROJECT <u>North & East Well Fields, Brookings, SD</u>											
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	↓ SURFACE ELEVATION <u>1617.48 ft.</u>										
	FAT CLAY: black, (CH)	FINE ALLUVIUM			1	BAG					
8 1/2	SAND: fine to medium grained, brown, waterbearing, (SP)	COARSE ALLUVIUM			2	BAG					
					3	BAG					
20	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			4	BAG					
					5	BAG					
30	SAND: fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			6	BAG					
WATER LEVEL MEASUREMENTS				START <u>5-24-22</u> COMPLETE <u>5-24-22 11:50 am</u>							
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD <u>Rotary Mud Drilling</u>					
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--	--	--	--	--	--	CREW CHIEF <u>Roy Hanson</u>					

GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 6/18/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-15 (2 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
	↓ SURFACE ELEVATION 1517.48 ft.											
35	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	49		8	BAG						
40	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			9	BAG						
45	SAND WITH SILT: with gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM			10	X SPT						
47	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			11	BAG						
50	SAND WITH SILT: with gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM	65		12	X SPT						
52	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	13		BAG							
55	SAND WITH SILT: a trace of gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM	14		BAG							
58	LEAN CLAY WITH SAND: a little gravel, dark brown and dark gray, (CL)	GLACIAL TILL	15		X SPT							
62	Bottom of borehole at 62 feet.		25									
WATER LEVEL MEASUREMENTS			START 5-23-22 COMPLETE 5-23-22 4:55 pm									
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 8/18/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226						BORING NO. 22-15 (1 of 2)					
PROJECT North & East Well Fields, Brookings, SD											
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	SURFACE ELEVATION <u>1517.48 ft</u> FAT CLAY: dark brown, a 8" layer of topsoil at the surface (CH)	FINE ALLUVIUM			1	BAG					
7	SAND: fine to medium grained, brown, (SP)	COARSE ALLUVIUM			2	BAG					
					3	BAG					
					4	BAG					
23	SAND: a trace of gravel, fine to medium grained, brown, (SP)	COARSE ALLUVIUM			5	BAG					
25	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			6	BAG					
					7	BAG					
WATER LEVEL MEASUREMENTS						START <u>5-23-22</u> COMPLETE <u>5-23-22 4:55 pm</u>					
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 6/18/22

GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226						BORING NO. 22-7 (1 of 2)						
PROJECT North & East Well Fields, Brookings, SD												
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
9	LEAN CLAY: brown, frozen to moist, a 10" layer of topsoil at the surface (CL)	FINE ALLUVIUM				1	FA					
	SAND: with gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM				2	BAG					
						3	BAG					
						4	BAG					
24½	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM				5	BAG					
29	SAND: fine to medium grained, brown, (SP)	COARSE ALLUVIUM				6	BAG					
WATER LEVEL MEASUREMENTS						START 3-3-22		COMPLETE 3-3-22 1:00 pm				
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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--	--	--	--	--	--	CREW CHIEF Roy Hanson						



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-7 (2 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
	SAND: fine to medium grained, brown, (SP) <i>(Continued from previous page)</i>	COARSE ALLUVIUM	22		7	BAG						
39½	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			8	BAG						
44½	SAND: with gravel, fine to coarse grained, brown, dense, (SP)	COARSE ALLUVIUM			9	SPT						
46½	LEAN CLAY: dark gray, firm, (CL)	GLACIAL FLUVIAL	7		10	SPT						
52	SAND WITH SILT: with gravel, fine to coarse grained, brown, very dense, (SP-SM)	COARSE ALLUVIUM			40	11	SPT					
			12			BAG						
59½	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	23		13	BAG						
62	LEAN CLAY WITH SAND: a little gravel, dark gray, very stiff, (CL)	GLACIAL TILL			14	SPT						
66	Bottom of borehole at 66 feet.											
WATER LEVEL MEASUREMENTS			START 3-3-22 COMPLETE 3-3-22 1:00 pm									
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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GEOTECHNICAL TEST BORING 22-226 GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226						BORING NO. 22-8 (1 of 2)						
PROJECT North & East Well Fields, Brookings, SD												
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
12	LEAN CLAY: brown, frozen to moist, a 12" layer of topsoil at the surface (CL)	FINE ALLUVIUM				1	FA					
						2	BAG					
						3	BAG					
						4	BAG					
						5	BAG					
						6	BAG					
						7	BAG					
						8	BAG					
WATER LEVEL MEASUREMENTS					START	3-3-22	COMPLETE	3-3-22 3:40 pm				
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-8 (2 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	SAND: a little gravel, fine to coarse grained, brown, (SP) <i>(Continued from previous page)</i>	COARSE ALLUVIUM			9	BAG					
					10	BAG					
44½	LEAN CLAY: dark gray, very stiff, (CL)	GLACIAL FLUVIAL	21		11	SPT					
46½	SAND WITH SILT: a little gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM			12	BAG					
					13	BAG					
54½	LEAN CLAY WITH SAND: a little gravel, dark gray, stiff, (CL)	GLACIAL TILL	12		14	SPT					
56½	Bottom of borehole at 56½ feet.										
WATER LEVEL MEASUREMENTS						START <u>3-3-22</u> COMPLETE <u>3-3-22 3:40 pm</u>					
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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--	--	--	--	--	--	CREW CHIEF Roy Hanson					

GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-9 (1 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
3	<u>LEAN CLAY</u> : black, frozen, (CL)	FINE ALLUVIUM (POSSIBLE TOPSOIL)			1	FA					
	<u>LEAN CLAY</u> : brown, (CL)	FINE ALLUVIUM			2	FA					
7	<u>SAND</u> : with gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			3	BAG					
					4	BAG					
					5	BAG					
					6	BAG					
24½	<u>SAND</u> : a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			7	BAG					
					8	BAG					
WATER LEVEL MEASUREMENTS					START	3-4-22	COMPLETE	3-4-22 11:40 am			
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-9 (2 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	SAND: a little gravel, fine to coarse grained, brown, (SP) <i>(Continued from previous page)</i>	COARSE ALLUVIUM			9	BAG					
39½	SAND: gravel, fine to coarse grained, brown, dense, (SP)	COARSE ALLUVIUM	16		10	SPT					
43	LEAN CLAY WITH SAND: a trace of gravel, black and gray, stiff, (CL)	GLACIAL TILL	15		11	SPT					
					12	BAG					
54½	Bottom of borehole at 54½ feet.										
WATER LEVEL MEASUREMENTS					START	3-4-22	COMPLETE	3-4-22 11:40 am			
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-10 (1 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
9	LEAN CLAY: brown, frozen to moist, a 9" layer of topsoil at the surface (CL)	FINE ALLUVIUM			1	FA					
	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			2	BAG					
					3	BAG					
					4	BAG					
					5	BAG					
					6	BAG					
WATER LEVEL MEASUREMENTS					START	3-4-22	COMPLETE	3-4-22 2:25 pm			
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22

