DEPARTMENT of AGRICULTURE and NATURAL RESOURCES
JOE FOSS BUILDING
523 E. CAPITOL AVE
PIERRE SD 57501-3182
danr.sd.gov

RECOMMENDATION OF ACTING CHIEF ENGINEER FOR FUTURE USE WATER PERMIT APPLICATION NO. 2900-2, Rapid Valley Sanitary District - Water Service

Pursuant to SDCL 46-2A-2, the following is the recommendation of the Acting Chief Engineer, Water Rights Program, Department of Agriculture and Natural Resources concerning Future Use Water Permit Application No. 2900-2, Rapid Valley Sanitary District - Water Service, 4611 Teak Drive, Rapid City SD 57703.

The Acting Chief Engineer is recommending APPROVAL of Application No. 2900-2 because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) Rapid Valley Sanitary District has demonstrated a reasonable need for the water reserved, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. Future Use Permit No. 2900-2 reserves 932 acre-feet of water annually from the Madison aquifer.

2. Future Use Permit No. 2900-2 is approved with the stipulation that this Permit is subject to review by the Water Management Board as to accomplishment in developing reserved water upon expiration of seven (7) years. This Permit shall be subject to cancellation if the Water Management Board determines during the review that the holder cannot demonstrate a reasonable need for the Permit.

3. At such time as definite plans are made to construct works and put the water reserved by this permit to beneficial use, specific application for all or any part of the reserved water must be submitted prior to construction of facilities pursuant to SDCL 46-5-38.1.

See report on application for additional information.

Adam Mathiowetz, PE
Acting Chief Engineer
February 13, 2026

NOTE: Approval of Future Use Permit No. 2900-2 does not preclude approval of subsequent appropriations by other persons within the future use area identified on No. 2900-2. Approval of any such appropriations will have a priority date junior to No. 2900-2. However, future siting of wells by the Rapid Valley Sanitary District to place water to beneficial use within the future use area will be subject to review during the application process to place to beneficial use regarding the likelihood of well interference between a Rapid Valley Sanitary District well or wells, and wells of other users within the future use area.

Report to the Chief Engineer on
Water Permit Application No. 2900-2
Rapid Valley Sanitary District
2026 January 27

Water Permit Application No. 2900-2 proposes to reserve 932 acre-feet of water annually from the Madison aquifer, for future use as municipal water supply for Rapid Valley Sanitary District, serving customers in Pennington County. The area described for future development of a water supply is located southeast of the city limits of Rapid City, in the NE ¼ NW ¼ Section 15 T1N-R8E Black Hills Meridian (Lot 3R1 Revised, Houks Subdivision). If approved, this application does not authorize construction of works or placement of water to beneficial use.

Aquifer: Madison Limestone (MDSN)

Hydrogeologic Characteristics

The Madison Group in South Dakota is a Lower Mississippian and Upper Devonian aged group of formations that in the Black Hills consists of the Englewood and Pahasapa Limestone formations [1]. The Pahasapa Limestone is a "white, light-gray to tan, fine- to medium-grained limestone and dolomite containing brown to gray chert" [2]. The Englewood Limestone is a "pink to lavender to light-gray, thin- to medium-bedded, fine- to medium-grained, argillaceous, dolomitic limestone" [2]. The Madison aquifer consists of the permeable and porous portions of the Madison Group that are sufficiently saturated to deliver useful quantities of water. The Madison aquifer extends over more than 210,000 square miles in Montana, Wyoming, North Dakota, South Dakota, and Nebraska [3] although, it may not be suitable as a source of water in all of those areas due to extreme depth to the aquifer and poor water quality far from the outcrops [4]. It crops out in the Black Hills and is buried elsewhere in South Dakota [3]. The Madison aquifer may be hydrologically connected to the underlying Deadwood aquifer. It is also hydrologically connected to the overlying Minnelusa aquifer [5]. The Minnelusa aquifer overlies the Madison unconformably [1], which means there was a period of erosion or weathering between when the Madison Group and the Minnelusa Formation were deposited. Transmissivity in the Madison aquifer mainly comes from secondary porosity features such as solution cavities, faults, and fractures [5]. Because most of the transmissivity in the Madison aquifer comes from secondary porosity features, aquifer characteristics in the Madison aquifer vary greatly from location to location [5].

There is a well completion report nearby this application for Water Permit No. 2848-2, also held by the applicant, which was completed on April 12, 2025, in the SE ¼ SW ¼ Section 10 T1N-R8E [6], which is approximately a quarter mile north-northeast of the proposed area for this application. The driller reported encountering the top of the Madison Limestone 3,816 feet below grade and drilled to a total depth of 4,128 feet. The static water level at the time the well was completed was approximately 590 feet below grade. This is consistent with the depth and conditions of the Madison aquifer [7] [8] that are mapped and in the Well Completion Report database [6].

Applicable South Dakota Codified Law (SDCL)

Pursuant to SDCL 46-2A-9, a permit to appropriate water may be issued if there is reasonable probability that there is unappropriated water available for the applicant's proposed use, that the proposed diversion 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 (from here on, "Board"). This report will only assess the availability of water and possibility of developing this application without unlawful impairment of existing domestic water uses and water rights.

Pursuant to SDCL 46-2A-10 a reservation for future use may be approved only if there is a reasonable probability that unappropriated water is available for this application, that the quantity of water will be needed by the entity, and that the proposed use will be a beneficial use and in the public interest. The applicant has submitted documents that supply reasoning for the quantity of water requested. This report will only assess the availability of water and possibility of developing this application without unlawful impairment of existing domestic water uses and water rights.

Availability of Water

Statewide Hydrologic Budget

Statewide Recharge

The Madison aquifer receives recharge from infiltration of precipitation and streamflow on the outcrop area and may also receive inflow from the underlying Deadwood aquifer [9]. Woodward-Clyde Consultants [10] estimated recharge to the outcrop of the Madison aquifer in the Black Hills as part of an environmental impact statement for the ETSI Coal Slurry Pipeline Project. The upper-bound estimate of recharge in the Woodward-Clyde Consultants report is approximately 400,000 ac-ft/yr, assuming almost all of the precipitation that falls on the outcrop infiltrates into the aquifer [10]. Woodward-Clyde Consultants produced a lower-bound recharge estimate of 140,000 ac-ft/yr based on the Rahn and Gries [11] report [10]. However, the Rahn and Gries report estimated recharge for all Paleozoic limestone in the Black Hills, which includes the Madison Group, the Minnelusa Formation, and the Minnekahta Formation [11]. Rahn and Gries [11, p. 15] reported that 146.14 cfs was their minimum estimated recharge rate for the Paleozoic limestone from infiltration of precipitation, which converts to approximately 106,000 ac-ft/yr for all Paleozoic formations. The Woodward-Clyde Consultants report did not acknowledge the fact that the Rahn and Gries [11] report estimated minimum recharge for a larger group of formations than the Woodward-Clyde Consultants report covers and therefore was likely to overestimate recharge to the Madison aquifer under the assumptions made [10].

