

Processing Materials

- Work copies of applicant-submitted information
- Deficiency letter
- Deficiency response
- Correct & complete determination
- Any correspondence with the applicant after application receipt and prior to sending the Draft PD

Processing Materials

THE MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

GOVERNOR GREG GIANFORTE



DNRC DIRECTOR AMANDA KASTER

DNRC

2273 Boot Hill Ct, STE 110

Bozeman, MT 59715

November 14, 2025

Barnard Construction, Inc.

3520 Royal Wolf Way

Bozeman, MT 59718

Subject: Correct and Complete Application for Beneficial Water Use Permit No. 41H 30165312

Dear Applicant:

The Department of Natural Resources and Conservation (Department) has determined that your application is correct and complete pursuant to ARM 36.12.1601. Please remember that correct and complete **does not mean that your application will be granted.** The purpose of this letter is to indicate that the Department has enough information to analyze your water right application.

The Department will issue a Draft Preliminary Determination within 60 days of the date of this letter per §85-2-307(2)(b), MCA.

Following issuance of the Draft Preliminary Determination, you (Applicant) will have 15 business days to request an extension of time to submit additional information, if desired pursuant to §85-2-307(3)(a), MCA.

If no extension of time is requested and the Draft Preliminary Determination decision is to grant your application or grant your application in modified form, the Department will prepare a notice of opportunity to provide public comment, per §85-2-307(4)(a), MCA.

If no extension of time is requested and the Draft Preliminary Determination decision is to deny your application, the Department will adopt the Draft Preliminary Determination as the final determination per §85-2-307(3)(d)(ii), MCA.

If you have any questions or concerns about the application process, please contact me.

Sincerely,

A handwritten signature in blue ink, appearing to read "Kendrew Ellis".

Kendrew Ellis

Water Resources Specialist

Bozeman Water Resources Office

Water Resources Division

CC, via email: Pat Thomson, pthomson@waterenvtech.com



DNRC.MT.GOV



[EXTERNAL] RE: Correct and Complete Permit Application 41H 301165312

From Pat Thomson <pthomson@waterenvtech.com>

Date Fri 11/14/2025 10:17 AM

To Ellis, Kendrew <Kendrew.Ellis@mt.gov>

Cc Strasheim, Kerri <kstrasheim@mt.gov>; Reynolds, Lyra <Lyra.Reynolds@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>

Thank you Kindrew. Have a great weekend.

From: Ellis, Kendrew <Kendrew.Ellis@mt.gov>

Sent: Friday, November 14, 2025 10:07 AM

To: Pat Thomson <pthomson@waterenvtech.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Reynolds, Lyra <Lyra.Reynolds@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>

Subject: Correct and Complete Permit Application 41H 301165312

WARNING - This email originated from an EXTERNAL SOURCE. Do not reply, click any link or open attachments unless you can confirm the sender. *Please report suspicious emails to itsupport*

Hi Pat-

The Department of Natural Resources and Conservation (Department) has determined that Permit Application No. 41H 30165312 is correct and complete pursuant to ARM 36.12.1601. The Department will issue a Draft Preliminary Determination within 60 days of the date of this letter, by 1/13/2026, per §85-2-307(2)(b), MCA. The correct and complete letter is attached to this email and was sent to the Applicant today, 11/14/25.

Please let me know if you have any questions.

Best,
Kendrew



Kendrew Ellis (she/her) | Water Resource Specialist

Bozeman Water Resources Office

Montana Department of Natural Resources and Conservation

2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4538 **EMAIL:** kendrew.ellis@mt.gov

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Application Materials

- Application
- Any information submitted with Application including maps

Application Materials



**APPLICATION FOR
BENEFICIAL WATER USE
PERMIT**

§ 85-2-302, MCA

Form No. 600 (02/2025)

FILING FEE

\$2900/\$1600 – Inside a Basin Closure Area, Controlled Groundwater Area or Compact Closure; without/with filing fee reduction.

\$2500/\$1200 – Outside a Basin Closure Area; Controlled Groundwater Area or Compact Closure; without/with filing fee reduction.

INFORMATION

An application will be eligible for a filing fee reduction and expedited timelines if the applicant completes a preapplication meeting with the Department (ARM 36.12.1302(1)), which includes submitting any follow-up information identified by the Department (ARM 36.12.1302(3)(c)) and receiving either Department-completed technical analyses or Department review of applicant-submitted technical analyses (ARM 36.12.1302(4) and (5)). An application for the proposed project also must be submitted within 180 days of delivery of Department technical analyses or scientific credibility review and no element on the submitted application can be changed from the completed preapplication meeting form (ARM 36.12.1302(6)). If application is eligible for a filing fee reduction, \$500 paid for Form 600P-B will be credited toward filing fees shown above.

For Department Use Only

Application # _____ Basin _____
Priority Date _____ Time _____ AM/PM
Rec'd By _____
Fee Rec'd \$ _____ Check # _____
Deposit Receipt # _____
Payor _____
Refund \$ _____ Date _____

Applicant Information: *Add more as necessary.*

Applicant Name Barnard Construction, Inc., Josiah Kiehl

Mailing Address 3520 Royal Wolf Way City Bozeman State MT Zip 59718

Phone Numbers: Home _____ Work 406-586-1995 Cell _____

Email Address josiah.kiehl@barnard-inc.com

Applicant Name Barnard Construction, Inc., Mathew Engel

Mailing Address 3520 Royal Wolf Way City Bozeman State MT Zip 59718

Phone Numbers: Home _____ Work 406-586-1995 Cell _____

Email Address matthew.engel@barnard-inc.com

Applicant Name _____

Mailing Address _____ City _____ State _____ Zip _____

Phone Numbers: Home _____ Work _____ Cell _____

Email Address _____

Contact/Representative Information: *Add more as necessary.*

Contact/Representative is: ☐ Applicant ☒ Consultant ☐ Attorney ☐ Other

Contact/Representative Name WET, Inc., Pat Thomson

Mailing Address 480 E. Park City Butte State MT Zip 59701

Phone Numbers: Home _____ Work 406-782-5220 Cell 406-490-0329

Email Address pthomson@waterenvtech.com

NOTE: If a contact person is identified as an attorney, all communication will be sent only to the attorney unless the attorney provides written instruction to the contrary (ARM 36.12.122(2)). If a contact person is identified as a consultant, employee, or lessee, the individual filing the water right form or objection form will receive all correspondences, and a copy may be sent to the contact person (ARM 36.12.122(3)).



Answer every question and applicable follow-up questions. Use the checkboxes to denote yes ("Y"), no ("N"), or not applicable ("NA"). Questions that require items to be submitted to the Department have a submitted ("S") checkbox, which is marked when the required item is attached to the Application. Label all submitted items with the question number for which they were submitted. Narrative responses that are larger than the space provided can be answered in an attachment. If an attachment is used, specify "see attachment" on this form, and label the attachment with the question number. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Responses in the form of a table may be entered into the table provided on this form or in an attachment. If an attachment is used, the table must have the exact headings found on this form, and "see attachment" must be entered as a response to the relevant question. Clearly label all units in tables and narrative responses.

PREAPPLICATION AND TECHNICAL ANALYSES INFORMATION

1. ☒ **Y** ☐ **N** Do you elect for Department technical analyses to be used for criteria assessment?

2. ☒ **Y** ☐ **N** Did you have a preapplication meeting AND complete a Permit Preapplication Meeting Form Part A and Part B (Form 600P-A and 600P-B)?

IF QUESTION 2 IS NO, answer 2.a and 2.b:

2.a. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.b. ☐ **S** ☒ **NA** Submit the technical analyses, if you elected in question 1 for Applicant technical analyses to be used for criteria assessment. Select "NA" if you elected for Departmental technical analyses.

IF QUESTION 2 IS YES, answer 2.c, 2.d, and 2.e:

2.c. ☐ **Y** ☒ **N** Has any element of the project described in this application changed from the mandatory elements of the project described in the completed form 600P? **If yes:**

2.c.i. Please explain.

2.c.ii. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.d. ☒ **Y** ☐ **N** Are the technical analyses to be used for criteria assessment exactly the same as those completed during the preapplication process? **If no:**

2.d.i. Please explain.

2.d.ii. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.e. ☒ **Y** ☐ **N** Did you elect in Question 1 for Department technical analyses to be used for criteria assessment? **If no:**

2.e.i. ☐ **S** Submit the technical analyses.



APPLICATION ADDENDA AND REVIEW

3. ☒ **S** ☐ **NA** If your application is for groundwater, not surface water, and one or more of your points of diversion are in a Basin Closure Area, then submit the Basin Closure Area Addendum (Form 600-BCA).
4. ☒ **S** ☐ **NA** If your application is for groundwater and one or more points of diversion are in a Basin Closure Area, then your project must have a Hydrogeologic Report that conforms with MCA 85-2-361 to comply with the requirements of § 85-2-360, MCA. A Hydrogeologic Report Addendum (Form 600-HRA) or Department Technical Analyses may be used to meet these requirements. Please mark the box below that best applies, then select "S" if submitting a Hydrogeologic Report or "NA" if one is not required. This question does not apply to surface water points of diversion in a Basin Closure Area.
- ☐ If you elected to conduct Technical Analyses, you must submit the Hydrogeologic Report Addendum (Form 600-HRA).
 - ☐ If you elected for DNRC to conduct Technical Analyses but did not have a preapplication meeting AND complete a Form 600P Permit Preapplication Meeting Form (or changes have occurred since the completed Form 600P), you must submit the Hydrogeologic Report Addendum (Form 600-HRA).
 - ☒ If you elected for DNRC to conduct Technical Analyses, had a preapplication meeting, completed a Form 600P, and the Technical Analyses remain unchanged since the preapplication meeting, you do not need to submit Form 600-HRA because the Department's Technical Analyses meet the report requirements of § 85-2-360 and § 85-2-361, MCA.
5. ☐ **S** ☒ **NA** If the project is for one or more groundwater points of diversion located in a Controlled Groundwater Area, then submit the Controlled Groundwater Area Addendum (Form 600-CGWA).
6. ☐ **S** ☒ **NA** If the project involves an appropriation that is greater than 5.5 CFS and 4,000 acre-feet, then submit a Criteria Addendum Application for Beneficial Water Use Permit for Appropriations Greater than 5.5 CFS and 4,000 AC-FT (Form 600-B).
7. ☐ **S** ☒ **NA** If the project involves out-of-state water use, then submit the Out-of-State Use Addendum (Form 600/606-OSA).
8. ☐ **S** ☒ **NA** If you require mitigation water to meet the criteria of issuance, then submit a Mitigation Purpose Addendum (Form 600/606-MIT).
9. ☐ **S** ☒ **NA** If the proposed purposes include marketing or selling water, (not marketing for mitigation/aquifer recharge), then submit the Marketing Purpose Addendum (Form 600/606-WMA).
10. ☐ **S** ☒ **NA** If the project involves one or more places of storage, then submit a Permit Storage Addendum (Form 600-SA). This does not include reservoirs, pits, pit-dams, or ponds with a capacity less than 0.1 AF; water tanks; or cisterns (ARM 36.12.113(6)).
11. ☐ **S** ☒ **NA** If the project is in designated sage grouse habitat, then submit a review letter from the Montana Sage Grouse Habitat Conservation Program.
12. ☐ **S** ☒ **NA** If the project includes a point of diversion and/or place of use on State of Montana Trust Land, submit documentation of consent from the DNRC Trust Lands Management Division.
13. ☐ **S** ☒ **NA** You must provide a written notice of the application to each owner of an appropriation right sharing a point of diversion or means of conveyance (e.g., canal, ditch, flume, pipeline, or constructed waterway) pursuant to §85-2-302(4)(c), MCA. Submit a copy of this notice and the recipient list.

PURPOSE AND DIVERSION INFORMATION

14. ☐ Y ☒ N Is the proposed use temporary?

14.a. If yes, when will the appropriation cease? _____

15. Is the proposed source surface water or groundwater? Groundwater

16. What is the source name? Tertiary Alluvium

17. ☒ S Attach a map utilizing an aerial photograph or topographic map that shows the following: section corners; township and range; north arrow; scale bar; all proposed points of diversion labeled with a unique Point of Diversion (POD) ID number and, if applicable, GWIC number; all proposed places of use; all proposed conveyance facilities and or routes; all proposed places of storage labeled with a unique Storage ID number; and places of use (POU) for all overlapping water rights. More than one map may be submitted, if necessary to clearly convey all required information.

18. Fill out the table below. Means of diversion for surface water includes headgate, pump, dam, and others. Means of diversion for groundwater includes well, developed spring, pit pond, and others.

Purpose	Means of Diversion	Acres Irrigated (if appl.)	Period of Diversion (Month/Day - Month/Day)	Period of Use (Month/Day - Month/Day)	Flow Rate		Volume (Acre-Feet)
					☒ GPM	☐ CFS	
Geothermal	Well		1/1 - 12/31	1/1 - 12/31	275		149.2
Geothermal	Well		1/1 - 12/31	1/1 - 12/31	275		149.2
Total Flow Rate and Volume Required					550		298.4

19. ☐ Y ☒ N Does the proposed use include on or more of the following purposes: domestic, multiple domestic, stock, or irrigation? If yes, fill out the following table, where applicable.

Purpose	Requested Information	Response
Domestic or multiple domestic	Number of dwellings	
Stock	Number of animal units	
Irrigation	Method of irrigation type (sprinkler or flood) and subtype (if flood: level border, graded border, furrow, contour ditch, or other; if sprinkler: center pivot, wheel line, or other)	
Irrigation (flood only)	Design slope	

POINT(S) OF DIVERSION

20. Describe the proposed location of the point(s) diversion to the nearest $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ Section. Label each POD with the POD ID number used for the project map (question 17).

POD #	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Sec.	Twp.	Rge.	County	Lot	Block	Tract	Subdivision	Gov. Lot
1	SW	SE	SE	22	1S	5E	Gallatin	26	7		Nelson Meadows	
2	SW	SE	SE	22	1S	5E	Gallatin	26	7		Nelson Meadows	

PLACE OF USE

21. What are the geocodes of the place of use?

06-0904-22-4-01-25-0000	

22. Describe the legal land description for the proposed place of use and, if applying for an irrigation or lawn and garden purpose, list the number of irrigated acres.

Acres	Gov. Lot	Block	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Sec.	Twp.	Rge.	County
			SE	sw	SE	22	1S	5E	Gallatin
			SW	SE	SE	22	1S	5E	Gallatin
			NW	Ne	Ne	27	1S	5E	Gallatin

SUPPLEMENTAL AND OVERLAPPING WATER RIGHTS

23. ☐ Y ☒ N Will other water rights supplement or overlap the place of use to contribute to the purpose(s)?

23.a. If yes, summarize how the supplemental and proposed water rights will be operated as a whole to serve the purpose(s).

24. For each supplemental or overlapping water right, please list the water right number, typical period of diversion and use (MM/DD-MM/DD), flow rate (GPM or CFS), and the volume of water (AF) contributed to the shared place of use.

Water Right #	Average Period of Diversion	Average Period of Use	Flow Rate	Volume Contributed

25. ☐ Y ☒ N Will this application supplement contract water from a Federal Project, ditch company, or other source?

25.a. If yes, explain.

ADVERSE EFFECT

26. Explain how you can control your diversion in response to a call being made.

The usage is non-consumptive geothermal and all diverted flows are returned to the production formation. Diverted water is controlled by variable frequency drives that allow adjustments to flow rate and can be adapted to reduce drawdown in event of a call.

27. Describe any plans you have for ensuring existing water rights will be satisfied during times of water shortage.

see above

28. ☐ Y ☒ N Are you aware of any calls that have been made on the source of supply or, if groundwater, on nearby surface water sources?

28.a. If yes, explain.

29. ☐ Y ☒ N Does a water commissioner distribute water or oversee water distribution on your proposed source?

29.a. If yes, list the source(s).

30. ☐ Y ☒ N Do other water rights share any of the proposed points of diversion?

30.a. If yes, describe how the proposed project will not adversely affect these water rights.

31. ☐ Y ☒ N Do other water rights share any conveyance infrastructure associated with the proposed project?

31.a. If yes, describe how the proposed project will not adversely affect these water rights.

ADEQUATE MEANS OF DIVERSION AND OPERATION

32. ☒ S Submit a diagram of how you will operate your system from all proposed points of diversion to all proposed places of use. [Diagrams include both distribution lines from wells to building and building to injection wells, and mechanical for heat exchange components \(see attached\)](#)

33. Describe specific information about the capacity of all proposed diversionary structures. This may include, where applicable: pump curves and total dynamic head calculations, headgate design specifications, and dike or dam height and length.

- pump curves attached.

- Dynamic Head Calculations attached.

34. Describe the size, materials, capacity, and configuration of infrastructure to convey water from all proposed points of diversion to all proposed places of use. This may include but is not limited to, pipelines and ditches. Include a description of any losses related to the proposed conveyance. Ditch conveyance losses may be estimated numerous ways, which include a ditch loss rate or Department standard methods.

Two wells provide water independently to the system; Conveyance consists of 150 feet of 4-inch drop pipe in each well to 6-inch conveyance via pitless adapter. All downstream conveyance is 6-inch diameter with piping extending 50 feet from EX-2 and 200 feet from EX-1 into building through 2 90 degree elbows, a heat exchange unit (44 feet head loss), two gate valves, 2 90 degree elbows. Waters then travel 530 and 660 feet via 6-inch PVC piping with to injection wells IN-1 and IN-2 respectively . An in-line gate valve is present before each well then a Spool pitless adapter.

35. Describe how the proposed diversion and conveyance infrastructure can provide the required flow and volume, for the purposes plus any conveyance losses and storage, throughout the proposed period of diversion.

The pump curve for the pumps installed in wells EX-1 and EX-2 allow for a maximum flow of >275 gpm required during peak demand periods anticipated during the cooling season. The system will operate at significantly less flows throughout a majority of the year with an average rate of 170 gpm. This allows the system to operate with an individual pump system and one redundant pump system for maintenance, etc.

36. Provide a plan of operations, which includes specific information about how water is delivered within the place of use. This may include, where applicable, the range of flow rates needed for a pivot.
The automated system will allow adjustment of diverted flows via variable frequency drives (VFDs) to provide cooling waters based on demand. Water may be diverted from a single POD during periods of low demand and increase diverted volumes during periods of high demand.

37. ☐ Y ☒ N Does the proposed conveyance require easements?

37.a. If yes, explain.

38. ☒ Y ☐ N Do you own the land where all proposed points of diversion are located?

38.a. ☐ S If no, submit documentation to show you have the right to use all points of diversion located on each property you do not own. This may include, but is not limited to, a well agreement, an easement, or permission of the party that owns the property where the proposed point(s) of diversion are located.

39. ☒ Y ☐ N Will your system be designed to discharge water from the project?

IF YES,

39.a. Explain the wastewater disposal method.

System is an open-loop geothermal system. As such, all diverted water will be returned / discharged via injection wells to production aquifer.

39.b. ☒ Y ☐ N ☐ NA Have the necessary permits been obtained to comply with §§ 75-5-410 and 85-2-364, MCA?

40. ☒ Y ☐ N Do you have any plans to measure your diversion and use?

40.a. If yes, describe the plan and the type of measurements you will take.

The system is equipped with a flow meter / totalizer.

41. ☒ Y ☐ N Is the means of diversion for any proposed point of diversion a well?

IF YES,

41.a. ☒ Y ☐ N Have all wells been drilled?

41.b. For all wells that have been drilled, what is the name of the well driller and, if available, what is their license number?

Driller is Bridger Drilling, Tyler Sampson Driller, Lic. No. WWC-165

41.c. ☒ Y ☐ N For all wells yet to be drilled, will a licensed well driller construct the wells?

41.d. ☐ S ☒ NA Submit any well logs not yet submitted to the Department.

BENEFICIAL USE

42. ☐ Y ☒ N Does the Department have a volume, period of diversion, or period of use standard for the purposes for which water is proposed? Department standards can be found in the DNRC Water Calculation Guide, ARM 36.12.112, and ARM 36.12.115.

42.a. ☐ Y ☐ N If yes, do all proposed beneficial uses fall within Department standards?

42.b. If no Department standard exists, or if any proposed beneficial use falls outside of Department standards, explain how the requested flow rate and volume are reasonable for the purpose.

The purpose is to provide geothermal cooling capacity for a commercial building and is designed as a non-consumptive open-loop well system with extraction and injection wells returning 100 percent of water back to source.

43. ☐ Y ☒ N Will your proposed project be subject to DEQ requirements for a public water supply (PWS) system or Certificate of Subdivision Approval (COSA)?

44. ☐ Y ☒ N Are you proposing to use surface water for in-house domestic use?

44.a. ☐ Y ☐ N If yes, does a COSA exist for the proposed place of use?

44.a.i. ☐ S ☐ NA If yes, please submit the COSA.

44.a.ii. ☐ Y ☐ N If no, have you researched or consulted with DEQ regarding their requirements?



POSSESSORY INTEREST

45. ☐ Y ☒ N Do you meet one of the exceptions to possessory interest requirements, pursuant to ARM 36.12.1802? Exceptions include cases where the application is for sale, rental, distribution, or is a municipal use, or in any other context in which water is being supplied to another and it is clear that the ultimate user will not accept the supply without consenting to the use of water on the user's place of use.

45.a. If yes, explain.

46. ☒ Y ☐ N ☐ NA Do you own all proposed places of use? Mark "NA" if you meet one of the exceptions to the possessory interest requirement.

IF NO,

46.a. ☐ S Explain and submit documentation that shows you either have possessory interest or written permission of the parties with possessory interest of the place of use.

46.b. ☐ Y ☐ N Would you like the water right to be appurtenant to the land? Please note that if your water right is not appurtenant to land it will not transfer by default with the conveyance of the property, pursuant to § 85-2-403, MCA.

46.b.i. If no, explain.

PROPOSED COMPLETION PERIOD

47. How much time will be needed to complete this project and to submit to the DNRC a Project Completion Notice (Form 617)? No additional time needed. Project is complete

48. Please describe why this amount of time is needed to complete this project.

AFFIDAVIT & CERTIFICATION

Read carefully before you sign and review with legal counsel if you have any questions. All owners (or trustees) must sign the form. ***If the owner is a business or trust, include the title of the representative(s) signing the form (i.e., president, trustee, managing partner, etc.) and provide documentation that establishes the authority of the representative to sign the application.*

I affirm the information provided for this application is to the best of my knowledge true and correct. If a preapplication meeting form was submitted, I am aware that my application for this project will not qualify for a discounted filing fee and expedited timelines if upon submittal of the application to the Department, I changed any element of the proposed application from the preapplication meeting form and follow-up materials (ARM 36.12.1302(6)(a)).

I affirm I have possessory interest, or the written consent of the person with the possessory interest, in the property where the water is to be put to beneficial use, unless this application meets an exception to the possessory interest requirements in ARM 36.12.1802(1)(b).

I understand that making a false statement under oath or affirmation in this application and official proceedings throughout the examination of my application may subject me to prosecution under § 45-7-202, MCA, a misdemeanor punishable by a jail term not to exceed 6 months or a fine not to exceed \$500, or both. I have read this Affidavit and understand the terms and conditions.

I declare under penalty of perjury and under the laws of the state of Montana that the foregoing is true and correct.