GEOTEK # 22-226						BORING NO. 22-10 (2 of 2)									
PROJECT North & East Well Fields, Brookings, SD															
DEPTH in FEET	DESCRIPTION OF MATERIAL					GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
									NO.	TYPE	WC	D	LL	PL	QU
34½	SAND: a little gravel, fine to coarse grained, brown, dense, (SP)					COARSE ALLUVIUM	24		7	X SPT					
									8	BAG					
39½	SAND: with gravel, fine to coarse grained, brown, dense, (SP)					COARSE ALLUVIUM	27		9	X SPT					
44	LEAN CLAY WITH SAND: a little gravel, dark gray, (CL)					GLACIAL TILL									
49½	Bottom of borehole at 49½ feet.								10	BAG					
WATER LEVEL MEASUREMENTS							START 3-4-22 COMPLETE 3-4-22 2:25 pm								
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling									
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GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226						BORING NO. 22-11 (1 of 3)						
PROJECT North & East Well Fields, Brookings, SD												
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
	LEAN CLAY: brown, frozen to moist, a 8" layer of topsoil at the surface (CL)	FINE ALLUVIUM				1	FA					
10	SAND: with gravel, medium to coarse grained, brown, (SP)	COARSE ALLUVIUM				2	BAG					
14½	SAND: a trace of gravel, medium grained, brown, dense to very dense, (SP)	COARSE ALLUVIUM				3	BAG					
						4	BAG					
						5	BAG					
						6	BAG					
WATER LEVEL MEASUREMENTS						START 3-7-22		COMPLETE 3-7-22 2:15 pm				
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-11 (2 of 3)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
39½	SAND: a trace of gravel, medium grained, brown, dense to very dense, (SP) <i>(Continued from previous page)</i>	COARSE ALLUVIUM	57		7	BAG					
	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			8	BAG					
44½	SAND WITH SILT: with gravel, fine to coarse grained, brown, dense, (SP-SM)	COARSE ALLUVIUM	112		9	SPT					
					10	BAG					
54½	SAND WITH SILT: a trace of gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM	103		11	SPT					
					12	BAG					
59½	SAND WITH SILT: with gravel, fine to coarse grained, brown, very dense, a lens of clay above 68' (SP-SM)	COARSE ALLUVIUM			13	BAG					
					14	SPT					
					15	BAG					
					16	BAG					
WATER LEVEL MEASUREMENTS						START	3-7-22	COMPLETE	3-7-22 2:15 pm		
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-11 (3 of 3)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
69½	SAND WITH SILT: fine to medium grained, brown, dense, (SP-SM)	COARSE ALLUVIUM	25		17	SPT					
		18			BAG						
		19			BAG						
		20			BAG						
82½	LEAN CLAY WITH SAND: a little gravel, dark gray, (CL)	GLACIAL TILL			21	BAG					
84½	Bottom of borehole at 84½ feet.										
WATER LEVEL MEASUREMENTS							START <u>3-7-22</u> COMPLETE <u>3-7-22 2:15 pm</u>				
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-12 (1 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
12	LEAN CLAY: brown, frozen to moist, a 6" layer of topsoil at the surface (CL)	FINE ALLUVIUM			1	BAG					
	SAND: with gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			2	BAG					
					3	BAG					
					4	BAG					
					5	BAG					
WATER LEVEL MEASUREMENTS						START	3-7-22	COMPLETE	3-7-22 4:50 pm		
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-12 (2 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
	SAND: with gravel, fine to coarse grained, brown, (SP) <i>(Continued from previous page)</i>	COARSE ALLUVIUM			6	BAG					
39½	SAND: a little gravel, fine to coarse grained, brown, dense, (SP)	COARSE ALLUVIUM	21		7	SPT					
					8	BAG					
44½	SAND WITH SILT: a little gravel, fine to medium grained, brown, (SP-SM)	COARSE ALLUVIUM			9	BAG					
49½	SAND WITH SILT: with gravel, fine to coarse grained, brown, very dense, (SP-SM)	COARSE ALLUVIUM	54		10	SPT					
					11	BAG					
54½	SAND: a trace of gravel, fine to medium grained, brown, (SP)	COARSE ALLUVIUM			12	BAG					
57	LEAN CLAY WITH SAND: a little gravel, dark gray, (CL)	GLACIAL TILL			13	BAG					
64½	Bottom of borehole at 64½ feet.										

WATER LEVEL MEASUREMENTS

START **3-7-22** COMPLETE **3-7-22 4:50 pm**

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD
--	--	--	--	--	--	Rotary Mud Drilling
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 3/21/22

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
			HIGHLY ORGANIC SOILS		

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

BORING LOG SYMBOLS AND DESCRIPTIVE TERMINOLOGY

SYMBOLS FOR DRILLING AND SAMPLING

<u>Symbol</u>	<u>Definition</u>
Bag	Bag sample
CS	Continuous split-spoon sampling
DM	Drilling mud
FA	Flight auger; number indicates outside diameter in inches
HA	Hand auger; number indicates outside diameter in inches
HSA	Hollow stem auger; number indicates inside diameter in inches
LS	Liner sample; number indicates outside diameter of liner sample
N	Standard penetration resistance (N-value) in blows per foot
NMR	No water level measurement recorded, primarily due to presence of drilling fluid
NSR	No sample retrieved; classification is based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit
SH	Shelby tube sample; 3-inch outside diameter
SPT	Standard penetration test (N-value) using standard split-spoon sampler
SS	Split-spoon sample; 2-inch outside diameter unless otherwise noted
WL	Water level directly measured in boring
▼	Water level symbol

SYMBOLS FOR LABORATORY TESTS

<u>Symbol</u>	<u>Definition</u>
WC	Water content, percent of dry weight; ASTM:D2216
D	Dry density, pounds per cubic foot
LL	Liquid limit; ASTM:D4318
PL	Plastic limit; ASTM:D4318
QU	Unconfined compressive strength, pounds per square foot; ASTM:D2166

DENSITY/CONSISTENCY TERMINOLOGY

<u>Density</u>		<u>Consistency</u>
<u>Term</u>	<u>N-Value</u>	<u>Term</u>
Very Loose	0-4	Soft
Loose	5-8	Firm
Medium Dense	9-15	Stiff
Dense	16-30	Very Stiff
Very Dense	Over 30	Hard

PARTICLE SIZES

<u>Term</u>	<u>Particle Size</u>
Boulder	Over 12"
Cobble	3" – 12"
Gravel	#4 – 3"
Coarse Sand	#10 – #4
Medium Sand	#40 – #10
Fine Sand	#200 – #40
Silt and Clay	passes #200 sieve

DESCRIPTIVE TERMINOLOGY

<u>Term</u>	<u>Definition</u>
Dry	Absence of moisture, powdery
Frozen	Frozen soil
Moist	Damp, below saturation
Waterbearing	Pervious soil below water
Wet	Saturated, above liquid limit
Lamination	Up to ½" thick stratum
Layer	½" to 6" thick stratum
Lens	½" to 6" discontinuous stratum

GRAVEL PERCENTAGES

<u>Term</u>	<u>Range</u>
A trace of gravel	2-4%
A little gravel	5-15%
With gravel	16-50%



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GEOTECHNICAL TEST BORING LOG

GEOTEK # **22-226**

BORING NO. **22-13 (1 of 2)**

PROJECT **North & East Well Fields, Brookings, SD**

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
	<u>SURFACE ELEVATION</u> <u>1616.62 ft.</u>											
	<u>LEAN CLAY</u> : very dark brown, a 8" layer of topsoil at the surface (CL)	FINE ALLUVIUM				1	BAG					
10	<u>SAND</u> : fine to medium grained, brown, (SP)	COARSE ALLUVIUM				2	BAG					
						3	BAG					
						4	BAG					
25	<u>SAND WITH SILT</u> : fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM				5	BAG					
30	<u>SAND</u> : fine to coarse grained, brown, (SP)	COARSE ALLUVIUM				6	BAG					
WATER LEVEL MEASUREMENTS				START <u>5-24-22</u> COMPLETE <u>5-24-22 3:00 pm</u>								
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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--	--	--	--	--	--	CREW CHIEF Roy Hanson						

GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 6/18/22



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GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226

BORING NO. 22-13 (2 of 2)

PROJECT North & East Well Fields, Brookings, SD

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS					
					NO.	TYPE	WC	D	LL	PL	QU	
	↓ SURFACE ELEVATION <u>1616.62 ft</u>											
	<u>SAND</u> : fine to coarse grained, brown, (SP) (Continued from previous page)	COARSE ALLUVIUM				7	BAG					
40												
	<u>SAND</u> : with gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	20			8	X SPT					
42												
	<u>SAND WITH SILT</u> : a trace of gravel, fine to coarse grained, brown, a few layers of coarse gravel or/ cobbles above 45' (SP-SM)	COARSE ALLUVIUM				9	BAG					
45												
	<u>SAND WITH SILT</u> : fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM				10	BAG					
50												
	<u>SAND WITH SILT</u> : with gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM	89			11	X SPT					
52												
	<u>SAND WITH SILT</u> : a trace of gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM				12	BAG					
55												
	<u>SAND WITH SILT</u> : a little gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM				13	BAG					
59												
	<u>LEAN CLAY WITH SAND</u> : a little gravel, brown and gray, (CL)	GLACIAL TILL	28			14	X SPT					
62												
	Bottom of borehole at 62 feet.											
WATER LEVEL MEASUREMENTS			START <u>5-24-22</u> COMPLETE <u>5-24-22 3:00 pm</u>									
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling						
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GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 6/18/22

GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226						BORING NO. 22-14 (1 of 2)					
PROJECT North & East Well Fields, Brookings, SD											
DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
8	FAT CLAY: black, (CH)	FINE ALLUVIUM			1	BAG					
					2	BAG					
	SAND: fine to medium grained, brown, (SP)	COARSE ALLUVIUM			3	BAG					
					4	BAG					
					5	BAG					
					6	BAG					
24 1/2	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			7	BAG					
					8	BAG					
WATER LEVEL MEASUREMENTS						START 5-23-22 COMPLETE 5-23-22 12:50 pm					
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
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GEOTECHNICAL TEST BORING LOG

GEOTEK # 22-226

BORING NO. 22-14 (2 of 2)

PROJECT North & East Well Fields, Brookings, SD

DEPTH in FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE		LABORATORY TESTS				
					NO.	TYPE	WC	D	LL	PL	QU
34½	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	38		9	BAG					
40	SAND: a little gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			10	BAG					
45	SAND: with gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM			11	X SPT					
46½	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	42		12	BAG					
49½	SAND WITH SILT: with gravel, fine to coarse grained, brown, (SP-SM)	COARSE ALLUVIUM			13	X SPT					
51½	SAND: a little gravel, fine to coarse grained, brown, a few layers of coarse gravel or/ cobbles above 52' (SP)	COARSE ALLUVIUM			14	BAG					
54½	SAND: a trace of gravel, fine to coarse grained, brown, (SP)	COARSE ALLUVIUM	19		15	BAG					
58	LEAN CLAY WITH SAND: a little gravel, dark brown and dark gray, (CL)	GLACIAL TILL			16	X SPT					
61½	Bottom of borehole at 61½ feet.										
WATER LEVEL MEASUREMENTS			START <u>5-23-22</u> COMPLETE <u>5-23-22 12:50 pm</u>								
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METHOD Rotary Mud Drilling					
--	--	--	--	--	--						
--	--	--	--	--	--						
--	--	--	--	--	--						
--	--	--	--	--	--	CREW CHIEF Roy Hanson					

