

WATER PERMIT NO. 8515-3

Name of Applicant: Riverview LLP

Address: 26406 470th Ave, Morris MN 56267

Phone: 320-392-5609

Amount of Water Claimed: 1.45 cfs (491 AF)

Total Acres: NA

Source of Water Supply: groundwater (3 wells)

Water to be used for: commercial County: Clark

Type of Waste Disposal System:

Location: 4 miles southeast of Willow Lake

PRIORITY Date Received: 5-6-21

Application/License Fee: \$1650

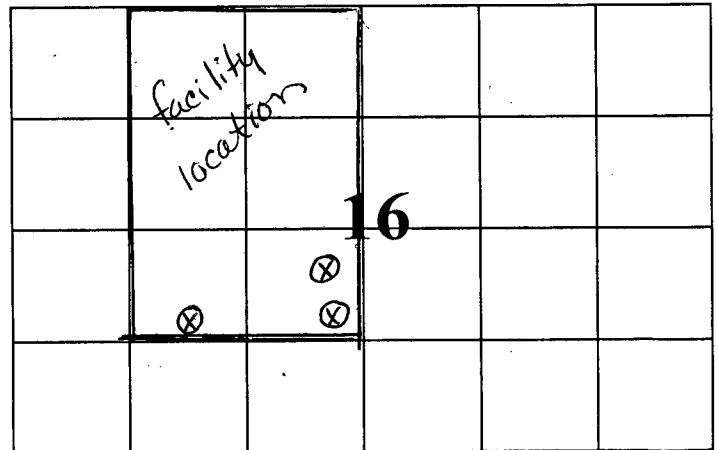
Corrected Application Received: 5-14-21

Period of Annual Use: January 1 – December 31

Remarks:

Diversion Point: N 1/2 SW 1/4 Sec 16-T113N-R56W

Facility Location: NW 1/4, N 1/2 SW 1/4 Sec 16-T113N-R56W



Depth of Well: 467 feet deep

Well Driller:

Remarks:

Type of Map: aerial

Prepared by:

Reviewed and the Number Assigned on: 5-17-21

By: Karen Schlaak

Notice of Hearing - date to intervene: _____

**SOUTH DAKOTA
WATER PERMIT NO. 8515-3**

Date of first receipt of application May 6, 2021.

Date of return to applicant for corrections, amendments or changes May 6, 2021.

Date of receipt of corrected application May 14, 2021.

The Chief Engineer, on behalf of the Water Management Board, issues Water Permit No. 8515-3 to Riverview LLP, c/o Brady Janzen, 26406 470th Ave, Morris MN 56267 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. 8515-3 appropriate 40 acre-feet of water annually at a maximum pump rate of 1.45 cubic feet of water per second from three wells to be completed into the Pleistocene Series:Unknown Aquifer (approximately 467 feet deep) located in the N 1/2 SW 1/4 Section 16 for commercial use in a dairy facility located in the NW 1/4, N 1/2 SW 1/4 Section 16; all in T113N-R56W. This site is located approximately 4 miles southeast of Willow Lake SD.
2. The water appropriated shall be used for the purpose of commercial use and may not exceed the amount of water needed for beneficial use.
3. The water is to be used during the following described annual period: January 1 – December 31.
4. The date from which applicant may claim right is May 6, 2021.
5. The date of approval of Permit No. 8515-3 is October 25, 2021.
6. One-fifth of the construction is to be completed on or before April 25, 2024.
7. All construction is to be completed on or before October 25, 2026.
8. Water is to be put to beneficial use on or before October 25, 2030.
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. 8515-3 may be located near domestic wells. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells.
4. The wells authorized by Permit No. 8515-3 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Pleistocene Series Unknown aquifer.
4. Water Permit No. 8515-3 authorizes a total annual diversion not exceeding 40 acre-feet of water annually from the Pleistocene Series Unknown aquifer.

WATER MANAGEMENT BOARD

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

NOV 23 2021
date



RECEIVED

MAY 14 2021

WATER RIGHTS
PROGRAM

Originally received
5-6-21

Mail to: DENR - Water Rights 523 E Capitol Ave Pierre, SD 57501-3182 ph. (605) 773-3352	No. <u>8515-3</u> (office use only) Hydrologic Unit <u>10170201</u>
	Basin <u>Sioux River</u>
	Newspaper <u>Clark County Courier</u>
	<u>Public Opinion</u>

Application For Permit To Appropriate Water Within The State Of South Dakota

Check use(s) of water:

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

Type of Application: (check one)

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

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

1. Name to Appear on Water Permit Riverview, LLP

Mailing Address 26406 470th Ave. (Address) Morris (City) MN (State) 56267 (Zip Code)

Phone 320-392-5609 Mobile _____ Email matt.waldbeser@riverviewllp.com

2. Amount of water claimed 1.45 *CFS or 650 **GPM and 40 ***AF or 160 MM 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 Altamont Aquifer

4. Location of point of diversion 3 Wells in SW 1/4 of Section 16- T113N-R56W County Clark

(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? Facility located NW1/4, N1/2 SW1/4 Sec 16-T113N-R56W
(example - NW1/4 section 12-T104N-R53W)

5. County or counties where water will be used Clark

6. Annual period during which water is to be used Daily from Jan 1st to Dec 31st

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 water will be used to supply a new dairy farm on the same site as the wells.

I, Bruce Jensen (Name of Person) Authorized Partner (Title (if applicable)), the applicant, certify under

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.

08

09

10

192 St

113N 56W

Washington Dairy Site

16

Well

Well

Well

25

15

38

21

3000 ft



Google Earth

© 2021 Google

Date:

RECEIPT

WATER RIGHTS PROGRAM South Dakota Department of Agriculture and Natural Resources

Date May 6, 2021

RECEIVED OF Riverview LLP 26406 470th Morris MN 56267

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

Fee for Application for Permit No. <u>8515-3</u> to Appropriate Water, to construct and to put water to beneficial use	\$1450.00
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>8515-3</u>	\$200.00
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	\$1650.00

By Eric Gronlund
Chief Engineer
VM

**WRITTEN ACTION OF
THE BOARD OF MANAGERS OF
RIVERVIEW, LLP**

Effective as of March 15th, 2021

THE UNDERSIGNED, being all or a majority of the members serving on the Board of Managers (the "**Board**") of Riverview, LLP, a Minnesota limited liability partnership (the "**Partnership**"), do hereby take and adopt the following:

SIGNATORY AUTHORITY

WHEREAS, the Board believes it is in the best interest of the Partnership to set forth certain personnel of the Partnership that have the ability to bind the Partnership to agreements, certificates, documents and other obligations; it is

RESOLVED: That the following persons are hereby authorized to bind the Partnership to any and all agreements, certificates, documents and other obligations of the Partnership; provided, however, that such authority shall not diminish the need to seek approval of the Board or partners of the Partnership in advance if otherwise required by applicable law or the Second Amended and Restated Partnership Agreement of the Partnership, as amended or restated from time to time:

Name	Title
Mitch Fehr	Chief Executive Officer
Gary Fehr	Authorized Partner
Brad Fehr	Chairman of the Board & CFO
Kurt Domnick	Secretary of the Board of Managers
Rick Metzger	Vice President of Finance
Renee Konz	Controller
Brady Janzen	Authorized Partner
Nate Knobloch	Authorized Partner

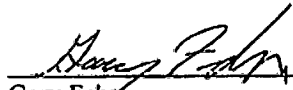
GENERAL AUTHORIZATION

RESOLVED: That each of the individuals named above are hereby authorized to take such steps, including the signing, sealing and delivery of all documents that may be necessary or appropriate, in their discretion, to effectuate the foregoing resolutions.

[Signature page follows]

IN WITNESS WHEREOF, the undersigned have executed this Written Action to be effective as of the date first written above.

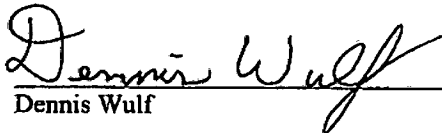
BOARD:



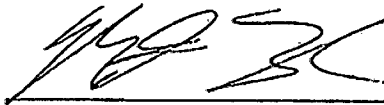
Gary Fehr



Brad Fehr



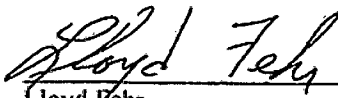
Dennis Wulf



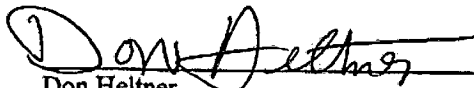
Mitch Fehr



Kurt Domnick



Lloyd Fehr



Don Heltner

[SIGNATURE PAGE TO WRITTEN ACTION OF RIVERVIEW, LLP]



531124456

ANNUAL REPORT

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

Foreign Limited Liability Partnership
SDCL 48-7A-1003; 59-11-6; 59-11-24.1

Filing Fee: \$50

2020
FILING YEAR

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

Total Fee: \$50

1. Business ID and Name:

FR000197
BUSINESS ID

RIVERVIEW, LLP
BUSINESS NAME

2. The jurisdiction under whose law it is formed **MINNESOTA**

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

Actual Street Address

26406 470TH AVE
MORRIS, MN 56267-5370

Mailing Address

26406 470TH AVE
MORRIS, MN 56267-5370

4. The South Dakota Registered Agent's Name:

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

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

CRA: **NATIONAL REGISTERED AGENTS, INC. (0000011)**

Actual Street Address in this State

319 COTEAU ST
PIERRE, SD 57501-3187

Mailing Address in this State

5. The names and business addresses of the partners.

Name

Address

Bradley Alan Fehr **26339 470th Ave, Morris, MN 56267**

Kurtis Jon Domnick **29677 US Highway 59, Morris, MN 56267**

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

No person may execute this report knowing it is false in any material respect. Any violation may be subject to a civil and/or criminal penalty (SDCL 22-39-36; 47-15-51).

11/27/2020

Dated

Email (Optional)

Molly Palmer

Signature of an Authorized Person

Molly Palmer

Printed Name



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

RECEIVED

MAY 14 2021

**WATER RIGHTS
PROGRAM**

May 6, 2021

Riverview LLP
Matt Waldbeser
26406 470th Ave
Morris MN 56267

Dear Mr. Waldbeser:

Thank you for submitting the *Application for a Permit to Appropriate Water* for a dairy facility in Clark County. In order to complete the application, the following is required.

- Enclosed is the aerial photo map submitted with the application. On the map, please outline the area where the dairy facility will be located.
- A review of the Secretary of State's corporation website finds Riverview LLP listed. Your name is not listed as one of its partners. DANR will need the application to be signed by a listed partner or a statement of authority that the person signing the application has the authority to act on behalf of Riverview LLP on all matters involving the water permit application.

If you have any questions, please contact me.

Sincerely,

Karen Schlaak

Karen Schlaak
Water Rights Program
605 773-3352
karen.schlaak@state.sd.us

enclosures

Mathiowetz, Adam (DENR)

From: Schulz, Layne <Layne.Schulz@usd.edu>
Sent: Thursday, May 20, 2021 10:43 AM
To: Mathiowetz, Adam (DENR)
Cc: Cowman, Tim
Subject: RE: [EXT] help identifying formation

Good morning Adam,

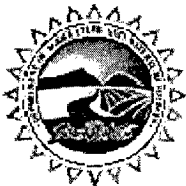
Looking at the test hole to the southeast of this well, I would say that the sand unit is probably part of the glacial sediments. The dark gray shale call on the drillers log at 458 matches the Pierre Shale call in the SDGS test hole. From my experience drilling in that area, the lower till unit looks like shale, but it does have many pebbles and fine sand in the matrix. The upper dark gray shale calls are probably unoxidized till. It is not uncommon to have sand layers that lie directly on the shale even outside of mapped aquifer areas, as is the case here. Let me know if you need more information ?

From: Mathiowetz, Adam (DENR) <Adam.Mathiowetz@state.sd.us>
Sent: Thursday, May 20, 2021 9:07 AM
To: Schulz, Layne <Layne.Schulz@usd.edu>
Cc: Kilts, Whitney <whitney.kilts@state.sd.us>
Subject: help identifying formation

Layne,

Good morning. I have attached a scan of a well log in southern Clark County. Whitney and I are struggling to figure out what formation the well is completed into. We aren't sure if some of the mentioned shale is actually unweathered clay or if the sand is reworked shale.

What we have come up with is the formation is either a lonesome deposit of Altamont (basal outwash) or Codell (which seems unlikely). Thanks for your help.