Carter, Driscoll, and Hamade [9] analyzed streamflow and precipitation data from water years 1931 to 1998 in the Black Hills area in South Dakota and Wyoming to determine the average annual recharge to the Madison and Minnelusa aquifers. They estimated a combined average annual recharge to both aquifers to be 344 cfs, or approximately 249,000 ac-ft/yr, not including possible flow from the Deadwood aquifer [9]. Carter, Driscoll, and Hamade [9] estimated that approximately 55% of the recharge goes to the Madison aquifer, so the total estimated average

recharge to the Madison aquifer from the outcrop in the Black Hills is 137,000 ac-ft/yr, not including possible inflow from adjacent aquifers or from the Madison aquifer outside of the Black Hills of South Dakota and Wyoming. The Carter, Driscoll, and Hamade [9] report uses more years of data, more recent data, and better assumptions than the Woodward-Clyde Consultants [10] and Rahn and Gries [11] reports. However, area for recharge from precipitation used by Carter, Driscoll, and Hamade [9] included the Limestone Plateau east of the groundwater divide. The water infiltrating into the Madison Limestone on the Limestone Plateau east of the groundwater divide does not flow to the greater aquifer. Instead, it becomes spring discharge on the eastern side of the Limestone Plateau, which flow across the Crystalline Core. The streamflow from those springs can flow across the Madison Formation on the eastern slope of the Black Hills, which does recharge the aquifer.

In 2025, Medler, Anderson, and Eldridge [12] used precipitation data and the framework established by Carter, Driscoll, and Hamade [9] to generate updated estimates of precipitation and streamflow recharge to the five largest sedimentary bedrock aquifers and the Jurassic interval in the Black Hills. The total estimated precipitation recharge to the Madison aquifer in South Dakota (excluding streamflow contributions) is approximately 57,003 ac-ft/yr. Medler, Anderson, and Eldridge [12] estimated recharge from streamflow to the Madison and Minnelusa aquifers together. Drennon [13] used streamflow loss estimates by Hortness and Driscoll [14] to divide streamflow recharge estimated by Medler, Anderson, and Eldridge [12] proportionately according to the amounts of estimated streamflow loss to each aquifer provided by Hortness and Driscoll [14]. Where Hortness and Driscoll [14] did not provide an estimate of how much streamflow went to each aquifer, Drennon assumed 70% of streamflow recharge went to the Madison aquifer, following work by Carter, et al. [9]. Using those methods, the total estimated recharge to the Madison aquifer is approximately 103,000 ac-ft/yr. Given the variety of methods and time periods used for estimates, the true value of recharge to the Madison aquifer may range between 103,000 and 137,000 ac-ft/yr, not including groundwater inflow from other regions.

Statewide Discharge

Discharge from the Madison aquifer in South Dakota is mainly by outflow to other aquifers when the hydraulic head in the Madison aquifer is higher than the other aquifers, outflow to springs and seeps, and withdrawals by domestic and appropriative wells [15]. Due to the presence of overlying aquifers and water distribution systems in many areas of the aquifer, domestic well withdrawals are a negligible portion of the hydrologic budget of the Madison aquifer. There are 183 water rights/permits currently authorized to withdraw from the Madison aquifer, and 12 future use water rights/permits reserving water from the Madison aquifer. Table 1 shows the future use permits reserving water from the Madison aquifer [16].

Of the 183 active water rights/permits, 112 are primarily for some type of water distribution system (rural water system, municipal, etc), 34 primarily for irrigation, 17 primarily for commercial use, 11 primarily for industrial use, 4 primarily for domestic use, 2 for geothermal use, 2 for institutional use, and one primarily for recreation [16]. There are 37 water rights/permits which have irrigation listed as one of the uses in their permit. Estimated withdrawals for irrigation use are shown in Table 5 (page 13). When there were more than 10

years of irrigation reports available, the average reported irrigation was used to estimate irrigation withdrawals. When there were fewer than 10 years of irrigation reports available, withdrawals are assumed to equal two acre-feet per acre, although actual usage is likely less for non-turf irrigation. Non-irrigation withdrawals from permit holders with irrigation also being a permitted use are assumed to withdraw at their maximum instantaneous diversion rate 60% of the time [17]. For Water Right No. 1885-1, that would have caused the total estimated withdrawal to exceed the rate they were physically capable of withdrawing, so their total estimated withdrawal is 100% of their maximum instantaneous diversion rate. The estimated average annual withdrawal from permits with irrigation as one use is 7,859 ac-ft/yr.

Table 1: Future Use Permits from the Madison aquifer [16]

Permit No.	Name/Business	County	Use	Priority Date	Amount Reserved (ac-ft/yr)
2028-1	Bear Butte Valley Water, Inc	MD	RWS, WDS	03/23/2023	440
369-1	City of Belle Fourche	LA	MUN	12/10/1958	620
2086-2	City of Rapid City	PE	MUN	05/18/1989	4,075
2086A-2	City of Rapid City	PE	MUN	05/18/1989	0
439-2*	City of Rapid City	PE	MUN	09/22/1956	3,367
1872-1	City of Spearfish	LA	MUN	11/13/2006	2,704
2560-2	Fall River Water Users District	FR	RWS	05/16/2005	358
2560A-2	Fall River Water Users District	FR	RWS	05/16/2005	0
2560B-2	Fall River Water Users District	FR	RWS	05/16/2005	0
2580-2	Southern Black Hills Water System	FR	RWS	03/02/2006	1,474
1833-2	Weston Heights Home Owners	MD	RWS	02/18/1983	211
1995-1	Black Hawk Water User District	MD	RWS	04/15/2020	1,300
Total					14,549

FR – Fall River, LA – Lawrence, MD – Meade, PE – Pennington
MUN – Municipal, RWS – Rural Water System, WDS – Water Distribution System
* This permit reserves water from multiple aquifers but is assumed to withdraw solely from the Madison for estimation of the hydrologic budget.