Printed Name _____

Applicant Signature _____ Date: 09/02/2025

Printed Name _____

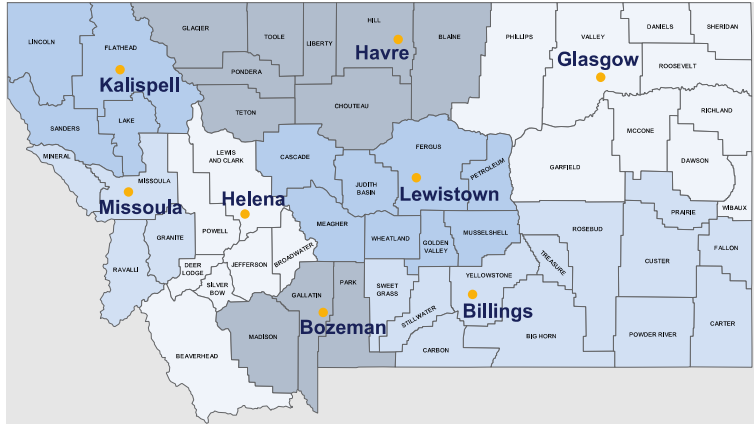
Applicant Signature _____ Date: _____

Printed Name _____

Applicant Signature _____ Date: _____



WATER RESOURCES REGIONAL OFFICES



BILLINGS

Airport Industrial Park, 1371 Rimtop Dr
Billings, MT 59105-9702

PHONE 406-247-4415 FAX 406-247-4416

EMAIL DNRCBillingsWater@mt.gov

Big Horn, Carbon, Carter, Custer, Fallon, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, Treasure, and Yellowstone Counties



BOZEMAN

2273 Boot Hill Court, Suite 110
Bozeman, MT 59715-7249

PHONE 406-586-3136 FAX 406-587-9726

EMAIL DNRCBozemanWater@mt.gov

Gallatin, Madison, and Park Counties



GLASGOW

222 6th Street South, PO Box 1269
Glasgow, MT 59230-1269

PHONE 406-228-2561

EMAIL DNRCGlasgowWater@mt.gov

Daniels, Dawson, Garfield, McCone, Phillips, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties



HAVRE

210 6th Ave., PO Box 1828
Havre, MT 59501-1828

PHONE 406-265-5516

EMAIL DNRCHavreWater@mt.gov

Blaine, Chouteau, Glacier, Hill, Liberty, Pondera, Teton, and Toole Counties



HELENA

1424 9th Ave., PO Box 201601,
Helena, MT 59620-1601

PHONE 406-444-6999 FAX 406-444-9317

EMAIL DNRCHelenaWater@mt.gov

Beaverhead, Broadwater, Deer Lodge, Jefferson, Lewis and Clark, Powell, and Silver Bow Counties



KALISPELL

655 Timberwolf Parkway, Suite 4
Kalispell, MT 59901-1215

PHONE 406-752-2288

EMAIL DNRCKalispellWater@mt.gov

Flathead, Lake, Lincoln, and Sanders Counties



LEWISTOWN

613 Northeast Main St., Suite E
Lewistown, MT 59457-2020

PHONE 406-538-7459

EMAIL DNRCLewistownWater@mt.gov

Cascade, Fergus, Golden Valley, Judith Basin, Meagher, Musselshell, Petroleum, and Wheatland Counties



MISSOULA

2705 Spurgin Rd. Bldg. C, PO Box 5004
Missoula, MT 59806-5004

PHONE 406-721-4284 FAX 406-542-5899

EMAIL DNRCMissoulaWater@mt.gov

Granite, Mineral, Missoula, and Ravalli Counties



DNRC

2273 Boot Hill Ct, STE 110

Bozeman, MT 59715

406-556-4500

October 14, 2025

Barnard Construction, Inc.

3520 Royal Wolf Way

Bozeman, MT 59718

Subject: Deficiency Letter for Beneficial Water Use Permit Application No. 41H 30165312

Dear Applicant:

The Department of Natural Resources and Conservation (DNRC or Department) has begun reviewing your application. This letter is to notify you of the deficiencies in your application as required in ARM 36.12.1501(1) and §85-2-302(5)(b), MCA. An Applicant is required to submit substantial and credible information addressing the rules and statutes that are relative to your application. You must provide the information specified below for your application to be considered correct and complete. "Correct and complete" means all of the information provided is substantial and credible and provides all of the information as required by applicable rules and statutes. The application as submitted contains deficiencies in the following section(s):

APPLICATION DETAILS – ARM 36.12.1304

- ☐ **2.b. Submit the technical analyses, if you elected in question 1 for Applicant technical analyses to be used for criteria assessment. Select "NA" if you elected for Departmental technical analyses.**
 - Applicant elected for Department technical analysis. Please clarify the answer.
- ☐ **2.c. Has any element of the project described in this application changed from the mandatory elements of the project described in the completed form 600P?**
 - Question not answered. Please answer the question.
- ☐ **2.d. Are the technical analyses to be used for criteria assessment exactly the same as those completed during the preapplication process?**
 - Question not answered. Please answer the question.
- ☐ **2.e. Did you elect in Question 1 for Department technical analyses to be used for criteria assessment?**
 - Question not answered. Please answer the question.



- ☐ 20. Describe the proposed location of the point(s) diversion to the nearest ¼ ¼ ¼ Section. Label each POD with the POD ID number used for the project map (question 17).
- Information in the Table shows the legal land descriptions for the injection wells. Please update the table for the extraction well legal land descriptions.
- ☐ 22. Describe the legal land description for the proposed place of use and, if applying for an irrigation or lawn and garden purpose, list the number of irrigated acres.
- The information submitted does not include all POUs that are also listed on the Preapplication Meeting Form (600P). Please update the table to include all of the legal land descriptions of the proposed place of use.

BENEFICIAL USE– ARM 36.12.1801

- ☐ 42. Does the Department have a volume, period of diversion, or period of use standard for the purposes for which water is proposed? Department standards can be found in the DNRC Water Calculation Guide, ARM 36.12.112, and ARM 36.12.115.
- The Department does not have a volume, period of diversion, or period of use standard for the Geothermal purpose proposed. Please update the question and explain how the requested flow rate and volume are reasonable for the purpose.

As stated above, the information submitted to address the rules and statutes listed in this deficiency letter must be substantial credible information to be acceptable at the correct and complete determination. §§85-2-102(9) and (26), MCA.

Please submit the information specified above to the Bozeman Regional Office by February 11, 2026. This is the only deficiency letter that will be sent. An application not corrected or completed within 120 days from the date of this letter is terminated per ARM 36.12.1501(2) and §85-2-302(6)(a), MCA.

Please let me know if you have any questions.

Best,



Kendrew Ellis
Water Resources Specialist
Bozeman Water Resources Office
Water Resources Division

Cc, via email: Pat Thomson, pthomson@waterenvtech.com





**APPLICATION FOR
BENEFICIAL WATER USE
PERMIT**

§ 85-2-302, MCA

Form No. 600 (02/2025)

FILING FEE

\$2900/\$1600 – Inside a Basin Closure Area, Controlled Groundwater Area or Compact Closure; without/with filing fee reduction.

\$2500/\$1200 – Outside a Basin Closure Area; Controlled Groundwater Area or Compact Closure; without/with filing fee reduction.

INFORMATION

An application will be eligible for a filing fee reduction and expedited timelines if the applicant completes a preapplication meeting with the Department (ARM 36.12.1302(1)), which includes submitting any follow-up information identified by the Department (ARM 36.12.1302(3)(c)) and receiving either Department-completed technical analyses or Department review of applicant-submitted technical analyses (ARM 36.12.1302(4) and (5)). An application for the proposed project also must be submitted within 180 days of delivery of Department technical analyses or scientific credibility review and no element on the submitted application can be changed from the completed preapplication meeting form (ARM 36.12.1302(6)). If application is eligible for a filing fee reduction, \$500 paid for Form 600P-B will be credited toward filing fees shown above.

For Department Use Only

RECEIVED

SEP 23 2025

DNRC

BOZEMAN WATER RESOURCES

Application # _____ Basin _____
Priority Date _____ Time _____ AM/PM
Rec'd By _____
Fee Rec'd \$ _____ Check # _____
Deposit Receipt # _____
Payor _____
Refund \$ _____ Date _____

Applicant Information: *Add more as necessary.*

Applicant Name Barnard Construction, Inc., Josiah Kiehl

Mailing Address 3520 Royal Wolf Way City Bozeman State MT Zip 59718

Phone Numbers: Home _____ Work 406-586-1995 Cell _____

Email Address josiah.kiehl@barnard-inc.com

Applicant Name Barnard Construction, Inc., Mathew Engel

Mailing Address 3520 Royal Wolf Way City Bozeman State MT Zip 59718

Phone Numbers: Home _____ Work 406-586-1995 Cell _____

Email Address matthew.engel@barnard-inc.com

Applicant Name _____

Mailing Address _____ City _____ State _____ Zip _____

Phone Numbers: Home _____ Work _____ Cell _____

Email Address _____

Contact/Representative Information: *Add more as necessary.*

Contact/Representative is: ☐ Applicant ☒ Consultant ☐ Attorney ☐ Other

Contact/Representative Name WET, Inc., Pat Thomson

Mailing Address 480 E. Park City Butte State MT Zip 59701

Phone Numbers: Home _____ Work 406-782-5220 Cell 406-490-0329

Email Address pthomson@waterenvtech.com

NOTE: If a contact person is identified as an attorney, all communication will be sent only to the attorney unless the attorney provides written instruction to the contrary (ARM 36.12.122(2)). If a contact person is identified as a consultant, employee, or lessee, the individual filing the water right form or objection form will receive all correspondences, and a copy may be sent to the contact person (ARM 36.12.122(3)).



Answer every question and applicable follow-up questions. Use the checkboxes to denote yes ("Y"), no ("N"), or not applicable ("NA"). Questions that require items to be submitted to the Department have a submitted ("S") checkbox, which is marked when the required item is attached to the Application. Label all submitted items with the question number for which they were submitted. Narrative responses that are larger than the space provided can be answered in an attachment. If an attachment is used, specify "see attachment" on this form, and label the attachment with the question number. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Responses in the form of a table may be entered into the table provided on this form or in an attachment. If an attachment is used, the table must have the exact headings found on this form, and "see attachment" must be entered as a response to the relevant question. Clearly label all units in tables and narrative responses.

PREAPPLICATION AND TECHNICAL ANALYSES INFORMATION

1. ☒ **Y** ☐ **N** Do you elect for Department technical analyses to be used for criteria assessment?

2. ☒ **Y** ☐ **N** Did you have a preapplication meeting AND complete a Permit Preapplication Meeting Form Part A and Part B (Form 600P-A and 600P-B)?

IF QUESTION 2 IS NO, answer 2.a and 2.b:

2.a. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.b. ☐ **S** ☒ **NA** Submit the technical analyses, if you elected in question 1 for Applicant technical analyses to be used for criteria assessment. Select "NA" if you elected for Departmental technical analyses.

IF QUESTION 2 IS YES, answer 2.c, 2.d, and 2.e:

2.c. ☐ **Y** ☒ **N** Has any element of the project described in this application changed from the mandatory elements of the project described in the completed form 600P? **If yes:**

2.c.i. Please explain.

2.c.ii. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.d. ☒ **Y** ☐ **N** Are the technical analyses to be used for criteria assessment exactly the same as those completed during the preapplication process? **If no:**

2.d.i. Please explain.

2.d.ii. ☐ **S** Submit the Technical Analyses Addendum (Form 600-TAA).

2.e. ☒ **Y** ☐ **N** Did you elect in Question 1 for Department technical analyses to be used for criteria assessment? **If no:**

2.e.i. ☐ **S** Submit the technical analyses.



APPLICATION ADDENDA AND REVIEW

3. ☒ **S** ☐ **NA** If your application is for groundwater, not surface water, and one or more of your points of diversion are in a Basin Closure Area, then submit the Basin Closure Area Addendum (Form 600-BCA).
4. ☒ **S** ☐ **NA** If your application is for groundwater and one or more points of diversion are in a Basin Closure Area, then your project must have a Hydrogeologic Report that conforms with MCA 85-2-361 to comply with the requirements of § 85-2-360, MCA. A Hydrogeologic Report Addendum (Form 600-HRA) or Department Technical Analyses may be used to meet these requirements. Please mark the box below that best applies, then select "S" if submitting a Hydrogeologic Report or "NA" if one is not required. This question does not apply to surface water points of diversion in a Basin Closure Area.
- ☐ If you elected to conduct Technical Analyses, you must submit the Hydrogeologic Report Addendum (Form 600-HRA).
 - ☐ If you elected for DNRC to conduct Technical Analyses but did not have a preapplication meeting AND complete a Form 600P Permit Preapplication Meeting Form (or changes have occurred since the completed Form 600P), you must submit the Hydrogeologic Report Addendum (Form 600-HRA).
 - ☒ If you elected for DNRC to conduct Technical Analyses, had a preapplication meeting, completed a Form 600P, and the Technical Analyses remain unchanged since the preapplication meeting, you do not need to submit Form 600-HRA because the Department's Technical Analyses meet the report requirements of § 85-2-360 and § 85-2-361, MCA.
5. ☐ **S** ☒ **NA** If the project is for one or more groundwater points of diversion located in a Controlled Groundwater Area, then submit the Controlled Groundwater Area Addendum (Form 600-CGWA).
6. ☐ **S** ☒ **NA** If the project involves an appropriation that is greater than 5.5 CFS and 4,000 acre-feet, then submit a Criteria Addendum Application for Beneficial Water Use Permit for Appropriations Greater than 5.5 CFS and 4,000 AC-FT (Form 600-B).
7. ☐ **S** ☒ **NA** If the project involves out-of-state water use, then submit the Out-of-State Use Addendum (Form 600/606-OSA).
8. ☐ **S** ☒ **NA** If you require mitigation water to meet the criteria of issuance, then submit a Mitigation Purpose Addendum (Form 600/606-MIT).
9. ☐ **S** ☒ **NA** If the proposed purposes include marketing or selling water, (not marketing for mitigation/aquifer recharge), then submit the Marketing Purpose Addendum (Form 600/606-WMA).
10. ☐ **S** ☒ **NA** If the project involves one or more places of storage, then submit a Permit Storage Addendum (Form 600-SA). This does not include reservoirs, pits, pit-dams, or ponds with a capacity less than 0.1 AF; water tanks; or cisterns (ARM 36.12.113(6)).
11. ☐ **S** ☒ **NA** If the project is in designated sage grouse habitat, then submit a review letter from the Montana Sage Grouse Habitat Conservation Program.
12. ☐ **S** ☒ **NA** If the project includes a point of diversion and/or place of use on State of Montana Trust Land, submit documentation of consent from the DNRC Trust Lands Management Division.
13. ☐ **S** ☒ **NA** You must provide a written notice of the application to each owner of an appropriation right sharing a point of diversion or means of conveyance (e.g., canal, ditch, flume, pipeline, or constructed waterway) pursuant to §85-2-302(4)(c), MCA. Submit a copy of this notice and the recipient list.

PURPOSE AND DIVERSION INFORMATION

14. ☐ Y ☒ N Is the proposed use temporary?

14.a. If yes, when will the appropriation cease? _____

15. Is the proposed source surface water or groundwater? Groundwater

16. What is the source name? Tertiary Alluvium

17. ☒ S Attach a map utilizing an aerial photograph or topographic map that shows the following: section corners; township and range; north arrow; scale bar; all proposed points of diversion labeled with a unique Point of Diversion (POD) ID number and, if applicable, GWIC number; all proposed places of use; all proposed conveyance facilities and or routes; all proposed places of storage labeled with a unique Storage ID number; and places of use (POU) for all overlapping water rights. More than one map may be submitted, if necessary to clearly convey all required information.

18. Fill out the table below. Means of diversion for surface water includes headgate, pump, dam, and others. Means of diversion for groundwater includes well, developed spring, pit pond, and others.

Purpose	Means of Diversion	Acres Irrigated (if appl.)	Period of Diversion (Month/Day - Month/Day)	Period of Use (Month/Day - Month/Day)	Flow Rate	Volume (Acre-Feet)
					☒ GPM ☐ CFS	
Geothermal	Well		1/1 - 12/31	1/1 - 12/31	275	149.2
Geothermal	Well		1/1 - 12/31	1/1 - 12/31	275	149.2
Total Flow Rate and Volume Required					550	298.4

19. ☐ Y ☒ N Does the proposed use include on or more of the following purposes: domestic, multiple domestic, stock, or irrigation? If yes, fill out the following table, where applicable.

Purpose	Requested Information	Response
Domestic or multiple domestic	Number of dwellings	
Stock	Number of animal units	
Irrigation	Method of irrigation type (sprinkler or flood) and subtype (if flood: level border, graded border, furrow, contour ditch, or other; if sprinkler: center pivot, wheel line, or other)	
Irrigation (flood only)	Design slope	

POINT(S) OF DIVERSION

20. Describe the proposed location of the point(s) diversion to the nearest $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ Section. Label each POD with the POD ID number used for the project map (question 17).

POD #	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Sec.	Twp.	Rge.	County	Lot	Block	Tract	Subdivision	Gov. Lot
1	SW	SE	SE	22	1S	5E	Gallatin	26	7		Nelson Meadows	
2	SW	SE	SE	22	1S	5E	Gallatin	26	7		Nelson Meadows	

PLACE OF USE

21. What are the geocodes of the place of use?

06-0904-22-4-01-25-0000	

22. Describe the legal land description for the proposed place of use and, if applying for an irrigation or lawn and garden purpose, list the number of irrigated acres.

Acres	Gov. Lot	Block	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	Sec.	Twp.	Rge.	County
			SE	sw	SE	22	1S	5E	Gallatin
			SW	SE	SE	22	1S	5E	Gallatin
			NW	Ne	Ne	27	1S	5E	Gallatin

SUPPLEMENTAL AND OVERLAPPING WATER RIGHTS

23. ☐ Y ☒ N Will other water rights supplement or overlap the place of use to contribute to the purpose(s)?

23.a. If yes, summarize how the supplemental and proposed water rights will be operated as a whole to serve the purpose(s).

24. For each supplemental or overlapping water right, please list the water right number, typical period of diversion and use (MM/DD-MM/DD), flow rate (GPM or CFS), and the volume of water (AF) contributed to the shared place of use.

Water Right #	Average Period of Diversion	Average Period of Use	Flow Rate	Volume Contributed

25. ☐ Y ☒ N Will this application supplement contract water from a Federal Project, ditch company, or other source?

25.a. If yes, explain.

ADVERSE EFFECT

26. Explain how you can control your diversion in response to a call being made.

The usage is non-consumptive geothermal and all diverted flows are returned to the production formation. Diverted water is controlled by variable frequency drives that allow adjustments to flow rate and can be adapted to reduce drawdown in event of a call.

27. Describe any plans you have for ensuring existing water rights will be satisfied during times of water shortage.

see above

28. ☐ Y ☒ N Are you aware of any calls that have been made on the source of supply or, if groundwater, on nearby surface water sources?

28.a. If yes, explain.

29. ☐ Y ☒ N Does a water commissioner distribute water or oversee water distribution on your proposed source?

29.a. If yes, list the source(s).

30. ☐ Y ☒ N Do other water rights share any of the proposed points of diversion?

30.a. If yes, describe how the proposed project will not adversely affect these water rights.

31. ☐ Y ☒ N Do other water rights share any conveyance infrastructure associated with the proposed project?

31.a. If yes, describe how the proposed project will not adversely affect these water rights.

ADEQUATE MEANS OF DIVERSION AND OPERATION

32. ☒ S Submit a diagram of how you will operate your system from all proposed points of diversion to all proposed places of use. [Diagrams include both distribution lines from wells to building and building to injection wells, and mechanical for heat exchange components \(see attached\)](#)

33. Describe specific information about the capacity of all proposed diversionary structures. This may include, where applicable: pump curves and total dynamic head calculations, headgate design specifications, and dike or dam height and length.

- pump curves attached.

- Dynamic Head Calculations attached.

34. Describe the size, materials, capacity, and configuration of infrastructure to convey water from all proposed points of diversion to all proposed places of use. This may include but is not limited to, pipelines and ditches. Include a description of any losses related to the proposed conveyance. Ditch conveyance losses may be estimated numerous ways, which include a ditch loss rate or Department standard methods.

Two wells provide water independently to the system; Conveyance consists of 150 feet of 4-inch drop pipe in each well to 6-inch conveyance via pitless adapter. All downstream conveyance is 6-inch diameter with piping extending 50 feet from EX-2 and 200 feet from EX-1 into building through 2 90 degree elbows, a heat exchange unit (44 feet head loss), two gate valves, 2 90 degree elbows. Waters then travel 530 and 660 feet via 6-inch PVC piping with to injection wells IN-1 and IN-2 respectively . An in-line gate valve is present before each well then a Spool pitless adapter.

35. Describe how the proposed diversion and conveyance infrastructure can provide the required flow and volume, for the purposes plus any conveyance losses and storage, throughout the proposed period of diversion.

The pump curve for the pumps installed in wells EX-1 and EX-2 allow for a maximum flow of >275 gpm required during peak demand periods anticipated during the cooling season. The system will operate at significantly less flows throughout a majority of the year with an average rate of 170 gpm. This allows the system to operate with an individual pump system and one redundant pump system for maintenance, etc.

36. Provide a plan of operations, which includes specific information about how water is delivered within the place of use. This may include, where applicable, the range of flow rates needed for a pivot. The automated system will allow adjustment of diverted flows via variable frequency drives (VFDs) to provide cooling waters based on demand. Water may be diverted from a single POD during periods of low demand and increase diverted volumes during periods of high demand.

37. ☐ Y ☒ N Does the proposed conveyance require easements?

37.a. If yes, explain.

38. ☒ Y ☐ N Do you own the land where all proposed points of diversion are located?

38.a. ☐ S If no, submit documentation to show you have the right to use all points of diversion located on each property you do not own. This may include, but is not limited to, a well agreement, an easement, or permission of the party that owns the property where the proposed point(s) of diversion are located.

39. ☒ Y ☐ N Will your system be designed to discharge water from the project?

IF YES,

39.a. Explain the wastewater disposal method.

System is an open-loop geothermal system. As such, all diverted water will be returned / discharged via injection wells to production aquifer.

39.b. ☒ Y ☐ N ☐ NA Have the necessary permits been obtained to comply with §§ 75-5-410 and 85-2-364, MCA?

40. ☒ Y ☐ N Do you have any plans to measure your diversion and use?

40.a. If yes, describe the plan and the type of measurements you will take.

The system is equipped with a flow meter / totalizer.

41. ☒ Y ☐ N Is the means of diversion for any proposed point of diversion a well?

IF YES,

41.a. ☒ Y ☐ N Have all wells been drilled?

41.b. For all wells that have been drilled, what is the name of the well driller and, if available, what is their license number?

Driller is Bridger Drilling, Tyler Sampson Driller, Lic. No. WWC-165

41.c. ☒ Y ☐ N For all wells yet to be drilled, will a licensed well driller construct the wells?

41.d. ☐ S ☒ NA Submit any well logs not yet submitted to the Department.

BENEFICIAL USE

42. ☐ Y ☒ N Does the Department have a volume, period of diversion, or period of use standard for the purposes for which water is proposed? Department standards can be found in the DNRC Water Calculation Guide, ARM 36.12.112, and ARM 36.12.115.

42.a. ☐ Y ☐ N If yes, do all proposed beneficial uses fall within Department standards?

42.b. If no Department standard exists, or if any proposed beneficial use falls outside of Department standards, explain how the requested flow rate and volume are reasonable for the purpose.

The purpose is to provide geothermal cooling capacity for a commercial building and is designed as a non-consumptive open-loop well system with extraction and injection wells returning 100 percent of water back to source.

43. ☐ Y ☒ N Will your proposed project be subject to DEQ requirements for a public water supply (PWS) system or Certificate of Subdivision Approval (COSA)?

44. ☐ Y ☒ N Are you proposing to use surface water for in-house domestic use?