Adam Mathiowetz, PE
Engineer, Water Rights Program
Department of Agriculture and Natural Resources
523 E. Capitol Ave. Pierre SD, 57501
605.773.4061
danr.sd.gov

From: NRPR1P22@state.sd.us <NRPR1P22@state.sd.us>
Sent: Thursday, May 20, 2021 9:07 AM
To: Mathiowetz, Adam (DENR) <Adam.Mathiowetz@state.sd.us>
Subject: Message from NRPR1P22

12" Production Well – Washington Twp

Owner: Riverview LLP

Clark County, South Dakota

Section 16

Twp. 113N

Range 56W

Drilled: 4/19/2021

GPS: N44 35.5100 W97 34.2550

DEPTH (ft.)	FORMATION
0-1	Top Soil
1-18	Yellow Clay
18-38	Brown Clay
38-83	Gray Clay
83-84	Boulder-white
84-95	Gray Clay
95-96	Boulder-white
96-156	Gray Clay
156-168	Gray Clay / sand mix
168-170	Gray Clay
170-183	Sand / clay mix
183-193.5	Gray Clay
193.5-195	Boulder
195-211	Gray Clay
211-214	Gray Clay / sand mix
214-233	Tan Clay
233-268	Yellow Clay
268-339	Dark Gray Shale
339-340	Sand
340-376	Dark Gray Shale
376-378	Sand
378-414	Dark Gray Shale w/traces of sand
414-415	Boulder
415-435	Dark Gray Shale w/traces of sand
435-458	Medium Fine Sand
458-467	Dark Gray Shale



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

June 09, 2021

Matt Waldbeser
Riverview, LLP
26406 470th Ave
Morris, MN 56267

Dear Mr. Waldbeser:

As requested by phone call on June 9, 2021, pursuant to South Dakota Well Construction Standard 74:02:04:21, you are authorized to have a South Dakota licensed well driller construct a test well, approximately 1,000 feet deep, prior to approval of a water permit. The test well will be located in the W ½ Section 16-T113N-R56W in Clark County. All test wells must be constructed in accordance with the SD Well Construction Standards. Any test holes or test wells that are abandoned must be plugged pursuant to the SD Well Construction Standards.

Authorization must be obtained before water from the well can be used in excess of domestic use as defined by South Dakota Codified Law 46-1-6(7) or for uses other than domestic use. All test or permanent wells to be constructed under this test well permission must be constructed using the methods described in Administrative Rule of South Dakota (ARSD) 74:02:04:28. No test or permanent wells constructed under this test well permission may be constructed using the alternative construction method in ARSD 74:02:04:35. Approval of this test well does not assure issuance of a water permit. Following review of a Water Permit Application and assessing the availability of water, the potential impacts to existing users, the beneficial use, and the public interest of a permit, the Chief Engineer will make a recommendation to the Water Management Board regarding the application. The recommendation to approve, deny, or defer the application will be publicly noticed and an opportunity afforded for the public to intervene. A public hearing may be required to consider the water permit. If you have questions regarding permitting, please call Ron Duvall at (605) 773-3352.

Sincerely,

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

CC: Thein Well Drilling

6/17/21

SPOKE WITH MATT WALDBESER

(320) 287-1028

HE SAYS THEY HAD DGR RUN
AN AQUIFER PERFORMANCE TEST



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

June 23, 2021

Brady Janzen and Matt Waldbeser
Riverview, LLP
25406 470th Avenue
Morris MN 56267

Dear Mr. Janzen and Mr. Waldbeser:

I am writing to confirm our conversation last week with Matt Waldbeser regarding the water permit application filed by Riverview LLP for a new dairy located southeast of Willow Lake in Clark County, South Dakota.

This application proposes to appropriate 491 acre-feet of water annually at a maximum pump rate of 1.45 cubic feet of water per second from three wells that will be approximately 467 feet deep located in the N1/2 SW 1/4 Section 16-T113N-R56W.

DANR's initial review determined that insufficient information is available for the aquifer at this location to determine if there is unappropriated water available and the potential effect of pumping on existing water users. This was based on a review of well completion reports and test holes in the area.

We indicated during the phone conversation that further study needs to be completed by Riverview to delineate the aquifer boundaries or a 7-day aquifer performance test performed, or both. Mr. Waldbeser indicated that Riverview's consultant, DGR Engineering, conducted a pump test. DANR inquired regarding what the pump test entailed in order to determine whether it meets the standard for a 7-day performance test. We requested a copy of the test and analysis prepared by their consultant. To date, DANR has not received information to review to see if the work conducted qualifies as an aquifer performance test and analysis.

Processing of Riverview's application is on hold pending information being submitted to complete the application in order to assess whether there is a reasonable probability of unappropriated water available and that the proposed diversion can be developed without unlawful impairment of existing rights.

If you have questions, please contact the Water Rights Program.

Sincerely,

Eric Gronlund, Chief Engineer
Water Rights Program, DANR
605 773-3352
Eric.Gronlund@state.sd.us

Memo



TO: DGR Project No. 854609
Washington Dairy
Riverview LLP

FROM: Logan Smidt, P.E.

DATE: June 30, 2021

RE: Riverview, LLP - Washington Dairy
Constant Rate Well Pumping Test

This memorandum provides a summary and analysis of the pumping test performed on the newly drilled production well for Riverview LLP (Washington Dairy location – Clark County, SD). The well was completed with 12-inch diameter casing and screen to 443-feet below the ground surface with a 24-foot screen length. Two-inch diameter and a 5-inch diameter observation wells were completed at 50' and 900' away from the production well, respectively. Drawing sheet 1 provides a site plan drawing.

South Dakota Geological Survey Bulletin 29, titled Geology and Water Resources of Clark County, South Dakota by Louis J. Hamilton identifies six major glacial outwash aquifers in Clark County. The aquifer mapping in the report does not show any glacial outwash aquifers being present in the location of the well, however, the depth and capacity may indicate it is in an outlying area of the Altamont 2 aquifer. The Altamont 2 aquifer underlies about 630 square miles and is estimated to contain 3.2 million acre-feet of stored water.

Water level data was collected in the pumped well and the two observation wells using electronic level recorders. The following dates and times summarize the data collection and pumping effort:

- 4/15/21: Level recorders were deployed in the two observation wells.
- 4/16/21: A level record was deployed in the production well.
- 4/19/21: Constant rate pumping test was started at 4:59 PM.
- 4/21/21: A pumping rate adjustment was made at approximately 6:00 AM.
- 4/27/21: A pumping rate adjustment was made at approximately 6:05 PM.
- 4/29/21: Constant rate pump test was stopped at 4:59 PM.
- 5/13/21: Level recorders were retrieved from all three wells.

The static water level prior to the start of the constant rate test was recorded to be approximately 190-feet below the ground surface, providing 229-feet of available drawdown above the screen.

No irregularities are present in the two full days of static water level measurements indicating that the formation is minimally impacted by neighboring wells.

The 12" production well was pumped at an average of 413 gpm for a total duration of 10 days. Recovery data was subsequently collected for an additional 12 days. A plot of the data collected for all three wells is provided in Figure 1. Selected data specific to the constant rate testing is shown in Figure 2. A logarithmic drawdown trend is not realized until approximately one day into the test. The incurred drawdown caused the test pump flow to decrease 5-7%; slight pump rate changes can be observed at approximately 2,220 minutes and 11,580 minutes that recouped the flow to within 1-2% of the original starting flow.

Hydraulic characteristics of the aquifer were identified through analysis of the test data to determine the coefficient of storage (S) and transmissivity (T). The coefficient of storage indicates how much water can be removed by pumping or draining, while transmissivity indicates how much water will move through the formation. These defining parameters allow predictions of great significance to be made regarding the long-term sustainability of the water-bearing formation.

An early time Cooper-Jacob straight-line analysis indicates Transmissivity, $T = 54,516$ gpd/ft and Coefficient of Storage, $S = 0.00006$. A late time Cooper-Jacob straight-line analysis method indicates Transmissivity, $T = 6,057$ gpd/ft and Coefficient of Storage, $S = 0.0009$. Analysis of recovery data was also performed providing similar results. Graphical illustrations of the analyses methods are provided in Figures 3-5. These calculated values of T and S are within the range typical of confined aquifers and consistent with values reported in South Dakota Geological Survey Bulletin 29 for the Altamont 2 and 3 aquifers. The variation in transmissivity values might suggest a heterogeneous aquifer where the local formation immediately surrounding the well has a higher transmissivity than areas distant from the well.

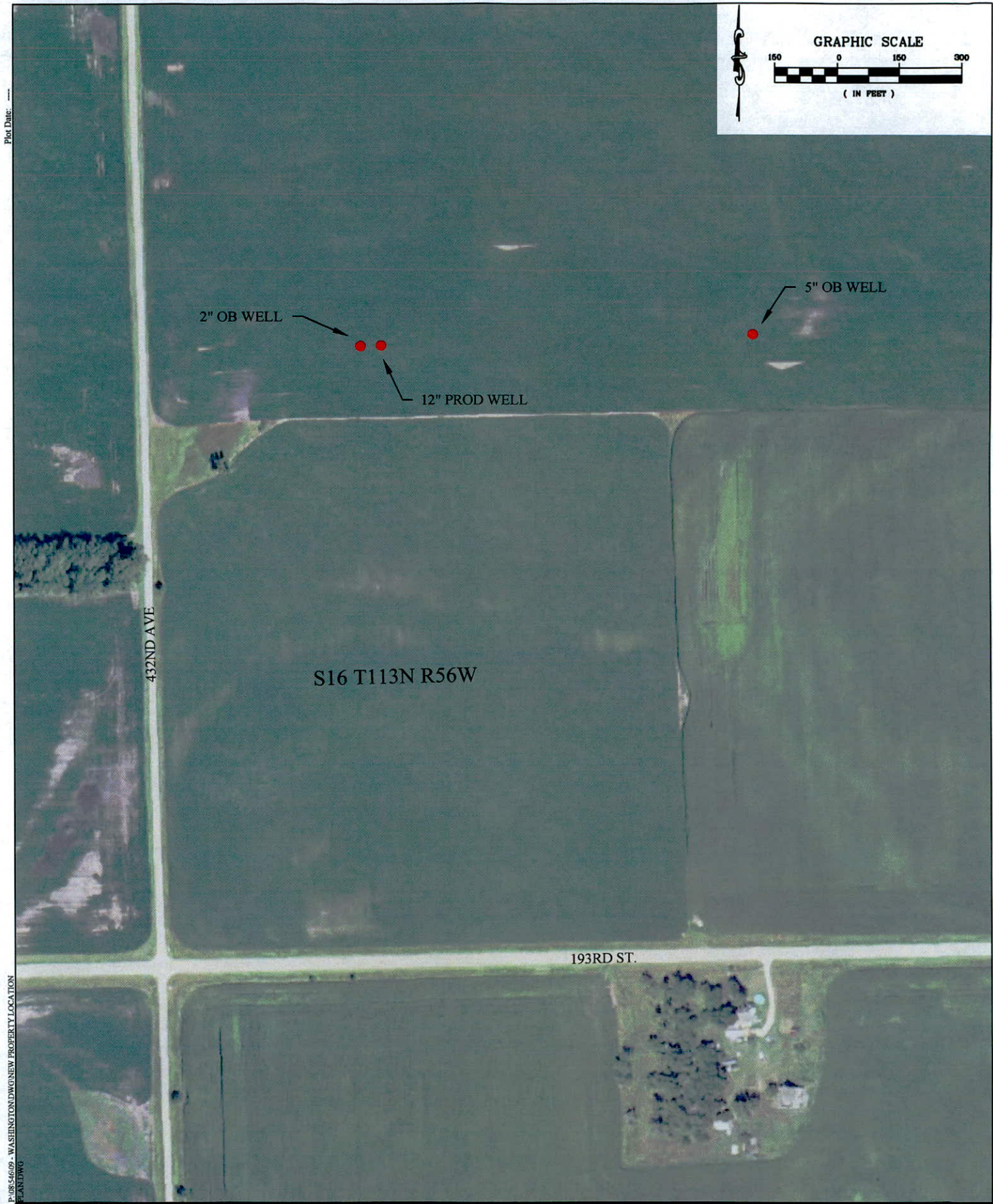
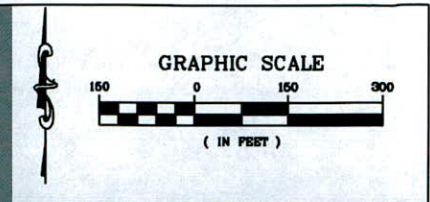
Riverview has requested a South Dakota DENR Water Rights Permit for up to 165 million gallons a year (MGY) or a 314 gallon per minute (GPM) average use. A statistically fit trendline to the late-time data estimates a drawdown of up to 95-feet could be realized if the aquifer were to be continuously pumped at 413 gpm for nineteen years as seen in Figure 6. The directly proportional relationship of drawdown and pumping rate can be used to estimate that pumping continuously at 314 gpm for nineteen years could generate a drawdown of up to 72-feet assuming no recharge as is projected on Figure 6. Actual drawdowns are expected to be less due to annual recharge/recovery and intermittent pumping. Average annual recharge of the Altamont 2 aquifer is estimated to be 54,000 acre-feet as is provided in South Dakota Geological Survey Bulletin 29. Furthermore, observed historic water level decline periods have reversed within a years' time due to increased recharge. Distance drawdown interpretive methods were used to calculate a radius of influence of 7,340 feet.

Withdrawal from the aquifer at Riverview's Washington Dairy site will remain well above the top of the water bearing formation. The projected long-term drawdown of up to 72-feet when pumping at 314 gpm continuously only utilizes 31% of the available 229-feet, indicating the aquifer will comfortably support the Washington Dairy's needs.