Of the non-irrigation permits, eight (743-1, 272-1, 1858-2, 574-2, 1442-1, 1703-1, 566-2, and 1628-2) are held by water distribution systems which purchase water from another system and are therefore assumed to withdraw a negligible amount of water under their Madison aquifer permits [18] [19]. There are 65 permits which have reporting their withdrawals to the Chief Engineer as a requirement under the permit, or report withdrawals from the Madison aquifer voluntarily along with a required report.

Table 6 (page 15) shows water right permits required to report to the Chief Engineer and the estimated withdrawal by those entities, using the same estimation methods as for irrigation reports when there were not enough years of reported withdrawals to use the average annual report. The estimated average annual withdrawal of Madison aquifer permits in this group of permits is 26,343 ac-ft/yr.

There are 17 permits which are not required to report withdrawals to the Chief Engineer but do report production to the SD DANR Drinking Water Program and have the Madison aquifer as their only source of water. The reported production for those systems is 187 ac-ft/yr as shown in Table 7 (page 16) and is used to estimate withdrawals for those permits. There are seven permits which have an annual volume of water listed on their permit but do not report withdrawals to the Chief Engineer or the Drinking Water Program and are assumed to withdraw their full allotted volume, for a combined total of 1,737 ac-ft/yr. The 49 remaining permits appropriate a combined total of 19.833 cfs and are assumed to withdraw at their maximum diversion rate 60 percent of the time, for an estimated average annual withdrawal of 8,621 ac-ft/yr.

There are two applications which are deferred or held in abeyance. Water Permit Application No. 2585-2 for Southern Black Hills Water System proposes to appropriate 1,600 ac-ft/yr but is deferred for further study. Water Permit Application No. 2685-2 for Powertech, Inc is held in abeyance pending federal permitting and proposes to appropriate 889 ac-ft/yr. There is one permit application, No. 2897-2, which proposes to appropriate 85 acre-feet of water for water distribution system use, and is pending approval.

Summary of Statewide Hydrologic Budget

The estimated average annual recharge from streamflow and precipitation to the Madison aquifer in South Dakota is approximately 103,000 to 137,000 ac-ft/yr. Table 2 shows a summary of the various methods of estimating withdrawals. The estimated average annual withdrawal from the Madison aquifer is 61,870 ac-ft/yr, including reservations for future use and held or pending applications. This application proposes to reserve 932 ac-ft/yr. Therefore, based on the hydrologic budget, there is reasonable probability unappropriated water is available for this application.

Table 2: Summary of estimated withdrawals

Use Type	Count	Est Use (ac-ft/yr)
Irrigation	37	7,859
Standby	8	0
Reports to Chief Engineer	65	26,343
Drinking Water Reports	17	187
Volume Limit	7	1,737
Sixty Percent Estimate	49	8,621
Subtotal, authorized to withdraw	*183*	*44,747*
Future Use	12	14,549
Pending	1	85
Deferred/Abeyance	2	2,489
Grand Total	**198**	**61,870**

Local Hydrologic Budgets

There are two studies which reviewed localized water availability in the Madison and Minnelusa aquifers that include the location of this future use reservation. Comparison of Water Rights estimated withdrawals to the recharge estimated in these studies is provided for the information of the Chief Engineer and the Water Management Board, but the Madison aquifer is not divided into management units by these local studies.

Carter, et al. [15]

Carter, et al. [15] divided the area around the Black Hills into nine subareas and used streamflow, precipitation, spring flow, estimated ground water flow, and well withdrawal data from 1987 to 1996 for the hydrologic budgets. This application is in Subarea 4 of their report. The boundaries of the Carter et al. [15] subareas were designed to minimize flow across subarea boundaries. Medler, Anderson, and Eldrige [12] provided an updated estimate of precipitation recharge to the Madison aquifer of 2,750 ac-ft/yr. Drennon [13] estimated that the recharge to the Madison aquifer from infiltration of streamflow to Subarea 4 is approximately 15,900 ac-ft/yr. Carter et al. [15] estimated recharge to the Madison and Minnelusa aquifers is 39.3 cfs. Multiplying that by 55%, the estimated recharge to the Madison aquifer is 21.6 cfs, equivalent to approximately 15,700 ac-ft/yr. Following the same methods as the Statewide Discharge section, withdrawals from Carter et al. [15] Subarea 4 are shown in Table 3, estimated to total to 26,901 ac-ft/yr including reservations for future use. This application proposes to reserve an additional 932 ac-ft/yr. While the local hydrologic budget indicates appropriations exceed recharge, actual measured water levels in the aquifer at nearby observation wells do not indicate withdrawals are exceeding recharge. This discrepancy may be due to the inherent uncertainties in estimating a recharge rate or unaccounted for movement of water from adjacent subareas or between aquifers, or a combination of these factors. Furthermore, the hydrologic budget is based on the entire aquifer and not a single subarea. Therefore, based on the local hydrologic budget in combination with other information available, there is reasonable probability unappropriated water is available for this application.

Table 3: Estimated withdrawals from the Madison aquifer in Subarea 4

Use Type	Count	Est Use (ac-ft/yr)
Irrigation	8	910
Standby	1	0
Reports to Chief Engineer	17	13,709
Drinking Water Reports	5	38
Volume Limit	0	0
Sixty Percent Estimate	15	3,205
Subtotal, authorized to withdraw	*46*	*17,863*
Future Use	5	8,953
Pending	1	85
Grand Total	**52**	**26,901**

Long and Putnam [5]

Long and Putnam [5] analyzed groundwater flow of the Madison and Minnelusa aquifers in the area near Rapid City, including the area for this application. One product of that analysis was a hydrologic budget for water years 1988 through 1997. Long and Putnam [5] estimated that in their study area, streamflow recharge was 38.8 cfs, precipitation recharge as 16.1 cfs, and groundwater inflow from the Deadwood aquifer was 6.3 cfs, for a total of 61.2 cfs flowing into the Madison and Minnelusa aquifers. Within the Long and Putnam [5] study area, the area of the Madison outcrop is 30,790 acres and the area of the Minnelusa outcrop is 31,196 acres, so the area of Madison and Minnelusa outcrop is divided approximately 50/50%. Therefore, the estimated recharge to the Madison aquifer within the Long and Putnam [5] study area is 30.6 cfs, or approximately 22,000 ac-ft/yr. The estimated withdrawals from the Long and Putnam [5] study area are shown in Table 4. The estimated average annual appropriation from the Long and Putnam [5] study area is 30,555 ac-ft/yr and there are five future use permits and no held applications in the study area. This application proposes to reserve up to 932 additional acre-feet of water per year. While the local hydrologic budget indicates appropriations exceed recharge, actual measured water levels in the aquifer at nearby observation wells do not indicate withdrawals are exceeding recharge. This discrepancy may be due to the inherent uncertainties in estimating a recharge rate or unaccounted for movement of water from adjacent subareas or between aquifers, or a combination of these factors. Furthermore, the hydrologic budget is based on the entire aquifer and not a single subarea. Therefore, based on the hydrologic budget, in addition to other information, there is reasonable probability unappropriated water is available for this application.