44.a. ☐ Y ☐ N If yes, does a COSA exist for the proposed place of use?

44.a.i. ☐ S ☐ NA If yes, please submit the COSA.

44.a.ii. ☐ Y ☐ N If no, have you researched or consulted with DEQ regarding their requirements?



POSSESSORY INTEREST

45. ☐ Y ☒ N Do you meet one of the exceptions to possessory interest requirements, pursuant to ARM 36.12.1802? Exceptions include cases where the application is for sale, rental, distribution, or is a municipal use, or in any other context in which water is being supplied to another and it is clear that the ultimate user will not accept the supply without consenting to the use of water on the user's place of use.

45.a. If yes, explain.

46. ☒ Y ☐ N ☐ NA Do you own all proposed places of use? Mark "NA" if you meet one of the exceptions to the possessory interest requirement.

IF NO,

- 46.a. ☐ S Explain and submit documentation that shows you either have possessory interest or written permission of the parties with possessory interest of the place of use.

- 46.b. ☐ Y ☐ N Would you like the water right to be appurtenant to the land? Please note that if your water right is not appurtenant to land it will not transfer by default with the conveyance of the property, pursuant to § 85-2-403, MCA.

46.b.i. If no, explain.

PROPOSED COMPLETION PERIOD

47. How much time will be needed to complete this project and to submit to the DNRC a Project Completion Notice (Form 617)? No additional time needed. Project is complete

48. Please describe why this amount of time is needed to complete this project.

AFFIDAVIT & CERTIFICATION

Read carefully before you sign and review with legal counsel if you have any questions. All owners (or trustees) must sign the form. ***If the owner is a business or trust, include the title of the representative(s) signing the form (i.e., president, trustee, managing partner, etc.) and provide documentation that establishes the authority of the representative to sign the application.*

I affirm the information provided for this application is to the best of my knowledge true and correct. If a preapplication meeting form was submitted, I am aware that my application for this project will not qualify for a discounted filing fee and expedited timelines if upon submittal of the application to the Department, I changed any element of the proposed application from the preapplication meeting form and follow-up materials (ARM 36.12.1302(6)(a)).

I affirm I have possessory interest, or the written consent of the person with the possessory interest, in the property where the water is to be put to beneficial use, unless this application meets an exception to the possessory interest requirements in ARM 36.12.1802(1)(b).

I understand that making a false statement under oath or affirmation in this application and official proceedings throughout the examination of my application may subject me to prosecution under § 45-7-202, MCA, a misdemeanor punishable by a jail term not to exceed 6 months or a fine not to exceed \$500, or both. I have read this Affidavit and understand the terms and conditions.

I declare under penalty of perjury and under the laws of the state of Montana that the foregoing is true and correct.

Printed Name _____

Applicant Signature _____ Date: 09/02/2025

Printed Name _____

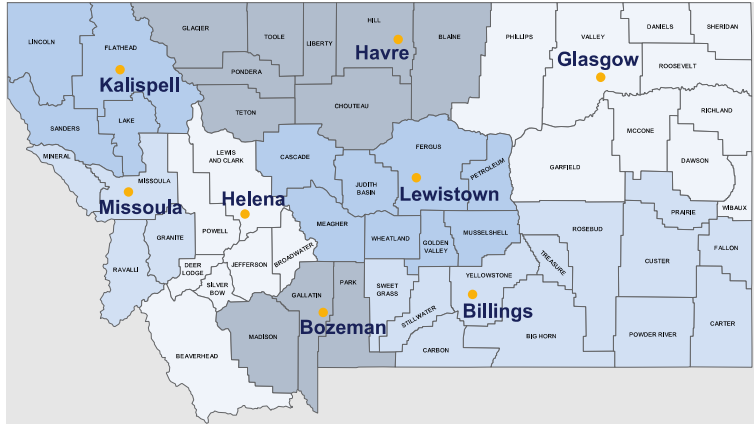
Applicant Signature _____ Date: _____

Printed Name _____

Applicant Signature _____ Date: _____



WATER RESOURCES REGIONAL OFFICES



BILLINGS

Airport Industrial Park, 1371 Rimtop Dr
Billings, MT 59105-9702

PHONE 406-247-4415 FAX 406-247-4416

EMAIL DNRCBillingsWater@mt.gov

Big Horn, Carbon, Carter, Custer, Fallon, Powder River, Prairie, Rosebud, Stillwater, Sweet Grass, Treasure, and Yellowstone Counties



BOZEMAN

2273 Boot Hill Court, Suite 110
Bozeman, MT 59715-7249

PHONE 406-586-3136 FAX 406-587-9726

EMAIL DNRCBozemanWater@mt.gov

Gallatin, Madison, and Park Counties



GLASGOW

222 6th Street South, PO Box 1269
Glasgow, MT 59230-1269

PHONE 406-228-2561

EMAIL DNRCGlasgowWater@mt.gov

Daniels, Dawson, Garfield, McCone, Phillips, Richland, Roosevelt, Sheridan, Valley, and Wibaux Counties



HAVRE

210 6th Ave., PO Box 1828
Havre, MT 59501-1828

PHONE 406-265-5516

EMAIL DNRCHavreWater@mt.gov

Blaine, Chouteau, Glacier, Hill, Liberty, Pondera, Teton, and Toole Counties



HELENA

1424 9th Ave., PO Box 201601,
Helena, MT 59620-1601

PHONE 406-444-6999 FAX 406-444-9317

EMAIL DNRCHelenaWater@mt.gov

Beaverhead, Broadwater, Deer Lodge, Jefferson, Lewis and Clark, Powell, and Silver Bow Counties



KALISPELL

655 Timberwolf Parkway, Suite 4
Kalispell, MT 59901-1215

PHONE 406-752-2288

EMAIL DNRCKalispellWater@mt.gov

Flathead, Lake, Lincoln, and Sanders Counties



LEWISTOWN

613 Northeast Main St., Suite E
Lewistown, MT 59457-2020

PHONE 406-538-7459

EMAIL DNRCLewistownWater@mt.gov

Cascade, Fergus, Golden Valley, Judith Basin, Meagher, Musselshell, Petroleum, and Wheatland Counties



MISSOULA

2705 Spurgin Rd. Bldg. C, PO Box 5004
Missoula, MT 59806-5004

PHONE 406-721-4284 FAX 406-542-5899

EMAIL DNRCMissoulaWater@mt.gov

Granite, Mineral, Missoula, and Ravalli Counties

Form 600-TAA - Question 2, Technical Analysis Addendum



**APPLICATION FOR BENEFICIAL WATER USE PERMIT
TECHNICAL ANALYSES ADDENDUM**
ARM 36.12.1303

Answer every question and applicable follow-up questions. Use the checkboxes to denote yes ("Y") or no ("N"). Questions that require items to be submitted to the Department have a submitted ("S") checkbox, which is marked when the required item is attached to the Technical Analyses Addendum. Label all submitted items with the question number for which they were submitted. Narrative responses that are larger than the space provided can be answered in an attachment. If an attachment is used, mark the see attachment ("A") checkbox on this form and label the attachment with the question number. If no attachment is needed, leave the see attachment ("A") checkbox blank. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Responses in the form of a table may be entered into the table provided on this form or in an attachment. If an attachment is used, the table must have the exact headings found on this form, and the see attachment ("A") checkbox on this form must be marked. Label all units in narrative responses and tables. Light gray checkbox cells denote a narrative or table response is required. Dark gray checkbox cells denote no response is needed because the question directs you to answer subsequent questions or provides you with information.

APPLICATION DETAILS

Questions, Narrative Responses, and Tables	Check-boxes
1. Did you have a preapplication meeting AND complete a Permit Preapplication Meeting Form (Form 600P)?	☒ Y ☐ N
a. If no, complete the remainder of Form 600-TAA. Skip to question 2.	
b. If yes,	
i. Do the technical analyses submitted with Form 600 remain unchanged from those completed during the preapplication meeting process?	☒ Y ☐ N
1. If yes, has any element of the project described in Form 600 changed from the mandatory elements of the project described in Forms 600P-A and/or 600P-B?	☐ Y ☒ N
a. If yes, complete the remainder of Form 600-TAA. Skip to question 2.	
b. If no, Form 600-TAA is complete.	
2. If no,	
a. Are you submitting new technical analyses with Form 600 to replace the technical analyses completed during the preapplication meeting process?	☐ Y ☐ N
i. If yes, complete the remainder of Form 600-TAA. Skip to question 2.	
ii. If no, are you correcting the technical analyses in response to a Departmental scientific credibility review completed during the preapplication meeting process?	☐ Y ☐ N

1. If yes, does every element of the project described in Form 600 remain unchanged from the mandatory elements of the project described in Forms 600P-A and/or 600P-B AND do the corrected technical analyses analyze the project exactly as proposed on Form 600 and Form 600P-A/600P-B?	☐ Y ☐ N
a. If yes, Form 600-TAA is complete.	
b. If no, complete the remainder of Form 600-TAA. Skip to question 2.	

SURFACE WATER

Questions, Narrative Responses, and Tables	Check-boxes
2. Is the proposed source surface water?	☐ Y ☐ N
a. If yes, move on to question 3.	
b. If no, skip to question 16.	

Surface Water Analysis

3. What is the flow rate (GPM or CFS), volume (AF), period of diversion start date and end date (MM/DD-MM/DD) at each point of diversion? Use the same POD # as the project map (Form 600) to label each point of diversion.						☐ A	
POD #	Period of Diversion Start	Period of Diversion End	Flow Rate			Volume	
	(MM/DD-MM/DD)	(MM/DD-MM/DD)	Flow Rate	GPM	CFS	(AF)	
1				☐	☐		
2				☐	☐		
				☐	☐		
				☐	☐		
				☐	☐		
Total				☐	☐		
4. Is the source type of the diversion perennial or intermittent, ephemeral, lake, or other? _____						☐ A	
Perennial or Intermittent	Answer questions 5 to 8	Ephemeral	Answer question 9	Lake	Answer question 10	Other	Answer questions 11 to 14



Surface Water Analysis: Perennial or Intermittent

☒ Applicable ☐ Not Applicable

5. Are stream gage data available?	☐ Y ☐ N
a. If yes, answer question 6.	
b. If no, answer question 7.	
6. Stream gage data are available.	
a. Is one stream gage located above the most upstream POD and one stream gage located below the most upstream POD?	☐ Y ☐ N
i. If no, is only one stream gage located near the most upstream POD?	☐ Y ☐ N
1. If yes, is the stream gage located upstream or downstream of the POD? _____	
b. List the gage name(s). Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
c. What is the distance between the gage(s) and the most upstream POD? Write "N/A" for Gage 2 if only one gage is available. Gage 1: _____ Gage 2: _____	
d. Is there a limiting or controlling factor on the source between the stream gage(s) and the most upstream POD? This includes dams that control the flow and streams with large gaining and/or losing reaches.	☐ Y ☐ N
i. If yes, explain. _____ _____ _____ _____	☐ A
e. How long is the period of record? Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
f. Who operates and maintains the gage(s)? Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	



g. Is each available stream gage operated and maintained by USGS or DNRC?	☐ Y ☐ N
i. If yes, skip to question 6.h.	
ii. If no, answer the following questions for each gage not operated and maintained by USGS or DNRC.	
1. How frequently are stage data recorded? Write "N/A" for Gage 2 if only one gage is not operated or maintained by USGS. Gage 1: _____ Gage 2: _____	
2. If data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
3. Was the rating curve established and maintained throughout the duration of the period of record using measurements taken near the reference gage and stage recorder according to USGS protocols?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
4. Were requirements established and followed for maintaining a permanent gage datum and meeting specified accuracy limits?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
h. Do the data for one or more available stream gages meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion? See the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual.	☐ Y ☐ N
i. If yes, record how many meet the standard, then skip to question 39 because this section is complete. Driller is Bridger Drilling, Tyler Sampson Driller, Lic. No. WWC-165 _____	
ii. If no, answer question 7.	
7. If no gage data are available or if available gage data do not meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion, is the source otherwise measured?	☐ Y ☐ N
a. If no, the Department requires gage data and/or measurements that meet the requirements of ARM 36.12.1702 or, in combination with an approved variance request, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria. Skip to question 8.	



b. If yes,	
i. Submit available measurements to the Department.	☐ S
ii. Who collected the measurements? _____	☐ A
iii. With what method were the data collected? _____ _____ _____	☐ A
iv. What is the period of record? _____	
v. What is the frequency of measurement? _____	
vi. Are there gaps in the data?	☐ Y ☐ N
1. If yes, what is the nature of the gaps and how are gaps handled to ensure data quality? _____ _____ _____	☐ A
vii. Is there a process for maintaining the data and meeting specified accuracy limits?	☐ Y ☐ N
1. If yes, explain. _____ _____ _____	☐ A
viii. Do available measurement data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion? See the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual.	☐ Y ☐ N
1. If yes, this section is complete. Skip to question 39.	
2. If no, answer question 8.	



8. Do the available measurement data, gage and/or otherwise measured, meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for validation of a Department-accepted estimation technique? If the Department finds that your measurements are not sufficient to validate an estimation technique or that no estimation technique is appropriate for the source characteristics, further measurements may be required. Refer to the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual for more information.	☐ Y ☐ N
a. If yes,	
i. Describe how the measurements are representative of high, moderate, and low flows.	☐ A
ii. Describe the estimation technique.	☐ A
b. If no, but a Department-accepted estimation technique will be appropriate for the source:	
i. Submit Form 653 if you want to request a variance from the requirements of ARM 36.12.1702(1)(b). The Department's technical analyses or scientific credibility review of your technical analyses cannot commence until the Department receives measurements that meet the requirements of ARM 36.12.1702(1) or, in combination with an approved variance request, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria.	☐ S
c. If no, because no Department-accepted estimation technique will be appropriate for the source:	
i. Describe why no Department-accepted estimation technique is appropriate for the source characteristics.	☐ A
ii. Do the available measurement data, gage and/or otherwise measured, meet the Department's standard for monthly measurements throughout the proposed period of diversion pursuant to ARM 36.12.1702(4)? Refer to the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual for more information.	☐ Y ☐ N
1. If no, submit Form 653 if you want to request a variance from the requirements of ARM 36.12.1702(4). The Department's technical analyses or scientific credibility review of your technical analyses cannot commence until the Department receives measurements that meet the requirements of ARM 36.12.1702(4) or, in combination with an approved variance request, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria.	☐ Y ☐ N



Surface Water Analysis: Ephemeral

☐ Applicable ☐ Not Applicable

9. Did you elect for the Department to conduct the Technical Analyses?	☐ Y ☐ N
a. If yes, do you have climate or drainage area data you would like the Department to consider during Technical Analyses?	☐ Y ☐ N
i. If yes, submit this information to the Department.	☐ S
b. If no,	
i. What estimation technique did you use to estimate physical availability at the point of diversion? The pump curve for the pumps installed in wells EX-1 and EX-2 allow for a maximum flow of >275 gpm required during peak demand periods anticipated during the cooling season. The system will operate at significantly less flows	☐ A
ii. What is the net annual precipitation? Include the source of this information. _____ _____	☐ A
iii. What is the drainage area upstream of the point of diversion and how was this figure calculated? _____ _____ _____	☐ A

Surface Water Analysis: Lake

☐ Applicable ☐ Not Applicable

10. What is the lake volume? Submit documentation explaining how the volume was quantified. Volume must be quantified by a qualified entity based on bathymetric data. _____	☐ S
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Surface Water Analysis: Other

☒ Applicable ☒ Not Applicable

11. Explain why the source type is "other". _____ _____	☐ A
12. Submit measurements of the source to the Department.	☐ Y ☐ N
13. With what method was the measurement data collected? _____ _____ _____ _____ _____	☐ A



14. What is the measurement interval? _____	
a. Does the interval meet the Department's standard for monthly measurements throughout the proposed period of diversion pursuant to ARM 36.12.1702(4)?	☐ Y ☐ N
i. If no, submit Form 653 if you want to request a variance from the requirements of ARM 36.12.1702(4). The Department's technical analyses or scientific credibility review of your technical analyses cannot commence until the Department receives measurements that meet the requirements of ARM 36.12.1702(4) or, in combination with an approved variance request, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria.	☐ S

Area of Potential Impact Analysis

All information for area of potential impact analysis was collected in previous questions.

GROUNDWATER

Questions, Narrative Responses, and Tables	Check-boxes
15. Is the proposed source groundwater?	☐ Y ☐ N
a. If yes, move on to question 16.	
b. If no, skip to question 39.	

Groundwater Analysis for Permits

16. What is the type of groundwater diversion? _____					
Well/Pit	Answer questions 17 to 20	Developed Spring	Answer questions 21 to 24	Pond	Answer questions 25 to 27

Groundwater Analysis for Permits: Well/Pumping Pit

☐ Applicable ☐ Not Applicable

17. Submit Aquifer Test Data Form (Form 633).	☐ S
18. Submit the Aquifer Testing Addendum (Form 600/606-ATA) and associated materials (e.g., well logs).	☐ S
19. Are you requesting a variance from ARM 36.12.121?	☐ Y ☐ N
a. If yes, submit Form 653.	☐ S
20. Have all proposed wells/pumping pits been constructed?	☐ Y ☐ N
a. If no, answer the following questions:	
i. Submit a list of all wells/pumping pits labeled with the same POD # as the project map (Form 600) and mark whether they have or have not been constructed.	☐ S



ii. When will all proposed wells/pumping pits be constructed? _____	☐ A
iii. Is the requested volume for each proposed well/pumping pit known?	☐ Y ☐ N
1. If yes, list the flow rate and volume requested for each proposed well/pumping pit. Label with the same POD # as the project map (Form 600). _____ _____	☐ A
2. If no, what is the total requested volume (AF) and the number of proposed wells/pumping pits? _____	

Groundwater Analysis for Permits: Developed Spring

☐ Applicable ☐ Not Applicable

21. Submit your measurements of the flow rate and volume of the source.	☐ S
22. With what method were measurements collected? _____ _____ _____ _____ _____ _____	☐ A
23. What is the interval of measurements? _____	
24. Is the interval of measurements sufficient to comply with ARM 36.12.1703(1)? Please note technical analyses or scientific credibility review cannot commence until the Department has measurement data that meets the requirements of ARM 36.12.1703(1). Variances from ARM 36.12.1703(1) are not allowed.	☐ Y ☐ N

Groundwater Analysis for Permits: Pond

☐ Applicable ☐ Not Applicable

25. Submit Form 653 to apply for a variance from ARM 36.12.121 for the Aquifer Test.	☐ S
26. Submit pond bathymetry data, survey, or engineering plans to the Department.	☐ S
27. Is the pond fed or drained by surface water?	☐ Y ☐ N
a. If yes,	
i. Explain. _____ _____ _____ _____	☐ A



ii. Submit measurements of the connected surface water source. These may include inflow and outflow measurements.	☐ S
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Surface Water Depletion Analysis

28. Is the type of groundwater diversion for your proposed project a developed spring? If yes, skip to question 33 because this section is complete. If no, move onto question 29.	☐ Y ☐ N
29. Is the type of groundwater diversion for your proposed project a pond? If yes, answer question 29.a, then skip to question 33 because this section is complete. If no, move onto question 30.	☐ Y ☐ N
a. Will any of the ponds have diversions for out-of-pond use that differ from, if year-round use, an allocation of diverted volume by the number of days in the month, or, if irrigation/lawn and garden use, the 80% dry year net irrigation requirement (IWR, NRCS 2003)?	☐ Y ☐ N
i. If yes, provide a schedule of the diversions for out-of-pond use in the table below. Use the same POD # as the project map (Form 600). Attach any additional schedules with POD # labeled.	☐ A

POD #			
Month	Diversions for Out-of-Pond Use Volume (AF)	Month	Diversions for Out-of-Pond Use Volume (AF)
January		July	
February		August	
March		September	
April		October	
May		November	
June		December	

30. What are the flow rate (GPM or CFS), volume (AF), and period of diversion required (MM/DD-MM/DD) at each well/pumping pit? What is the well/pumping pit depth (FT), if available, or estimated well/pumping pit depth (FT). Please use the same POD # as the project map (Form 600) to match this information with the location information.	☐ A
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POD #	Flow Rate	GPM	CFS	Volume (AF)	Period of Diversion (MM/DD-MM/DD)	Well Depth (FT)	Measured or Estimated
		☐	☐				
		☐	☐				
		☐	☐				
		☐	☐				
		☐	☐				
		☐	☐				

31. Will any of the <i>new</i> wells/pumping pits have a monthly pumping schedule that differs from, if year-round use, an allocation of diverted volume by the number of days in the month, or, if irrigation/lawn and garden use, the 80% dry year net irrigation requirement (IWR, NRCS 2003)?	☐ Y ☐ N
a. If yes, provide the alternative pumping schedule(s) in the table below. Use the same POD # as the project map (Form 600). Attach any additional pumping schedules with POD # labeled.	☐ A

POD #				POD #			
Month	Volume (AF)	Month	Volume (AF)	Month	Volume (AF)	Month	Volume (AF)
January		July		January		July	
February		August		February		August	
March		September		March		September	
April		October		April		October	
May		November		May		November	
June		December		June		December	

32. Will one or more <i>existing</i> wells/pumping pits be used for the proposed project?	☐ Y ☐ N
a. If yes, will any of the <i>existing</i> wells/pumping pits have a monthly pumping schedule, before or after the proposed project, that differs from an allocation of diverted volume by the number of days in the month (if year-round use) or the 80% dry year net irrigation requirement (if irrigation/lawn and garden use) (IWR, NRCS 2003)?	☐ Y ☐ N
i. If yes, provide the pumping schedules before and after the proposed project in the table below. Use the same POD # as the project map (Form 600). Attach any additional pumping schedules with POD # and before/after proposed project labeled.	☐ A

Before proposed project: POD #				After proposed project: POD #			
Month	Volume (AF)	Month	Volume (AF)	Month	Volume (AF)	Month	Volume (AF)
January		July		January		July	
February		August		February		August	
March		September		March		September	
April		October		April		October	
May		November		May		November	
June		December		June		December	

Surface Water Analysis of Depleted Surface Water

33. If you submitted Technical Analyses with this application, list the hydraulically connected surface water sources and answer questions 34 to 38 one time per source. Use the "Additional Hydraulically Connected Source (600-TAA)" sheet for each additional source. If you have elected for the Department to conduct the Technical Analyses after application submittal, write "N/A" and skip to question 39 because the information required to answer questions 34 to 38 is not yet available. If measurements are required to determine physical or legal availability of depleted surface water sources, the Department will not have the information necessary to complete all necessary technical analyses or to evaluate the applicable criteria. If the type of groundwater diversion for your proposed project is a developed spring, write "NA" and skip to question 39 because this section is complete. _____ _____	
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34. Name the hydraulically connected surface water source for which you are answering questions 35 to 38. _____	
35. Are stream gage data available?	☐ Y ☐ N
a. If yes, answer question 36.	
b. If no, answer question 37.	
36. Stream gage data are available.	
a. Is one stream gage located above and one stream gage located below the start of the depleted reach?	☐ Y ☐ N
i. If no, is only one stream gage located near the start of the depleted reach?	☐ Y ☐ N
1. If yes, is the stream gage located upstream or downstream? _____	
b. List the gage name(s). Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
c. What is the distance between the gage(s) and the start of the depleted reach? Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
d. Is there a limiting or controlling factor on the source between the stream gage(s) and the start of the depleted reach? This includes dams that control the flow and streams with large gaining and/or losing reaches.	☐ Y ☐ N
i. If yes, explain. _____ _____ _____ _____	☐ A
e. How long is the period of record? Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
f. Who operates and maintains the gage(s)? Write "N/A" for Gage 2 if one gage is available. Gage 1: _____ Gage 2: _____	
g. Is each available stream gage operated and maintained by USGS or DNRC?	☐ Y ☐ N
i. If yes, skip to question 36.h.	
ii. If no, answer the following questions for each gage not operated and maintained by USGS or DNRC.	
1. How frequently are stage data recorded? Write "N/A" for Gage 2 if only one gage is not operated or maintained by USGS. Gage 1: _____ Gage 2: _____	