Enclosure

Plot Date: ---

P:\084609 - WASHINGTON DAIRY RIVERVIEW PROPERTY LOCATION
LEAD.DWG



REV	DATE	DESCRIPTION



Project Manager: LJS
Designer: CLJ
Project Number: 854609
Phone: (712) 472-2531

WASHINGTON DAIRY
RIVERVIEW LLC

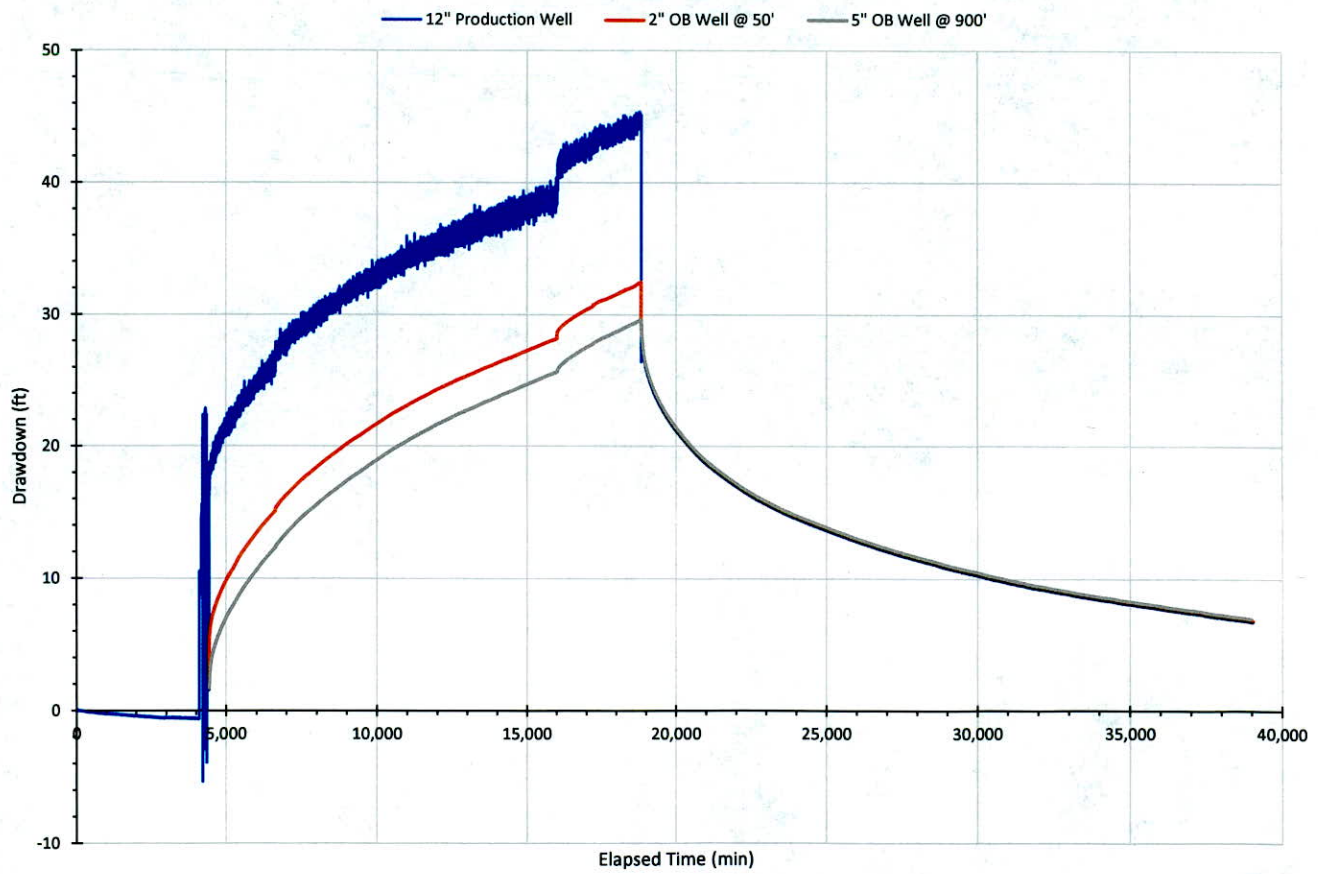
SITE PLAN

S
H
E
E
T

1.

Figure 1

Riverview LLP - Washington Dairy
Well Drawdown & Recovery Data



P:\08\546\09 - Washington\Constant Rate\ALL_Downloads_Combined (version 1)

Figure 2

Riverview LLP - Washington Dairy

Constant Rate Pump Test Data

$Q_{\text{Constant}} = 413 \text{ gpm}$

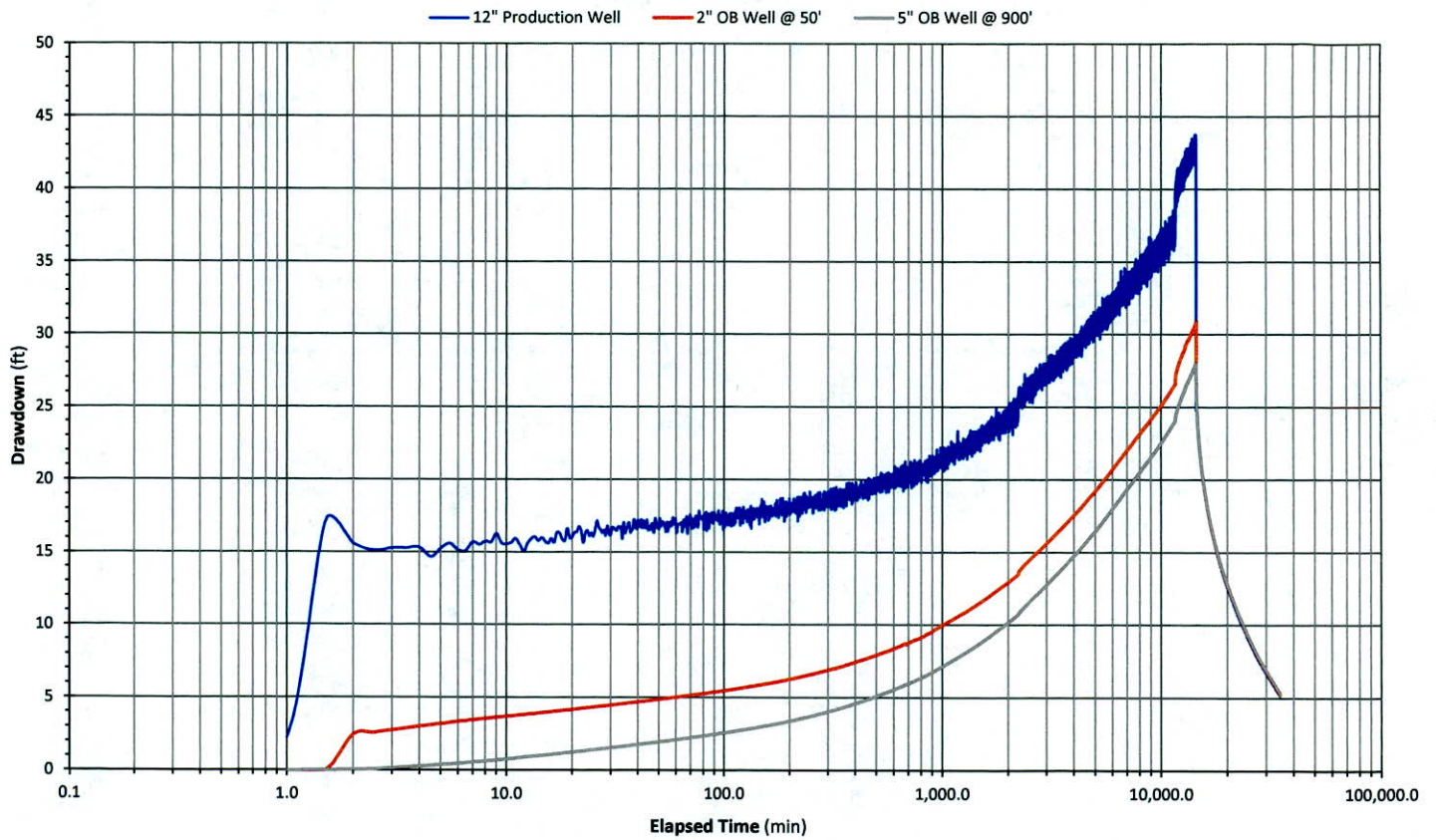


Figure 3

Riverview LLP - Washington Dairy
Constant Rate Pump Test Data
Cooper-Jacob Straight-line Analysis
 $Q_{\text{Constant}} = 413 \text{ gpm}$

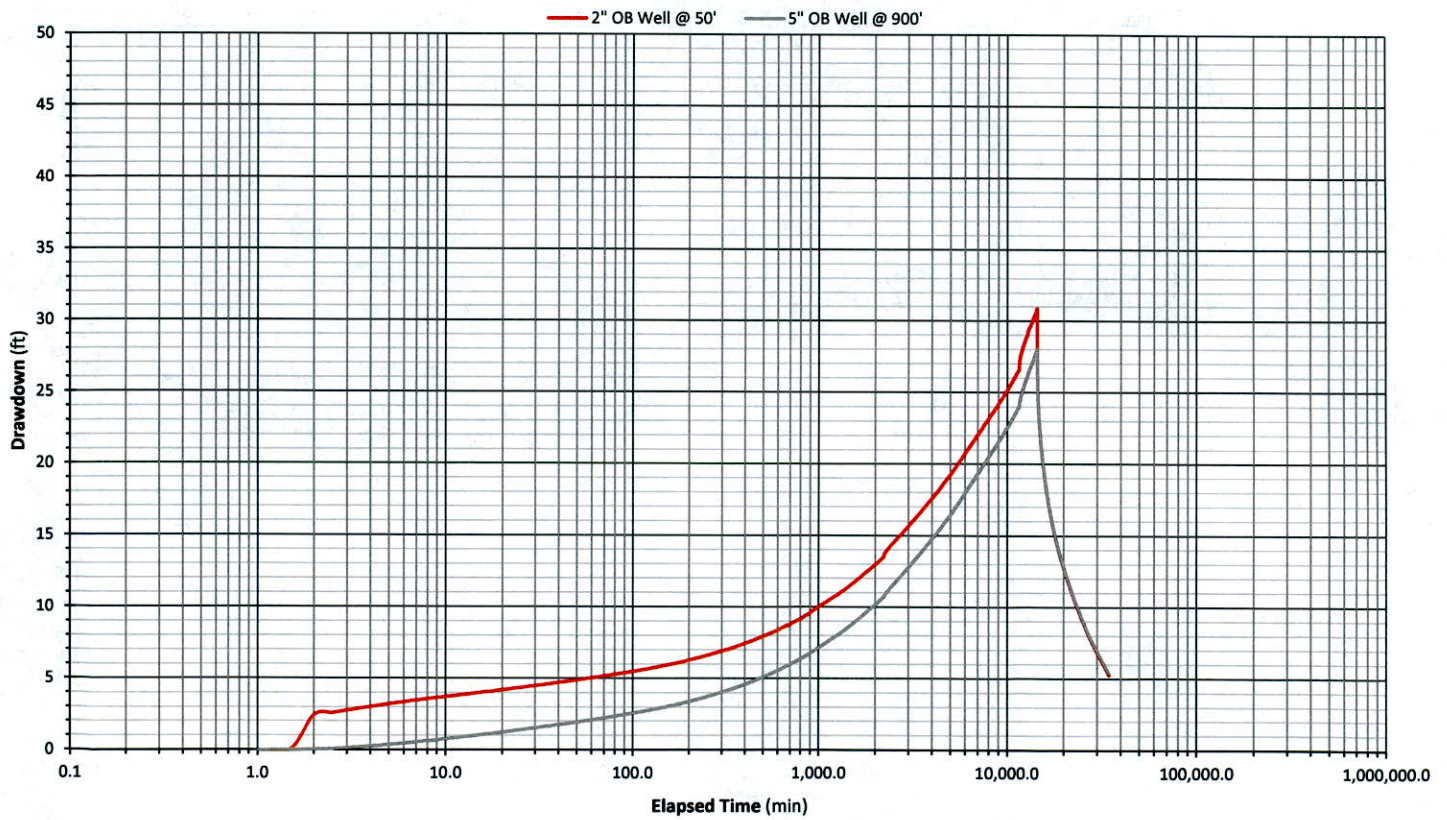


Figure 4

Riverview LLP - Washington Dairy
Constant Rate Pump Test Data
Recovery vs. Recovery Time Analysis
 $Q_{\text{Constant}} = 413 \text{ gpm } 2''$