GEOTECHNICAL TEST BORING 22-226.GPJ GEOTEKENG.GDT 6/18/22

INVOICE

SD Agriculture and Natural Resources
Water Rights
Attn: Rachel Rodriguez
523 East Capitol Ave.
Pierre SD 57501

DATE: AUGUST 10, 2023
INVOICE

TO Brookings Municipal Utilities
c/o Eric Witt
525 Western Avenue
Brookings SD 57006

SALESPERSON

JOB

PAYMENT TERMS

DUE DATE

Due upon receipt

QTY	DESCRIPTION	UNIT PRICE	LINE TOTAL
1	Future Use/No Inspection Fee	\$435.00	\$435.00
1	Application Fee (\$1550.00) plus Inspection Fee (\$200.00)	\$1750.00	\$1750.00
1	Application Fee (\$2650.00) plus Inspection Fee (\$200.00)	\$2850.00	\$2850.00

SUBTOTAL \$5035.00

SALES TAX

TOTAL \$5035.00

Make all checks payable to DANR/Water Rights

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date August 31, 2023

RECEIVED OF Brookings Municipal c/o Eric Witt 525 Western Avenue Brookings SD 57006

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

Fee for Application for Permit No. <u>8795-3</u> to Appropriate Water, to construct and to put water to beneficial use	\$ <u>2650.00</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>8795-3</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>2850.00</u>

By Eric Gronlund
Chief Engineer
vm

Rodriguez, Rachel

From: Honner, Joe <Joseph.Honner@hdrinc.com>
Sent: Friday, September 1, 2023 10:53 PM
To: Rodriguez, Rachel
Cc: Stump, Phillip
Subject: RE: [EXT] Brookings Municipal Utilities Applications

Rachel, the correct location is T110N-R49W. Thank you for catching this.

If you have any additional questions, please let me know.

Joseph Honner, PE
D 605-782-8138 M 605-940-3670

hdrinc.com/follow-us

From: Rodriguez, Rachel <Rachel.Rodriguez@state.sd.us>
Sent: Friday, September 1, 2023 11:47 AM
To: Honner, Joe <Joseph.Honner@hdrinc.com>
Subject: Brookings Municipal Utilities Applications

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good morning,

In looking over two of the three applications (see attached), I see that two applications have Section 29-T100N-R49W. However, the maps for each application have T110N-R49W. Please confirm that the correct location is T110N-R49W.

Thank you,

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



Rodriguez, Rachel

From: Duvall, Ron
Sent: Thursday, August 3, 2023 8:32 AM
To: Rodriguez, Rachel
Subject: FW: [EXT] Brookings Municipal Utilities - Water Well Applications - East Wellfield
Attachments: EW 3Well_East_WellfieldAPP_ALL_Sign_R1.pdf; EW East_Wellfield_Futures_APP_ALL_Sign_R1.pdf; EW 1Well_East_Wellfield_APP_ALL_Sign.pdf

New permit applications for your review. I figured out the fee for each one – let's see if we both come up with the same amounts 😊.

From: Stump, Phillip <Phillip.Stump@hdrinc.com>
Sent: Wednesday, August 2, 2023 10:58 AM
To: Duvall, Ron <Ron.Duvall@state.sd.us>
Cc: Honner, Joe <Joseph.Honner@hdrinc.com>
Subject: RE: [EXT] Brookings Municipal Utilities - Water Well Applications - East Wellfield

Ron,

Please see attached the three applications that I referred to in my email below. All are signed by Eric Witt. Thanks for you offering to complete an initial review so that an invoice can be worked up so we can officially submit the three applications with payment.

Please contact me with any questions about this. We will also be mailing you a letter about BMU's water well rehabilitation plans for their North Wellfield.

Best Regards,

Phil
Phil Stump, PE
D 307.757.9003 M 307.256.1620

hdrinc.com/follow-us

From: Duvall, Ron <Ron.Duvall@state.sd.us>
Sent: Tuesday, July 11, 2023 2:07 PM
To: Stump, Phillip <Phillip.Stump@hdrinc.com>
Subject: RE: Brookings Municipal Utilities - Water Well Applications - East Wellfield

CAUTION: [EXTERNAL] This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Phil,

The signed applications can be submitted digitally and I can take a look before your officially submit them. Also, we can work up an invoice once the fee amount is determined.

Thank you,

Ron

From: Stump, Phillip <Phillip.Stump@hdrinc.com>
Sent: Tuesday, July 11, 2023 11:58 AM
To: Duvall, Ron <Ron.Duvall@state.sd.us>
Subject: [EXT] Brookings Municipal Utilities - Water Well Applications - East Wellfield

Ron,

HDR is working for Brookings Municipal Utilities (BMU) to prepare water well applications for the expansion of their East Wellfield. I need help with some questions about the process of preparing and submitting the applications.

- We are preparing three different applications (three wells under an existing future use water right, one new well application, and one Future Use Permit application) all on Form 2 that will be signed electronically by their W/WW Plant and Engineering Supervisor Eric Witt.
- Once signed electronically, HDR will print and submit signed forms and map with test well borehole logs to Pierre, SD office. I assume you require signed hard copies for submittals but wanted to confirm that.
- Can your office complete an initial review and invoice BMU for the application fees? Based on speaking to Eric today the processing of an invoice is much easier for them. We also wanted assistance from your Office to confirm the correct application fee amounts for the 3 applications.

I look forward to hearing back from you and corresponding further about these applications.

Best Regards,

Phil
Phil Stump, P.E.
Project Manager

HDR
7350 Stockman St., Ste. A
Cheyenne, WY, 82009
D [307-757-9003] M [307-256-1620]
Phillip.Stump@hdrinc.com
hdrinc.com/follow-us



**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. 8795-3, Brookings Municipal Utilities**

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. 8795-3, Brookings Municipal Utilities, 525 Western Avenue, Brookings SD 57006.

The Chief Engineer is recommending APPROVAL of Application No. 8795-3 because 1) the proposed diversion can be developed without unlawful impairment of existing domestic water uses and water rights, 2) the proposed use is a beneficial use and 3) it is in the public interest as it pertains to matters of public interest within the regulatory authority of the Water Management Board with the following qualifications:

1. The wells approved under Water Permit No. 8795-3 are located near domestic wells and other wells which may obtain water from the same aquifer. Water withdrawals under this Permit shall be controlled so there is not a reduction of needed water supplies in adequate domestic wells or in adequate wells having prior water rights.
2. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Big Sioux Aurora aquifer.
3. Water Permit No. 8795-3 authorizes a total annual diversion of up to 2,426 acre-feet of water.

See report on application for additional information.

Eric Gronlund, Chief Engineer
October 18, 2023

Report to the Chief Engineer
On Water Permit Application No. 8795-3
Brookings Municipal Utilities

October 19, 2023

Water Permit Application No. 8795-3 proposes to construct and place to beneficial use 2,426 acre-feet of water annually at a maximum instantaneous diversion rate of 5.57 cubic feet per second (cfs) from three wells to be completed into the Big Sioux: Aurora aquifer (approximately 70 feet deep) located in the S $\frac{1}{2}$ SE $\frac{1}{4}$ of Section 29-T110N-R49W for municipal use. This water is appropriated and reserved by Future Use Permit No. 1598-3. The site of interest is located in Brookings County approximately one-half mile east of Brookings, SD.

AQUIFER: Big Sioux: Aurora (BS: A)

HYDROGEOLOGY:

The Big Sioux aquifer is primarily composed of Quaternary-aged meltwater stream and glacial outwash deposits that range from fine to medium, poorly sorted sand to a well-sorted sand and medium gravel and occurs mostly in the floodplains of the Big Sioux River and its major tributaries (Hamilton, 1989). The Big Sioux aquifer is divided into twelve management units that have been historically recognized by the DNR-Water Rights Program and SD Water Management Board (Water Rights, 2023c). The water proposed to be reserved is within the Aurora management unit of the Big Sioux aquifer.