Table 4: Estimated withdrawals in the Long and Putnam [5] area

Use Type	Count	Est. Use (ac-ft/yr)
Irrigation	9	957
Standby	1	0
Reports to WR	32	16,953
Drinking Water Reports	6	93
Volume Limit	0	0
Sixty Percent Estimate	20	3,514
Subtotal	68	21,517
Future Use	5	8,953
Pending	1	85
Grand Total	**74**	**30,555**

Observation Wells

Administrative Rule of South Dakota (ARSD) 74:02:05:07 requires that the Water Management Board consider the record of observation wells in addition to other information to determine the availability of unappropriated water. The DANR Water Rights Program maintains 25 observation wells completed into the Madison aquifer [20]. The nearest observation wells to this application are PE-65A, PE-89A, PE-89C, and PE-96A. Figure 1 shows a map of water right permits and Water Rights Program observation wells completed into the Madison aquifer near this

application. Table 8 (page 17) describes all water right permits withdrawing from the Madison aquifer shown in Figure 1. Water level data from these wells is shown in Figure 2 [20]. Observation Wells PE-65A, PE-89A, and PE-96A are near high-capacity wells and Rapid Creek and therefore have water levels influenced by appropriative use by Rapid City and the physical maximum water elevation allowed by spring flow to Rapid Creek. Observation Well PE-89C is further from those features and is reflective of general conditions in the aquifer at that location. In general, water levels rise during periods of higher-than-average precipitation and decline during periods of lower-than-average precipitation. The predominant influence of climactic fluctuations on the observation well data indicates that the Madison aquifer is discharging water naturally. The Water Management Board considers natural discharge to be available for capture. Therefore, based on the record of observation well data, there is reasonable probability unappropriated water is available for this application.

Nearby Water Users

As mentioned in the report submitted by the applicant, the nearest water user withdrawing from the Madison aquifer in proximity to this application is a well owned by the applicant. The engineering consultant hired by the applicant does not expect interference to be a concern between the applicant's existing well and the proposed well which would be constructed when this future use reservation is placed to beneficial use, if approved. Another application is required to be submitted identifying well location(s) when a future use reservation is to be placed to beneficial use. The potential for unlawful impairment is evaluated with that application.

Conclusions

1. Water Permit Application No. 2900-2 proposes to reserve 932 acre-feet of water annually from the Madison aquifer, for future use as municipal water supply for Rapid Valley Sanitary District, serving customers in Pennington County. The area described for future development of a water supply is located southeast of the city limits of Rapid City, in the NE ¼ NW ¼ Section 15 T1N-R8E Black Hills Meridian (Lot 3R1 Revised, Houks Subdivision). If approved, this application does not authorize construction of works or placement of water to beneficial use.
2. Based on the hydrologic budget and observation well analysis, there is reasonable probability unappropriated water is available for this application.