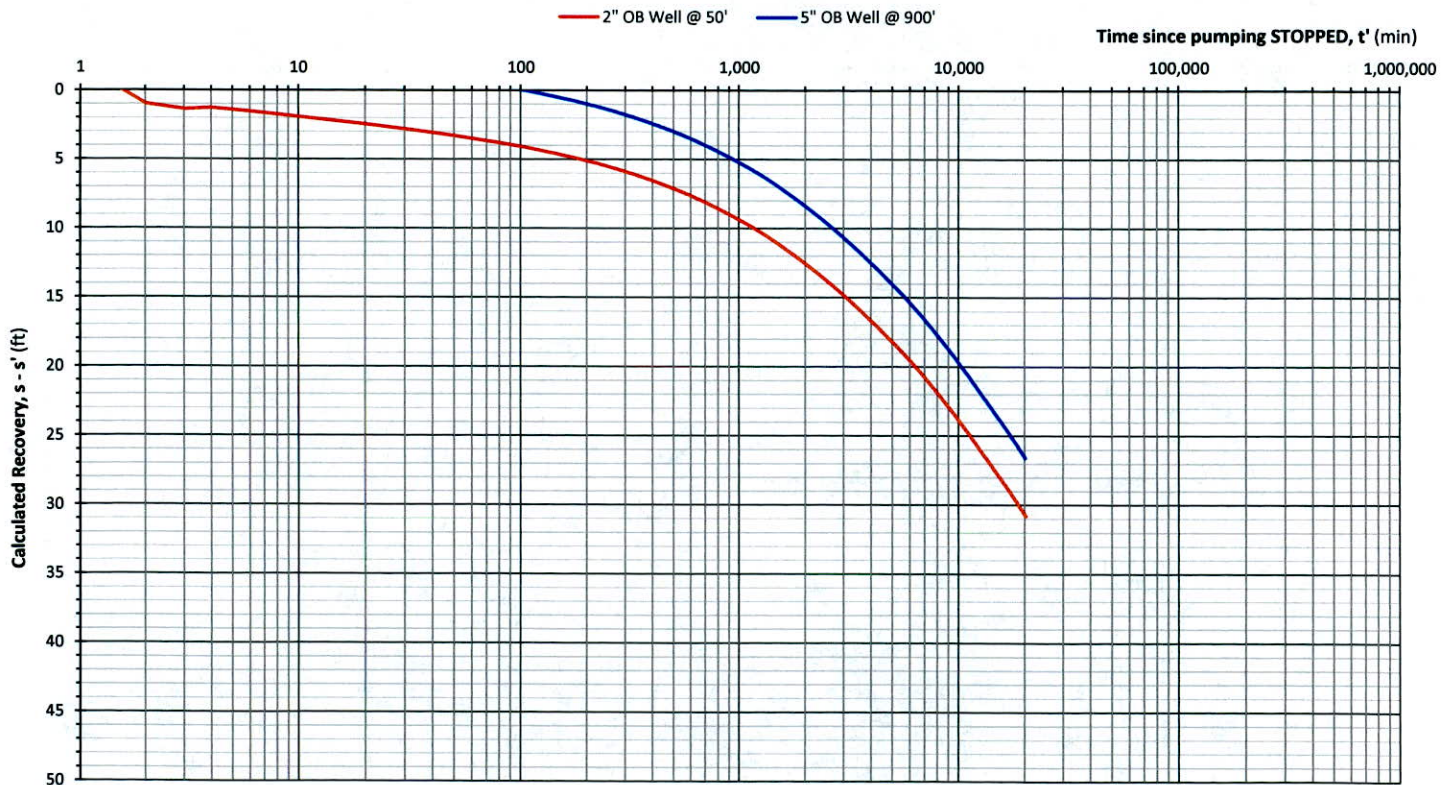


Figure 5

Riverview LLP - Washington Dairy
Constant Rate Pump Test Data
Theis Recovery Analysis

$Q_{\text{Constant}} = 413 \text{ gpm}$

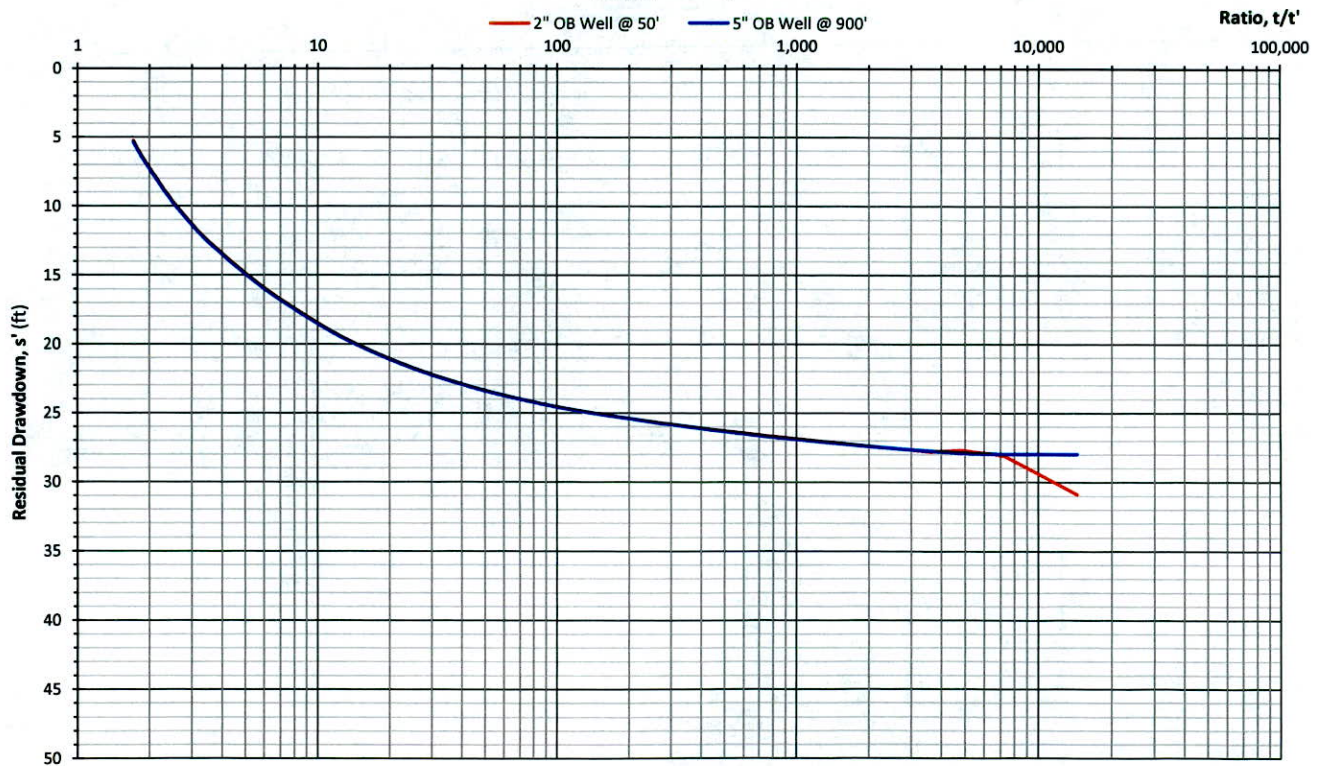
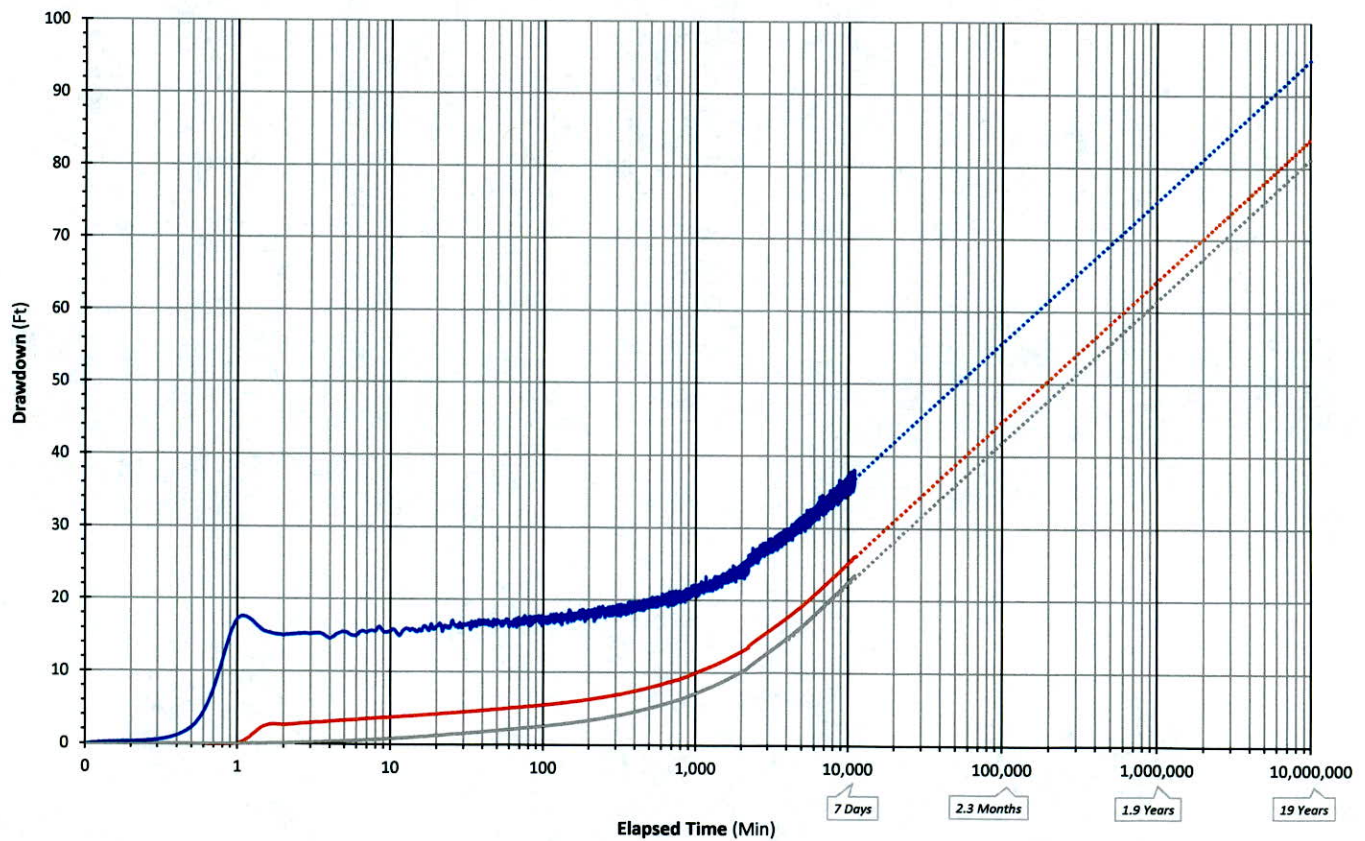
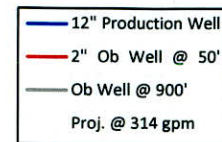


Figure 6
Riverview LLP - Washington Dairy
Constant Rate Pump Test
 $Q_{\text{Constant}} = 413 \text{ gpm}$



Gronlund, Eric

From: Gronlund, Eric
Sent: Thursday, August 12, 2021 11:07 AM
To: Matt Waldbeser
Subject: Riverview's water permit application for Washington Dairy in Clark County, South Dakota

Matt – since you were unavailable left you a voicemail and am following up with this email regarding Riverview's water permit application to supply Washington dairy

The staff engineer has drafted the technical report on Riverview's (Washington Dairy) water permit application seeking to appropriate 491 acre feet of water per year. The technical report is currently under peer review by other program engineers. Here is a brief overview just to bring you up to date.

- Aquifer is identified at Pleistocene Series:Unknown (PS:U)
- Based on best information available the aerial extent is 3,200 acres. May extend further to north but there is not test hole information available to confirm.
- Instead of the recharge estimate of 1.5 – 1.6 in/yr found in the Clark County study, based on a Hedges study the recharge rate is likely in the range of 0.15 in/yr to 0.60 in/yr.
- That provides an annual recharge volume between 40 – 160 acre feet per year. Due to the depth at this location we expect the most defensible recharge is 0.15 in/yr which provides recharge of only 40 acre feet per year.
- A formal recommendation has not been yet been made.

This is not a volume of water that is going satisfy Riverview's water needs at Washington Dairy. Once the report is final, I will be in contact and Riverview will be able to have your consultant review the report.

Eric



Eric Gronlund, PE
Chief Engineer, Water Rights Program
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**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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**RECOMMENDATION OF CHIEF ENGINEER FOR WATER PERMIT
APPLICATION NO. 8515-3, Riverview LLP**

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. 8515-3, Riverview LLP, 26406 470th Ave, Morris MN 56267.

The Chief Engineer is recommending APPROVAL of Application No. 8515-3 for an annual volume of 40 acre-feet because 1) there is reasonable probability that there is unappropriated water available for the applicant's proposed use, 2) the proposed diversion can be developed without unlawful impairment of existing rights, 3) the proposed use is a beneficial use and 4) it is in the public interest with the following qualifications:

1. The wells approved under Water Permit No. 8515-3 may be located near domestic wells. The well owner under this Permit shall control his withdrawals so there is not a reduction of needed water supplies in adequate domestic wells.
2. The wells authorized by Permit No. 8515-3 shall be constructed by a licensed well driller and construction of the well and installation of the pump shall comply with Water Management Board Well Construction Rules, Chapter 74:02:04 with the well casing pressure grouted (bottom to top) pursuant to Section 74:02:04:28.
3. The permit holder shall report to the Chief Engineer annually the amount of water withdrawn from the Pleistocene Series Unknown aquifer.
4. Water Permit No. 8515-3 authorizes a total annual diversion not exceeding 40 acre-feet of water annually from the Pleistocene Series Unknown aquifer.