In Brookings County, Hedges and others (1982) estimated the Big Sioux: Aurora aquifer to underly 39,300 acres and contain approximately 165,060 acre-feet of recoverable water in storage. More recent mapping estimates completed by Buhler (2012) estimated the Big Sioux: Aurora aquifer to underly approximately 83,000 acres in Brookings and Moody Counties in South Dakota, and Pipestone and Lincoln Counties in Minnesota. Farmer (2017) made additional revisions to the mapping completed by Buhler (2012) and estimated the Big Sioux: Aurora aquifer to underly approximately 72,485 acres in Brookings and Moody Counties in South Dakota, and Pipestone and Lincoln Counties in Minnesota. The areal extent of the Aurora management unit of the Big Sioux aquifer is likely in the range of the estimates calculated by Buhler (2012) and Farmer (2017). However, there are portions of the Big Sioux: Aurora aquifer mapped by Hamilton (1989) not included in either Buhler (2012) or Farmer's (2017) areal extent estimates. Hamilton's (1989) mapping estimates of the Big Sioux aquifer in Brookings and Kingsbury Counties indicated sections of the aquifer that are buried under glacial till, particularly in the northeastern extreme of the Big Sioux: Aurora aquifer. The available lithologic evidence indicates that the Big Sioux: Aurora aquifer does exist in at least portions of Hamilton's delineation of the aquifer (Hamilton, 1989; SDGS; 2023; Water Rights, 2023d).

There is a groundwater divide in the Big Sioux: Aurora aquifer that exists near Elkton, South Dakota (near the approximate center of T109N-R47W) that can be seen on the potentiometric surface map for the Big Sioux: Aurora aquifer (Hamilton, 1989). The direction of groundwater

movement north of the divide flows to the west, and groundwater south of the divide flows to the southwest (Hamilton, 1989). As such, the groundwater divide isolates the flow of the northern portion of the aquifer from the southern portion, essentially creating two sub-units in the Aurora management unit as shown in Figure 1. The proposed diversion points for this application (if approved) are to be located in the northern sub-unit of the Big Sioux: Aurora aquifer. For the remainder of this report, the term “Big Sioux: Aurora aquifer” will be referencing the northern sub-unit of the Big Sioux: Aurora aquifer. Farmer (2017) estimated the areal extent of the northern sub-unit of the Big Sioux: Aurora aquifer to be approximately 54,245 acres.

Several test hole completion reports were submitted with Water Permit Application No. 8795-3. The map provided with the application identified three test holes proposed to be used. The first report identifies sand with varying amounts of gravel and silt from approximately 12 to 57 feet below the ground surface, the second report with similar conditions from 8 to 58 feet, and the third report with similar conditions from approximately 7 to 58 feet below the ground surface. The test holes were drilled in March and May of 2022.

Within approximately one mile of the proposed diversion point, water well completion reports on file for wells completed into the Big Sioux: Aurora aquifer have saturated thicknesses ranging from approximately 15 to 50 feet, with the depth to the top of aquifer materials ranging from approximately 5 to 20 feet below the ground surface, and static water levels varying between 5 to 20 feet below the ground surface at the time of well completion (SDGS, 2023; Water Rights, 2023b and 2023d). Based on the water well completion reports on file, and the lithologic logs on file for nearby observation wells, the Big Sioux: Aurora aquifer is expected to be unconfined near the proposed diversion points (SDGS, 2023; Water Rights, 2023b and 2023d).

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

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

WATER AVAILABILITY:

Water Permit Application No. 8795-3 proposes to appropriate water from the Big Sioux: Aurora 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 Big Sioux: Aurora aquifer is not older than or stratigraphically lower than the Greenhorn Formation (Fahrenbach et al., 2010), while the applicant’s proposed use is not for use in a water distribution system as defined by SDCL 46-1-6(17). Future Use Permit No. 1598-3 appropriated and reserved the water requested by Water Permit Application No. 8795-3. A hydrologic budget is provided as information for the Chief Engineer and Water Management Board.

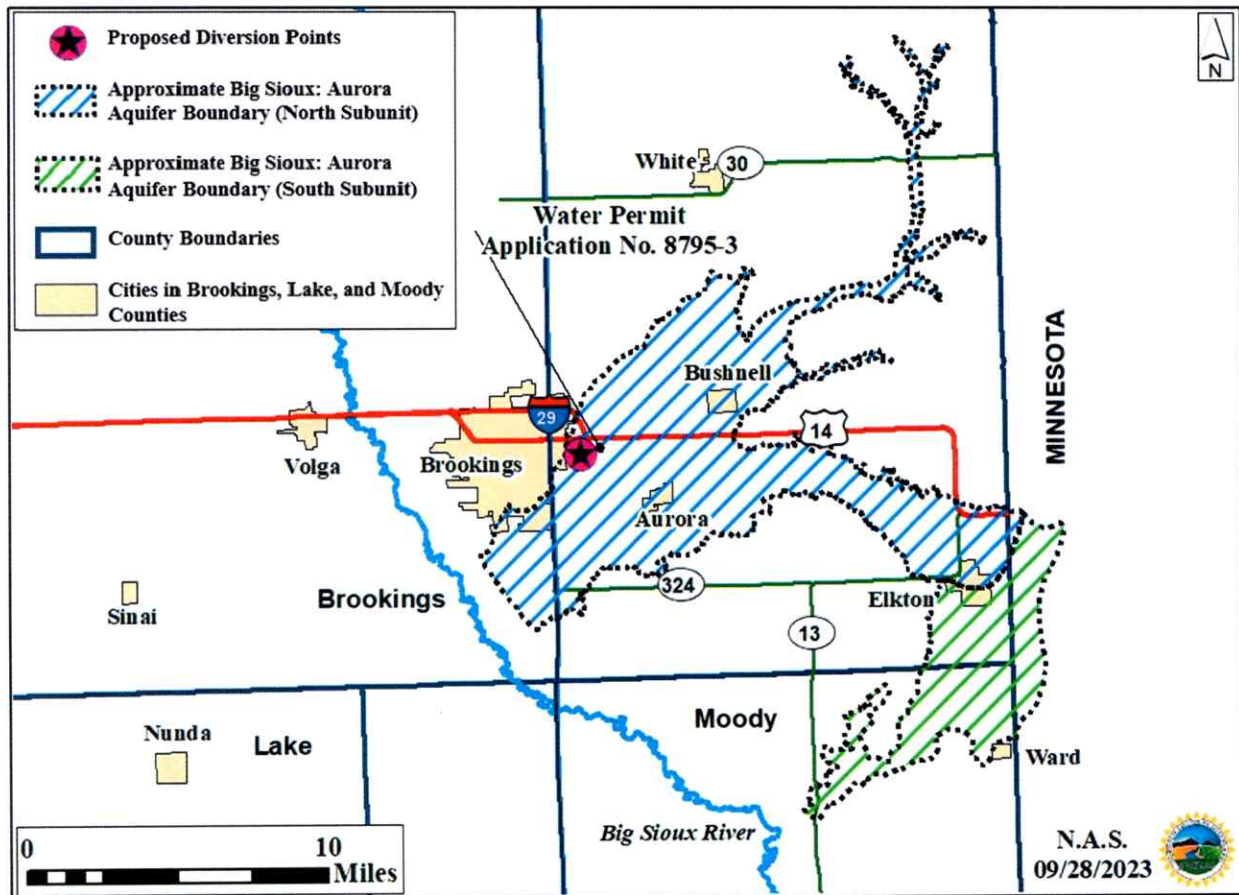


Figure 1. Map of the approximate Big Sioux: Aurora aquifer boundary (modified from Farmer, 2017) and the proposed diversion points for Water Permit Application No. 8795-3

HYDROLOGIC BUDGET:

Recharge

Recharge to the Big Sioux: Aurora aquifer is primarily through infiltration of precipitation and by slow seepage through till, lake deposits and underlying aquifers when the potentiometric surface of the aquifer is lower than the potentiometric surface of either surface or ground water source (Hamilton, 1989).

Using observation well analysis, Hedges and others (1985) estimated a recharge rate of 5.0 inches per year to the Big Sioux: Aurora aquifer. Farmer (2017) estimated the areal extent of the northern sub-unit of the Big Sioux: Aurora aquifer to be approximately 54,245 acres. Therefore,

the average annual recharge rate to the northern sub-unit of the Big Sioux: Aurora aquifer is estimated at approximately 22,602 acre-feet per year.

Discharge

Discharge from the Big Sioux: Aurora aquifer is through evapotranspiration, leakage to underlying aquifers and surface water sources when the potentiometric surface of the aquifer is above the potentiometric surface of the surface water source, and well withdrawals (Hamilton, 1989; Water Rights, 2023d). Currently, there are 80 water rights/permits authorized to appropriate water from the Big Sioux: Aurora aquifer and two future use permits reserving water (Water Rights, 2023c). Of those, 59 water rights/permits are located in the northern sub-unit of the Big Sioux: Aurora aquifer and Future Use Permit No. 1598-3 reserves 2,426 acre-feet of water annually from the northern sub-unit of the Big Sioux: Aurora aquifer for the City of Brookings (Water Rights, 2023c). Water Permit Application No. 8795-3 proposes to construct and place to beneficial use the entire remaining volume reserved by Future Use Permit No. 1598-3.