2. If data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
3. Was the rating curve established and maintained throughout the duration of the period of record using measurements taken near the reference gage and stage recorder according to USGS protocols?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
4. Were requirements established and followed for maintaining a permanent gage datum and meeting specified accuracy limits?	
a. Gage 1.	☐ Y ☐ N
b. Gage 2. Write "N/A" on the line instead of answering yes or no, if only one gage is not operated or maintained by USGS or DNRC. _____	☐ Y ☐ N
h. Do the data for one or more available stream gages meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the months with net depletions? See the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual.	☐ Y ☐ N
i. If yes, record how many meet the standard, then skip to question 39 because this section is complete. _____	
ii. If no, answer question 37.	
37. If no gage data are available or if available gage data do not meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the months with net depletions, is the source otherwise measured?	☐ Y ☐ N
a. If no, the Department requires gage data and/or measurements that meet the requirements of ARM 36.12.1702 or, in combination with an approved variance request, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria. Skip to question 38.	
b. If yes,	
i. Submit available measurements to the Department.	☐ S
ii. Who collected the measurements? _____	☐ A
iii. With what method were the data collected? _____ _____ _____	☐ A
iv. What is the period of record? _____	



v. What is the frequency of measurement? _____	
vi. Are there gaps in the data?	☐ Y ☐ N
1. If yes, what is the nature of the gaps and how are gaps handled to ensure data quality? _____ _____ _____	☐ A
vii. Is there a process for maintaining the data and meeting specified accuracy limits?	☐ Y ☐ N
1. If yes, explain. _____ _____ _____	☐ A
viii. Do available measurement data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the months with net depletions? See the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual.	☐ Y ☐ N
1. If yes, this section is complete. Skip to question 39.	
2. If no, answer question 38.	
38. Do the available measurement data, gage and/or otherwise measured, meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for validation of a Department-accepted estimation technique? If the Department finds that your measurements are not sufficient to validate an estimation technique or that no estimation technique is appropriate for the source characteristics, further measurements may be required. Refer to the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual for more information.	☐ Y ☐ N
a. If yes,	
i. Describe how the measurements are representative of high, moderate, and low flows. _____ _____ _____ _____	☐ A
ii. Describe the estimation technique. _____ _____ _____ _____ _____ _____ _____ _____	☐ A



b. If no, but a Department-accepted estimation technique will be appropriate for the hydraulically connected surface water source:	
i. Submit a request to deviate from the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for calibration of a Department-accepted estimation technique. The Department's technical analyses or scientific credibility review of your technical analyses cannot commence until the Department receives measurements that meet Department measurement standards, or in combination with a request to deviate, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria.	☐ S
c. If no, because no Department-accepted estimation technique will be appropriate for the source:	
i. Describe why no Department-accepted estimation technique is appropriate for the source characteristics. _____ _____ _____	☐ A
ii. Do the available measurement data, gage and/or otherwise measured, meet the Department's standard for monthly measurements throughout the months with net depletions? Refer to the "Department Standard Practice for Determining Physical Surface Water Availability" in the Permit Manual for more information.	☐ Y ☐ N
1. If no, submit a request to deviate from the Department's standard for monthly measurements throughout the months with net depletions. The Department's technical analyses or scientific credibility review of your technical analyses cannot commence until the Department receives measurements that meet Department measurement standards, or in combination with a request to deviate, are sufficient to complete any necessary technical analyses or scientific credibility reviews and to evaluate the applicable criteria.	☐ S

Area of Potential Impact Analysis of Depleted Surface Water

All information for area of potential impact of depleted surface water was collected in previous questions.



PROJECT-SPECIFIC QUESTIONS

Controlled Groundwater Areas and Basin Closures

Questions, Narrative Responses, and Tables	Check-boxes
39. Does the project include one or more groundwater points of diversion located in the East Valley Controlled Groundwater Area (EVCGWA)?	☐ Y ☐ N
a. If yes, is the use over 35 GPM or 10 AF per year?	☐ Y ☐ N
i. If no, this is the incorrect form. Use instead Form 600-EVCGWA: East Valley Controlled Groundwater Area Permit Application.	
ii. If yes, how does this project meet the specific requirements of the East Valley Controlled Groundwater Area? Include any relevant documentation. _____ _____ _____ _____	☐ A
b. If no, skip to question 40.	
40. Does the project include one or more groundwater points of diversion located in the Yellowstone Controlled Groundwater Area (YCGA)?	☐ Y ☐ N
a. If yes, is the proposed flow rate and volume over 35 GPM or 10 AF per year?	☐ Y ☐ N
i. If no, this is the incorrect form. Use instead Form 600-YCGA: Yellowstone Controlled Groundwater Area Permit Application.	
ii. If yes, submit <i>Form 600 YCGA: Yellowstone Controlled Groundwater Area Addendum Over 35 gallons per minute</i> .	☐ S
41. Is the project for surface water or groundwater and subject to one or more of the following areas listed on the Department's website (https://dnrc.mt.gov/Water-Resources/Water-Rights/Basin-Closures-Stream-Depletion-Controlled-Ground-Water-Areas)? - Controlled Groundwater Areas, not mentioned in questions 39 to 40 - Basin Closures or Stream Depletion Zones	☐ Y ☐ N
a. If yes, identify each area and describe how the proposed project meets its requirements. An application must meet the specific requirements of the Controlled Groundwater Area or closure to be accepted by the Department. _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	☐ A

Form 600-BCA: Question 3 Basin Closure Area

**APPLICATION FOR BENEFICIAL WATER USE PERMIT
BASIN CLOSURE ADDENDUM**§§ 85-2-360, 85-2-361, 85-2-362, MCA
ARM 36.12.120

The Department cannot process an application located in a basin closure area unless it qualifies as a basin closure exception. The Department will determine whether an application in a basin closure area can be processed based on the information received from the applicant and will document its findings before it will review the application to determine whether it is correct and complete. You will be required to mitigate the net depletion of water that may create an adverse effect to groundwater and hydraulically connected surface water rights.

Answer every question and applicable follow-up questions. Use the checkboxes to denote yes ("Y") or no ("N"). Questions that require Applicant to submit items to the Department have a submitted ("S") checkbox, which is marked when the required item is attached to the Basin Closure Addendum. Label all submitted items with the question number for which they were submitted. Responses that are larger than the space provided can be answered in an attachment. If an attachment is used, specify "see attachment" on this form. Label all attachments with the question number.

1. ☐ Y ☒ N For groundwater applications filed pursuant to § 85-2-360, MCA, did the Hydrogeologic Assessment Report indicate that the proposed groundwater use will affect a surface water source? If yes, continue through the addendum. If no, this addendum is complete.
2. What surface water source will be affected by the groundwater use?

3. ☐ S Submit a map showing the location of the effect on surface water. Create the map on an aerial photograph or topographic map and include the following: section corners, township and range, scale bar, and north arrow.
4. What amount of effect will occur to surface water? _____ ☐ GPM -or- ☐ CFS
_____ ☐ Acre-Feet
5. What is your plan to mitigate the amount of water identified in question 4?
 - a. ☐ One or more Applications to Change a Water Right (Form 606) to mitigate the adverse effect created. Applications to Change a Water Right must be submitted with the Application for Beneficial Water Use (Form 600).
 - b. ☐ Alternative mitigation plan, in lieu of an Application to Change a Water Right, to mitigate the adverse effect created. Submit your alternative mitigation plan with Form 600/606-MIT.
 - c. ☐ A mitigation plan is not required.
 - i. ☐ S Submit all documentation to show a mitigation plan is not required.



6. ☐ **Y** ☐ **N** Are there existing documented hazards that could be affected or exacerbated by the proposed project, such as areas of subsidence? If yes, describe a plan to mitigate any of those conditions or impacts.

NOTE: Information required for the hydrogeologic assessment may not be sufficient to meet applicable criteria under § 85-2-311, MCA, including but not limited to adverse effect to a prior appropriator. The applicant for a beneficial water use permit pursuant to § 85-2-311, MCA, is responsible for providing sufficient evidence to meet all applicable criteria.



Question 4 - Technical Analyses



Groundwater Permit Technical Analyses Report - Part A

Department of Natural Resources and Conservation (DNRC)

Water Resources Division

Evan Norman, Groundwater Hydrologist, Water Sciences Bureau (WSB)

Application No.	41H 30165312	Point of Diversion Legal Land Description	Section 27 and 22, Township 01 South, Range 5 West
Applicant	Barnard Construction		

Overview

This report is Part A of a two-part publication which analyzes data submitted by the Applicant in support of the above-mentioned water right application. This report provides technical analyses as required under the Administrative Rules of Montana (ARM) 36.12.1303 in support of the water rights criteria assessment as required in §85-2-311, Montana Code Annotated (MCA). For applications in closed basins, this report fulfills the requirements of MCA 85-2-361.

This Groundwater Permit Technical Analyses Report – Part A contains the following sections:

Overview	1
1.0 Executive Summary	2
2.0 Hydrogeologic Setting	3
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1.0 Executive Summary

Application Details

The Applicant requests to divert 550.0 gallons per minute (gpm) and up to 298.40 acre-feet (AF) of groundwater from two points of diversion (wells) for geothermal cooling purposes. The two Extraction Wells, Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) IDs [335313](#) and [335315](#), would each divert water at a rate of 275.0 gpm. Two injection Wells, GWIC IDs [335309](#) and [335811](#), would each inject water at a rate of 275.0 gpm back into the aquifer via an open-loop geothermal cooling system.

Recommended and Approved Variances from ARM 36.12.121

The required variances, rationale, and recommended action to grant the variance requests were sent in an Aquifer Testing Addendum Review checklist to the Bozeman Regional Office on April 7, 2025. Variances from aquifer test requirements found in ARM 36.12.121: 3(a), 3(g), 3(h), and 3(e)(iii) were approved by the Bozeman Regional Office on April 14, 2025.

WSB Technical Analyses Findings

Based on information submitted, the WSB estimated aquifer properties, evaluated the extraction well(s) available water column, quantified the water available in the source aquifer, and evaluated potential impacts to existing groundwater and surface water rights. These technical analyses are in support of the following criteria assessment: adequacy of diversion, physical availability, and adverse effect. A summary of WSB findings described in subsequent sections are listed below.

TECHNICAL ANALYSES FINDINGS

AQUIFER TEST ANALYSIS	Using the Cooley-Case (1973) solution, saturated thickness (b) of 218 feet (ft), and submitted 72.2-hour aquifer testing data for GWIC ID 335315, estimates of aquifer properties include a Transmissivity (T) of 873 ft ² /day and Storativity (S) of 1.1×10^{-4} .
MODELING INPUTS	The following aquifer properties were used to complete adequacy of diversion, physical availability and adverse effect technical analyses: T of 873 ft ² /day, S of 1.1×10^{-4} . The estimated leakage parameter (r/B ; β), storage ratio in aquitard (S'/Sy), and dimensionless height of capillary fringe (L/b') are identified in figures below. Pumping schedules and boundaries used to model each criterion are identified within the document.
ADEQUACY OF DIVERSION	The aquifer adjacent to GWIC ID 335313 and 335315 would experience 54.20 and 58.90 ft of drawdown after the first year, leaving approximately 134 ft and 159 ft of available water column above the bottom of the perforated intervals, respectively.
PHYSICAL AVAILABILITY	The model predicted the 0.01-foot drawdown contour, or zone of influence (ZOI), has a width of approximately 14,000 ft in the predominate direction of groundwater flow. The northeastern and eastern extent of the ZOI was



	truncated to the East Gallatin River. The total flux through the ZOI is equal to 1,024 AF/year. There are 152 existing groundwater rights with a status of active and severed within the ZOI. (Appendix A) .
ADVERSE EFFECT (DRAWDOWN IN EXISTING WELLS)	The 1-foot drawdown contour extends out approximately 4,100 ft from GWIC ID 335313 and 335315 at the end of July of the fifth year of pumping. 13 water rights are predicted to experience drawdown equal to or greater than 1-foot (Appendix B) .
ADVERSE EFFECT (NET DEPLETION TO SURFACE WATER)	The East Gallatin River is identified as being hydraulically connected to the source aquifer. There would be no consumed volume associated with the proposed geothermal purpose, and therefore no net depletion to hydraulically connected surface waters.

2.0 Hydrogeologic Setting

As identified in **Figure 1**, the Production Wells GWIC ID 335313 and 335315 (Extraction Wells 1 & 2) were completed to 202 and 232 ft below ground surface (bgs) in Section 27 and 22, Township 01 South, Range 05 East, Gallatin County, respectively. Both wells are completed in the Tertiary aged valley-fill sediments (120SDMS) with perforated interval lengths of 35 ft. The wells, GWIC IDs 335309 and 335811 (Reinjection Wells 1 & 2) are completed to 300 and 215 ft bgs, respectively, in Section 22, Township 01 South, Range 05 East, Gallatin County. The injection wells are also completed in the source aquifer 120SDMS with perforated interval lengths of 144 and 100 ft. Well logs near the project location primarily describe alternating lenses of sand and gravel, clay-bound gravels, and clay which may act as localized leaky-confining units.

The surficial geology is mapped as Quaternary braided plain alluvium deposits of cobbles, boulders, sand, silt and clay up to 30 ft thick (Vuke et al., 2014). The Quaternary sediments are underlain by Tertiary Madison Valley member silt, siltstone, sandstone and conglomerates, in some parts of the valley up to 300 ft thick (Vuke et al., 2014).

The Gallatin Valley Quaternary and Tertiary aquifer system contains shallow unconfined, semi-confined (leaky confined), confined, and possibly even perched groundwater (English, 2018). Generally, groundwater and surface water flows from southeast to northwest across the valley and is recharged by irrigation, stream losses, and ditch leakage ultimately discharging to the Gallatin River (Hackett et al., 1960). The wells are on the edge of the Bozeman hydrogeologic subarea (Fan) adjacent to the Upper East Gallatin and Belgrade hydrogeologic subareas mapped by Hackett et al. (1960). Recent studies suggest that recharge from the surrounding bedrock aquifer and leakage from canals and ditches are the two largest components of groundwater recharge to the Gallatin Valley Aquifer (Michalek and Sutherland, 2020).

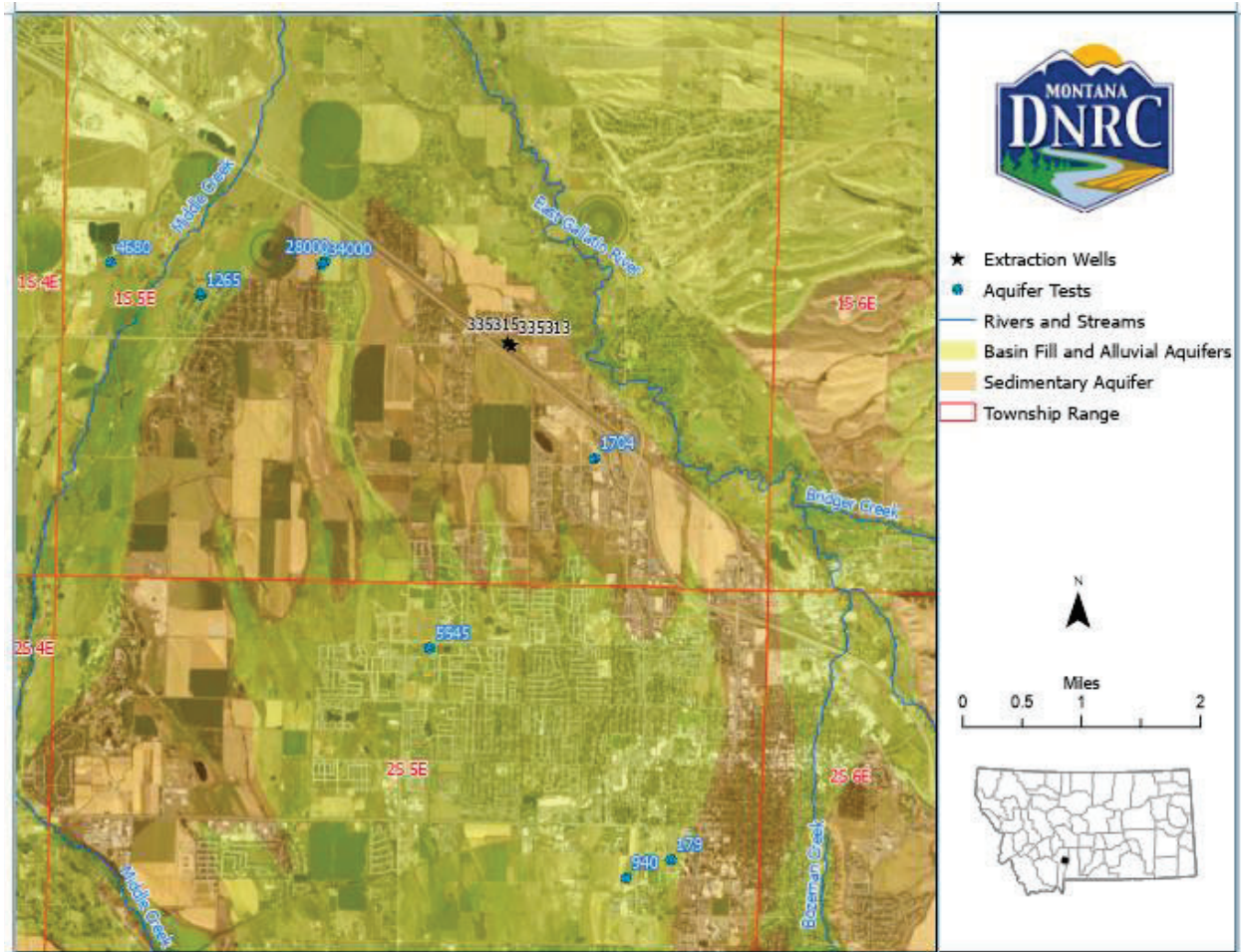


Figure 1: Map of the Applicant's aquifer test location and nearby T values derived from aquifer tests (Table 4).

3.0 Aquifer Test Summary

DNRC requires two different types of tests: "Aquifer Tests" and "Drawdown and Yield Tests." which aid DNRC in analyzing different application criteria.

- An "aquifer test" is a pumping test that is meant to provide data to model aquifer properties. The minimum duration of these tests is either 24-hours or 72-hours, depending on the proposed flow rate and volume (AMR 36.12.121(3)(e)), and DNRC only requires one of these tests per application. Aquifer Tests must include observation well data and pre-test monitoring data as well as post-test recovery data.
- A "drawdown and yield test" is a pumping test that is meant to evaluate well construction and the ability of the aquifer to yield water to the well. This is also known as demonstrating "adequacy of diversion." The minimum duration of these tests is 8 hours, and every well that is a part of the application, that did not have an aquifer test, must be



tested for at least 8 hours. Observation wells, pre-test background data, and post-test recovery data are not required for Drawdown and Yield Tests.

Field Methods and Equipment

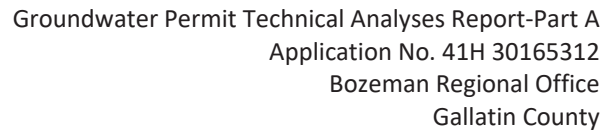
A 72.2-hour aquifer test was conducted on the Production Well, GWIC ID 335315. Water pressure was collected using an In-situ LevelTROLL 400 water level logger and corrected using a BaroTROLL 400 data logger in the Production Well and Observation Wells (GWIC ID [335313](#) and [304409](#)). Manual water level measurements were collected using a Geotech water level meter. Observation Wells GWIC ID 335313 and 304409 are 163 and 430 ft from the Production Well and completed in the same source aquifer. The discharge was measured with a Blue-White Brand F-300 flow meter attached to a 4-inch discharge pipe.

Background Data

A variance for ARM 36.12.121 was granted for 3(g) and therefore, limited background data was collected as part of the 72.2-hour aquifer test. Background level trends did not appear to affect the drawdown and recovery data.

Drawdown Data

The 72.2-hour aquifer test started on July 23, 2024, at 12:00 P.M. on the Production Well and is considered ($t = 0$) for the computation of drawdown. The average pumping rate was 269.5 gpm. The pumping rate varied during the test beyond a margin of 5% of the average discharge (+/- 5% average discharge). The additional drawdown and yield test was submitted to meet the total requested flow rate of 550.0 gpm.



Recovery Data

Recovery groundwater level data was monitored for 72-hours in the Production Well GWIC ID 335315 and Observation Well GWIC ID 335313. At the end of the recovery period the Production and Observation Wells were both -0.05 ft from pre-test swls, respectively.

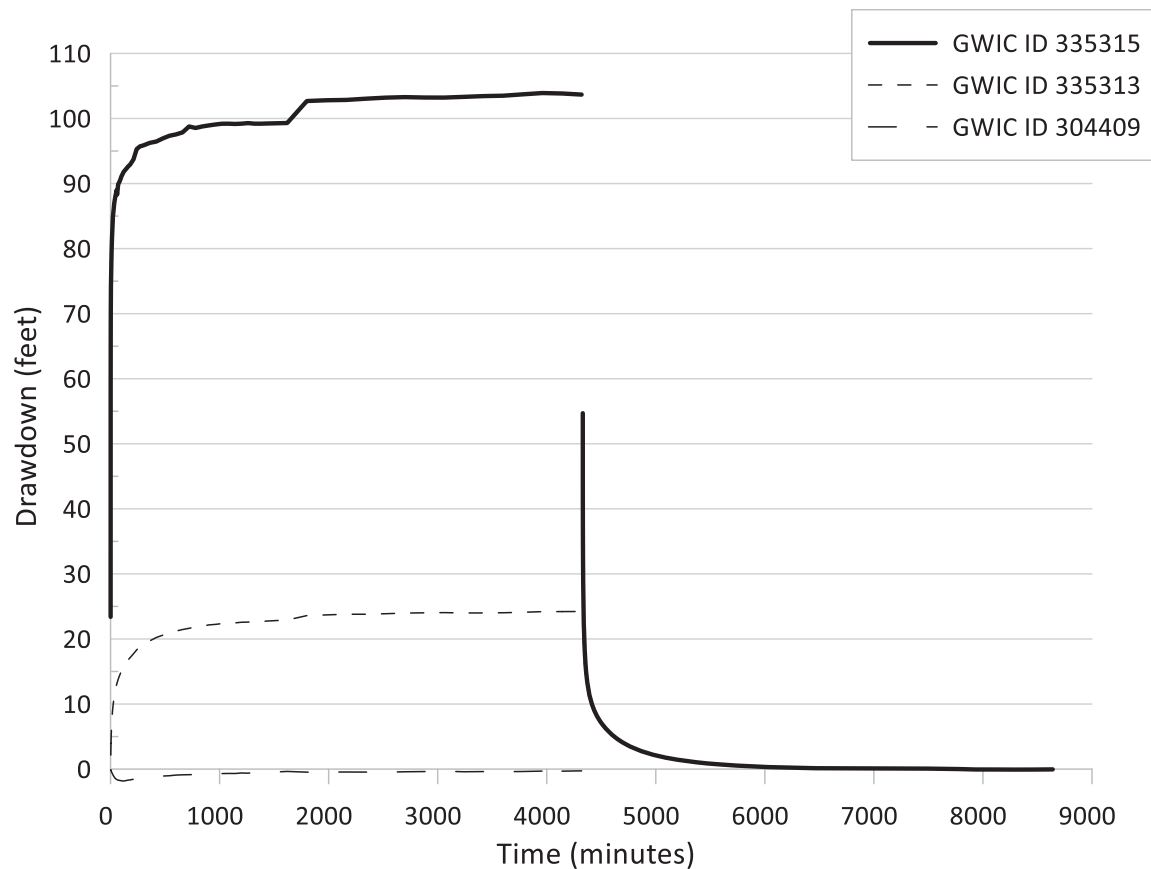


Figure 3: Drawdown and recovery data for Production and Observation Wells during the 72.2-hour aquifer test.