See report on application for additional information.

Eric Gronlund, Chief Engineer
September 30, 2021

**Report to the Chief Engineer on
Water Permit Application No. 8515-3**

Riverview, LLP
2021 August 4

Water Permit Application No. 8515-3 seeks to appropriate up to 491 acre-feet of water per year (ac-ft/yr) at a maximum instantaneous withdrawal rate of 1.45 cubic feet of water per second (cfs) or, 650 gallons per minute (gpm), from one well completed into the Pleistocene Series: Unknown aquifer approximately 467 feet deep located in the N $\frac{1}{2}$ SW $\frac{1}{4}$ Section 16 for commercial use in a dairy facility located in the NW $\frac{1}{4}$, N $\frac{1}{2}$ SW $\frac{1}{4}$ Section 16; all in T113N-R56W, 5th Principal Meridian. This site is located approximately 4 miles southeast of Willow Lake, South Dakota.

Aquifer: Pleistocene Series: Unknown (PS:U)

Hydrogeologic Characteristics

Pleistocene Series: Unknown aquifers are a category of aquifer materials that were deposited by glacial movement during the Pleistocene geologic epoch and are not connected to another named aquifer. Bodies of Pleistocene Series: Unknown aquifer are generally glacial outwash deposits composed of sand and gravel that are limited in areal extent. Lithologic information on the aquifer in the area of this application is limited to four test holes and three well completion reports completed for the applicant all in W $\frac{1}{2}$ Section 16 T113N-R56W, one domestic well completion report located in SE $\frac{1}{4}$ Section 17 T113-R56W, South Dakota Geological Survey Program test holes that are spaced several miles apart near this application, and a bedrock surface map based on the test holes [1] [2] [3].

The applicant submitted a well completion report for the production well 467 feet deep that was completed on April 19, 2021. The driller reported "top soil" from ground surface to one foot below grade, yellow clay from one to 18 feet, brown clay from 18 to 38 feet, gray clay with boulders and sand lenses from 38 to 214 feet below grade, yellow clay from 233 to 236 feet, "dark gray shale" with a boulder and sand lenses from 268 to 435 feet, "medium fine sand" from 435 to 458 feet, and dark gray shale 458 to 467 feet below grade. The driller placed the screen from 443 to 467 feet below grade and the static water level was 190 feet below grade at the time the well was completed, which means there was 245 feet of hydraulic head above the aquifer at the time the well was completed. It is likely that the formations reported as "shale" above the producing formation are actually unoxidized glacial till, which can drill like shale in the area of this application [4].

The producing formation for the applicant's well is similar in elevation to the Altamont aquifer identified in the 1986 Clark County Study [5] but, based on the bedrock topography [3] and lithologic data available [1] [2], it is likely that it is not connected to the mapped body of Altamont outwashes in Clark county. Some evidence indicates it may be connected to a thin glacial outwash located south and southeast of the applicant's well [1] [2] [6], but the bedrock topography can change significantly over short distances in the area of this application, and there are not enough lithologic logs reaching the depth of the producing formation and the bedrock to confirm that possibility.

Constant Rate Aquifer Performance Test

Technique and methodology review

At the request of the Water Rights Program, the applicant submitted a report on a constant rate pump test which was performed by their consultant, DGR Engineering, from April 15, 2021 to May 13, 2021 [7] [8] [9]. The pumped well is the one identified in the application, which has a 12-inch casing. Two observation wells were completed and used in addition to the pumped well. Observation Well 1 has a 2-inch casing and is located 50 feet west of the production well and Observation Well 2 has a 5-inch casing and is located 900 ft east of the production well [7]. They pumped the well from 4:59 pm on April 19, 2021 to 4:59 pm on April 29, 2021. The flow rate of the pump was maintained manually [7]. In order to maintain a more constant flow rate, the pump speed was adjusted at 6:00 am on April 21, 2021 (2,220 minutes since pumping began) and 6:05 pm on April 27, 2021 (11,585 minutes since pumping began) [7]. Water-level data was collected in all three wells using electronic level recorders that collected data every 30 seconds in the early portion of the test and every minute in the later portion of the test [8]. DGR Engineering did not indicate if their data was corrected for barometric pressure changes.

Pump discharge data was collected at irregular intervals [9]. The average pump rate of any given interval varied up to 7.09% from the average pump rate over the whole time [9]. The average pump rate calculated by Water Rights Staff was 397 gpm [9], whereas the average pump rate reported by DGR Engineering in their report was 413 gpm [7]. Figure 1 shows the average pump rate in an interval at the center of each interval [9] and Figure 2 shows the observed drawdown in each observation well and the production well [8] [7]. The manual pump speed adjustments appear as two distinct jumps in the drawdown graph [7]. The drawdown in the production well has a significant amount of noise in the data which can be visually observed in the graph. The variations in flow rate may cause problems in data interpretation and analysis, especially for detecting changes in slope of the drawdown curve that indicate boundary conditions. Additionally, all the wells being colinear means boundary conditions cannot be detected in two-dimensional space.

After pumping stopped, DGR Engineering continued collecting recovery data for the observation wells until May 13, 2021 [7] [8]. The maximum drawdown in Observation Well 1 was approximately 31 feet and the maximum drawdown in Observation Well 2 was approximately 28 feet. At the end of the data collection period, the residual drawdown in both observation wells was approximately 5 feet below the water level at the time pumping began [7] [8]. Overall, the constant-rate pump test was performed long enough to assess aquifer properties, but the variations in pump rate and noise in the data mean fine details regarding boundary conditions are somewhat indistinguishable from the other sources of fluctuations in the water level data.

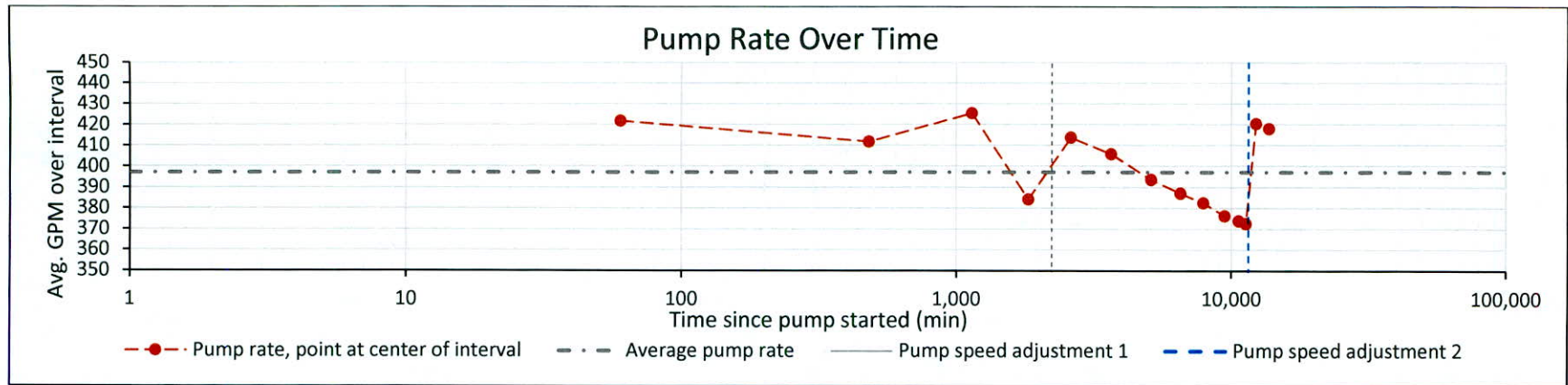


Figure 1: Pump rate over time based on meter data [9] [7]

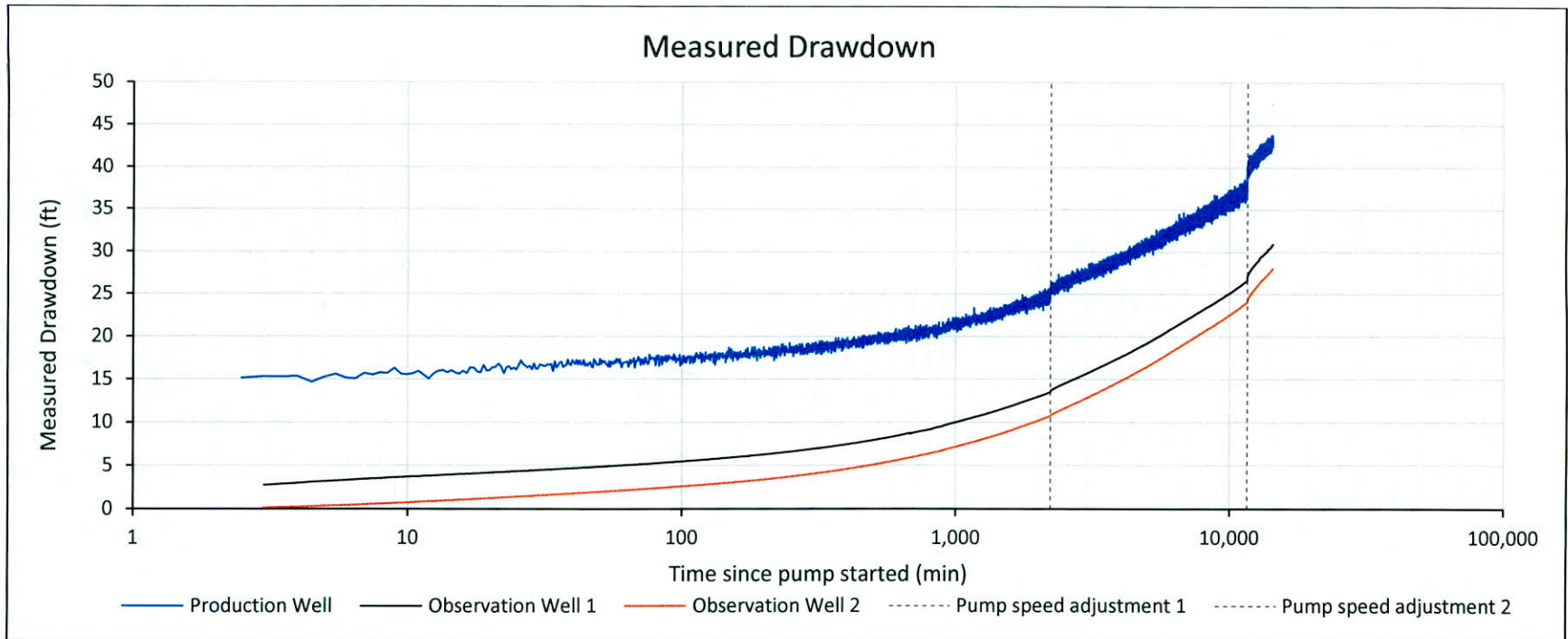


Figure 2: Drawdown measured over time during the pumping portion of the test [8] [7]

Review of Assumptions and Analysis

DGR Engineering used an analysis method based on the Cooper and Jacob [10] modification of the Theis [11] equation to calculate values for aquifer transmissivity and the coefficient of storage for two different time intervals in the drawdown test from the recovery data for both observation wells and for one observation well [7]. The time intervals DGR Engineering used to calculate the aquifer properties for the drawdown portion of the test are approximately 20 to 100 minutes (from here on, “early time”) and 3,000 to 9,000 minutes (from here on, “late time”) [7]. Table 1 shows the aquifer properties DGR Engineering calculated in various methods. The straight-line interpolations by DGR Engineering appear to have been done by a visual method.

Table 1: Aquifer properties calculated by DGR Engineering [7]

Interval	Flow (gpm)	Transmissivity (gpd/ft)	Coefficient of Storage	Location in Report
Early time	413	54,516	0.00006	Text page 2 and Figure 3
Late time	413	6,057	0.00090	Text page 2 and Figure 3
Early time Recovery	413	54,516	0.00400	Figure 4
Late time Recovery	413	5,452	0.00080	Figure 4
Late time Recovery	413	5,452	N/A	Figure 5

The Theis [11] equation relies on the following assumptions in order to accurately model drawdown in an aquifer:

1. The water-bearing formation is uniform in character and the hydraulic conductivity is the same in all directions.
2. **The formation is uniform in thickness and infinite in areal extent.**
3. The formation receives no recharge from any source.
4. The pumped well penetrates, and receives water from, the full thickness of the water-bearing formation.
5. The water removed from storage is discharged instantaneously when the head is lowered
6. The pumping well is 100% efficient.
7. All water removed from the well comes from aquifer storage.
8. Laminar flow exists throughout the well and aquifer.
9. The water table or potentiometric surface has no slope. [12]

It is common to use the Theis [11] equation even though many of those assumptions are not true of a real aquifer, if inconsistencies between the model assumptions and reality do not impact the overall validity of the analysis [13]. In the case of this aquifer test, Assumption 2, that the formation must be uniform in thickness and infinite in areal extent, can be demonstrated to be false based on lithologic logs, well completion reports, and somewhat based on the bedrock topography map. No aquifer is truly infinite in area, but in general, a time period where the drawdown data shows “infinite acting radial flow” can be identified to match to the Theis [11] equation [13]. The Theis [11] equation is given in Equation 1.