Kimberly C. Drennon, E. I.
Engineer III – DANR Water Rights Program

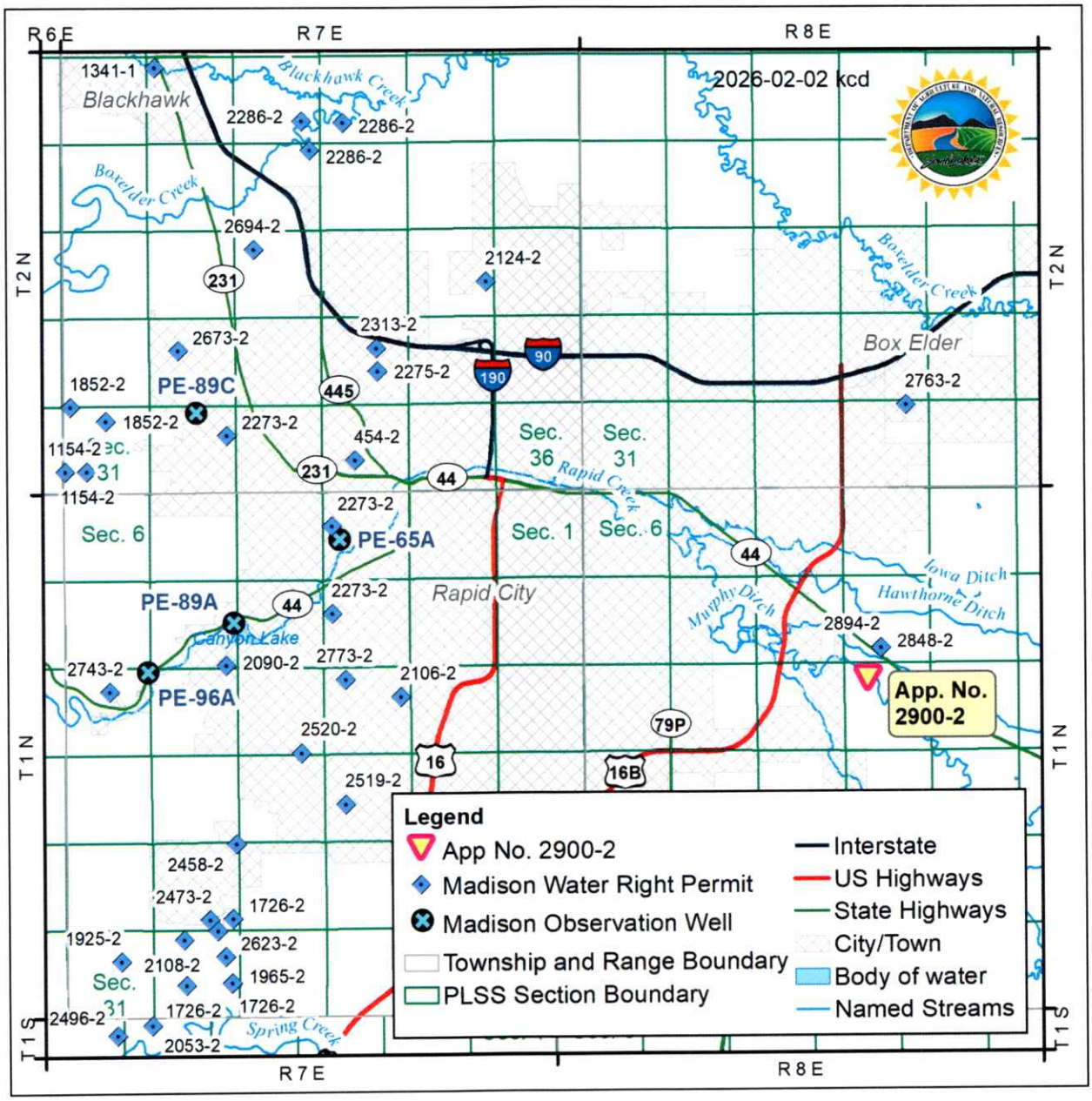

Figure 1: Water right permits and Water Rights Program observation wells near this application. Future use area is too small for this map scale [20] [16].

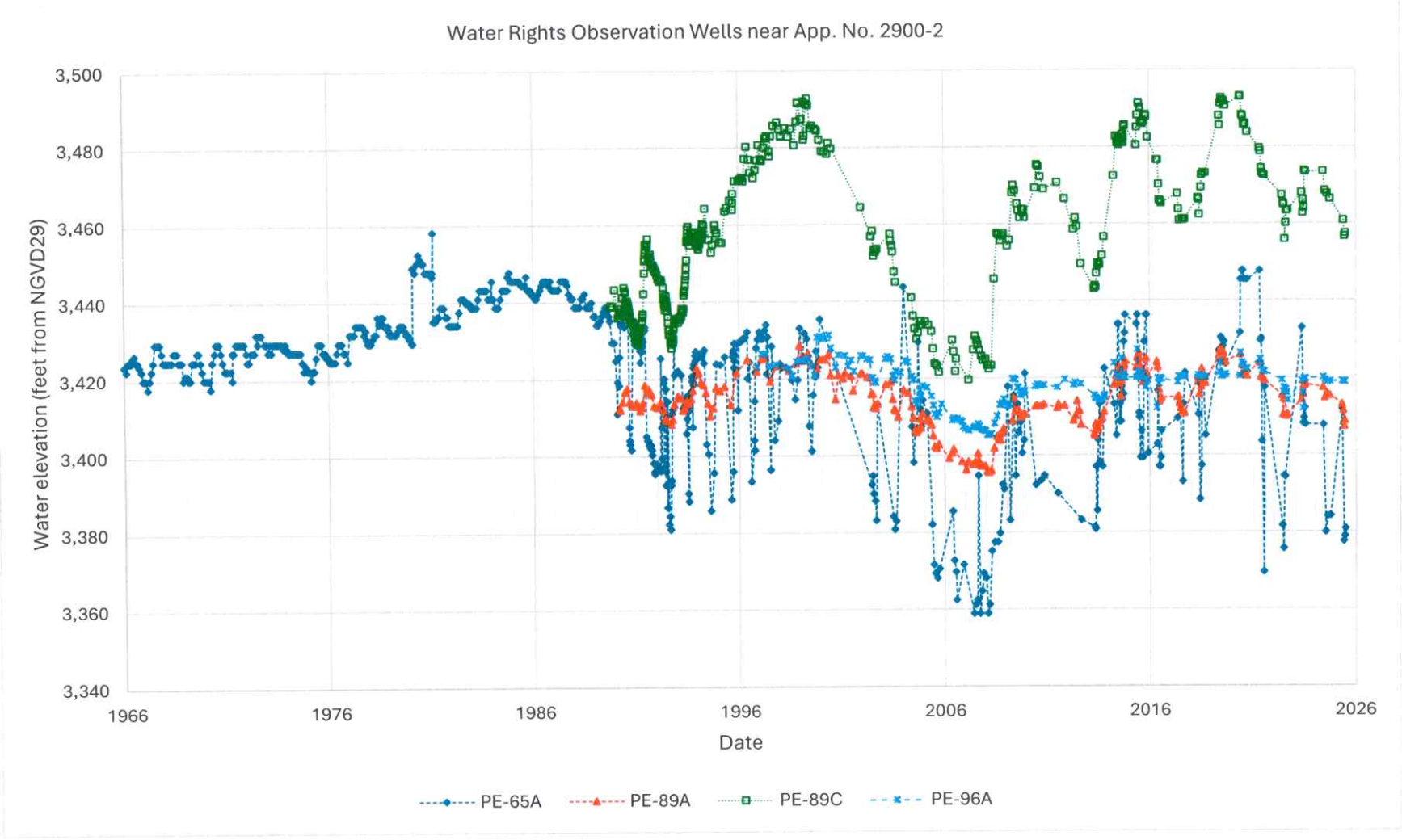

Figure 2: Water elevations from Water Rights observation wells completed into the Madison aquifer near App. No. 2900-2 [20]

References

[1] M. D. Fahrenbach, F. V. Steece, J. F. Sawyer, K. A. McCormick, G. L. McGillivray, L. D. Schulz and J. A. Redden, "South Dakota Stratigraphic Correlation Chart," SD DANR Geological Survey Program, Vermillion, South Dakota, 2010. Oil and Gas Investigation 3.

[2] J. E. Martin, J. F. Sawyer, M. D. Fahrenbach, D. W. Tomhave and L. D. Schulz, "Geologic Map of South Dakota," SD DANR Geological Survey Program, Vermillion, South Dakota, 2004. General Map 10.

[3] J. S. Downey, "Geohydrology of the Madison and associated aquifers in Parts of Montana, North Dakota, South Dakota, and Wyoming," United States Geological Survey, Alexandria, Virginia, 1984. Professional Paper 1273-G.

[4] J. M. Carter, D. G. Driscoll, J. E. Williamson and V. A. Lindquist, "Atlas of water resources in the Black Hills area, South Dakota," United States Geological Survey, 2002. Hydrologic Atlas 747.

[5] A. J. Long and L. D. Putnam, "Flow-system analysis of the Madison and Minnelusa aquifers in the Rapid City area, South Dakota - Conceptual model," United States Geological Survey, 2002. Water-Resources Investigations Report 02-4185.