4.0 Aquifer Test Analysis

Methods

The DNRC utilized AQTESOLV® (HydroSOLVE, Inc., 2007) to analyze drawdown data from the aquifer test and obtain estimates of aquifer properties. Aquifer properties were used in forward modeling to evaluate the available water column in the well, quantity of water available in the source aquifer, and potential impacts to groundwater and surface water rights. AQTESOLV® is an analytical modeling software that uses image-well theory and the principle of superposition to simulate aquifer stress tests. Drawdown data and measured flow rates from the aquifer test, and the spatial location of each well are input into the model. Using this compilation of data, aquifer properties including T and S are identified based on a best-fit visual and statistical match between the observed and theoretical drawdown data.

Analyses

Analytical groundwater solutions were matched to Production and Observation Well drawdown data to generate estimates of aquifer properties for the source aquifer. As identified in **Figure 4** through **Figure 6**, theoretical AQTESOLV® predicted derivatives (red line) were compared to the



calculated derivatives from the observed drawdown (black triangles) and predicted drawdown (blue line) compared to the observed drawdown (black squares).

For estimation of aquifer properties, the Production and Observation Wells were assumed to be fully penetrating, and a saturated thickness (b) of 218 ft was used, which is length between the bottom of the perforated interval and the swl for the Production Well. Drawdown data and measured flow rates from the aquifer test, and the relative location of the Production Well and Observation Wells were input into AQTESOLV®. As shown in **Figure 4** and **Figure 5**, the Cooper-Jacob (1946) solution was used to perform a preliminary analysis of T and S using the Production and Observation Wells. The drawdown data for the Production Well and Observation Well show slight declines in the derivative throughout the aquifer testing, indicative of leaky-confined aquifer conditions.

The Cooley-Case (1973) solution for leaky-confined aquifers with a water-table aquitard was used to analyze T, S, and the leakage parameters for Observation Well GWIC ID 335313 based on the best-fit visual and statistical match between the observed and theoretical drawdown (**Figure 6**). The Cooley-Case (1973) model assumes a homogenous, isotropic leaky confined aquifer with instantaneous drainage at the water table from storage. **Table 3** lists the aquifer test analyses for the Production and Observation wells. The recommended aquifer T and S to be used in forward modeling is 873 ft²/day and 1.1×10^{-4} from the Cooley-Case (1973) solution for Observation Well GWIC ID 335313. The estimated parameters are supported by existing hydrogeologic data below and the conceptual model of the project location described in the hydrogeologic setting above.

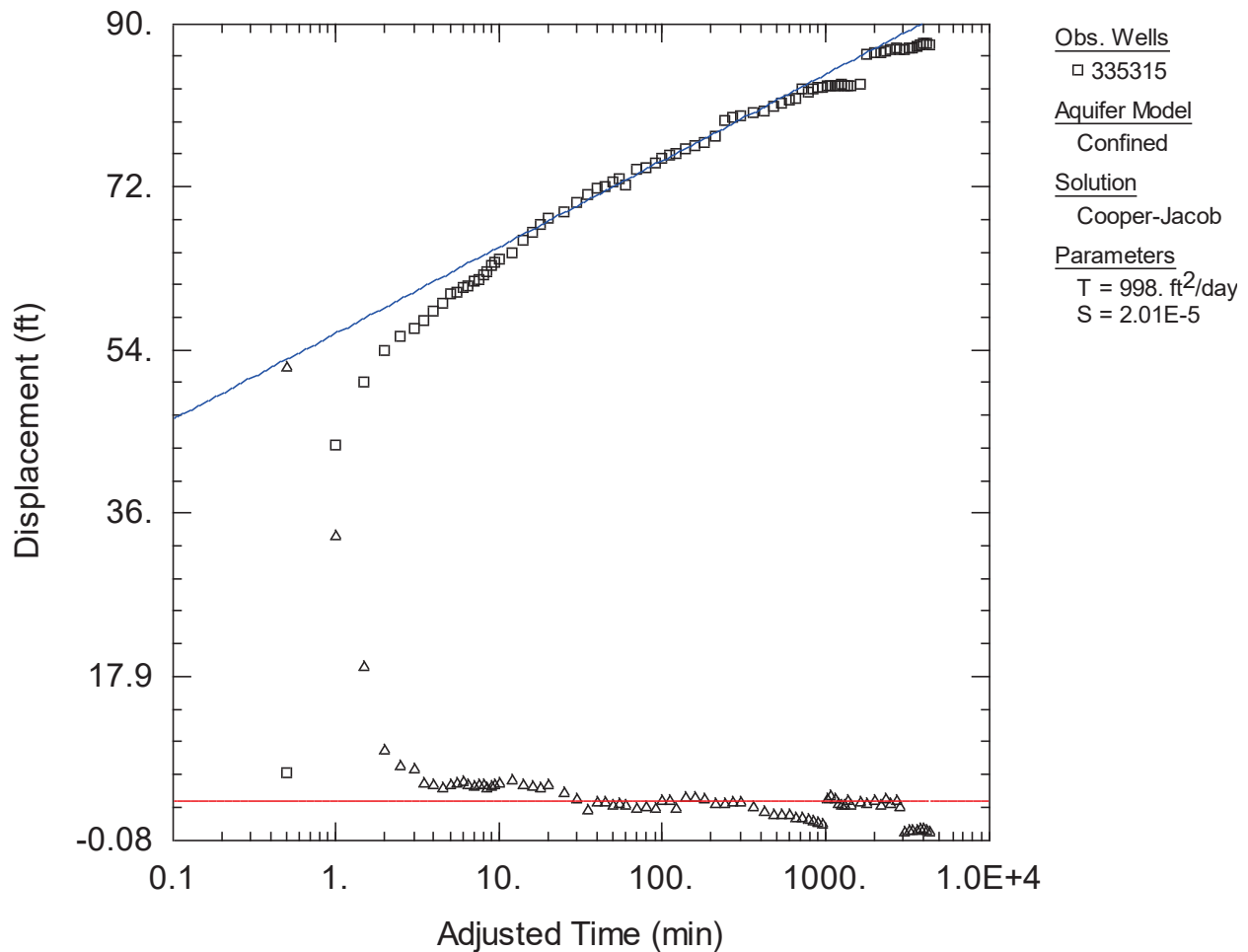


Figure 4: Cooper-Jacob (1946) time-drawdown and derivative analysis for the Production Well GWIC ID 335315.

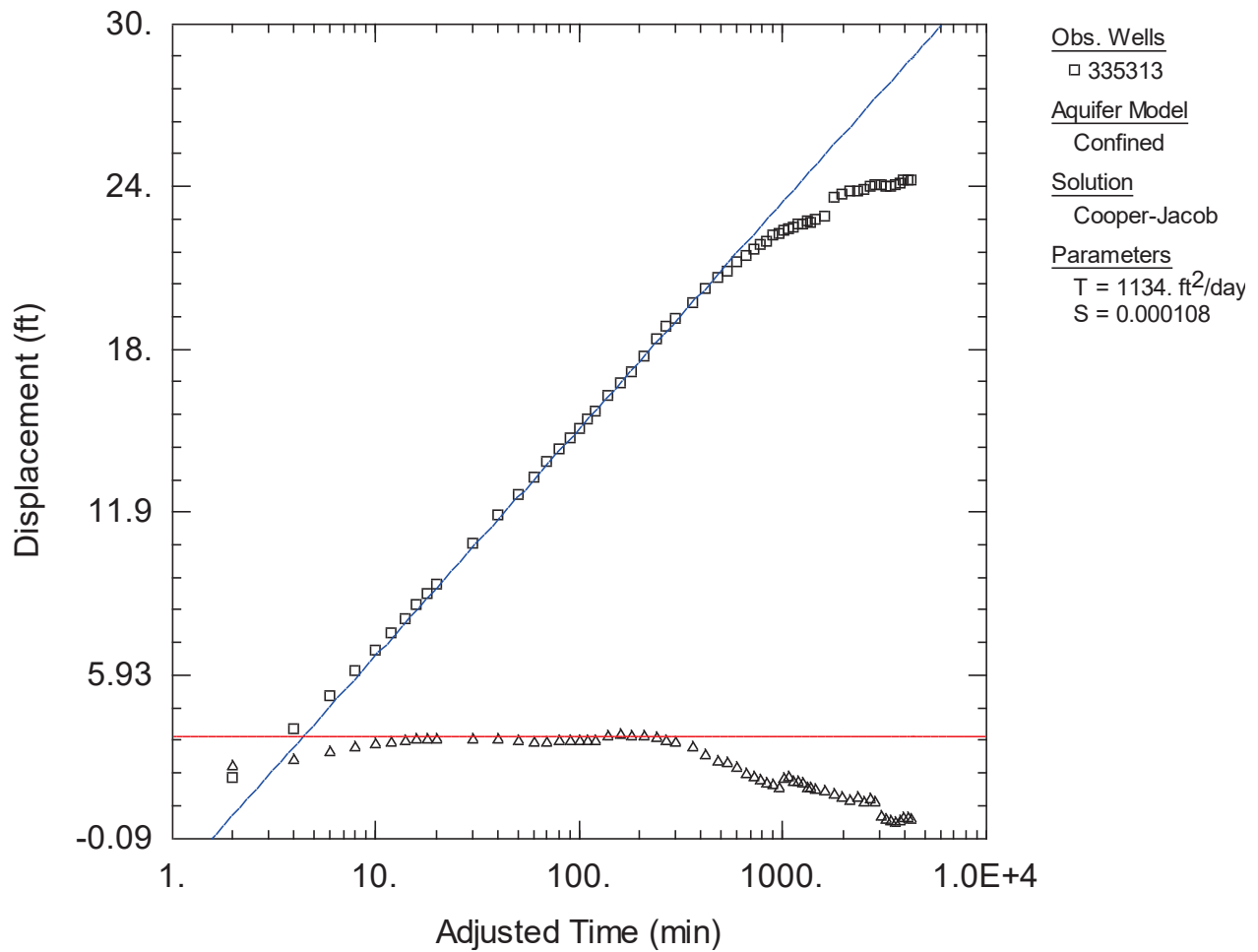


Figure 5: Cooper-Jacob (1946) time-drawdown and derivative analysis for the Observation Well GWIC ID 335313.

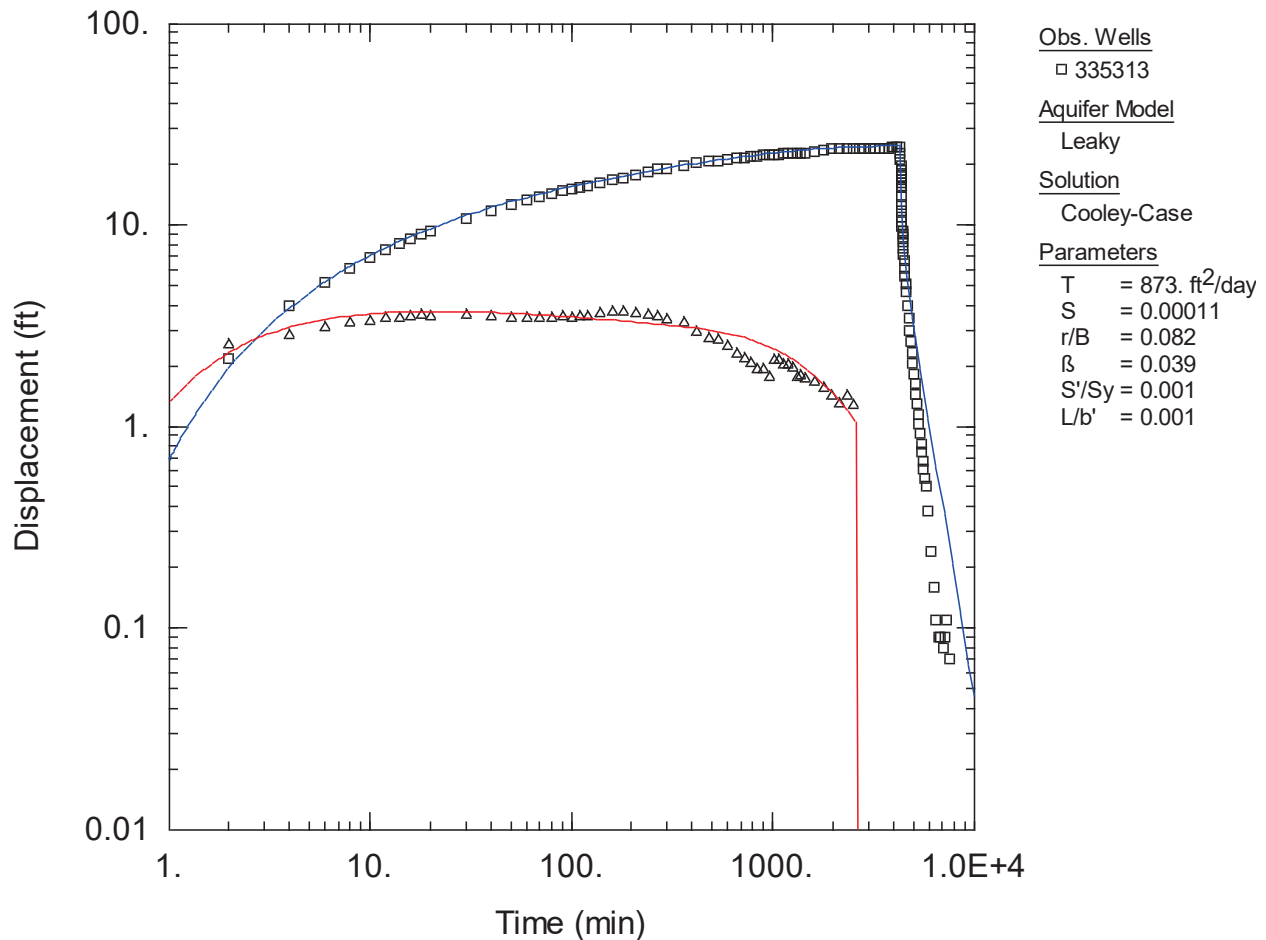


Figure 6: Cooley-Case (1973) time-drawdown and derivative analysis for the Observation Well GWIC ID 335313.

Table 3: Aquifer test analyses for 72.2-hour test completed on the Production Well.

Production Well (GWIC ID, Phase)	Well Analyzed (GWIC ID)	Analysis Solution	T (ft ² /day)	S
335315, Drawdown	335315	Cooper-Jacob (1946)	998	NA
335315, Drawdown	335313	Cooper-Jacob (1946)	1,134	1.1×10^{-4}
335315, Drawdown & Recovery	335313	Cooley-Case (1973)	873	1.1×10^{-4}



Table 4: Nearby Aquifer Tests and estimates of T and S when available.

Water Right No.	GWIC ID	Well Completion Depth (ft)	Distance from Proposed Project (miles)	Aquifer Test Length (hours)	Pumping Rate (gpm)	T (ft ² /day)	S
41H 30127867	304056	155	1.2	72	240	1,704	1.0E-3
41H 30109060	292561	178	1.7	76	397	28,000	0.1
41H 30109060	292562	158	1.7	72	388	34,000	0.1
41H 30115127	296973	280	2.6	72	206	5,545	4.0E-4
41H 30000136	205719	146	2.6	24	250	1,265	0.1
41H 30010803	215306	140	3.4	72	200	4,680	---
41H 30009188	183089	282	4.5	72	583	179	---
41H 30048037	95855	171	4.6	72	583	940	0.2

The Quaternary and Tertiary sediments of the Bozeman fan have T ranges of 602 to 8,689 ft²/day and 40 to 361 ft²/day, respectively (Hackett et al. 1960). Further, Custer et al. (1991) provided a T range for the Quaternary and Tertiary sediments of 214 ft²/day to 10,694 ft²/day. The reported S range of 4.0×10^{-4} to 0.2 in **Table 4**, supports the confined to unconfined conditions of the Quaternary and Tertiary aquifer system introduced by English (2018). The range of values shown from the aquifer test data in **Table 4**; published literature values; and findings that the Tertiary sediments in the Bozeman Fan subarea are generally less conductive than surrounding basin-fill and sedimentary rock aquifer subareas (Sutherland, 2023), support the recommended property values shown **Figure 6** and **Table 3**.

5.0 Drawdown and Yield Test

An 8.0-hour drawdown and yield test was conducted on the Production Well, GWIC ID 335313. Water levels during the test were collected using an In-situ Leveltroll 400 transducer. The discharge rate was measured with a 4-inch diameter discharge pipe and averaged 275 gpm. Per ARM 36.12.121 and Form 633, background level and recovery data are not required for drawdown and yield tests on additional Production Wells. However, the data was collected and is found in submitted Form No. 633 for GWIC ID 335313 as part of Application No. 41H 30165312.



Drawdown Data

The 8.0-hour drawdown and yield test started on August 12, 2024, at 09:46 A.M. on the Production Well and is considered ($t = 0$) for the computation of drawdown. The maximum drawdown in the Production Well was 73.69 ft below the static water level (swl) of 16.06 ft below top of casing (btc), leaving approximately 114 ft of available water column above the bottom of the perforated interval adjusting for the well casing stick-up height of 2-ft.

6.0 Modeling Inputs

Technical analyses in support of the following criteria assessment: adequacy of diversion, physical availability, and adverse effect (drawdown in existing wells) were modeled in AQTESOLV[®] (HydroSOLVE INC., 2007) using the following inputs:

- Cooley-Case (1973) solution for fully penetrating wells in an isotropic aquifer
- Well radius of 0.33 ft
- $T = 873 \text{ ft}^2/\text{day}$
- $S = 1.1 \times 10^{-4}$
- r/B ; $1/B = 1.7 \times 10^{-4}$; 5.0×10^{-4}
- β ; $\beta/r = 7.8 \times 10^{-5}$; 2.4×10^{-4}
- $S'/S_y = 0.001$
- $L/b' = 0.001$

The leakage parameters used to forward model multiple wells were adjusted from r/B and β shown in **Figure 6** to account for the distance of the Observation Well GWIC ID 335313 used to derive aquifer properties from the Production Well 335315 ($r = 163$ ft). Leakage parameters used to forward model one well were adjusted from r/B and β shown in **Figure 6** to account for the radius of the modeled well (0.3 ft). The storage ratio in the aquitard (S'/S_y) of 0.001 was taken from **Figure 6** and verified as a representative input using the above estimated parameters, and representative vertical hydraulic conductivity and thickness of the aquitard. The dimensionless height of the capillary fringe (L/b') was taken from **Figure 6**. Monthly pumping schedules and boundaries used to complete technical analyses are identified in subsequent criteria sections.

7.0 Adequacy of Diversion Analysis

An evaluation of the potentially available water column remaining in the proposed wells was modeled in FWD:SOLV (HydroSOLVE INC., 2007) using the following pumping schedule:

- The monthly pumping and injection schedule identified in column 4 and column 7 of **Table 5** for one year of pumping.

Predicted theoretical drawdown for the proposed wells was modeled for the period of diversion using the monthly pumping schedule for each well identified in **Table 5**. The Applicant requests



298.40 AF, which was apportioned evenly to each Extraction and Injection Well based on the monthly pumping schedule provided by the Applicant.

Table 5: Proposed monthly extraction and injection schedule for the Applicant's wells.

Month	Extraction Schedule GWIC ID 335313 and 335315			Injection Schedule GWIC ID 335309 and 335811		
	Volume (AF)	Flow Rate (gpm)	Flow Rate (gpm/well)	Volume (AF)	Flow Rate (gpm)	Flow Rate (gpm/well)
January	19.2	140.0	70.0	-19.2	-140.0	-70.0
February	17.3	140.0	70.0	-17.3	-140.0	-70.0
March	19.2	140.0	70.0	-19.2	-140.0	-70.0
April	18.6	140.0	70.0	-18.6	-140.0	-70.0
May	21.2	154.5	77.2	-21.2	-154.5	-77.2
June	28.0	210.9	105.4	-28.0	-210.9	-105.4
July	46.9	342.2	171.1	-46.9	-342.2	-171.1
August	45.3	330.3	165.2	-45.3	-330.3	-165.2
September	25.7	193.7	96.9	-25.7	-193.7	-96.9
October	19.4	141.9	71.0	-19.4	-141.9	-71.0
November	18.6	140.0	70.0	-18.6	-140.0	-70.0
December	19.2	140.0	70.0	-19.2	-140.0	-70.0
Total	298.40	---	---	-298.40	---	---



As identified in **Table 6**, total drawdown is the sum of interference drawdown and predicted drawdown with well loss. Two extraction and two injection wells are proposed; interference drawdown was calculated using the pumping and injection schedule for each well. Predicted drawdown with well loss is calculated by dividing the predicted theoretical maximum drawdown by a well efficiency value. Well efficiency is calculated by dividing the maximum modeled drawdown for the aquifer test by the maximum observed drawdown of the aquifer test.

The aquifer adjacent to extraction wells GWIC ID 335313 and GWIC ID 335315 would experience a predicted total drawdown of 54.20 ft and 58.90 ft at the end of the first year, respectively. The remaining available water columns for GWIC ID 335313 and 335315 are approximately 134 and 159 ft, respectively. The remaining available water column is equal to the available drawdown above the bottom of the perforations minus total drawdown including interference drawdown.

Table 6: The remaining available water column for extraction wells.

Drawdown Estimate	GWIC ID 335313	GWIC ID 335315
Total Depth at Bottom of Perforated Interval (ft btc) ¹	204	234
Pre-Test Static Water Level (ft btc)	16.06	16.05
Available Drawdown Above Bottom of Perforations (ft)	188	218
Aquifer Test Observed Drawdown (ft)	73.69	87.86
Modeled Drawdown Using Average Aquifer Test Rate (ft)	81.00	77.00
Well Efficiency (%)	100	88
Predicted Theoretical Maximum Drawdown from assumed monthly pumping schedule (ft)	52.00	52.00
Predicted Drawdown with Well Loss (ft)	52.00	59.33
Interference Drawdown (ft)	2.20	-0.40
Total Drawdown (ft)	54.20	58.90
Remaining Available Water Column (ft)	134	159

¹The total well depth measuring point (bgs) was adjusted to the top of well casing based on a 2-foot stickup reported on the well logs.