Equation 1 [11]

$$s = \frac{Q}{4 * \pi * T} * \int_u^{\infty} \frac{e^{-u}}{u} du$$

Where s is the drawdown in the well, Q is the flow rate of the pump, T is the transmissivity, and u is given in Equation 2. Transmissivity represents the flow rate of water that can come from the aquifer per unit width of aquifer across which the water flows.

Equation 2: [11]

$$u = \frac{r^2 * S}{4 * T * t}$$

Where r is the distance from the pumped well to the observation well, S is the coefficient of storage, and t is the time since pumping began. The coefficient of storage represents the volume of water removed from the aquifer per unit volume of aquifer material and is typically low for confined aquifers. Realistic values of the coefficient of storage can range from on the order of 0.001 to 0.00001 [12]. Presentation of these equations can vary depending on if factors are included to convert units.

Under conditions that sufficiently meet all the assumptions of the Theis [11] equation, when pumping is done at a constant rate, the graph of the drawdown in the aquifer curves where time since pumping began is small and look like a line with a constant slope at large times since pumping began, when the time axis is graphed on a logarithmic scale. The Cooper and Jacob [10] method of analysis uses only the constant-slope portion of the data to estimate aquifer properties by drawing a line of constant slope through the portion of data with a constant slope. Then, aquifer properties are calculated based on that line. The Cooper and Jacob [10] method relies on the additional assumptions that the term u of the Theis [11] equation is sufficiently small and the drawdown curve, when graphed with a logarithmic time axis, is truly in a straight line. In general, u is low when r is low and t is high. Different authors have different opinions on what value of u is sufficient to have an acceptably small error when calculating aquifer properties using the Cooper and Jacob [10] method to estimate aquifer properties. Fletcher Driscoll [12] indicates 0.05 is acceptable. Walton [14] indicates 0.01 is the largest acceptable value of u . Cooper and Jacob [10] indicate that 0.02 is the largest acceptable value of u for their method to apply.

Under the assumption that the slope of the drawdown chart was constant when time was graphed on a logarithmic scale, just as DGR Engineering assumed, Water Rights staff used the trendline feature of Microsoft Excel to linearly interpolate portions of the data following the Cooper and Jacob method. Water Rights staff were able to calculate similar values of transmissivity to DGR Engineering. However, while DGR Engineering calculated an early time value for the coefficient of storage of 0.00006, the value Water Rights calculated for the same interval is 0.0006, which is 10 times higher than the one calculated by DGR Engineering. If the coefficient of storage is not calculated accurately, that will have an effect on the value of u (see Equation 2). In the aquifer performance test performed by DGR Engineering, the value of u associated with the results is generally not sufficiently small to apply the Cooper and Jacob [10] method. Using the late time T

estimated by DGR Engineering, u is too large according to Cooper and Jacob [10] and Walton [14]. Using values estimated by DGR Engineering, $T = 6,057$ gallons per day per foot, $S = 0.0009$, $r = 900$ feet (the distance to the observation well those values of T and S are derived from), time = 11,585 minutes (the latest time in the late time interval), and conversion factors of 1 cubic foot equals 7.48 gallons and 1 day equals 1,440 minutes, then $u = 0.03$. Using values calculated by the Water Rights Program, u is too large according to all authors for all times in Observation Well 2, and for the late-time data in Observation Well 1.

Furthermore, in the drawdown data provided by DGR Engineering, the curve only has a constant slope from approximately 20 minutes to 100 minutes from the time pumping began (the early time interval). The curve of the line during the late time interval appears to have a constant slope on the graph, but the flow rate was continuously decreasing during that interval, so the decreasing flow rate may be the cause of the appearance of a constant slope. Therefore, because the time-drawdown graph has a continuously increasing slope during the late time interval and because u is higher than any credible source recommends, it is inappropriate to assume the Cooper and Jacob [10] method of analysis applies to the late-time data of the Observation Well 1 graph according to Driscoll [12], Walton [14], and Cooper and Jacob [10], or to any time interval in the Observation Well 2 graph according to Walton [14] and Cooper and Jacob [10]. Accounting for variations in pump rate, the continuously increasing slope of the drawdown line after approximately 100 minutes indicates that the aquifer is not experiencing infinite-acting radial flow after that time, and a significant boundary condition exists [12].

DGR Engineering used the distance-drawdown method described by Cooper and Jacob [10] to estimate a radius of influence, but the radius of influence they calculated could not be replicated by Water Rights staff with the information provided. They also estimated aquifer properties based on recovery data to confirm their values calculated for aquifer properties in the drawdown period. However, since assumptions about the aquifer boundaries and aquifer properties may not be accurate, information from the recovery period does not confirm their calculations.

DGR Engineering used the T and S values calculated in their late time data and estimated average pump rate to estimate the drawdown to the aquifer after 10 billion minutes (approximately 19 years), an arbitrarily long time after pumping would begin. They estimated that drawdown after 10 billion minutes would be approximately 72 feet below the original water level. Since a significant boundary condition exists and the aquifer properties were estimated using incorrect assumptions, that value is likely not accurate.

Finally, DGR Engineering estimated recharge to the aquifer based on the recharge data provided in the 1986 Clark County Study, which estimated recharge was 1.5-1.6 inches per year [5]. They also assumed that the aquifer in which the applicant's well is completed is connected to the Altamont outwashes identified in the Clark County Study [5] and that boundary conditions would not cause additional drawdown. The Altamont outwashes in Clark County have hydraulic connections to the surface [1] [2], which are not demonstrated to exist in the aquifer for this application. Based on the resources available [1] [2] [15], this outwash is not likely connected to the Altamont outwashes in Clark County, so the recharge estimate provided in the Clark County Study is not likely to reflect recharge to the outwash in this application.

Aquifer evaluation considering boundary conditions

When a boundary condition is significant in evaluating drawdown in an aquifer, the Method of Images [16] is an effective way to model the boundary effects. For an aquifer with one impervious boundary, the drawdown in any part of the aquifer can be modeled as if the aquifer is infinite, but there is an identical well withdrawing on the opposite side of the boundary (Figure 3). The identical well across the boundary is referred to as an "image well." Based on available geologic data [2] [1] [15], it is likely the aquifer the applicant wishes to withdraw from is a long channel such as in Figure 4 on page 8 [16]. For an aquifer bounded on three sides, such as in a channel that extends a long way in one direction, the drawdown in any location in the aquifer can be modeled as if there is an infinite array of image wells reflected across the long boundaries of the channel and an additional row of image wells reflected across the short boundary of the channel [16]. Using the method of images, it is possible to estimate the locations of boundaries by matching the modeled drawdown to actual data.

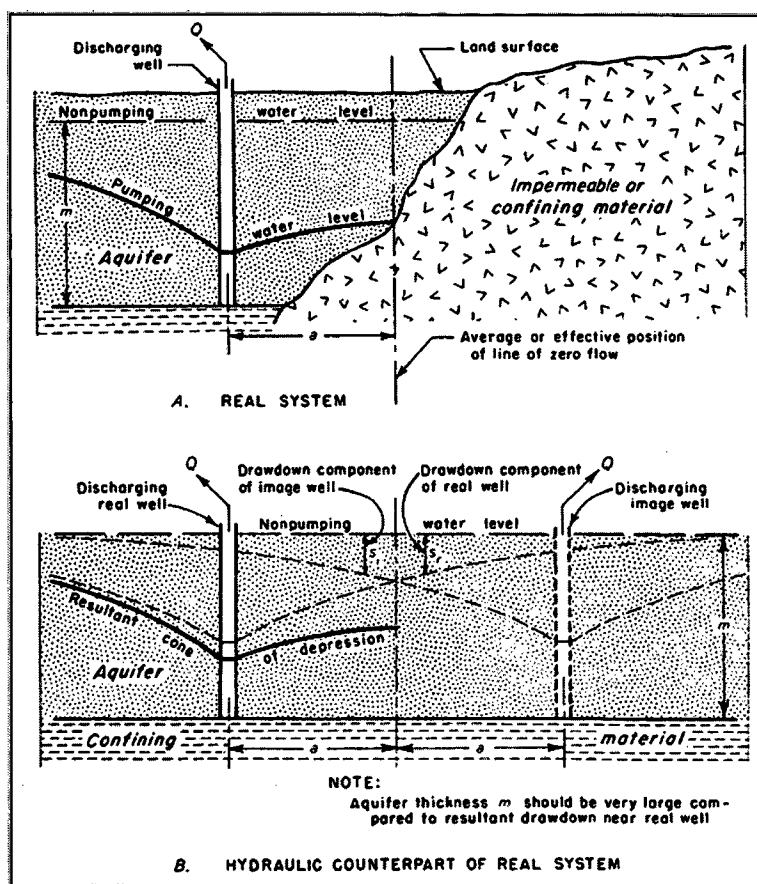


Figure 3: Method of Images for one impervious boundary [16, p. 149]

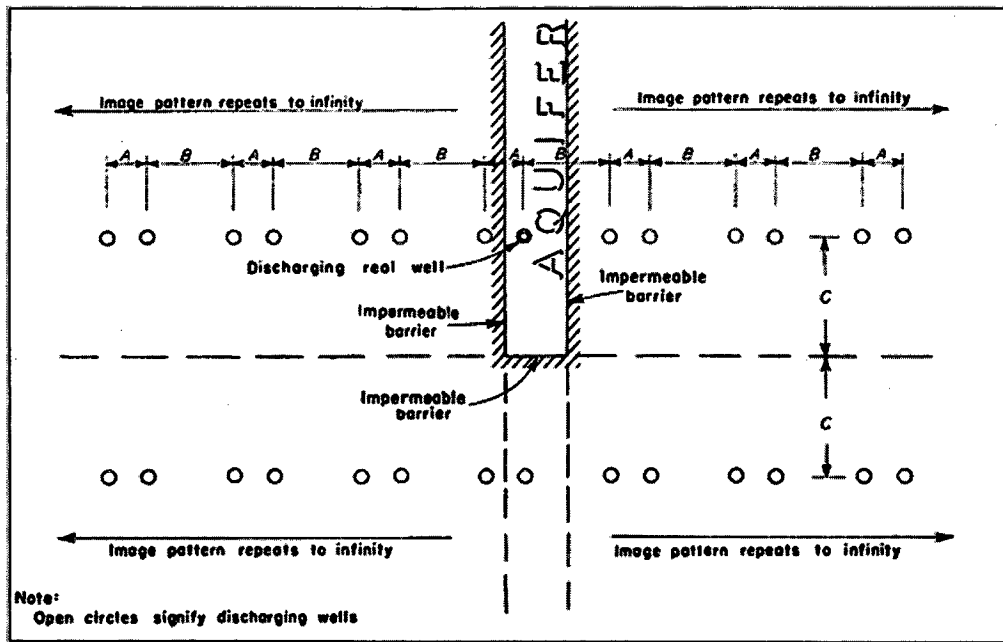


Figure 4: Method of Images for a long aquifer bounded on three sides, or a half-channel [16, p. 158]

Method of Images for Observation Well 1

Using the Method of Images [16], the Theis [11] equation for each image well and the pumped well, an average pump rate of 397 gallons per minute, and aquifer properties calculated from the early time interval in Observation Well 1, drawdown in the aquifer was modeled as a half-channel (Figure 4). Boundary distances were chosen to fit the late time drawdown data and remain reasonable based on available geological information [2] [1] [15]. The eastern boundary was assumed to be approximately 1,750 feet from the pumped well, the west boundary was approximately 1,500 feet from the pumped well, and the north boundary approximately 4,500 feet from the pumped well. The distances were chosen based on the fact that a nearby domestic well completed in the same formation is west of the pumped well but has only 5 feet of sand in the formation, indicating a boundary near that location. The Theis [11] equation was evaluated as a convergent series with a macro in Microsoft Excel [17]. Figure 5 shows the Method of Images half-channel model parameters and actual drawdown data for Observation Well 1. DGR Engineering proposes that the average pump rate will be 314 gallons per minute [7]. At the time the applicant's well was completed, there was 245 feet of hydraulic head above the aquifer. This model cannot predict drawdown characteristics below the top of the aquifer. Additionally, causing the hydraulic head to decline below the top of the aquifer could cause unlawful impairment to water users in the aquifer. Using the same aquifer properties and boundary conditions, but with the average proposed pump rate of 314 gallons per minute [7], drawdown in Observation Well 1 is estimated to reach 245 feet in 640 days (1.75 years). This estimate does not reflect any recharge available in the aquifer, although over the short span of time in which their average pump rate may unlawfully impair an existing water user, it is unlikely that a significant amount of recharge would occur.