There are two pending applications for the northern sub-unit of the Big Sioux: Aurora aquifer: Future Use Permit Application No. 8793-3 proposing to appropriate and reserve 4,500 acre-feet of water annually and Water Permit Application No. 8794-3 proposes to appropriate 1,160 acre-feet annually (Water Rights, 2023c).

Table 1 summarizes the 17 non-irrigation water rights/permits authorized to appropriate water from the northern sub-unit of the Big Sioux: Aurora aquifer with the estimated annual use for each water right/permit as determined by their permitted maximum diversion rate or annual volume. Historically, average water use by non-irrigation appropriations limited by an instantaneous diversion rate have been assumed to be pumping 60% of full time at the respective permitted diversion rate. Water rights/permits limited by an annual volume are assumed to withdraw their entire respective annual volume limitation. This is a standard method used by the DNR-Water Rights Program for estimating annual withdrawals by non-irrigation appropriations from an aquifer and is likely an overestimation of average annual withdrawals (Water Rights, 2023c). Two municipal water rights (Nos. 1952-3 and 4038-3) were identified as being connected to a rural water system and likely maintain their wells for standby purposes (Drinking Water Program, 2023; Water Rights, 2023c); as such, the average annual water use for these water rights has been estimated to be zero acre-feet per year on Table 1. Overall, the estimated average annual withdrawal rate from the northern sub-unit of the Big Sioux: Aurora aquifer by the non-irrigation water rights/permits (including pending Water Permit Application No. 8794-3) is approximately 12,133 acre-feet per year (Table 1) (Water Rights, 2023c).

Table 1. Summary of the limiting diversion rate or appropriation and estimated use for the non-irrigation water rights/permits for the northern sub-unit of the Big Sioux: Aurora aquifer (Drinking Water Program, 2023; Water Rights, 2023c)

Permit No.	Name	County	Status	Use	Authorized Diversion Rate (cfs)	Authorized Annual Volume (ac-ft/yr)	Estimation Method	Estimated Use (ac-ft/yr)
1952-3	City of Aurora	BG	LC	MUN	0.2		Connected to RWS	0
3979-3	City of Brookings	BG	LC	MUN	6.69		60% Pumping	2,906
4038-3	City of Elkton	BG	LC	MUN	0.72		Connected to RWS	0
4980-3	Brookings-Deuel RWS	BG	LC	RWS	0.89		60% Pumping	386.6
5433-3	Brookings-Deuel RWS	BG	LC	RWS	0.44		60% Pumping	191.1
6048-3	City of Brookings	BG	LC	MUN	2.9	2,100	Volume	2,100
6325-3	Valero Renewable Fuels Company LLC	BG	LC	IND	2.67	1,935	Volume	1,935
6437-3	Crosswind Jersey's Inc	BG	LC	COM	0.056		60% Pumping	24.3
7167-3	Basin Electric Power Cooperative	BG	LC	IND	0.22		60% Pumping	95.6
7182-3	Agfirst Farmers Cooperative	BG	LC	COM	0.35	10	Volume	10
7887-3	Novita Aurora LLC	BG	LC	IND	0.67		60% Pumping	291
8146-3	Brookings Economic Dev Ag Tech Center	BG	LC	IND	0.033	23.9	Volume	23.9
8285-3	Norm's Greenhouse & Nursery LLC	BG	LC	COM	0.1	9.2	Volume	9.2
8379-3	Bobcat Farms RE LLC	BG	LC	COM, LCO	0.1	62	Volume	62
8401-3	LG Everist Inc	BG	LC	IND	11.1	2,210	Volume	2,210
8443-3	Linde Dairy LLC	BG	PE	COM, LCO	0.67	323	Volume	323
8511-3	Bowes Construction Inc	BG	PE	IND	1.67	405	Volume	405
8794-3	Brookings Municipal Utilities	BG	pending	MUN	2.67	1,160	Volume	1,160
Total:								12,133

LC: Licensed Water Right; PE: Water Permit; MUN: Municipal; RWS: Rural Water System; IND: Industrial; COM: Commercial; LCO: Livestock Confinement Facility

There are eight non-irrigation water rights/permits required to report their annual water usage from the Big Sioux: Aurora aquifer each year (Water Rights, 2023c and 2023f). The reported values averaged on Table 2 are for comparison purposes only to show historically the average annual use has been less than the volume that is estimated on Table 1 (Water Rights, 2023c and 2023f). The estimated use for these non-irrigation water rights/permits calculated on Table 1 will be used in the analysis.

Table 2. Non-irrigation water rights/permits required to report their respective annual use from the Big Sioux: Aurora aquifer (Water Rights, 2023c and 2023f)

Permit No.	Name	Status	Use Type	Priority Date	Authorized Diversion Rate (cfs)	Authorized Annual Volume (ac-ft/yr)	Yrs of Reported Use	Avg of Reported Use (ac-ft/yr)
6048-3	City of Brookings	LC	MUN	06/28/1968	2.9	2,100	20	2,016.8
6325-3	Valero Renewable Fuels Company LLC	LC	IND	05/21/2002	2.67	1,935	20	1,150.5
7167-3	Basin Electric Power Cooperative	LC	IND	11/02/2009	0.22		13	18.2
7887-3	Novita Aurora LLC	LC	IND	08/21/2013	0.67		9	137.8
8146-3	Brookings Economic Dev Ag Tech Center	LC	IND	03/26/2015	0.033	23.9	8	14.4
8285-3	Norm's Greenhouse & Nursery LLC	LC	COM	05/15/2017	0.1	9.2	6	9.2
8379-3	Bobcat Farms RE LLC	LC	COM, LCO	11/01/2018	0.1	62	4	16.6
8443-3	Linde Dairy LLC	PE	COM, LCO	08/31/2020	0.67	323	2	60

LC: Licensed Water Right; PE: Water Permit; COM: Commercial; IND: Industrial; MUN: Municipal; LCO: Livestock Confinement Operation

Currently, there are 62 irrigation water rights/permits authorized to appropriate water from the Big Sioux: Aurora aquifer, with 42 of those water rights/permits located in the northern sub-unit (Water Rights, 2023c). Irrigation water rights/permits have been typically required to report their annual usage on an irrigation questionnaire since 1979. The estimated average annual withdrawal rate from the northern sub-unit of the Big Sioux: Aurora aquifer irrigation water rights/permits that have reported over the period of record (1979 to 2022) is approximately 2,181 acre-feet per year (Table 3) (Water Rights, 2023a). To reflect the current development of irrigation water rights/permits more accurately, the average annual withdrawal rate for irrigation appropriations that have reported from 2013 through 2022 is approximately 1,747 acre-feet per year (Table 3) (Water Rights, 2023a). The average annual withdrawal rate over the period of record (1979 to 2022) will be used in this analysis. Table 3 lists 41 water rights/permits as reporting in 2022 as the usage from Water Right 5467A-3 is reported with Water Right No. 7252-3 (McMath, 2020).

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

Hydrologic Budget Summary

The estimated average annual recharge rate to the Big Sioux: Aurora aquifer is approximately 22,602 acre-feet per year. The estimated average annual withdrawal rate from the northern sub-unit of the Big Sioux: Aurora aquifer including this application is approximately 21,240 acre-feet per year (non-irrigation (including pending Water Permit Application No. 8794-3): 12,133 acre-feet/year; irrigation (avg 1979 to 2022): 2,181 acre-feet/year; future use permit reservation (only including pending Future Use Application No. 8793-3): 4,500 acre-feet/year; Water Permit Application No. 8795-3 (if approved, assuming full volume): 2,426 acre-feet/year). Review of the hydrologic budget confirms there is a reasonable probability that unappropriated water is available from the Big Sioux: Aurora aquifer.

Table 3. Reported historic irrigation use from the northern sub-unit of the Big Sioux: Aurora aquifer (Water Rights, 2023a)

Year	No. of Water Rights/Permits Reporting	Reported Pumpage (acre-feet)
1979	34	1,034.7
1980	34	1,231.3
1981	43	2,607
1982	41	1,405.2
1983	40	1,937.8
1984	41	2,393
1985	44	2,642
1986	46	1,476
1987	47	2,579.7
1988	46	3,959.5
1989	48	3,108.7
1990	39	2,408.5
1991	40	1,299.4
1992	40	660.2
1993	40	208.1
1994	38	1,557.6
1995	35	250.1
1996	35	1,840.1
1997	35	2,863
1998	36	3,318.6
1999	36	2,319.5
2000	36	2,698.1
2001	37	2,812.1
2002	38	2,799.5
2003	37	3,176
2004	35	2,695.6
2005	35	2,312.5
2006	35	2,829.7
2007	35	3,221.4
2008	38	3,732.3
2009	38	3,431.3
2010	39	537
2011	39	2,673.9
2012	39	4,464.9
2013	44	3,972.4
2014	44	2,246.5
2015	44	1,474.8
2016	44	1,264.2
2017	44	1,392.3
2018	44	835.2
2019	43	118.01
2020	43	1,291.7
2021	41	2,836.9
2022	41	2,037.7
Min	34	118
Max	48	4,465
Avg (1979 to 2022)	40	2,181
Avg (2013 to 2022)	43	1,747

OBSERVATION WELL DATA:

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

Observation wells provide data on how the aquifer reacts to regional climatic conditions and local pumping. The DANR-Water Rights Program monitors 15 observation wells completed into the Big Sioux: Aurora aquifer, with 14 completed into the northern sub-unit of the Big Sioux: Aurora aquifer (Water Rights, 2023b). The three closest observation wells to the proposed diversion points are BG-79D (approximately 0.8 miles northeast), BG-77R (approximately 1.2 mile southeast), and BG-77S (approximately 1.8 miles northeast) (as shown in Figure 5) (Water Rights, 2023b). The hydrographs for these observation wells are displayed in Figures 2 to 4 (Water Rights, 2023b). The data points utilized to construct the hydrographs are measurements of the static water level in the observation wells from the top of the well casing.