[6] J. M. Carter, D. G. Driscoll and G. R. Hamade, "Estimated recharge to the Madison and Minnelusa aquifers in the Black Hills Area, South Dakota and Wyoming, Water Years 1931-98," United States Geological Survey, Rapid City, South Dakota, 2001. Water-Resources Investigations Report 00-4278.

[7] Woodward-Clyde Consultants, "Well-field hydrology technical report for the ETSI coal slurry pipeline project," United States Department of Interior Bureau of Land Management, 1981.

[8] P. H. Rahn and J. P. Gries, "Large springs in the Black Hills, South Dakota and Wyoming," SD DENR Geological Survey Program, Vermillion, South Dakota, 1973. Report of Investigations 107.

[9] C. J. Medler, T. M. Anderson and W. G. Eldridge, "Hydrologic Budgets and Water Availability of Six Bedrock Aquifers in the Black Hills Area, South Dakota and Wyoming, 1931–2022," USGS, Reston, Virginia, 2025. Scientific Investigations Report 2025-5067.

[10] K. C. Drennon, "Memorandum to DANR Water Rights Engineering Staff regarding Streamflow Recharge to the Madison and Minnelusa aquifers," not published, Joe Foss Building, Pierre, South Dakota, 2026.

[11] J. E. Hortness and D. G. Driscoll, "Streamflow Losses in the Black Hills of Western South Dakota," United States Geological Survey, Rapid City, South Dakota, 1998. Water-Resources Investigations Report 98-4116.

[12] J. M. Carter, D. G. Driscoll, G. R. Hamade and G. J. Jarrell, "Hydrologic budgets for the Madison and Minnelusa aquifers, Black Hills of South Dakota and Wyoming, Water Years 1987-96," United States Geoligcal Survey, Rapid City, South Dakota, 2001. Water-Resources Investigations Report 01-4119.

[13] SD DANR Water Rights Program, "Water right permit file database," SD DANR Water Rights Program, Pierre, South Dakota, 2024.

[14] N. A. Steen, Interviewee, *Natural Resources Engineer - DANR Water Rights Program.* [Interview]. 9 September 2024.

[15] Drinking Water Program, "Drinking Water Reports," SD DANR, Joe Foss Bldg. Pierre, South Dakota, 2024.

[16] B. Friedeman, Interviewee, *Environmental Scientist II, DANR Drinking Water Program.* [Interview]. 26 September 2025.

[17] SD DANR Water Rights Program, "Observation Wells," SD DANR Water Rights Program, Pierre, South Dakota, 2026.

[18] SD Water Management Board, "On the Matter of Water Permit Application No. 2313-2 for Coca Cola Bottling Company," SD DANR Water Rights Program, Pierre, South Dakota, 1995.

Appendix: Supplementary Tables

Table 5: Estimated withdrawals for permits with irrigation listed as one use

Permit No.	Name/Business	Status	Use Types	Priority	Diversion rate (cfs)	Acres Licensed/ Permitted	Est. Non-irr. Use (ac-ft/yr)	No. Years of Irr. Reports	Average Report (ac-ft)	Est. Avg. Irr. (ac-ft/yr)	Total Est. Withdrawal (ac-ft/yr)
2773-2[1]	Arrowhead Country Club	Permit	IRR	07/27/2017	1.110	100.00	0	7	0	0	0
1635-1	Black Hills Natl. Cemetery	License	IRR, INS	04/02/1990	0.820	54.50	356	29	95	95	451
1452-1	Black Hills State University	License	IRR, MUN	12/19/1988	3.330	25.44	1,447	36	22	22	1,469
1670-1	Buddy L, Peggy A, Kami S Ireland	License	IRR	06/09/1998	3.610	253.00	0	27	42	42	42
1096A-1[2]	Butte Meade Sanitary Dist	Permit	RWS, IRR	04/16/1976	1.330	0.00	--	1	0	--	964
2458-2	City of Rapid City	License	IRR	03/30/2001	0.800	107.00	0	24	100	100	100
2002-1	City of Spearfish	Permit	IRR	12/28/2020	1.330	40.00	0	4	0	80	80
2313-2	Coca-Cola Bottling	License	IRR, COM	04/08/1994	0.330	3.00	2	30	7	7	9
1899-1	Davis Ranches Inc	License	IRR	08/25/2008	1.430	100.00	0	16	0	0	0
1650-1[3]	Dennis L Miller	License	COM, IRR	04/03/1997	0.890	0.00	--	0	N/A	--	56
2673-2	Diocese of Rapid City	License	IRR	05/27/2011	0.120	7.00	0	12	8	8	8
1009-1	Donald F/Ann J Brady	License	IRR	02/01/1974	0.780	53.73	0	43	29	29	29
1185-1[4]		License	IRR, REC, FWP	01/18/1979	0.380	22.52	0	43	116	116	116
2286-2	Donald Konechne	License	IRR	04/28/1993	0.100	38.50	0	31	10	10	10
1707A-1	Elkhorn Ridge @ Frawley Ranches LLC	Permit	IRR, SHD, COM, DOM	01/06/2000	3.705	100.00	90	1	0	0	90
1707E-1		Permit	IRR	01/06/2000	0.000	0.00	0	22	14	14	14
1931-1		License	IRR, COM	08/17/2012	0.170	3.30	74	1	4	7	80
1945-1	Frawley Ranches LLC	Permit	IRR	02/10/2014	1.110	265.00	0	11	55	55	55
1858-1	Glencoe Camp Resort II LLC	License	IRR, COM	03/08/2006	0.860	34.00	374	19	0	0	374
2593-2	Hart Ranch Development	License	IRR, SHD	06/15/2006	0.490	72.50	213	18	34	34	247
1911-2	Hart Ranch Development Co	License	IRR, SHD, REC	09/27/1984	0.880	124.00	383	31	117	117	500
1725-2	Janice R Crowser	License	IRR	08/20/1980	1.070	75.10	0	26	1	1	1
2037-1	Jared & Anna Lukens-Black	Permit	IRR	06/24/2024	0.055	0.60	0	1	0	1	1
2880-2	Jeremiah & Wendy Walla	Permit	IRR	07/24/2024	0.390	23.54	0	1	0	47	47
2012-1	Jesse Horstmann	Permit	IRR	12/23/2021	0.500	43.50	0	3	0	87	87
858-2	John & Heidi McBride	License	IRR	02/05/1965	9.360	655.75	0	43	6	6	6
1885-1	John T & Veronica Widdoss	License	IRR, DOM	04/09/2007	0.110	22.00	36	8	20	44	80
1960-1	One Diamond Inc	License	IRR, COM	04/11/2016	1.280	150.00	29	9	136	300	329
1223-1	P & L Water & Hay LLP	License	IRR	03/10/1981	0.670	263.00	0	43	182	182	182
1923-1	Roger & Jean Ranschau	License	IRR, DOM	02/15/2011	0.110	3.00	48	13	1	1	49
2013-1	Santa Maria Land & Cattle Corp	Permit	IRR	01/18/2022	2.220	460.00	0	2	0	920	920