Method of Images for Observation Well 2

Since the Cooper and Jacob [10] method is inappropriate to estimate aquifer properties in Observation Well 2, aquifer properties at that well were chosen to best fit the model to the data during the early time interval. To match the model to the late time data in Observation Well 2, the aquifer boundaries were expanded to 5,000 feet to the east, 3,000 feet to the west, and 19,000 feet (3.6 miles) to the north. Figure 6 (see page 10) shows the Method of Images half-channel model parameters and actual drawdown data for both observation wells. Using the aquifer properties and boundary conditions that fit the Method of Images half-channel model at Observation Well 2, if the applicant pumped at an average rate of 314 gallons per minute, drawdown at Observation Well 2 is estimated to reach 245 feet in 560 days (1.53 years). As with the Observation Well 1 model, this estimate does not include any potential recharge that could occur in the aquifer, but over the short span of time in which their average pump rate may unlawfully impair an existing water user, it is unlikely that a significant amount of recharge would occur.

Interpretation of Models

The coefficient of storage used to match the Method of Images half-channel model to Observation Well 2 is an order of magnitude lower than the coefficient of storage used to match the model to Observation Well 1. This indicates that the aquifer formation is significantly tighter near Observation Well 2 than it is near Observation Well 1, possibly due to additional clay in the sand or more clay lenses that may not be perceived by the driller. A physical explanation for why the modeled aquifer boundaries might be further from the pumped well at Observation Well 2 than they are at Observation Well 1 is that the area where the aquifer is a lower coefficient of storage is much larger than the area of the aquifer that is looser. The differences in time to draw the water down to the top of the formation represent uncertainty in the model, especially in the location of the aquifer boundaries, and heterogeneous aquifer properties.

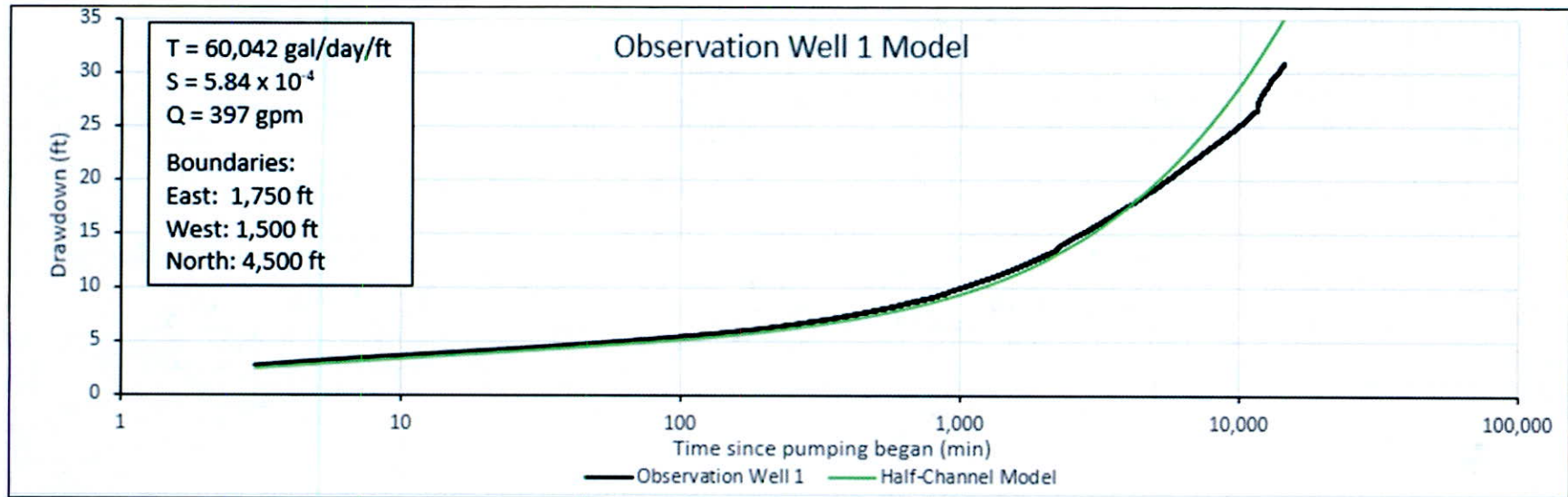


Figure 5: Observation Well 1 data [8] and half-channel drawdown model [16] [17]

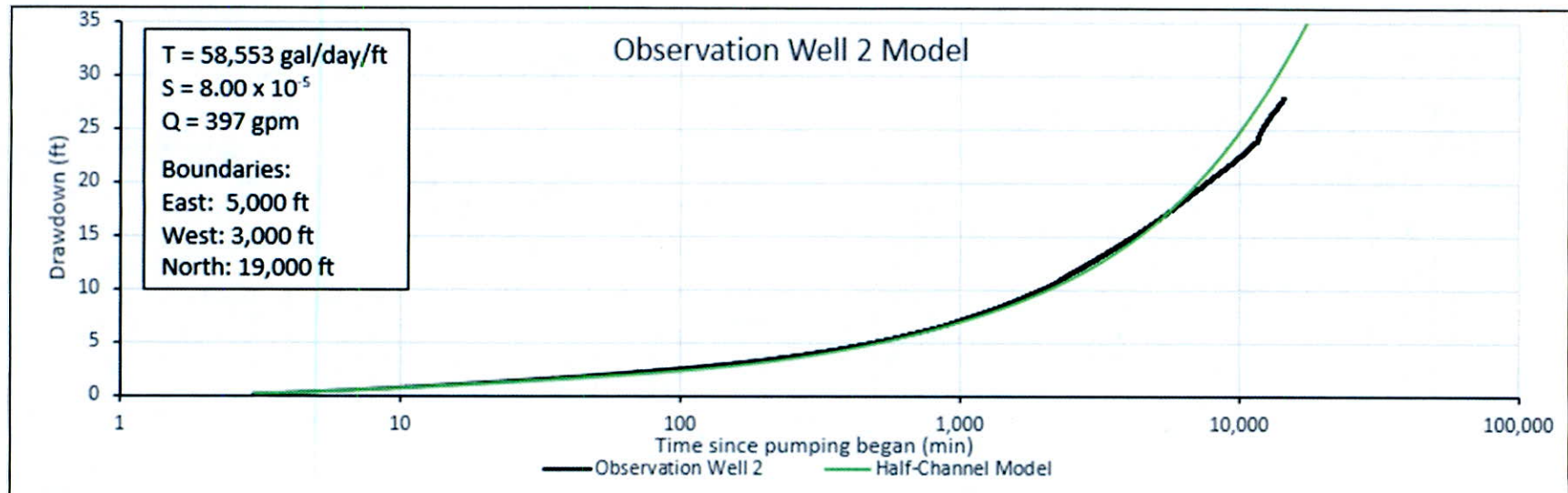


Figure 6: Observation Well 2 data [8] and half-channel drawdown model [16] [17]

The Water Rights Program consulted with South Dakota Geological Survey Program to estimate an area of recharge to the aquifer [15]. The aquifer area was mapped considering a mapping of the bedrock surface [3], available lithologic data [1], well completion reports [2], and the boundary effects modeled. Figure 7 shows the approximate area, which is approximately 3,200 acres.

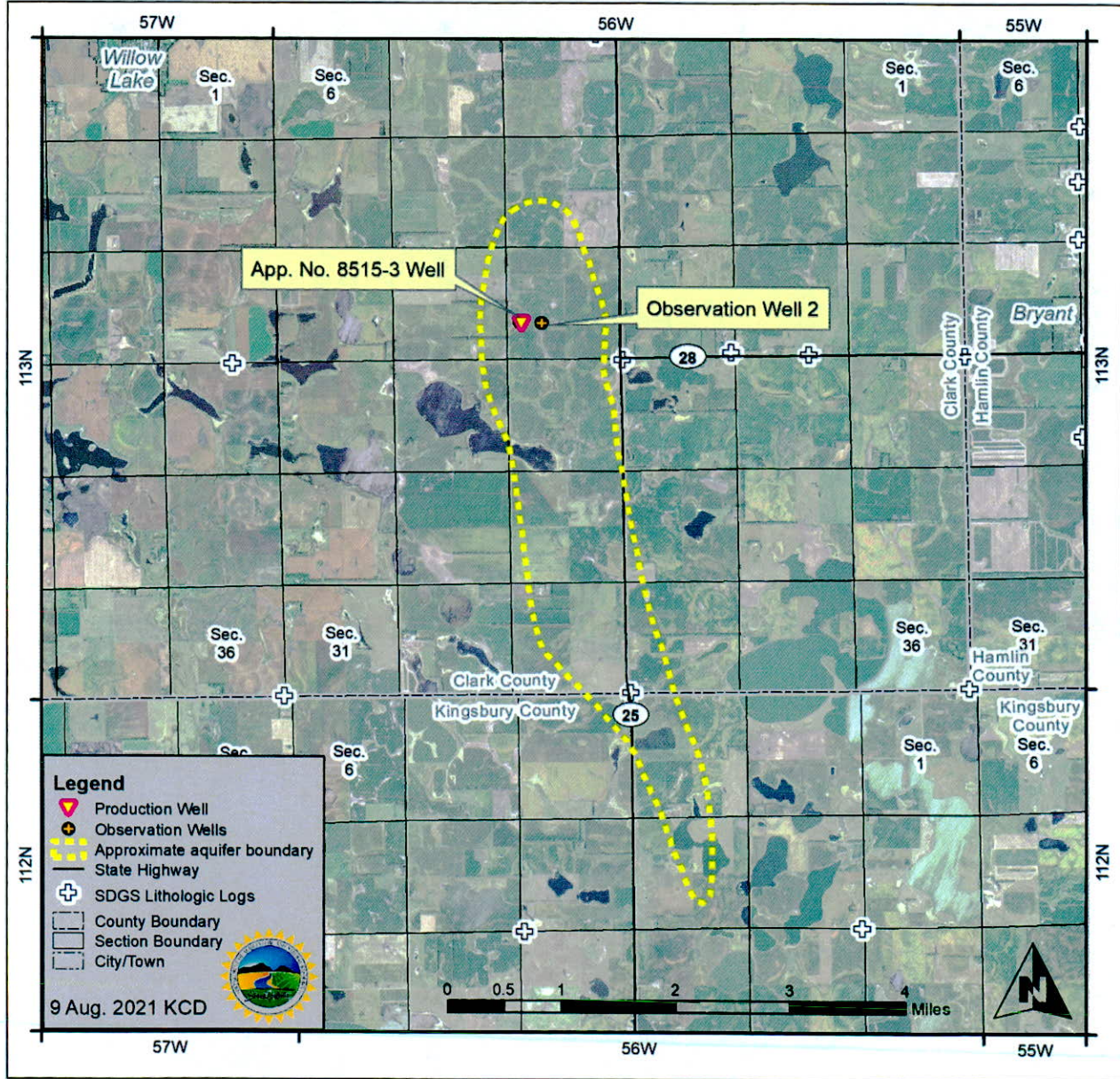


Figure 7: Aquifer boundary modified from SDGS [15], pumped well, Observation Well 2 [2], and locations of SDGS lithologic logs [1]. Observation Well 1 is too close to the pumped well to map at this scale.

Applicable South Dakota Codified Law

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 rights, and that the proposed use is a beneficial use and in the public interest. This report will only assess the availability of water and possibility of developing this application without unlawful impairment of existing water rights.

Pursuant to SDCL 46-6-3.1, 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 the water to the groundwater source. An exception allows water distribution systems to withdraw from groundwater sources older or stratigraphically lower than the Greenhorn Formation regardless of the results of a hydrologic budget. The applicant is not a water distribution system as defined in SDCL 46-1-6(17), and the Pleistocene Series: Unknown aquifer is not older and stratigraphically lower than the Greenhorn Formation. Therefore, it is necessary to find that recharge exceeds withdrawals to approve this application.

Availability of Water

Observation Wells

Administrative Rule of South Dakota 74:02:05:07 requires the Water Management Board to rely upon the record of observation wells in addition to other information in order to determine that average withdrawals do not exceed average recharge to the aquifer. The Water Rights Program does not maintain any observation wells completed into this portion of the Pleistocene Series: Unknown aquifer. If any portion of this application is approved, one or more observation wells should be added to the Water Rights Observation Well Network in the vicinity of this permit and in this portion of the Pleistocene Series: Unknown aquifer. The monitoring of the aquifer in this area would provide information on the long-term impacts of pumping under this permit, if any portion of it is approved. Observation well information would be valuable in evaluating any future applications for the aquifer in this area and provide monitoring to evaluate any complaints of unlawful impairment of existing rights. To assist in evaluating the observation well data collected, a qualification should be added to the permit requiring the applicant to report their annual usage from the aquifer.

Hydrologic Budget

Recharge to the Pleistocene Series: Unknown aquifer in the area of this application is likely to only be from infiltration from the glacial till above and adjacent to the aquifer and possibly from groundwater inflow from the south if hydraulic head in any connected materials is higher than the hydraulic head in the aquifer [1] [2] [15]. Discharge from the Pleistocene Series: Unknown aquifer is likely by at least one domestic well withdrawal [2] and by outflow to connected sediments when the hydraulic head in the aquifer is higher than the head in connected sediments. Hedges, Allen, and Holly [18] recommend using a recharge rate between 0.15 and 0.6 inches per year for confined buried aquifers. Since this aquifer is buried relatively deep for a glacial aquifer and there is not evidence available that this formation is hydraulically connected to surficial sediments or other glacial or bedrock aquifers [1] [2] [15], the actual recharge rate is more likely to be near the 0.15 inches per year end of the range. Applying 0.15 inches per year over 3,200 acres, the average annual recharge to the aquifer is approximately 40 ac-ft/yr. Using the upper bound recharge rate of 0.6 inches per year, the estimated recharge would be 160 ac-ft/yr. The

applicant is requesting 491 ac-ft/yr, so based on the hydrologic budget, there is not a reasonable probability unappropriated water is available for the entire amount requested by this application.