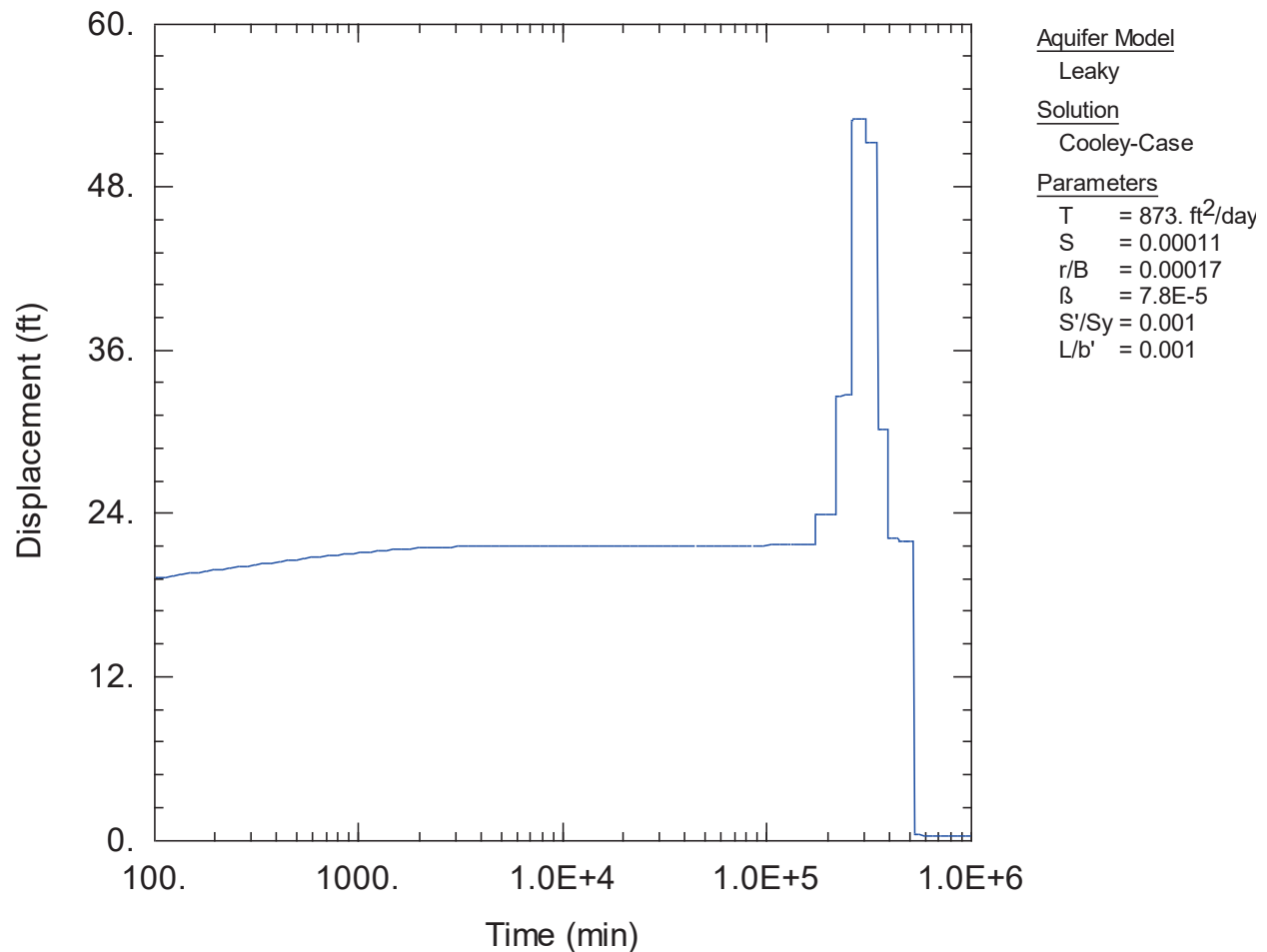


Figure 7: Cooley-Case (1973) time-drawdown plot of the predicted theoretical drawdown in the extraction wells at the end of the first year of the assumed monthly pumping schedule.

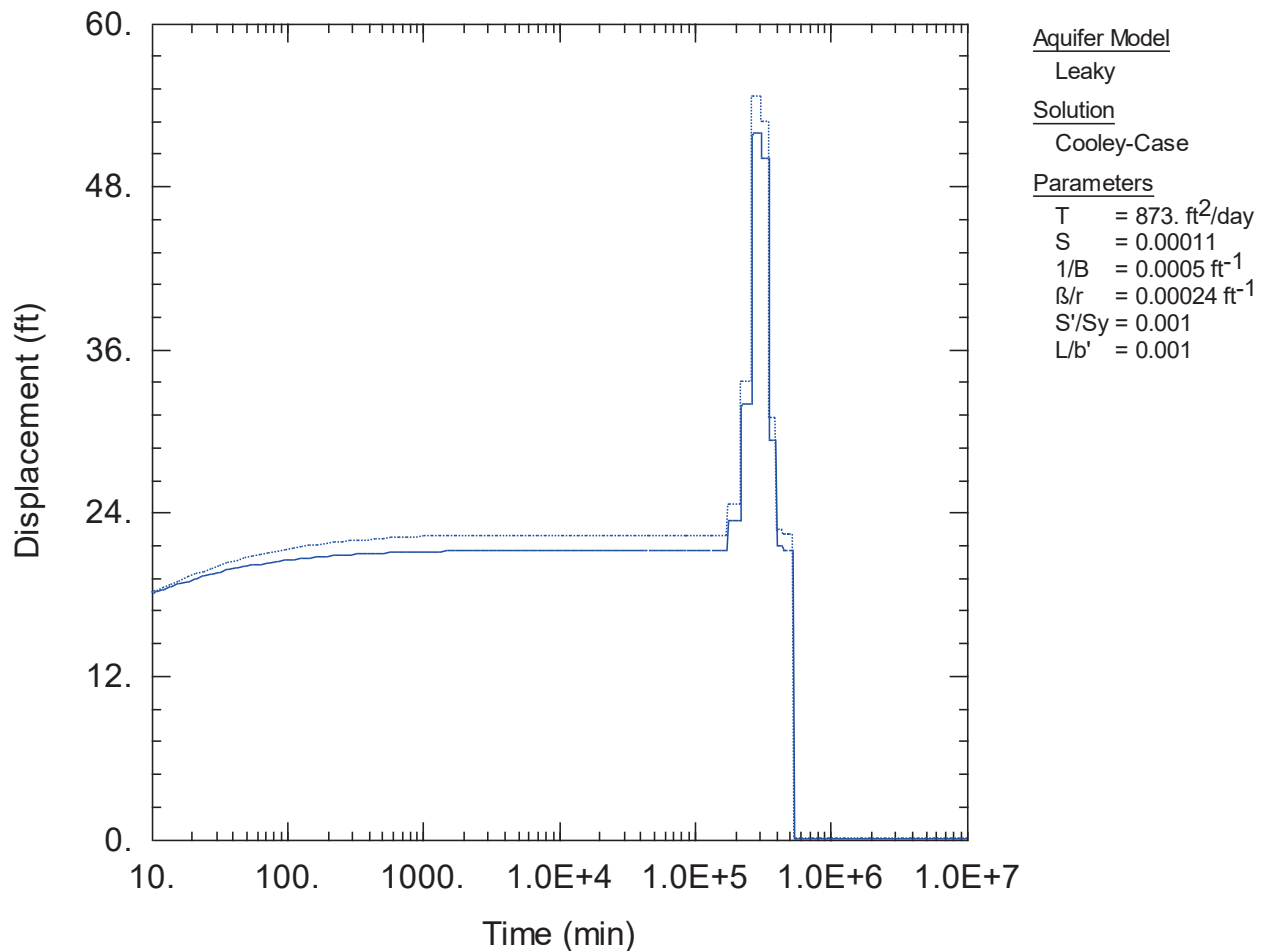


Figure 8: Cooley-Case (1973) time-drawdown plot of the predicted theoretical drawdown in GWIC ID 335313 (dotted line) and GWIC ID 335315 (solid line) including interference drawdown at the end of the first year of the assumed monthly pumping schedule.

8.0 Physical Availability Analysis

An evaluation of groundwater availability in the source aquifer for the purpose of evaluating physical and legal availability was done by calculating groundwater flux through a zone of influence (ZOI) corresponding to the 0.01-foot drawdown contour. The 0.01-foot drawdown contour was modeled in AQTESOLV® (HydroSOLVE INC., 2007) using the following pump schedule and boundaries:

- Constant pumping rate of 240.7 gpm and -240.7 gpm for the Extraction and Injection Wells, respectively, for one year of pumping.

The normalized pumping rate required to produce the adjusted annual volume for the Extraction and Injection Wells is 240.7 gpm and -240.7 gpm, respectively. As shown in **Figure 9**, the 0.01-foot drawdown has an average width of approximately 14,000 ft perpendicular to direction of



groundwater flow to the northwest and is truncated to the East Gallatin River. **Appendix A** provides a list of groundwater rights that are within the 0.01-foot drawdown contour.

The calculation for groundwater flux (Q) through the delineated area is given by Eq. 1 and is 122,220 ft³/day or 1,024 AF/year:

$$Q = TWi$$

where:

T = Transmissivity = 873 ft²/day

W = Width of Zone of Influence = 14,000 ft

i = Groundwater gradient (English (2018); Sutherland (2023)) = 0.01 ft/foot

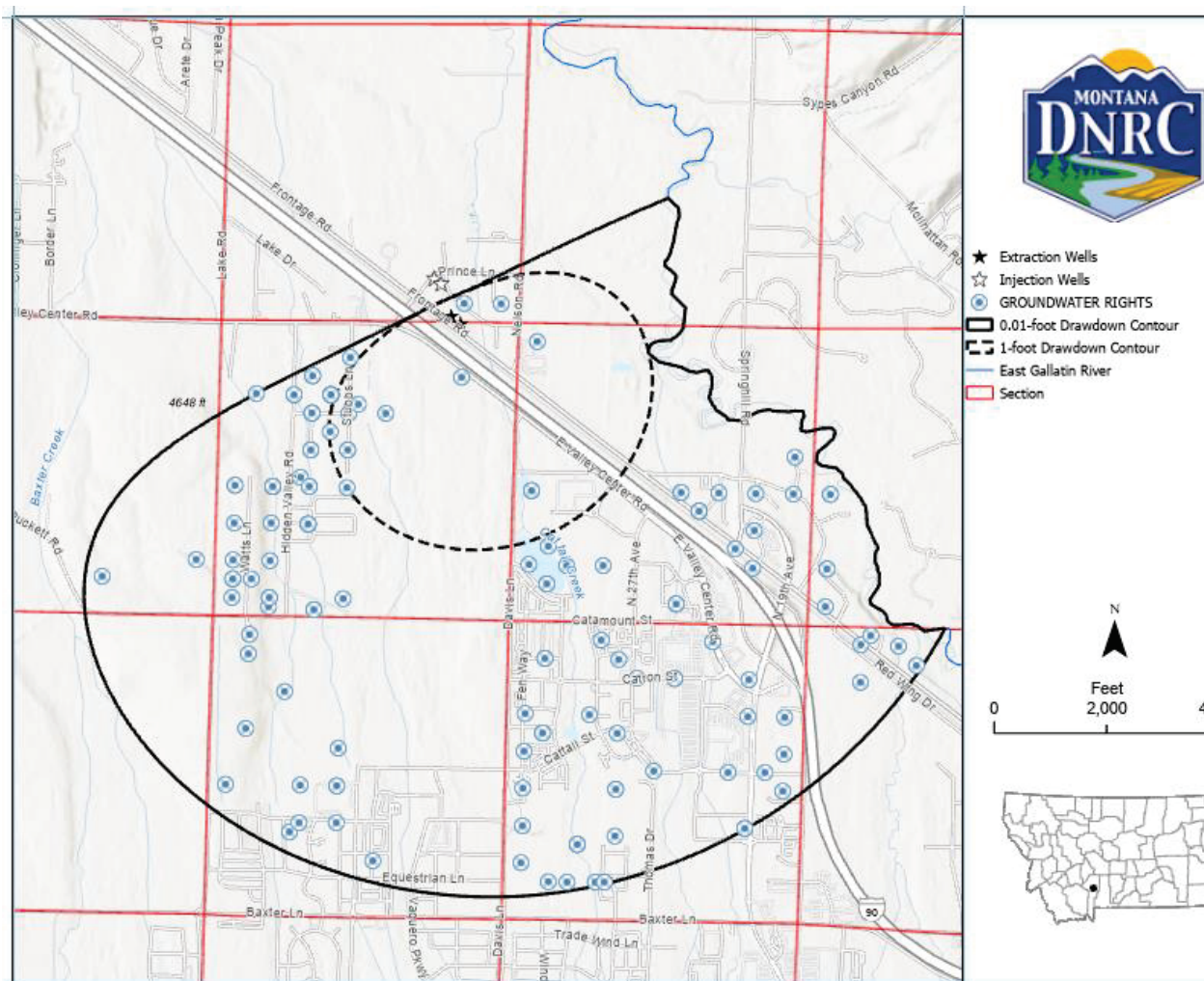


Figure 9: 0.01-foot and 1-foot drawdown contour and water rights (active, severed) within each contour extent for Permit Application No. 41H 30165312.



9.0 Adverse Effect Analyses

Using the Applicant's proposed pump schedule and associated annual volume, potential impacts to existing water rights are evaluated by modeling drawdown in nearby wells and net depletions to surface water(s).

9.1 Groundwater - Drawdown in Existing Wells

The drawdown in existing wells was modeled in AQTESOLV[®] (HydroSOLVE, Inc., 2007) using the following pump schedule and boundaries:

- The monthly pumping and injection schedule identified in column 4 and column 7 of **Table 5** assigned to the Extraction and Injection Wells for five years of pumping.

The drawdown is the largest at the end of July of the fifth year using the proposed pumping schedule. As identified in **Figure 9**, the 1-foot drawdown contour extends to a maximum of approximately 4,100 ft from the Extraction Wells at the end of July of the fifth year of pumping. The 1-foot drawdown contour includes 13 water rights that are predicted to experience drawdown equal to or greater than one foot (**Appendix B**).

9.2 Surface Water - Net Depletion

Pursuant to *Montana Trout Unlimited v. DNRC*, 2006 MT 72, 331 Mont. 483, 133 P.3d 224, the DNRC recognizes the connection between surface water and groundwater, and the effect of pre-stream capture and induced infiltration on surface waters.

Net depletions to surface water depend on propagation of drawdown to areas of the aquifer from which water can be captured. Captured water consists of two possible sources – a reduction in the natural discharge (outflow) rate of groundwater from the aquifer (pre-stream capture) or an increase in the natural/artificial recharge (inflow) rate to the aquifer (e.g. induced infiltration). Two important assumptions are made when evaluating net depletions: first the stream and underlying aquifer remain hydraulically connected by a continuous saturated zone, and second, the stream does not become dry. In addition, net depletion is not a function of groundwater flow rate or direction (Theis, 1938; Leake, 2011) and drawdown from pumping can propagate through the entire thickness of the confining layer to overlying aquifers or surface waters (Konikow and Neuzil, 2007).

As such, net depletions are identified for hydraulically connected surface water sources, not including ditches or ephemeral streams. Net depletion is equal to consumption for proposed groundwater use and is described as the calculated volume, rate, timing, and location of reductions to surface water that are offset by return flows (non-consumed water). Net depletion is evaluated by 1) quantifying the consumed volume associated with the proposed use; 2) identifying hydraulically connected surface waters; and 3) calculating the monthly rate and timing of net depletions to affected surface water(s).



1. Consumed Volume

Consumed groundwater does not return to the source aquifer. Consumed volume depends on the proposed use and its associated percentage of known consumption. Depletion is assumed to be equivalent to consumption on an annual basis unless return flows do not accrete to the potentially affected surface water.

Monthly consumption for irrigation, not including turf grass, can be calculated using ARM 36.12.115 irrigation standards and associated efficiency values or the net irrigation requirement (dry year 80% chance) calculated using the USDA Natural Resources Conservation Service (NRCS) IWR program with inputs consistent with DNRC consumptive use rules in ARM 36.12.1902. Monthly consumption for irrigation of turf grass (lawns) is calculated using either a minimum efficiency value of 70% and ARM 36.12.115 lawn and garden standards or the net irrigation requirement from IWR with inputs consistent with DNRC (2010) Consumptive Use Methodology for turf grass.

Consumption for other purposes are listed in **Table 7** and are based on the results of studies by Kimsey and Flood (1987), Vanslyke and Simpson (1974), Paul, Poeter, and Laws (2007), DNRC (2018), wastewater treatment method, operation of systems, or DNRC policy. Net evaporation is calculated using gridded monthly net evaporation values and methodologies associated with DNRC (2023).

Table 7: Percent consumption by purpose.

Purpose	Method of treatment/Use	Consumed
Domestic/Municipal*/Commercial/Institutional	Individual drainfields	10%
Domestic/Municipal*/Commercial/Institutional	Central treatment facility with minimal consumption	5%
Domestic/Municipal*/Commercial/Institutional	Evaporation basin or land application	100%
Municipal Use for Municipality	Variable	100%
Water Marketing/Agriculture Spraying/Stock Water/some Industrial Uses	Variable	100%
Geothermal	Open-loop geothermal cooling system with pumping and reinjection wells.	0%
Commercial/Industrial	Aggregate Washing – construction standard for moisture allowed in the finished aggregate product.	5%
Commercial	Snow Making – depends on time of day, machine, weather at time of operation, etc.	10-30%
Fisheries, Recreation, Storage for Irrigation	Net evaporation off reservoir surface, gridded monthly net evaporation values and	AF/acre

*Municipal use for a non-municipality, such as a Water District.



WSB Findings

For the subject application, the proposed project includes an open-loop geothermal cooling system, and therefore, will have no consumed volume.

2. Hydraulically Connected Surface Water(s) and Location of Net Depletion

Potentially affected surface waters in a net depletion evaluation are identified by their hydraulic connection, both direct and indirect, to the source aquifer of a proposed groundwater diversion. Hydraulic connection depends on the depth to groundwater beneath the beds of surface waters, connection between deep and overlying shallow aquifers, vertical gradients, and can vary along a reach and with time of year.

Procedures for evaluating hydraulic connection and identifying one or more potentially affected surface water(s) for a proposed well in an unconfined/confined aquifer or regional bedrock aquifer can be found in DNRC (2018) and DNRC (2019), respectively. Net depletion is apportioned between multiple potentially affected surface waters generally following procedures described in Section 3.2 of a guidance document developed by the Province of British Columbia (2016) for determining the effect of groundwater diversion on specific streams.

Following protocols in DNRC (2018) **Table 8** identifies published information used to assess hydraulically connected surface water(s). Not all data may be available for each project and is noted as “NA” when that occurs.

Table 8: Published information used to identify hydraulically connected surface water(s).

Published Information	Surface Water Source
	East Gallatin River
USGS National Hydrographic Dataset (NHD) ¹	Perennial
USGS PROSPER Dataset ²	Perennial (0.9+)
MBMG GWIC wells, less than 50 ft deep, within 1,000 ft of surface water, static water levels above or within 10 ft of elevation of stream bed (DNRC, 2018) ³	Mapped GWIC ID's 91805, 91796, 91789, 151869, 151868, 151867, 151871, 165050, 91779 (Figure 13)
Published Water Table Maps, Publications, Previous Water Rights, etc. ⁴	Sutherland (2023), Madison (2022), Provisional Permit No. 41H 30115965
Gridded National Soil Survey Geographic Database ⁵	Hydric conditions mapped along river (Figure 13)
Aerial imagery	Wet channel (NAIP 2013-2024)
Affidavits, photographs, etc.	NA

¹ Review NHD to identify perennial, intermittent, and ephemeral classifications for surface water sources most proximal to the proposed diversion(s).

² USGS PROSPER probability of streamflow permanence (greater than 50 percent of the time it flows).

³ Per DNRC (2018) hydraulic connection of individual stream reaches to groundwater is evaluated by comparing streambed elevations to static ground water elevations measured in MBMG GWIC wells less than 50 ft deep and within 1,000 ft of surface water or from published water table maps. Surface water within that area is considered



hydraulically connected to the unconfined aquifer if static ground water elevations are above or within 10 ft of the elevation of the stream bed.

⁴No water table maps available.

⁵ Review Gridded National Soil Survey Geographic Database to identify hydric soils or shallow water tables near surface water sources.

WSB Scientific Findings

Based on the review of the published information in **Table 8**, the source aquifer is hydraulically connected to the East Gallatin River, a perennial surface water source. As identified in **Figure 13** the starting point of the depleted reach starts along the northern side of the NWSEW of Section 23, Township 01 South, Range 05 East, Gallatin County.

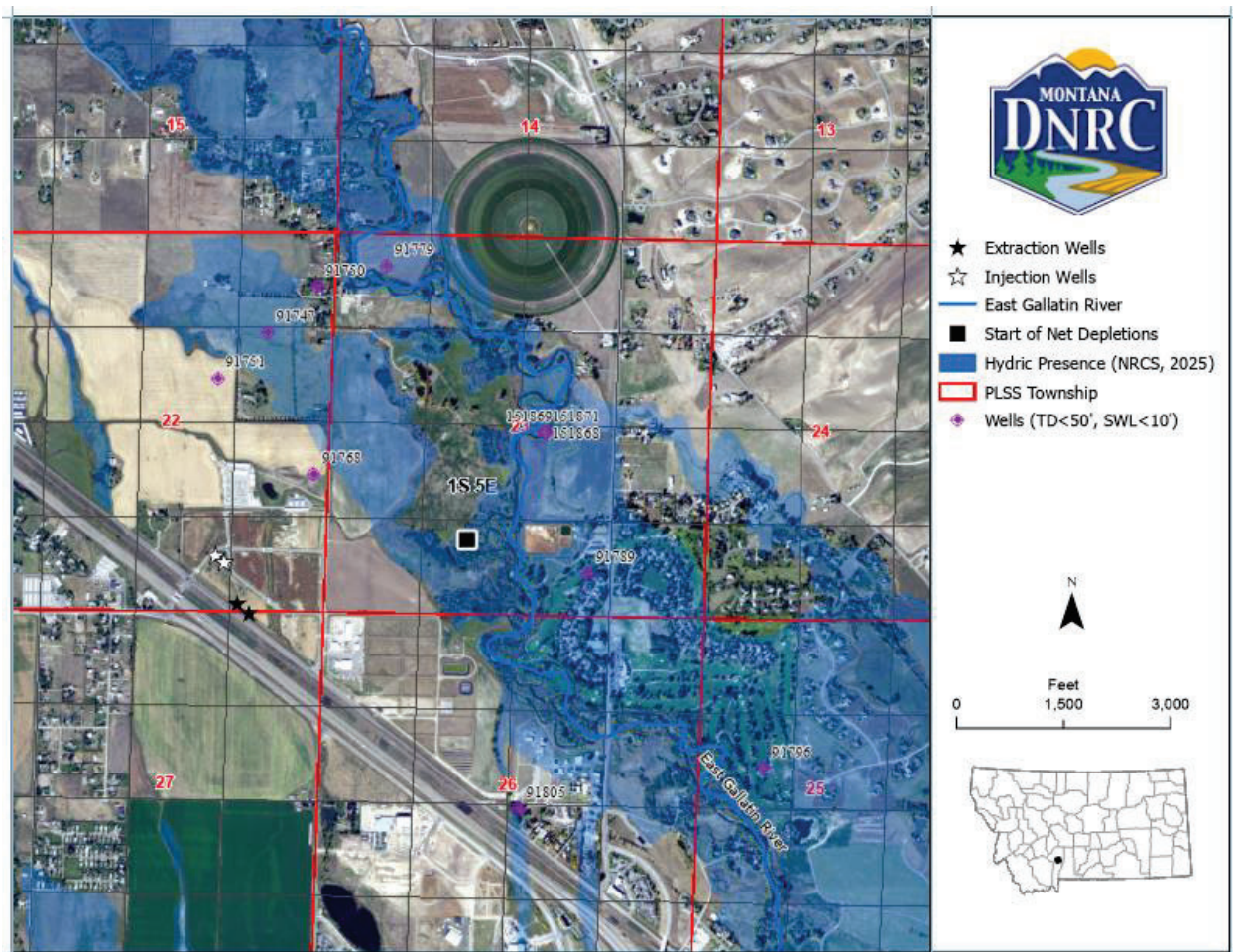


Figure 13: Information used to assess hydrologic connection and location of starting point of the depleted reach on the East Gallatin River for Permit Application No. 41H 30165312.