Permit No.	Name/Business	Status	Use Types	Priority	Diversion rate (cfs)	Acres Licensed/ Permitted	Est. Non-irr. Use (ac-ft/yr)	No. Years of Irr. Reports	Average Report (ac-ft)	Est. Avg. Irr. (ac-ft/yr)	Total Est. Withdrawal (ac-ft/yr)
1363-1	Spearfish Canyon Country Club	License	IRR	09/15/1986	0.900	80.10	0	38	68	68	68
2106-2	Stuart Rice	License	IRR, DOM	06/06/1990	0.080	2.80	35	34	1	1	36
1842-1	Tom C Davis	License	IRR	04/05/2005	0.440	330.00	0	20	0	0	0
2741-2	Tubbs Land & Cattle LLC	Permit	IRR	08/20/2018	3.340	567.00	0	6	304	1,134	1,134
2879-2	Weinreis Brothers	Permit	IRR	05/15/2024	0.500	75.00	0	1	0	150	150
419-2	Wind Cave National Park	License	COM, IRR	12/29/1955	0.150	6.00	65	1	0	12	77
Total	--	--	--	--	44.750	4,160.88	3,152	--	1,370	3,688	7,859

DOM – Domestic, FWP – Fish and Wildlife Production, INS – Institutional, IRR – Irrigation, MUN – Municipal, REC – Recreational, RWS – Rural Water System, SHD – Suburban Housing Development. 1. Indicated use abandoned in 2024 irrigation questionnaire and may be subject to cancellation. 2. Flows continuously, see report. 3. See report. 4. Reports non-irrigation and irrigation use together.

Table 6: Non-irrigation water right permits required to report to the Chief Engineer

Permit No.	Name/Business	Status	Max. CFS	Volume Limit (ac-ft/yr)	Number of Reports	Average Report (ac-ft)	Est. Avg. Use (ac-ft/yr)
2886-2	Angostura Resort LLC	Permit	0.670	149	0	N/A	149
1928-1	Bear Butte Valley Water Inc	License	0.510	N/A	13	77	77
1997-1		Permit	0.890	200	4	N/A	200
2020-1		Permit	1.400	240	2	N/A	240
1674-1	Black Hawk Water User District	License	1.900	N/A	9	535	826
1991-1		Permit	1.780	760	5	N/A	760
2038-1	Black Hills Experience LLC	Permit	0.111	12	1	0	12
2041-1	Bridger Canyon LLC	Permit	0.340	2	0	N/A	2
2033-1	Butte Meade Sanitary Water District	Permit	2.000	869	1	3	869
2576-2	Canyon Springs Sanitary & Water District	License	0.250	N/A	17	31	31
2812-2		Permit	0.220	25	4	12	25
2005-1	Cedar Berry Canyon LLC	Permit	0.200	28	3	0	28
1987-1	Centennial Vista Estates HOA	License	0.060	11	6	13	11
2031-1	City of Belle Fourche	Permit	2.220	960	1	0	960
2616-2	City of Box Elder	License	1.000	437	17	478	478
2763-2		License	0.910	394	9	0	394
2631-2		Permit	1.000	435	9	0	435
2519-2	City of Rapid City	License	4.120	1,936		N/A	1,936
2520-2		License	1.780	773		N/A	773
2273-2		License	11.060	4,804		N/A	4,804
2275-2		License	3.800	1,651		N/A	1,651
1579-1	City of Spearfish	License	4.450	2,500	13	1747	1,747
1901-1		License	2.670	1,160	13	486	
1955-1		License	1.560	678	9	N/A	678
2029-1		Permit	1.330	426	2	N/A	426
2030-1		Permit	1.780	679	2	N/A	679
1878-1	City of Whitewood	License	0.780	50	17	183	183
2623-2	Colonial Pine Hills Sanitary District	License	0.400	N/A	17	102	102
2607A-2		License	0.510	N/A	17	89	89
2810-2	Croell Inc	License	0.330	25	4	2	25
1998-1	Dakota Cable Solutions Inc	Permit	0.110	40	5	0	40
1825A-1	Diamond D Water Co LLC	License	0.260	N/A	16	48	48
1736-1	Elk Mountain Estates	License	0.189	N/A	18	1	1
2850-2	Elk Mountain Water Users Association Inc	Permit	0.333	145	1	0	145
2629-2	Fall River Water Users District	License	0.720	524	9	256	524
2022-1	Golden Valley Water Company LLC	Permit	1.090	470		N/A	470
1840-1	H20 Clear Solutions LLC	License	0.330	N/A	19	39	39
2044-1		Permit	0.560	270	0	N/A	270
2532-2	Hermosa Water Users Assn	License	1.110	N/A	18	168	168
2040-1	Infinity Properties, LLC.	Permit	0.600	326	1	1	326
1887-1	JKRK Properties LLC	License	0.190	N/A	17	16	16
2025-1		Permit	2.670	450	1	0	450
2018-1	Monarch Ridge Development Inc	Permit	1.110	119	1	0	119
1951-1	No Name City Resort LLC	License	0.022	3	9	1	3
2694-2	Pete Lien & Sons Inc	License	1.560	N/A	12	18	18