Potential for impairment of existing water rights

There are no other water rights/permits completed into this portion of the Pleistocene Series: Unknown aquifer [19]. There is a domestic well on file with the Water Rights Program located in the NE ¼ SW ¼ Section 17 that has 5 feet of sand at approximately the correct depth to be in this aquifer [2]. That well was completed in 1956 and has a 2-inch casing for most of the depth [2]. The Water Rights Program has historically interpreted an unlawful impairment of existing water rights to occur if a junior water right/permit causes a nearby adequate well with a senior water right/permit to become unable to withdraw at the rate it is entitled to or, if an adequate domestic well is impacted, the water right/permit causes the adequate domestic well to be unable to withdraw at the rate needed to supply reasonable domestic use of water. Administrative Rule of South Dakota (ARSD) 74:02:04:20(6) defines an adequate well 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

Based on the well construction information provided, it is likely the nearby well on file is not an adequate well according to ARSD 74:02:04:20(6). However, any adequate domestic well completed into the aquifer in the future has priority over any water rights/permits. There are no adequate wells on file with the Water Rights Program that this application would be likely to interfere with, but if an adequate domestic well was completed into this portion of the Pleistocene Series: Unknown aquifer, then the applicant should control their withdrawals so that adequate domestic wells are capable of delivering necessary water for reasonable domestic use.

Conclusions:

1. Water Permit Application No. 8515-3 seeks to appropriate 491 acre-feet of water at a maximum instantaneous withdrawal rate of 1.45 cfs from one well completed into the Pleistocene Series: Unknown aquifer located in the N ½ SW ¼ Section 16 for commercial use in a dairy facility located in the NW ¼, N ½ SW ¼ Section 16; all in T113N-R56W.
2. The applicant submitted data and a report for a constant-rate aquifer performance test that was completed by their consultant.
3. The applicant's submitted report concluded unappropriated water would be available for this application.
4. Water Rights Program staff could not replicate some of the aquifer properties the consultant calculated based on that aquifer performance test.
5. Water Rights Program staff believes inaccurate assumptions were made in the consultant's analysis.
6. Based on the hydrologic budget using the best information available, there is not reasonable probability that unappropriated water is available for the amount requested by this application.

Report on Water Permit Application No. 8515-3

7. There are no adequate domestic wells or senior water rights on file that this application could affect, but if an adequate domestic well is completed into the Pleistocene Series: Unknown aquifer that the applicant could adversely impact, the applicant shall control their withdrawals so that the adequate domestic well can deliver necessary water for reasonable domestic use.
8. If this application is approved, an observation well should be completed to add to the SD DANR Water Rights Program's observation well network.

A handwritten signature in black ink, reading "Kimberly Drennon". The signature is fluid and cursive, with the first name "Kimberly" and last name "Drennon" clearly distinguishable.

Kimberly C. Drennon, E.I.

Natural Resources Engineer II – DANR Water Rights Program

References

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OCT 26 2021

WATER RIGHTS
PROGRAM

LOCALiQ

Aberdeen News
Watertown Public Opinion

PO Box 630567 Cincinnati, OH 45263-0567

PROOF OF PUBLICATION

Riverview Llp
Riverview Llp
26406 470TH AVE
MORRIS MN 56267

STATE OF SOUTH DAKOTA, COUNTY OF CODINGTON

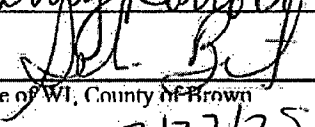
The Watertown Public Opinion is, and during all the times hereafter mentioned was, a daily legal newspaper as defined in SDCL 17-2-2.1 through 17-2-2.4, as amended, published at Watertown, Codington County, South Dakota, by Watertown Public Opinion; that the notice, order or advertisement, a printed copy of which is attached, was published in said newspaper in the issue dated:

10/13/2021

and that the fees charged are legal.
Sworn to and subscribed before on 10/13/2021



Legal Clerk



Notary, State of WI, County of Brown

7/27/25

My commission expires

Publication Cost: \$34.96

Order No: 6372081

of Copies:

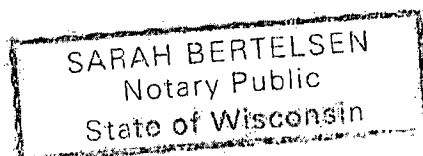
Customer No: 559590

1

PO #: 8515-3

THIS IS NOT AN INVOICE!

Please do not use this form for payment remittance.



**NOTICE OF
APPLICATION
NO. 8515-3 to Appropriate
Water**

Notice is given that Riverview LLP, c/o Brady Janzen, 26406 470th Ave, Morris MN 56267 has filed an application for a water permit to appropriate 491 acre-feet of water annually at a maximum pump rate of 1.45 cubic feet of water per second from three wells to be completed into the Pleistocene Series: Unknown Aquifer (approximately 467 feet deep) located in the N 1/2 SW 1/4 Section 16 for commercial use in a dairy facility located in the NW 1/4, N 1/2 SW 1/4 Section 16; all in T113N-R56W. This site is located approximately 4 miles southeast of Willow Lake SD. Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8515-3 for an annual volume of 40 acre-feet of water with qualifications because 1) unappropriated water is available for the recommended volume, 2) existing rights will not be unlawfully impaired, 3) It is a beneficial use of water, and 4) it is in the public interest. 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 or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 25, 2021.

The petition may be informal but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

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 \$34.96

Affidavit of Publication

State of South Dakota

§

County of Clark

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Published once at the
total approximate cost of \$28.32.
10-13-1t

William J. Krikac of said county, being first duly sworn, on oath says that he is the publisher of the **Clark County Courier**, a weekly newspaper printed and published in Clark in said County of Clark and has a full and personal knowledge of all the facts therein stated; that said newspaper is a legal newspaper and has a bona-fide circulation of at least two hundred copies weekly, and has been published within said County for fifty-two successive weeks next prior to the publication of the notice herein mentioned, and was and is printed wholly or in part in an office maintained at said place of publication; that the

Riverview LLP

a printed copy of which taken from the paper in which same was published, is attached to this sheet, and is made a part of this Affidavit, was published in said newspaper at least once in each week for

One

successive week(s), on the day of each week on which said newspaper was regularly published, to wit:

October 13, 2021

that the full amount of the fees for the publication of the annexed notice is **\$28.32**

William J. Krikac

Subscribed and sworn to before me this

RECEIVED**OCT 18 2021****WATER RIGHTS
PROGRAM****14th day of October, 2021**

Andrew Helke

Notary Public
Clark County, South Dakota

My Commission expires: 06/04/2025

Schlaak, Karen

From: Schlaak, Karen
Sent: Monday, October 4, 2021 1:33 PM
To: Watertown Public Opinon (legals@thepublicopinion.com)
Subject: 8515-3, Riverview LLP
Attachments: 8515-3public.short.docx; FORM8.FRM.doc

Attached is a notice to be published on October 13, 2021.

Riverview LLP, c/o Brady Janzen, 26406 470th Ave, Morris MN 56267 (320 392-5609) has been notified to contact you to authorize publication and arrange for payment.

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

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

Karen Schlaak

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





**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

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

October 4, 2021

Riverview LLP
c/o Brady Janzen
26406 470th Ave
Morris MN 56267

Dear Mr. Janzen:

Water Permit Application No. 8515-3 for commercial use have been examined and found to comply with the South Dakota Water Laws and applicable rules. A notice has been sent to the Clark County Courier printed at Clark (Ph # 532-3654) and the Public Opinion printed at Watertown (Ph # 886-6901). You will need to contact the newspapers and authorize publication of this notice. For your information, a copy of the notice, the recommendation of the Chief Engineer and report on the application are enclosed. Please review the notice prior to publication and notify this office, if you have any corrections or questions.

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

Sincerely,

Karen Schlaak

Karen Schlaak
Water Rights Program
(605) 773-3352

enclosures

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

NOTICE OF APPLICATION NO. 8515-3 to Appropriate Water

Notice is given that Riverview LLP, c/o Brady Janzen, 26406 470th Ave, Morris MN 56267 has filed an application for a water permit to appropriate 491 acre-feet of water annually at a maximum pump rate of 1.45 cubic feet of water per second from three wells to be completed into the Pleistocene Series:Unknown Aquifer (approximately 467 feet deep) located in the N 1/2 SW 1/4 Section 16 for commercial use in a dairy facility located in the NW 1/4, N 1/2 SW 1/4 Section 16; all in T113N-R56W. This site is located approximately 4 miles southeast of Willow Lake SD.

Pursuant to SDCL 46-2A-2, the Chief Engineer recommends APPROVAL of Application No. 8515-3 for an annual volume of 40 acre-feet of water with qualifications because 1) unappropriated water is available for the recommended volume, 2) existing rights will not be unlawfully impaired, 3) it is a beneficial use of water, and 4) it is in the public interest. 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 or supporting this application or recommendation must file a written petition with BOTH the applicant and Chief Engineer. The applicant must file a petition if contesting the Chief Engineer's recommendation. The Chief Engineer's address is "Water Rights Program, Foss Building, 523 E Capitol, Pierre SD 57501 (605 773-3352)" and the applicant's mailing address is given above. A petition filed by either an interested person or the applicant must be filed by October 25, 2021.

The petition may be informal but must include a statement describing the petitioner's interest in the application, the petitioner's reasons for opposing or supporting the application, and the signature and mailing address of the petitioner or the petitioner's legal counsel, if legal counsel is obtained.

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_

November 23, 2021

PAYMENT REQUEST FORM

PAYEE: Riverview LLP
c/o Brady Janzen
26406 470th Ave
Morris MN 56267

FROM: DANR Water Rights Program
523 E. Capitol Ave
Pierre, SD 57501-3181

DESCRIPTION OF SERVICE, PRODUCE OR TRANSFER

Refund-Over Payment of Application/License Fee

AMOUNT: \$950.00

FUNDING SOURCE:

GENERAL: X

FEDERAL:

OTHER:

COMMENTS:

AUTHORIZATION: *Eric Henderson* 11/23/2021

I declare and affirm under the penalties of perjury that this claim is in all things, true and correct. I further agree to comply with the provisions of the Civil Rights Act of 1964 and regulations issued thereunder relating to nondiscrimination in federal assisted programs.



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

NOV 23 2021

Riverview LLP
c/o Brady Janzen
26406 470th Ave
Morris MN 56267

Dear Mr. Janzen:

Enclosed is Water Permit No. 8515-3 authorizing construction of the water diversion system and beneficial use of the water, not exceeding the limits as specified in the Water Permit.

An application/license filing fee of \$1,650.00 was submitted with the application. Based on the number of acre-feet authorized by the permit, the fee should be \$700.00. \$950.00 will be refunded to you. The refund check should be received within the next couple of weeks.

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

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

Sincerely,

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

enclosures



**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

July 25, 2024

8515-3

Riverview LLP
c/o Matt Waldbeser
26406 470th Ave
Morris MN 56267

Dear Mr. Waldbeser:

I am writing to acknowledge receipt of the "Notice of Completion of Works" form that you sent in to let us know that you are completed with the water use system authorized by Water Permit No. 8515-3.

The system is now ready for inspection. Inspections are done on a county-by-county basis as staff time permits. You have done everything you need to do and the intervening time between the completion of your project and the staff inspection has no bearing on your water permit.

Someone from our office will contact you prior to the inspection to set up a time that is convenient for you. If you have any questions, please contact me.

Sincerely,

Amanda Dewell
Water Rights Program
(605) 773-3352
email: Amanda.Dewell@state.sd.us



RECEIVED

JUL 25 2024

OFFICE OF
WATER

**DEPARTMENT of AGRICULTURE
and NATURAL RESOURCES**

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

**NOTICE OF COMPLETION OF WORKS AND
APPLICATION OF WATER TO BENEFICIAL USE**

TO: Water Rights Program, DANR
523 E. Capitol Ave.
Pierre, SD 57501-3182
or via email to DANRmail@state.sd.us

Date 07-24-2024

FROM: Riverview LLP - Matt Waldbeser 320-392-5609
(name) (phone)
26406 470th Ave matt.waldbeser@riverviewllp.com
(address) (email)
Morris, MN 56267
(city, state, zip)

I have completed the construction of the water use system and I have put the water to beneficial use to the maximum extent it is going to be used.

Water Permit No. 8515-3 states that the water use system is to be constructed by

Oct 25, 2026, and water is to be put to beneficial use by Oct 25, 2030.
(date) (date)

The water use system was completed on Oct 31, 2023
(date)

Applying the water to beneficial use was completed on June 3, 2024
(date)

You may schedule an inspection so that the water license may be issued.