The hydrographs for these observation wells were compared to hydrographs for other observations wells completed into the Big Sioux: Aurora aquifer and all displayed a generally similar trend as shown on the hydrographs displayed in Figures 2 to 4 (Water Rights, 2023b). The hydrographs for the observation wells display stable to increasing water levels over their respective periods of record. The hydrographs for the Big Sioux: Aurora aquifer indicate that the aquifer responds well to climatic conditions because water levels are rising during wetter periods and declining to a stable water level during drier periods. Additionally, the water levels in the observation wells display that the amount of recharge to and natural discharge from the aquifer exceeds pumping with the aquifer returning to pre-pumping conditions between irrigation seasons. Aquifer recovery indicates that climatic conditions and therefore, the effects of recharge to and natural discharges from the aquifer govern the long-term fluctuations of waters levels in the aquifer rather than the impacts of pumping from the Big Sioux: Aurora aquifer. By recognizing that both recharge to and natural discharge from an aquifer can be captured for pumping, the observation well hydrographs demonstrate unappropriated water is available for the proposed appropriation.

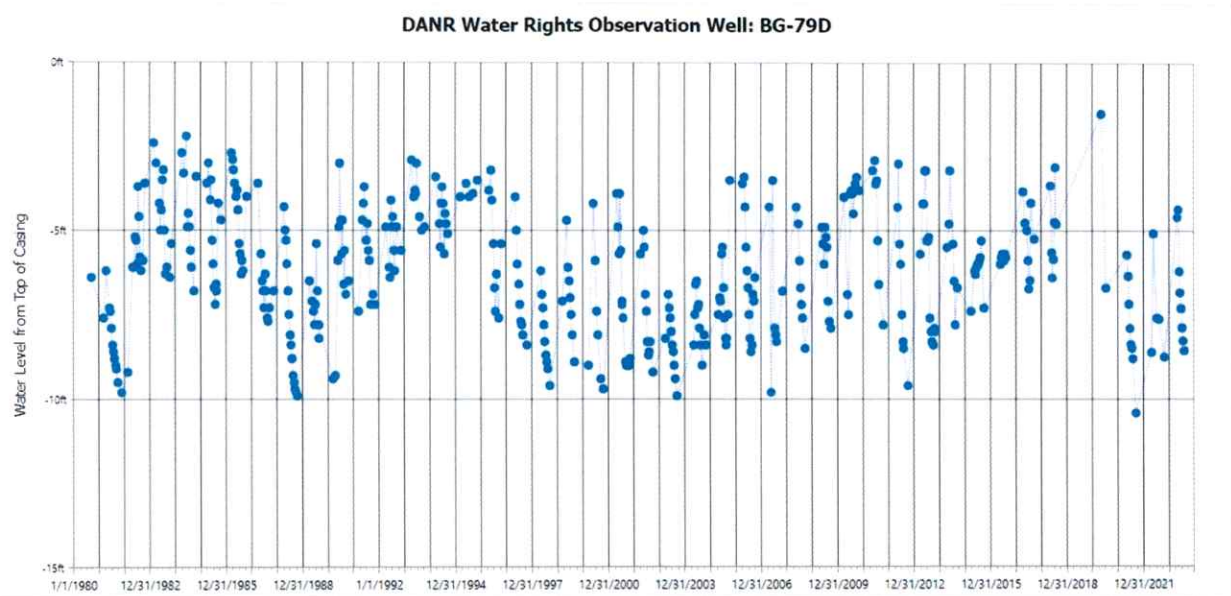


Figure 2. Hydrograph for observation well BG-79D (Water Rights, 2023b)

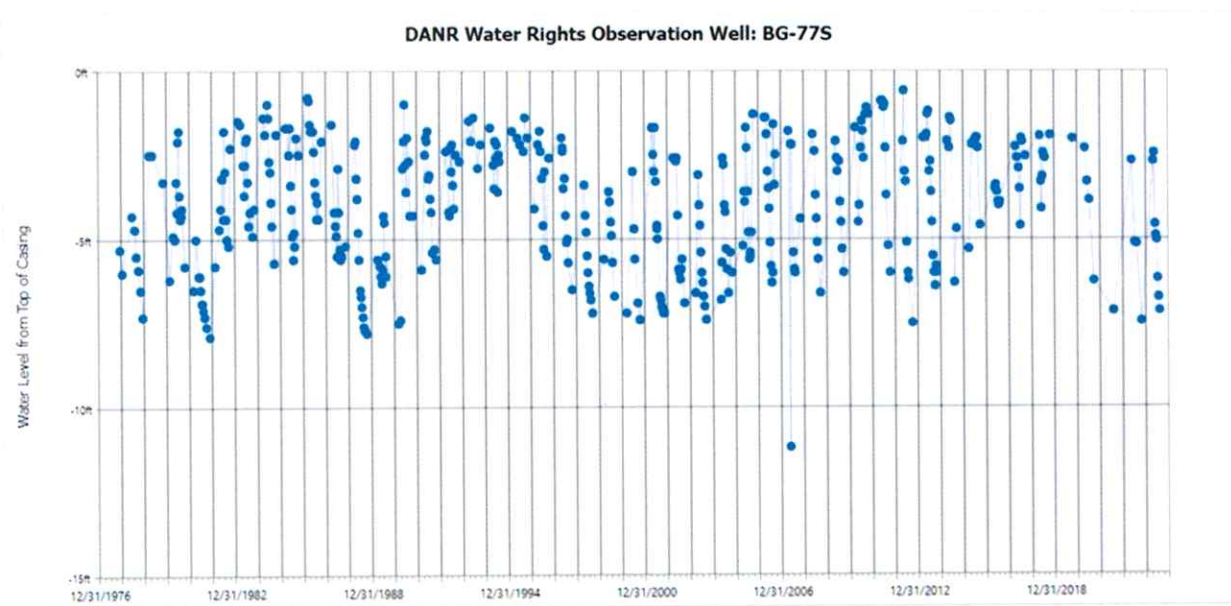


Figure 3. Hydrograph for observation well BG-77S (Water Rights, 2023b)

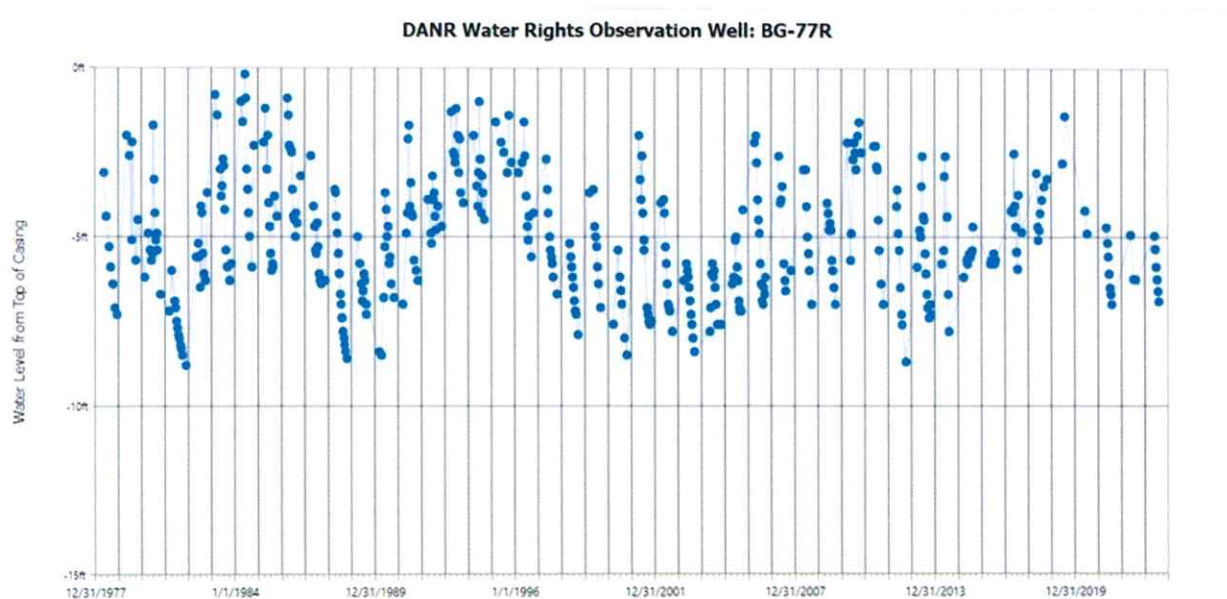


Figure 4. Hydrograph for observation well BG-77R (Water Rights, 2023b)