Permit No.	Name/Business	Status	Max. CFS	Volume Limit (ac-ft/yr)	Number of Reports	Average Report (ac-ft)	Est. Avg. Use (ac-ft/yr)
2816-2	Pine Grove Community Water Assoc Inc	Permit	0.110	8	4	11	8
2484A-2		License	0.392	N/A			
2027-1	Rae Marie Homes LLC	Permit	0.110	45	2	8	45
2848-2	Rapid Valley Sanitary District - Water Service	Permit	1.560	720		N/A	720
2894-2		Permit	0.670	197		N/A	197
1835-1	Red Water Well LLC	License	0.310	N/A	18	91	91
2016-1	SD Ellsworth Development Authority	Permit	2.670	1,600	1	0	1,600
2527-2	Signature Development Company	License	0.670	300	10	39	39
2633A-2	Southern Black Hills Water System	Permit	0.000	N/A	8	9	0
2633-2		Permit	0.670	484	4	0	484
2377A-2		Permit	0.000	N/A	4	8	0
2895-2	Steve Simunek	Permit	0.110	28	0	N/A	28
2634-2	Streeter Family Limited Partnership	License	0.243	N/A	16	17	17
1910-1	Sturgis Water Dept	License	2.440	1,004	15	787	787
1911-1	Sturgis Water Dept	License	1.670	773	15	N/A	
2034-1	City of Sturgis	Permit	1.000	500		N/A	500
2893-2	Town of Hermosa	Permit	0.960	463	0	N/A	463
1888-1	Valley View Water Association Inc	License	0.190	N/A	17	4	4
1950-1	Wild Turkey Estates HOA	License	0.167	24	9	18	24
1994-1	Wonderland Homes Water & Service Co	Permit	0.670	107	5	58	107
Total	--	--	75.497	27,804	--	5,358	26,343

Table 7: Water distribution systems reporting production to the Drinking Water Program [18]

Name	Reported Use (gpd)	Permit(s)
Hart Ranch Development Co	49,000	1877-2, 1911-2
Highland Hills Water Assoc	3,000	1965-2
Meadow Crest Sanitary District	4,725	2011-1
Mountain Plains 2 Homeowners Assoc	63,000	1599-1
Pleasant Valley Homeowners Assn	5,000	1277-1
Ponderosa Park Dev Assoc	2,325	1925-2
Ponderosa Water & Homeowners Assn	1,875	1852-2
Provo Township	3,150	1850-2
Rimrock Ridge Water Association	12,000	2743-2
Seventy-Six Ranch Estate	2,000	1863-2
Shirt Tail Gulch Homeowners Assn	4,000	1956-1
Valhalla Addition	2,000	1777-1
Westberry Trails Water	15,000	1154-2

Table 8: Water right permits shown in Figure 1 [16]

Township(s)	Range(s)	Section(s)	Permit No.	Name/Business	Priority	Status	Use Type(s)	Max. CFS	Irrigation Acres	Volume (ac-ft/yr)
2N	7E	8	1341-1	Black Hawk Water User District	1985-08-05	License	RWS	1.150	N/A	N/A
2N, 2N, 2N	7E, 7E, 7E	9, 10, 16	2286-2	Donald Konechne	1993-04-28	License	IRR	0.100	38.5	1.5
2N	7E	21	2694-2	Pete Lien & Sons Inc	2012-10-12	License	IND, COM	1.560	N/A	N/A
2N	7E	23	2124-2	City of Rapid City	1990-03-19	License	MUN	1.790	N/A	N/A
2N	7E	29	2673-2	Diocese of Rapid City	2011-05-27	License	IRR	0.120	7.0	N/A
2N	7E	27	2275-2	City of Rapid City	1989-05-18	License	MUN	3.800	N/A	1651.0
2N	7E	27	2313-2	Coca-Cola Bottling	1994-04-08	License	IRR, COM	0.330	3.0	1.5
2N, 2N	7E, 7E	31, 31	1154-2	Westberry Trails Water	1973-09-05	License	SHD	0.250	N/A	N/A
2N, 2N	7E, 7E	31, 31	1852-2	Ponderosa Water & Homeowners Assn	1983-08-03	License	SHD	0.110	N/A	N/A
2N, 1N, 1N	7E, 7E, 7E	32, 3, 10	2273-2	City of Rapid City	1989-05-18	License	MUN	11.060	N/A	4804.0
2N	7E	34	454-2	Black Hills Corporation	1957-04-09	License	IND	1.000	N/A	N/A
2N	8E	34	2763-2	City of Box Elder	2012-10-15	License	MUN	0.910	N/A	394.0
1N	7E	8	2090-2	Chapel Lane Water Co	1989-06-15	License	SHD	0.670	N/A	N/A
1N	7E	18	2743-2	Rimrock Ridge Water Association	1993-06-07	License	SHD	0.090	N/A	N/A
1N	7E	16	2520-2	City of Rapid City	1989-05-18	License	MUN	1.780	N/A	773.0
1N	7E	15	2106-2	Stuart Rice	1990-06-06	License	IRR, DOM	0.080	2.8	N/A
1N	7E	15	2773-2	Arrowhead Country Club	2017-07-27	Permit	IRR	1.110	100.0	7.5
1N	7E	22	2519-2	City of Rapid City	1989-05-18	License	MUN	4.120	N/A	1936.0
1N, 1N	7E, 7E	29, 32	1726-2	Colonial Pine Hills San. Dist.	1980-08-27	License	SHD	0.380	N/A	N/A
1N	7E	29	2458-2	City of Rapid City	2001-03-30	License	IRR	0.800	107.0	15.0
1N	7E	29	2473-2	Cregut Inc	2001-11-15	License	COM	0.040	N/A	N/A
1N	7E	31	1925-2	Ponderosa Park Dev Assoc	1985-04-23	License	SHD	0.033	N/A	N/A
1N	7E	32	1965-2	Highland Hills Water Assoc	1986-05-01	License	SHD	0.056	N/A	N/A
1N	7E	32	2108-2	Colonial Pine Hills San. Dist.	1989-10-02	License	SHD	0.044	N/A	N/A
1N	7E	32	2607A-2	Colonial Pine Hills San. Dist.	2006-12-18	License	SHD	0.510	N/A	N/A
1N	7E	32	2623-2	Colonial Pine Hills San. Dist.	2001-05-03	License	SHD	0.400	N/A	N/A
1N	8E	10	2848-2	Rapid Valley San. Dist. - Water Service	2022-05-10	Permit	RWS	1.560	N/A	720.0
1N	8E	10	2894-2	Rapid Valley San. Dist. - Water Service	2025-05-28	Permit	WDS, RWS	0.670	N/A	197.0
1S	7E	6	2496-2	Spring Canyon Water Co	2002-12-09	License	SHD	0.170	N/A	N/A
1S	7E	5	2053-2	Spring Canyon Water Co	1988-02-18	License	SHD	0.050	N/A	N/A

COM - Commercial, DOM - Domestic, IND - Industrial, IRR - Irrigation, MUN - Municipal, RWS - Rural Water System, SHD - Suburban Housing Development, WDS - Water Distribution System