3. Rate and Timing of Depletions

Evaluations of the rate and timing of depletions caused by pumping are based on the basic concept that groundwater pumping eventually is offset by an equivalent increase in recharge or decrease in discharge (Theis, 1940; Leake et al., 2008), a process defined as capture by Lohman (1972). Capture occurs as drawdown propagates to surface water and areas of phreatophyte vegetation (areas of groundwater discharge) that takes water directly from groundwater. In the absence of credible evidence to the contrary, capture of ET by phreatophytes is neglected and net depletion is assumed to equal total capture. This assumption is justified because published estimates for conditions common in Montana alluvial valleys indicate capture of ET generally is less than 10 percent of total capture (Xunhong, 2006). Capture of ET in ephemeral drainages may be significant and will be evaluated on an application-by-application basis.

The rate and timing of net depletion caused by pumping may be modeled using a variety of analytical and numerical models selected to fit site-specific conditions and needs. Simple models including the Alluvial Water Accounting System (AWAS), the Well Pumping Depletion Model (WPDM) or FWD:SOLV (HydroSOLVE, Inc. 2024) typically are used by DNRC to model depletions to one source with simple aquifer boundaries. Adjustments may be made for more complex conditions or multiple sources using methods like those described by Contor (2011), analytical models by Hunt (2003) and Butler et al. (2001) or a superposition numerical groundwater flow model.

Modeling may not be necessary in some situations such as where a proposed use is constant year-round, the source aquifer is confined, or the distance to potentially affected stream reaches is greater than one mile. Modeling net depletions can be simplified if the proposed place of use is located the same relative distance from the potentially affected surface water as the proposed wells and all non-consumed water infiltrates the source aquifer and returns to the potentially affected surface water as return flows. Under those simplifying assumptions, net depletion can be modeled based on withdrawal of the monthly consumed amounts. Otherwise, net depletion by the full withdrawals and return flows need to be modeled separately with net depletion calculated as depletion minus return flows.

The proposed use is geothermal, water will be extracted and injected simultaneously. There would be no consumed volume, and therefore, no timing of net depletions was completed as part of Application No. 41H 30165312.

Review

This document has been reviewed on June 30, 2025 in accordance with Category 7 of [DNRC's Water Sciences Bureau Minimum Standards of Review](#), Version 2, February 2024.

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Appendix A: Groundwater Rights within Area of Potential Impact



WRNUMBER	ALL_OWNERS
41H 30127867	FLIR SYSTEMS INC
41H 100672 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST
41H 80659 00	CRESTVIEW LAKE LLC
41H 113364 00	CECILIA R VANIMAN; DONALD D VANIMAN
41H 115518 00	HIDDEN VALLEY OWNER LLC
41H 115515 00	HIDDEN VALLEY OWNER LLC
41H 40130 00	HIDDEN VALLEY OWNER LLC
41H 39225 00	HIDDEN VALLEY OWNER LLC
41H 115516 00	HIDDEN VALLEY OWNER LLC
41H 115517 00	HIDDEN VALLEY OWNER LLC
41H 42480 00	DALE LILLEJORD
41H 59866 00	LYNN C WINDHAM
41H 60759 00	MICHAEL D COK
41H 90747 00	D2BZ1 LLC
41H 108859 00	JULIE OGHIGIAN; MATTHEW OGHIGIAN
41H 117208 00	WOODY LAURIE BATES REVOCABLE TRUST DATED 4/4/95
41H 96799 00	9019 LLC
41H 30125032	KEVIN KENT
41H 30000996	SARAH HALL
41H 30063822	MICHAEL D COK
41H 30045047	CRESTVIEW LAKE LLC
41H 108896 00	JULIE OGHIGIAN; MATTHEW OGHIGIAN
41H 30162630	KAMERON KELSEY; SALLY KELSEY
41H 25895 00	ABIGAIL L MINFORD; BENJAMIN D PRENTISS
41H 100708 00	COSTCO WHOLESALE
41H 107598 00	GALLATIN CENTER LTD PRTRNSHP
41H 116445 00	BOZEMAN MONTANA HOLDINGS LLC
41H 100715 00	NINETEENTH STREET PARTNERSHIP
41H 30162633	KAMERON KELSEY; SALLY KELSEY
41H 30045048	CRESTVIEW LAKE LLC
41H 39213 00	TRACEY PETER REVOCABLE TRUST
41H 40108 00	S&S DAVIS LLC
41H 30069875	JOSHUA N GRUENBERG; MIKARON F GRUENBERG
41H 116444 00	BOZEMAN MONTANA HOLDINGS LLC
41H 30103555	PETER E GARCIA; TASHA D GARCIA
41H 36789 00	MARY ELLEN BRUHN
41H 80669 00	CAROLYN J TATARKA; RAYMOND J TATARKA
41H 107475 00	JOHN HECHT
41H 107601 00	GALLATIN CENTER LTD PRTRNSHP
41H 113372 00	JOHN D HECHT; MARY HECHT
41H 30148873	KRUSE, KELLY R LIVING TRUST; KRUSE, PATRICIA A LIVING TRUST
41H 40413 00	ROBERT A WHITTMYER; SHARON WHITTMYER
41H 79512 00	CHRISTINA RIFFLE; SCOTT RIFFLE



41H 93745 00	BOB DAVIS; ROXI M DAVIS
41H 30149453	BARTIMCO PROPERTIES LLC
41H 111644 00	JOHN D HECHT; MARY HECHT
41H 139045 00	HEMINGWAY, PATRICK & CAROL T TRUST
41H 6741 00	BOZEMAN, CITY OF
41H 30020414	FHG CONSTRUCTION INC
41H 42468 00	JOHN D HECHT
41H 32752 00	BARBARA F MCLAUGHLIN
41H 30120927	MICHAEL W DINKINS
41H 114302 00	SUSAN R TAYLOR
41H 138 00	NICOLE R BOWER; SPENCER J BOWER
41H 104756 00	ORVILLE WAY LLC
41H 30067919	KENNETH WIRTZ
41H 30106534	STEVEN SMITH
41H 30161488	BURT HAMNER; EMILY MORRILL
41H 39221 00	LARRY D KIRKPATRICK; KAREN S LANZ
41H 47327 00	BMCH RENTALS LLC
41H 96656 00	BRANDON BEAMER
41H 30170704	RICHARD A NOONAN; LEAH J REUTER; RICHARD J REUTER; CAROLYN G WIDMAN
41H 111645 00	FIRST INTERSTATE BANK OF COMMERCE
41H 14010 00	4 CLOVERS LLC; OREILLY PARTNERSHIP LLC; SEVEN OX SEVEN LLC
41H 39746 00	LANTANA CORPORATION
41H 45560 00	BOZEMAN HEALTH URGENT CARE LLC
41H 53161 00	RUSSELL HOSNER LLC
41H 106106 00	KELLER SUPPLY CO
41H 30105693	MONTANA, STATE OF DEPT OF TRANSPORTATION
41H 30047249	CRESTVIEW LAKE LLC
41H 30047250	CRESTVIEW LAKE LLC
41H 103121 00	JERRI K ALEXANDER; LOREN C ALEXANDER
41H 31114 00	BOZEMAN ELEMENTARY DISTRICT NO. 7
41H 95370 00	FETTIS, WILLIAM J TRUST
41H 19409 00	DALLAS J PEUSE
41H 103232 00	G AND S FAMILY TRUST
41H 89705 00	KENNETH WIRTZ
41H 99364 00	SANDAN LLC
41H 59783 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST
41H 23019 00	DAROLD E BRUHN; NORMA J BRUHN
41H 23316 00	JAMES D BRUHN
41H 104707 00	VALLEY CENTER LTD PRTRNSHP
41H 114952 00	BOZEMAN 6 RE LLC
41H 16414 00	WALDO E KUCHLING
41H 17696 00	FLOYD MATHISON
41H 17715 00	K SCOTT HALL; TERESA C HALL
41H 18751 00	KEVIN KENT



41H 21416 00	JOHN WESEN
41H 22014 00	ORR F MARY; MICHAEL J SWEENEY
41H 22940 00	FIVEFOLD HOLDINGS LLC
41H 23687 00	MARY S SEED; RAYMOND B SEED
41H 28957 00	JOSEPHINE Z HOWE; ROBERT H HOWE
41H 31360 00	LAURA F BARRY; STEPHEN R BARRY
41H 32618 00	LINDA K ANDERSON
41H 34684 00	JOSHUA C CAMPBELL
41H 36426 00	RONALD D GREEN; RUTH A GREEN
41H 37428 00	BOZEMAN ELEMENTARY DISTRICT NO. 7
41H 40139 00	DEBRA A GILL; MICHAEL L GILL
41H 44265 00	CRAYTON, ROBERT F & CYNTHIA REVOCABLE LIVING TRUST
41H 44266 00	CRAYTON, ROBERT F & CYNTHIA REVOCABLE LIVING TRUST
41H 49600 00	PATTERSON PLACE LLC
41H 55200 00	KEVIN J FRANK
41H 58361 00	TODD J PIERONI
41H 75642 00	ROBERT L ADAMS; JOHN L MARCELLA; PAMELA J MARCELLA
41H 9574 00	DYPEX INC
41H 30149451	BARTIMCO PROPERTIES LLC
41H 89647 00	RR1045 LLC
41H 104721 00	ANITA L SAUNDERS; R ED SAUNDERS
41H 110100 00	CARRIE MCCLAUGHRY; TOBIAS H MCCLAUGHRY
41H 30047450	CHAD MUESKE
41H 30048611	SOUTH HAMILTON COURT CONDO ASSN
41H 30105386	TAC INVESTMENTS LLC
41H 30043137	CATKIN CONDOMINIUM OWNERS ASSN INC
41H 30147910	ARMKNECHT STEVEN R REVOCABLE LIVING TRUST
41H 100809 00	AMERICAN SIMMENTAL ASSOC INC
41H 30065502	NATHAN S NAPRSTEK
41H 30161243	BRIAN LAPKA
41H 30161244	BRIAN LAPKA
41H 73705 00	ROGER S KIRK
41H 30115761	DERRICK SALVESON; JYLISSA SALVESON
41H 40136 00	CASNURSPROP LLC
41H 108962 00	RIVERGLEN CONDOMINIUMS
41H 30050963	BOZEMAN SCHOOL DIST 7
41H 114948 00	BOZEMAN 6 RE LLC
41H 11915 00	CASNURSPROP LLC
41H 139905 00	ROBERT D LANE; THOMAS E LANE
41H 30005476	JAMES ARMSTRONG; NINA ARMSTRONG
41H 30010468	KINGMA REVOCABLE TRUST
41H 30011859	SANDAN LLC
41H 30012764	SANDAN LLC
41H 30013046	SANDAN LLC



41H 30016832	RICHTER, DELBERT L & DENA S REVOCABLE LIVING TRUST
41H 30021277	P ANDREW VAN ORDEN
41H 30021278	C&C MANAGEMENT LLC
41H 30023647	JASON A DARROW
41H 30024622	BAXTER MEADOWS MASTER COMMUNITY ASSN INC
41H 30024623	BAXTER MEADOWS MASTER COMMUNITY ASSN INC
41H 30025056	SANDAN LLC
41H 30028964	BRENT J SCHMOLL
41H 30029336	TURNQUIST REVOCABLE TRUST
41H 30030867	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30030868	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30031011	JACQUELINE J REYGERS; LODY E REYGERS
41H 30041929	HENRY J BOUMA
41H 30042369	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30042370	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30044488	URBAN VILLA HOMEOWNERS ASSN
41H 30145989	LACEY BUCZALA; ROBERT BUCZALA
41H 361 00	RUSSELL HOSNER LLC
41H 362 00	RUSSELL HOSNER LLC
41H 5099 00	TATARKA FAMILY FARMS LLC
41H 636 00	RONALD K LEWIS



Appendix B: Groundwater Rights Within 1-foot Drawdown Contour



WRNUMBER	ALL_OWNERS	Well Depth (ft)	Static Water Level (ft)	Drawdown (ft)	Available Water Column (ft)
41H 30161243	BRIAN LAPKA	52	17	8.8	26
41H 30103555	PETER E GARCIA; TASHA D GARCIA	63	23	1.7	38
41H 30041929	HENRY J BOUMA	60	16	2.6	41
41H 107475 00	JOHN HECHT	60	17	1.2	42
41H 30149453	BARTIMCO PROPERTIES LLC	72	5	17.2	50
41H 111644 00	JOHN D HECHT; MARY HECHT	60	6	1.4	53
41H 30065502	NATHAN S NAPRSTEK	82	25	1.2	56
41H 59783 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST	74	10	1.6	62
41H 30105693	MONTANA, STATE OF DEPT OF TRANSPORTATION	80	10	5	65
41H 30149451	BARTIMCO PROPERTIES LLC	88	9	6.9	72
41H 113364 00	CECILIA R VANIMAN; DONALD D VANIMAN	100	12	1.6	86
41H 30047450	CHAD MUESKE			1	
41H 100672 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST			1.6	



Groundwater Permit Technical Analyses Report – Part B

Department of Natural Resources and Conservation (DNRC or Department)

Water Resources Division

Kendrew Ellis, Water Resource Specialist, Bozeman Regional Office

Application No.	41H 30165312	Proposed Point of Diversion	SWSESE Section 22, T1S, R5E, Gallatin County
Applicant	Barnard Construction		

Overview

This report is Part B of a two-part publication which analyzes data submitted by the Applicant in support of the above-mentioned water right application. This report provides technical analyses as required under the Administrative Rules of Montana (ARM) 36.12.1303 in support of the water rights criteria assessment as required in § 85-2-311, Montana Code Annotated (MCA).

This Groundwater Permit Technical Analyses Report – Part B contains the following sections:

Overview.....	1
Variances	2
1.0 Application Details	2
2.0 Surface Water Analysis of Depleted Surface Water	1
3.0 Area of Potential Impact Analysis of Depleted Surface Water	1
Review	2
References	2



Variances

A variance from the requirements found in ARM 36.12.121(3)(a) “pumping must be maintained throughout the duration of the test and the rate may not depart from the average pumping rate by more than 5%” was granted from the Bozeman Regional Office April 14, 2025. Multiple times throughout the first 1,620 minutes of the aquifer testing, the measured discharged fluctuated slightly more than 5% from the average measured discharge rate of 269.5 gpm. From 1,620 minutes until the end of the test, the pumping was maintained at a constant discharge rate and consistent drawdown was collected in both the Production and Observation Wells.

A variance from the requirements found in ARM 36.12.121(3)(e)(iii) “the testing procedures for a minimum eight-hour drawdown and yield test performed on any production well must follow (a), (d), and (h)” was also granted from the Bozeman Regional Office on April 14, 2025. During the first 16 -minutes of the eight-hour drawdown and yield test, the discharge started at 225 gpm and was raised to up to approximately 275 gpm with an average measured discharge rate of 263.8 gpm. The discharge deviation greater than 5 % at the start of well testing is common, and the remainder of the pumping was maintained at a constant discharge rate. The requirements for drawdown at yield test under 3(e)(iii), specifically 3(d) and 3(h) were met.

A variance from the requirements found in ARM 36.12.121(3)(g) “to monitor background groundwater levels in the production well and observation well(s) at frequent intervals for at least two days prior to beginning the aquifer test according to Form No. 633” was also granted from the Bozeman Regional Office on April 14, 2025. The background water levels in the Production Well and Observation Well 1 were collected two days prior to the day of aquifer testing. The water level difference in the Production Well on the day prior to the aquifer testing was 0.1 ft. The drawdown and recovery data in the Production Well and Observation Well 1 did not appear to be affected by any background level trends. The background level data collected for Observation Well 2 represented the start of the aquifer testing. However, clear interference drawdown was shown in Observation Well 2 and impacts from background levels were not recognizable.

A variance from the requirements found in ARM 36.12.121(3)(h) “water levels in the production well and/or observation well(s) must be reported with 0.01-foot precision according to the schedule specified on Form No. 633” was also granted from the Bozeman Regional Office on April 14, 2025. The Applicant does not follow minimum required time increment schedule for Observation Well 1 and 2 for first 60 minutes of data collection. The remainder of the data collection period fulfilled the requirements of 3(h) and is adequate for obtaining aquifer properties.

1.0 Application Details

The Applicant proposes to divert groundwater from 1/1 to 12/31 for non- consumptive geothermal use from two extraction well points of diversion (PODs) in the SWSESE Section 22,



T1S, R5E, Gallatin County (EX-1 and EX-2). The two injection wells for the project are located in SESWSE Section 22, T1S, R5E, Gallatin County (IN-1 and IN-2). The wells will divert a total 298.38 AF at a total flow rate of 550 GPM (275 GPM per well) from 1/1 to 12/31 to provide geothermal cooling for the commercial building in SESWSE and SWSESE Section 22 and NWNENE Section 27, T1S, R5E, all in Gallatin County, as seen in **Table 1** and **Figure 1**.

Table 1. Summary of the proposed use.

Source	Flow Rate	Diverted Volume	Consumed Volume	Purpose	Period of Use	Place of Use	Point(s) of Diversion	Period of Diversion
Groundwater	550 GPM	298.38 AF/yr	0 AF	Geothermal	1/1-12/31	SESWSE & SWSESE Section 22, T1S, R5E, Gallatin County NWNENE Section 27, T1S, R5E, Gallatin County	SWSESE Section 22, T1S, R5E, Gallatin County SWSESE Section 22, T1S, R5E, Gallatin County	1/1-12/31



Groundwater Permit Technical Analyses Report- Part B
Application No. 41H 30165312
Bozeman Regional Office
Gallatin County

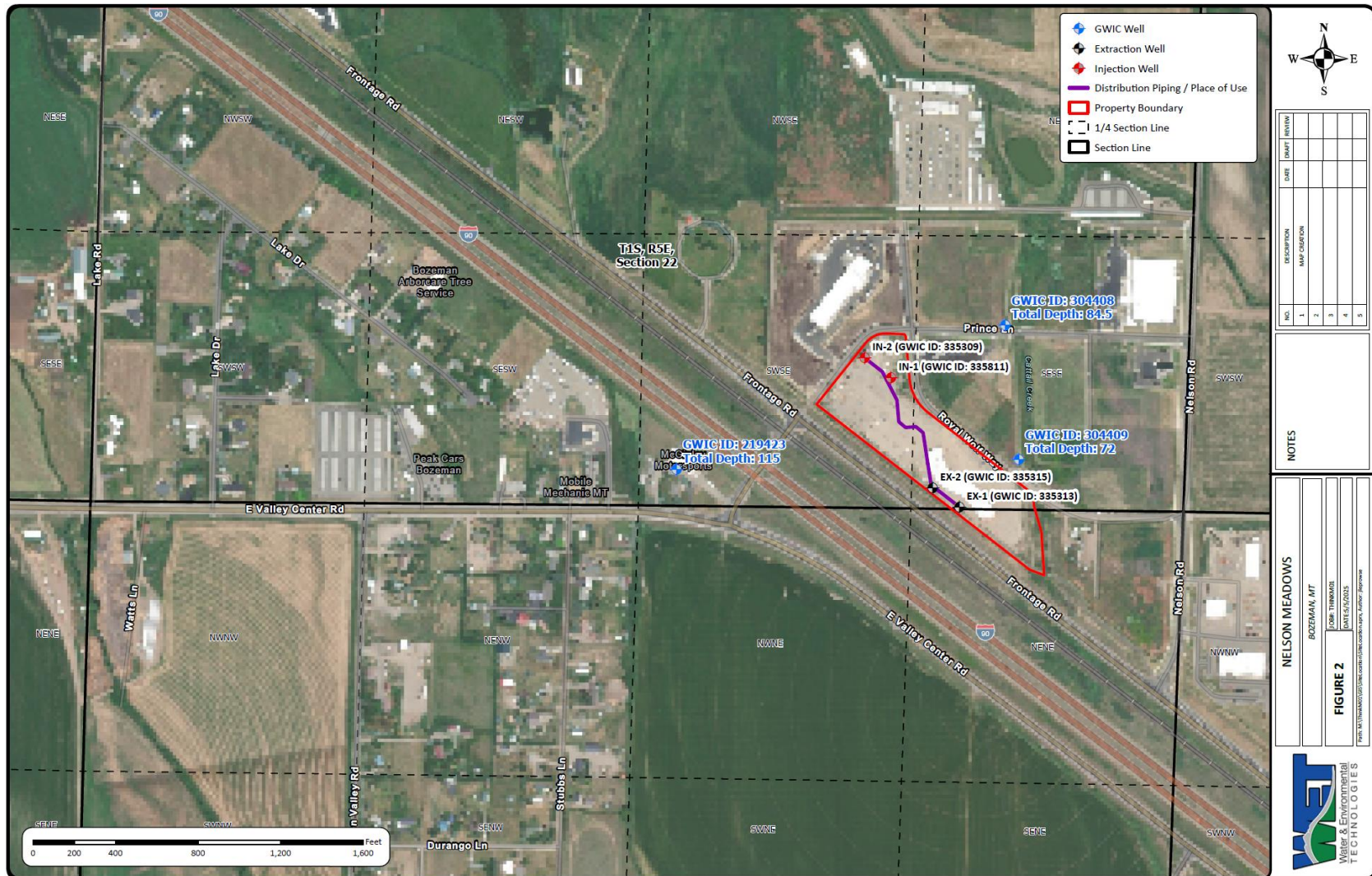


Figure 1: Map of the Applicant's proposed POD on the source and proposed place of use by Water & Environmental Technologies dated 5/5/2025.



2.0 Surface Water Analysis of Depleted Surface Water

As net depletions to the surface water source are 0 AF, the Department did not find the physical availability of the surface water source for later comparison to downstream legal demands.

3.0 Area of Potential Impact Analysis of Depleted Surface Water

The Area of Potential Impact for this application is: The proposed use is non-consumptive, and a net depletion of 0 AF was identified for the hydraulically connected surface water. No area of potential impact for surface water was identified because no net depletion will occur.



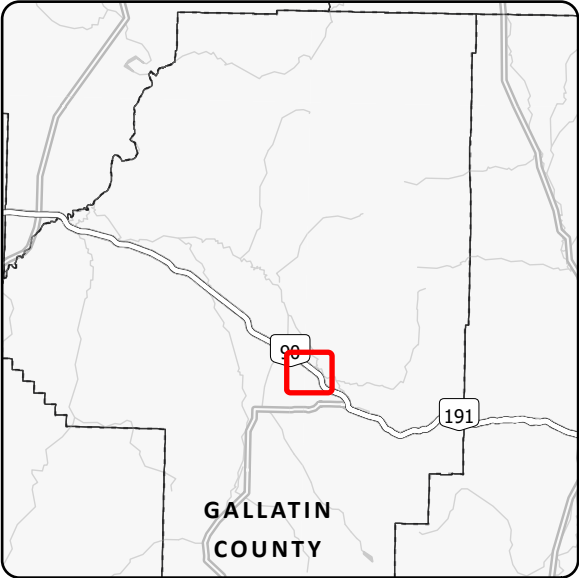
Review

This document has been reviewed by the Department on July 7, 2025.