POTENTIAL FOR UNLAWFUL IMPAIRMENT OF EXISTING WATER RIGHTS:

Currently, there are 80 water rights/permits authorized to appropriate water from the Big Sioux: Aurora aquifer and two future use permits reserving water (Water Rights, 2023c). Of those, 59 water rights/permits and one future use permit are located in the northern sub-unit of the Big Sioux: Aurora aquifer (Water Rights, 2023c). Additionally, there are two pending applications: Future Use Permit Application No. 8793-3 and Water Permit Application No. 8794-3. The closest water right/permit (not held by the applicant) to the proposed diversion points is Water Right No. 8146-3, which is held by Brookings Economic Development Ag Tech Center. The diversion point for Water Right No. 8146-3 is located approximately 0.9 miles southwest of the proposed diversion points for this application (Table 4) (Figure 5) (Water Rights, 2023c).

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

Table 4. Water rights/permits authorized to withdraw water from the Big Sioux: Aurora aquifer within approximately two miles of the proposed diversion points, as shown in Figure 5 (Water Rights, 2023c)

Permit No.	Name	Status	Use Type	Authorized Acres if IRR	Authorized Diversion Rate (cfs)	Authorized Annual Volume (acre-feet/year)
644-3	Jim Gilkerson	LC	IRR	149.3	0.5	
1344-3	N E Hansen LLC	LC	IRR	99	1.41	
1880-3	City of Brookings	LC	IRR	149	1.76	
2328-3	J L Anderson	LC	IRR	227	1.56	
2677-3	Terrance A Hill	LC	IRR	220	1.89	
3346-3	Ida Slocum	LC	IRR	163	2.23	
3979-3	City of Brookings	LC	MUN		6.69	
5241-3	Doris Jean Pahl	LC	IRR	134	1.67	
6048-3	City of Brookings	LC	MUN		2.9	2,100
7463-3	Gerard & David Moriarty	LC	IRR	90	1.29	
7887-3	Novita Aurora LLC	LC	IND		0.67	
8146-3	Brookings Economic Dev Ag Tech Center	LC	IND		0.033	23.9
8401-3	L G Everist Inc	LC	IND		11.1	2,210
1598-3	City of Brookings	FU	MUN		n/a	2,426

FU: Future Use; LC: Licensed Water Right; IND: Industrial; IRR: Irrigation; MUN: Municipal

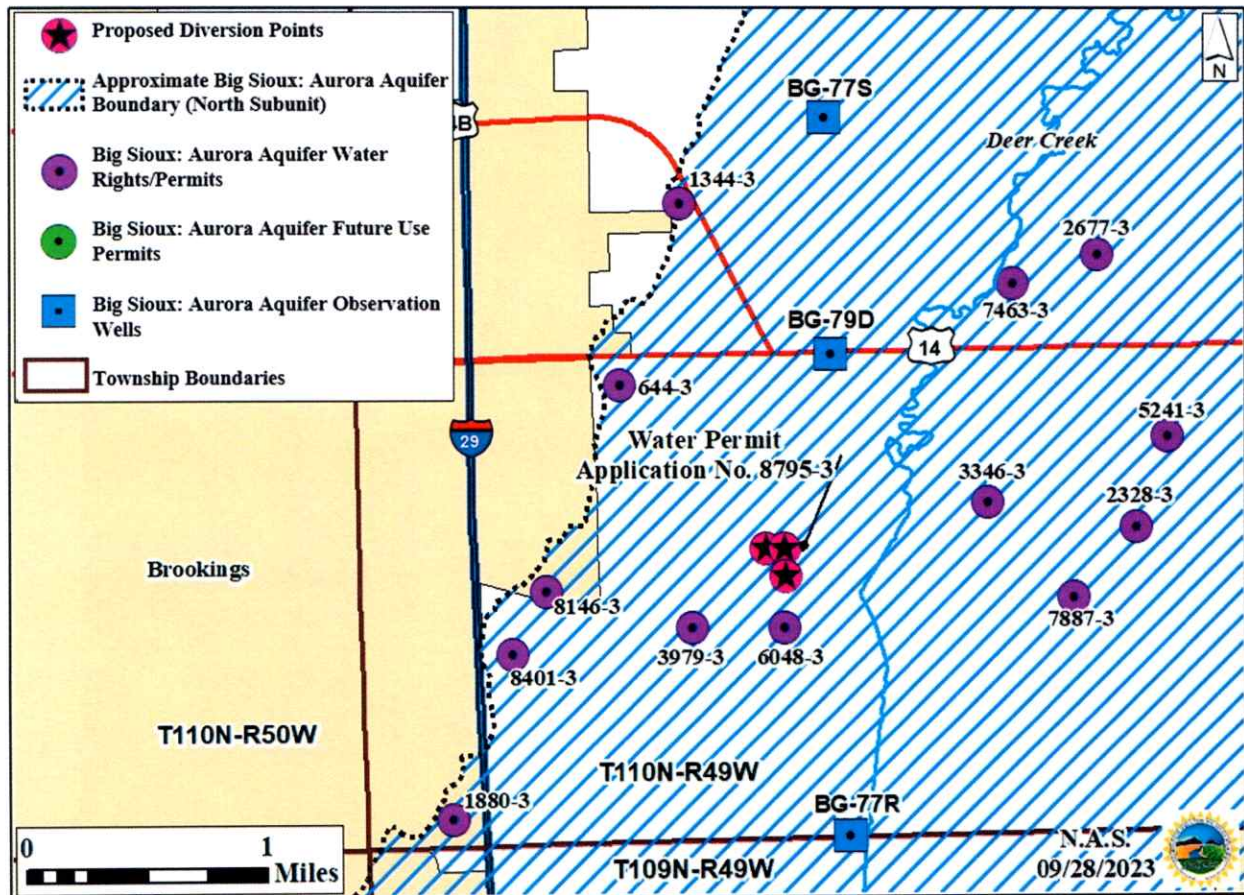


Figure 5. Location of the proposed diversion points for Water Permit Application No. 8795-3 with the Big Sioux: Aurora aquifer water rights/permits and observation wells within approximately two miles (Water Rights, 2023b and 2023c)

The Big Sioux: Aurora aquifer is generally unconfined near the Big Sioux River and along major tributary valleys (such as Deer Creek), but is elsewhere confined beneath till (Hamilton, 1989; Water Rights, 2023d). Based on the water well completion reports on file, and the lithologic logs on file for nearby observation wells, the Big Sioux: Aurora aquifer is expected to be unconfined near the proposed diversion points (SDGS, 2023; Water Rights, 2023b and 2023d). Drawdown created by pumping a well generally does not extend far from the pumped well in an unconfined aquifer; however, in a confined aquifer, drawdown from pumping could extend a distance from the diversion point. The exact drawdown behavior of a well cannot be known without an aquifer performance test.

In Brookings County, the Big Sioux aquifer has an average saturated aquifer thickness of approximately 30 feet and a documented maximum thickness of 93 feet (Hamilton, 1989). Within approximately one mile of the proposed diversion points, water well completion reports on file for wells completed into the Big Sioux: Aurora aquifer have saturated thicknesses ranging from approximately 15 to 50 feet (Water Rights, 2023b and 2023d). Any drawdown as a result of the proposed diversion is not expected to unlawfully impair nearby adequate wells. An adequate well is defined by ARSD 74:02:04:20(6) as “a well constructed or rehabilitated to allow various withdrawal methods to be used, to allow the inlet to the pump to be placed not less than 20 feet into the saturated aquifer or formation material when the well is constructed, or to allow the pump to be placed as near to the bottom of the aquifer as is practical if the aquifer thickness is less than 20 feet.” There are no complaints on file with the DANR-Water Rights Program regarding well interference for adequate wells completed into the Big Sioux: Aurora aquifer (Water Rights, 2023e).

When considering the saturated thickness of the Big Sioux: Aurora aquifer near the proposed diversion points, the generally unconfined nature of the aquifer, and the lack of well interference complaints for adequate wells completed into the Big Sioux: Aurora aquifer, any drawdown created from the proposed diversion is not expected to cause an unlawful impairment to existing water right/permit holders or domestic users with adequate wells. Therefore, there is a reasonable probability that any interference from the proposed appropriation will not impose unlawful impairments to existing users with adequate wells.

CONCLUSIONS:

1. Water Permit Application No. 8795-3 proposes to construct and place to beneficial use 2,426 acre-feet of water annually at a maximum instantaneous diversion rate of 5.57 cfs from three wells to be completed into the Big Sioux: Aurora aquifer (approximately 70 feet deep) for municipal use. This water is appropriated and reserved by Future Use Permit No. 1598-3. The site of interest is located in Brookings County approximately one-half mile east of Brookings, SD.
2. The water this application proposes to place to beneficial use was appropriated previously by Future Use Permit No. 1598-3. Current observation well data and a review of the hydrologic budget, confirm there is a reasonable probability that unappropriated water is available from the Big Sioux: Aurora aquifer.

3. There is a reasonable probability that the proposed diversion by Water Permit Application No. 8795-3 will not unlawfully impair adequate wells for existing water right/permit holders and domestic users.

Nakaila Steen

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

Reviewed by:

Adam Mathiowetz

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

References

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Water Rights, 2023d. Well Completion Reports, SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.

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Water Rights, 2023f. "2003-2022 Non-Irrigation Yearly Reports", SD DANR-Water Rights Program, Joe Foss Bldg, Pierre, SD.



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

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

October 20, 2023

Brookings Municipal Utilities
c/o Eric Witt
525 Western Avenue
Brookings SD 57006

Dear Mr. Witt:

Water Permit Application Nos. 8793-3, 8794-3, and 8795-3 have been examined and found to comply with the South Dakota Water Laws and applicable rules. Three separate notices have been sent to the Brookings Register printed in Brookings SD (Ph # 605 692-6271). You will need to contact the newspaper and authorize publication of the three notices. For your information, a copy each notice, the recommendations of the Chief Engineer and reports on the applications are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

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

Sincerely,

Rachel Rodriguez

Rachel Rodriguez
Water Rights Program
(605) 773-3352

enclosures

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

Instruction to Newspaper - Publish the Notice on October 26, 2023. The applicant is responsible for payment.

NOTICE OF APPLICATION NO. 8795-3 to Withdraw Water from Future Use Permit No. 1598-3

Notice is given that Brookings Municipal Utilities, 525 Western Avenue, Brookings SD 57006 has filed an application for a water permit to construct and place to beneficial use 2,426 acre-feet of water annually at a maximum pump rate of 5.57 cubic feet of water per second from three wells to be completed into the Big Sioux Aurora aquifer (approximately 70 feet deep) located in the S 1/2 SE 1/4 Section 29-T110N-R49W for municipal use. This water is appropriated and reserved by Future Use Permit No. 1598-3. The well sites are located approximately one-half mile east of Brookings SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8795-3 with qualifications because 1) existing domestic water uses and water rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest as it pertains to matters within the regulatory authority of the Water Management Board. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501" or call (605) 773-3352. The applicant's mailing address is given above. If contesting the Chief Engineer's recommendation, the applicant shall also file a petition. A petition filed by either an interested person or the applicant must be filed by November 6, 2023.

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

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by November 6, 2023.

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

Published once at the total approximate cost of _

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, October 20, 2023 9:20 AM
To: registerclassifieds@brookingsregister.com
Subject: 8795-3 Brookings Municipal Utilities - Public Notice
Attachments: 8795-3 public.short_final.docx; FORM8.FRM.doc

Attached is a notice to be published on October 26, 2023.

Brookings Municipal Utilities, c/o Eric Witt, 525 Western Avenue, Brookings SD 57006, (605-692-6325) 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



Affidavit of Publication

State of South Dakota

Exhibit "A"

ss

County of Brookings

Katherine Foiles of said county, first duly sworn, on oath, says: That she is the office clerk of THE BROOKINGS REGISTER, a daily newspaper, printed and published in the City of Brookings, in said County of Brookings, and State of South Dakota; that she has full and personal knowledge of the facts herein stated; that said newspaper is a legal newspaper and has a bona fide circulation of at least two hundred copies of each issue daily; that said newspaper has been published within the said County of Brookings and State of South Dakota, for more than one year prior to the first publication of Exhibit "A," hereto attached and herein mentioned, and was and is printed that the

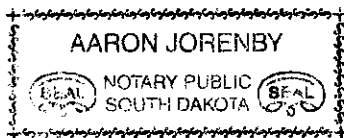
LEG #25987 Notice of Application

same was published, is hereto attached marked Exhibit "A" said newspaper for _____ 1 times, to-wit:

October 26, 2023

said Exhibit "A" inures to the sole benefit for the publishers of said newspaper; that no agreement or 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; that the fees charged for the publication thereof are:

Forty-Five Dollars and Sixty-Two Cents \$45.62



KmFoiles

31 day of

October

2023

Notary Public in and for the County of Brookings, South Dakota.
My Commission expires February 22, 2026

RECEIVED

NOV 06 2023

**OFFICE OF
WATER**

Legal 25987 1X
10/26

**NOTICE OF APPLICATION
NO. 8795-3 TO WITHDRAW
WATER FROM FUTURE USE
PERMIT NO. 1598-3**

Notice is given that Brookings Municipal Utilities, 525 Western Avenue, Brookings SD 57006 has filed an application for a water permit to construct and place to beneficial use 2,426 acre-feet of water annually at a maximum pump rate of 5.57 cubic feet of water per second from three wells to be completed into the Big Sioux Aurora aquifer (approximately 70 feet deep) located in the S 1/2 SE 1/4 Section 29-T10N-R49W for municipal use. This water is appropriated and reserved by Future Use Permit No. 1598-3. The well sites are located approximately one-half mile east of Brookings SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8795-3 with qualifications because 1) existing domestic water uses and water rights will not be unlawfully impaired, 2) it is a beneficial use of water, and 3) it is in the public interest as it pertains to matters within the regulatory authority of the Water Management Board. The Chief Engineer's recommendation with qualifications, the application, and staff report are available at <https://danr.sd.gov/public> or contact Ron Duvall for this information, or other information, at the Water Rights Program address provided below.

Any person interested in opposing this application or recommendation shall allege that the application, upon approval, will cause injury to the person

that is unique from any injury suffered by the public in general. The injury must concern a matter either within the regulatory authority found in SDCL 46-2A-9 for approval or denial of the application, or other matter concerning the application within the regulatory authority of the board to act upon as defined by SDCL 46-2-9 and 46-2-11, or both. Any person meeting the petitioner requirements and wishing to be a party of record in a contested case hearing shall file a written petition to oppose the application with BOTH the applicant and Chief Engineer. A petition opposing the application shall be filed on a form provided by the Chief Engineer. The petition form is available online at <https://danr.sd.gov/public> or by contacting the Chief Engineer. The Chief Engineer's address is "Water Rights Program, Foss Building, 525 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 November 6, 2023.

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

Any interested person may file a comment on the application with the Chief Engineer. The comment shall be filed on a form provided by the Chief Engineer and is available online at <https://danr.sd.gov/public> or by calling (605) 773-3352 or writing the Chief Engineer at the address provided above. Filing a comment does not make the commenter a party of record or a participant in any hearing that may be held. Any comment must be filed by November 6, 2023.

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

Published October 26, 2023 at the total approximate cost of \$45.62 and may be viewed free of charge at www.sdpublicnotices.com.

Rodriguez, Rachel

From: Rodriguez, Rachel
Sent: Friday, October 20, 2023 10:09 AM
To: 'ewitt@swiftel-bmu.com'
Subject: 8793-3, 8794-3, 8795-3 Brookings Municipal Utilities - Public Notice
Attachments: 8793-3 Rec.pdf; 8794-3 Rec.pdf; 8795-3 Rec.pdf; Brookings Letter.pdf; Public Notices.pdf

Good morning,

Attached is a copy of the reports, chief engineer's recommendations and information regarding the public notices for your water permit applications. 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





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

JAN 02 2024

Brookings Municipal Utilities
Eric Witt, Engineering Manager
525 Western Avenue
Brookings SD 57006

Dear Mr. Witt:

Enclosed are Water Permit Nos. 8794-3 and 8795-3 authorizing construction of your water diversion systems and beneficial use of the water, not exceeding the limits as specified in the Water Permits.

Form 10's, *Notice of Completion of Works and Application of Water to Beneficial Use*, are enclosed. Please return the completed forms after you have finished the systems and have put the water to beneficial use. An investigation can then be scheduled so the water licenses may be issued, thus completing the acquisition of a water right.

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

Sincerely,

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

enclosures



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

STATE OF SOUTH DAKOTA)
) SS
COUNTY OF HUGHES)

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

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

Application No.: 8795-3

Name of Applicant: Brookings Municipal Utilities, Eric Witt

Date of Posting: 10/24/2023

Date of Removal: 1/2/2024

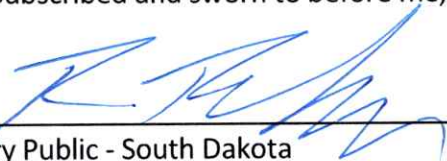


Ron Duvall, Engineer III

1/2/2024

Date

Subscribed and sworn to before me, a notary public, this 2nd day of January, 2024.



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

(SEAL)