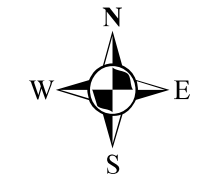
References

Department Standard Practice for Determining Physical Availability of Surface Water
Department Standard Practice for Area of Potential Impact Analysis

Site Map - Question 17



 Property Boundary



NO.	DESCRIPTION	DATE	DRAFT	REVIEW
1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS SITE LOCATION

BOZEMAN, MT

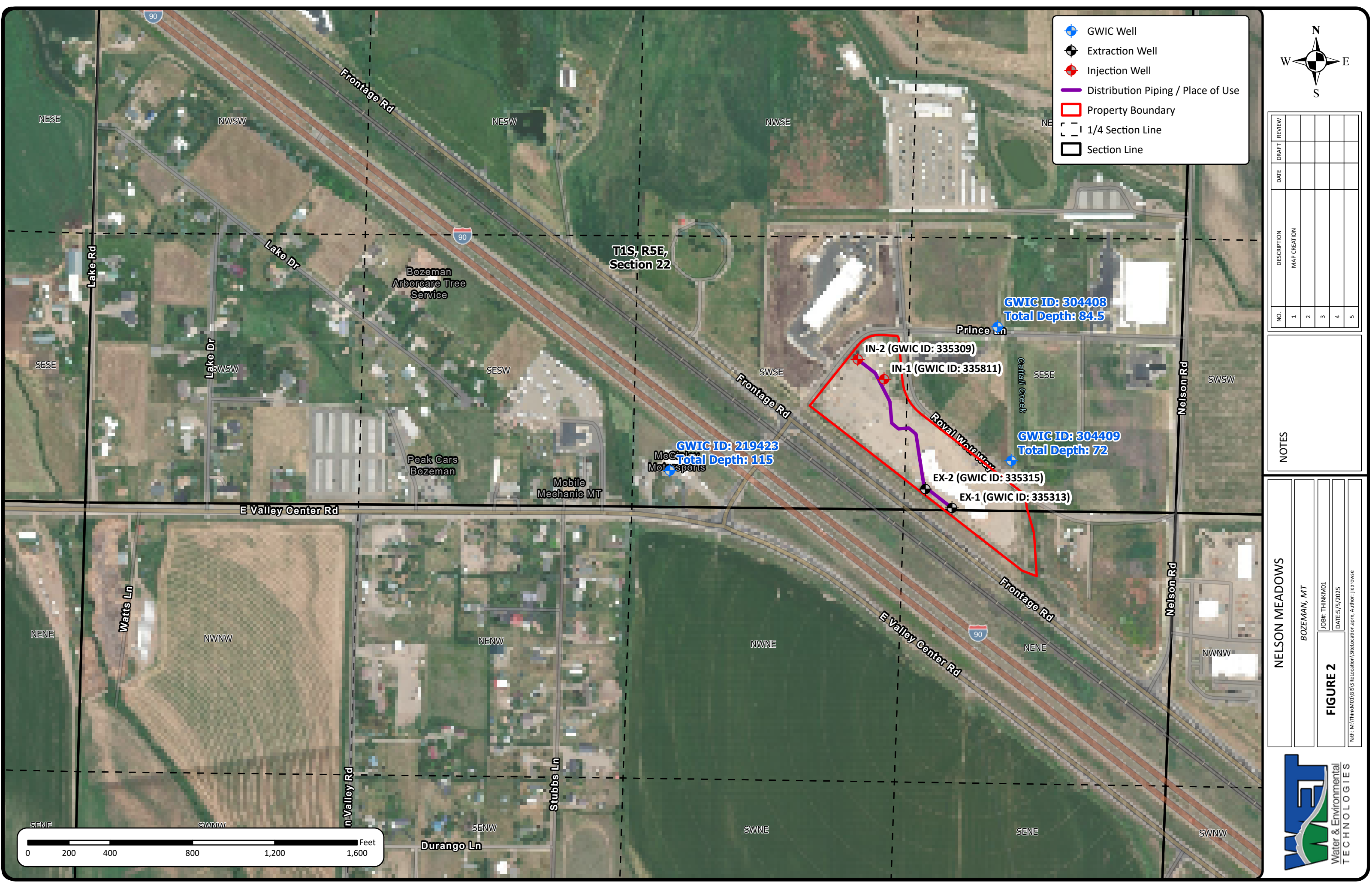
FIGURE 1

JOB#: THINKM01

DATE: 2/7/2025

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GWIC Well

Extraction Well

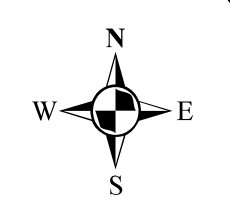
Injection Well

Distribution Piping / Place of Use

Property Boundary

1/4 Section Line

Section Line



NO.	DESCRIPTION	DATE	DRAFT	REVIEW
1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS

BOZEMAN, MT

JOB#: THINKM01

DATE: 5/5/2025

FIGURE 2

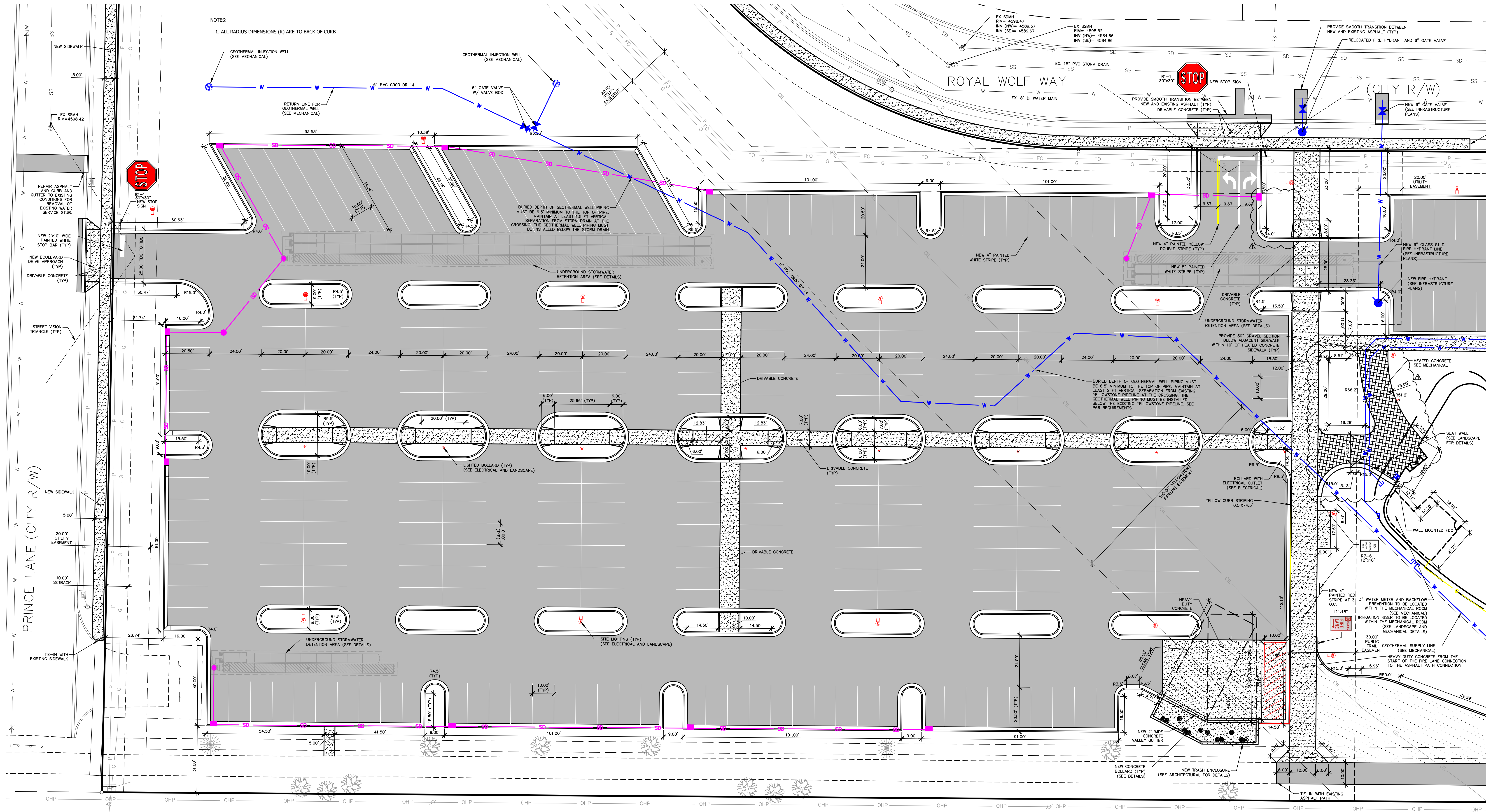
Path: M:\ThinkM01\GIS\SiteLocation\SiteLocation.aprx, Author: jleprosse



Civil & Mechanical Diagrams - Question 32



20 10 0 20 40
SCALE: 1" = 20'



NOTES:
1. ALL RADIUS DIMENSIONS (R) ARE TO BACK OF CURB

BURIED DEPTH OF GEOTHERMAL WELL PIPING MUST BE 6.5' MINIMUM TO THE TOP OF PIPE. MAINTAIN AT LEAST 1.5' FT VERTICAL SEPARATION FROM STORM DRAIN AT THE CROSSING. THE GEOTHERMAL WELL PIPING MUST BE INSTALLED BELOW THE STORM DRAIN

BURIED DEPTH OF GEOTHERMAL WELL PIPING MUST BE 6.5' MINIMUM TO THE TOP OF PIPE. MAINTAIN AT LEAST 2' FT VERTICAL SEPARATION FROM EXISTING YELLOWSTONE PIPELINE AT THE CROSSING. THE GEOTHERMAL WELL PIPING MUST BE INSTALLED BELOW THE EXISTING YELLOWSTONE PIPELINE. SEE P66 REQUIREMENTS.

NEW 4" PAINTED RED STRIPE AT 3' O.C.
12"x18"
IRRIGATION RISER TO BE LOCATED WITHIN THE MECHANICAL ROOM (SEE LANDSCAPE AND MECHANICAL DETAILS)
30.00' PUBLIC TRAIL EASEMENT
GEOTHERMAL SUPPLY LINE (SEE MECHANICAL)
HEAVY DUTY CONCRETE FROM THE START OF THE FIRE LANE CONNECTION TO THE ASPHALT PATH CONNECTION

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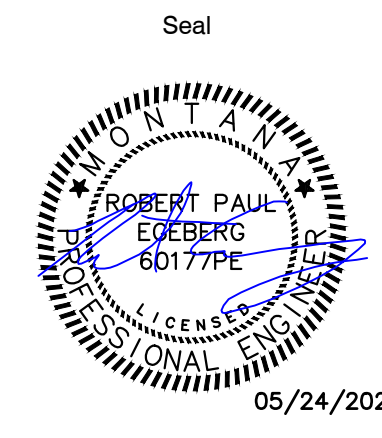
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BARNARD CONSTRUCTION



Issue	Date
SITE PLAN MODIFICATION	02/07/2025
SEAT WALL ELEVATION	03/21/2025
GRADING REVISION	05/05/2025

BARNARD OFFICE HQ
ROYAL WOLF WAY
BOZEMAN, MT

Project Number
21-723

Project Number: 21-723
Drawn By: CS
Reviewed By: RPE
Approved By: RPE

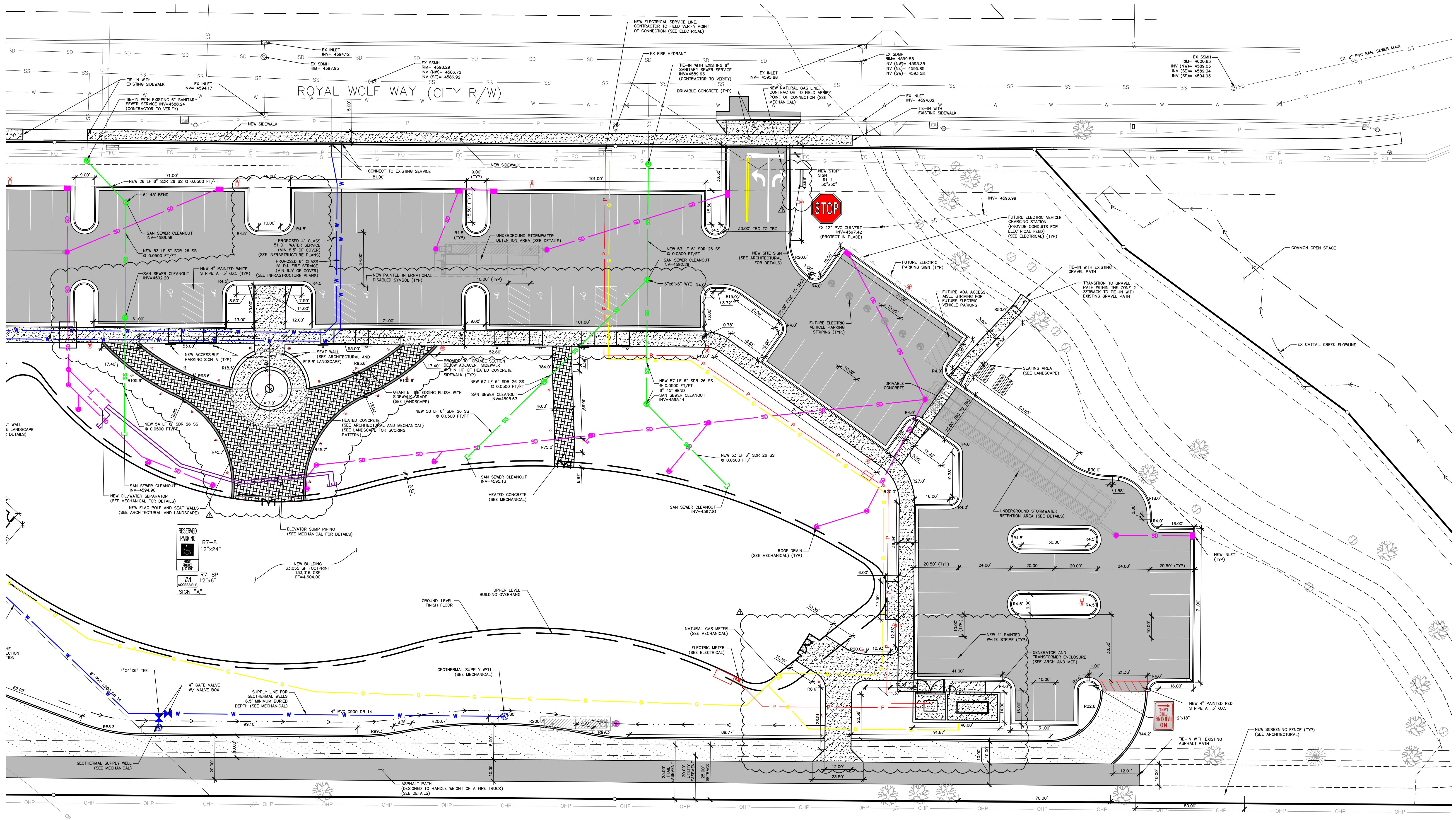
SITE AND UTILITY PLAN - WEST

C4.1

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20 10 0 20 40
SCALE: 1" = 20'



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BARNARD CONSTRUCTION

Seal

Issue

Date

SITE PLAN MODIFICATION 02/07/2025

SEAT WALL ELEVATION 03/21/2025

GRADING REVISION 05/05/2025

05/24/2023

BARNARD OFFICE HQ
ROYAL WOLF WAY
BOZEMAN, MT

Project Number: 21-723

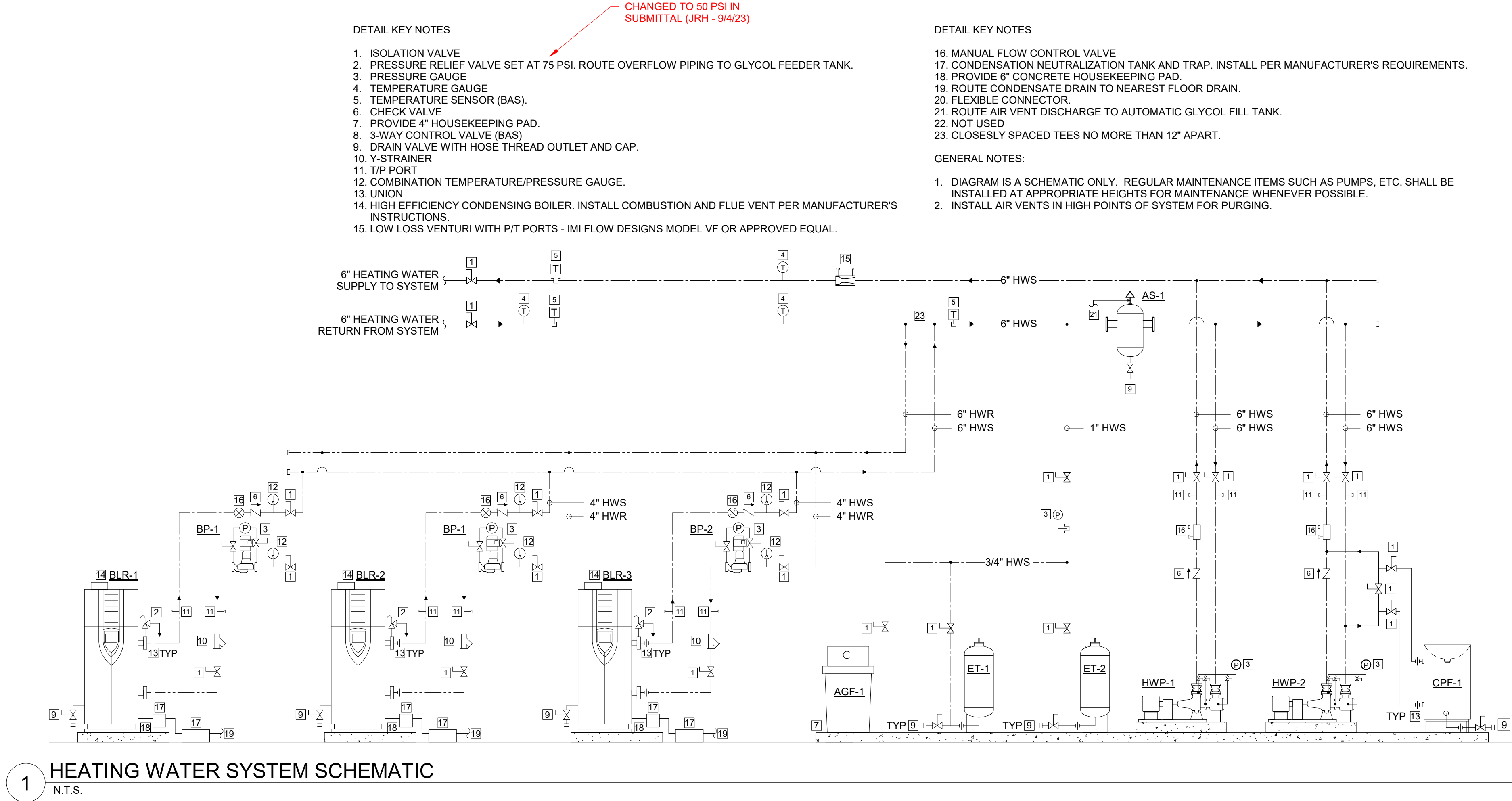
Drawn By: CS
Reviewed By: RPE
Approved By: RPE

Project Number 21-723

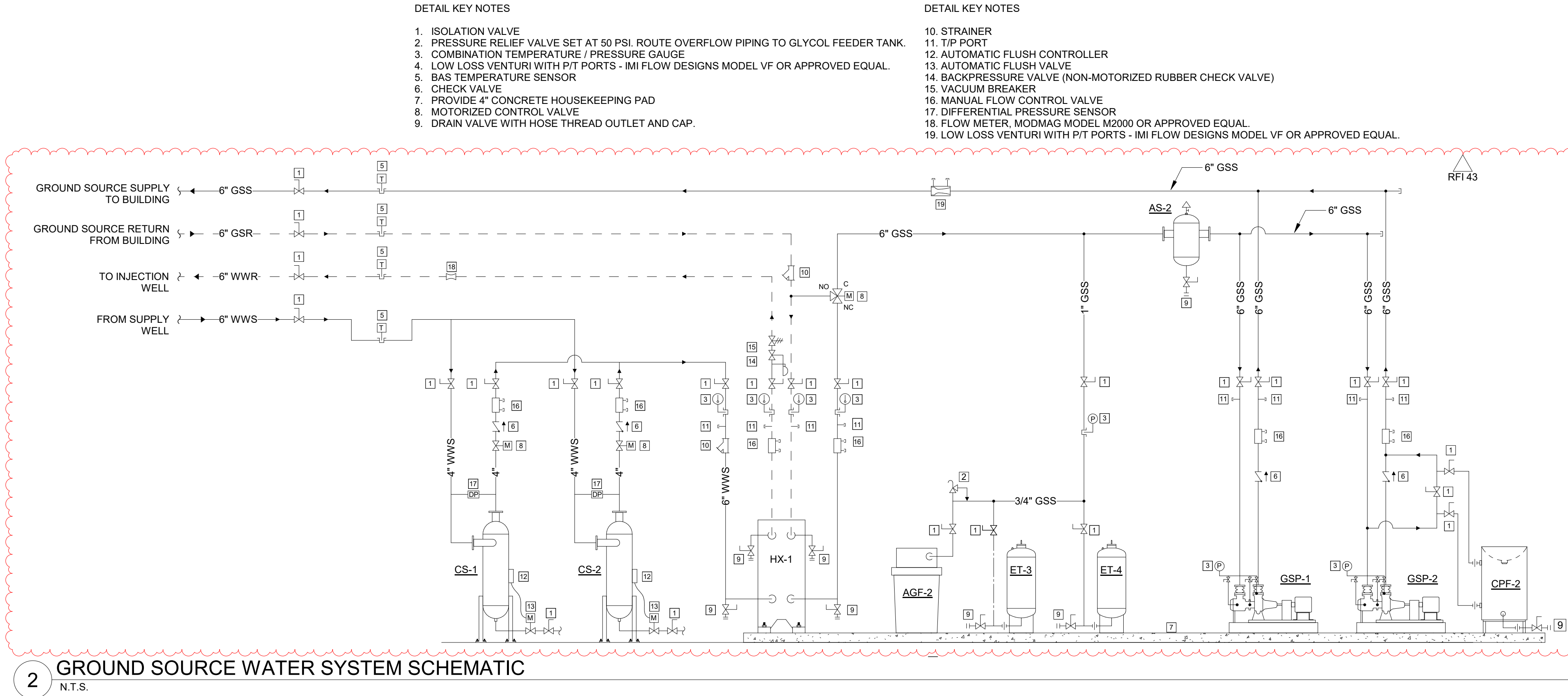
SITE AND UTILITY PLAN - EAST

C4.2

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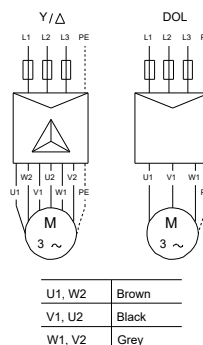
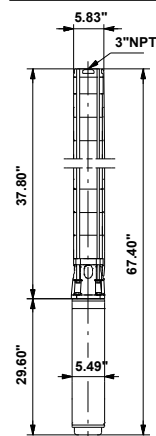
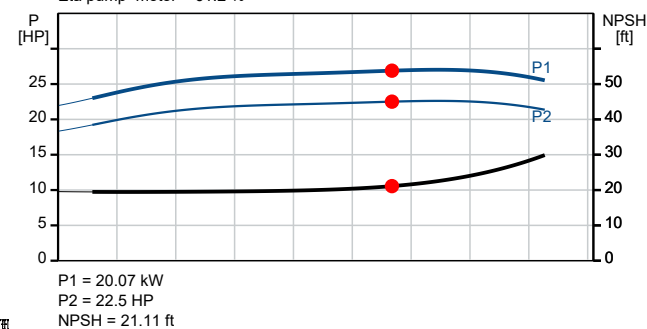
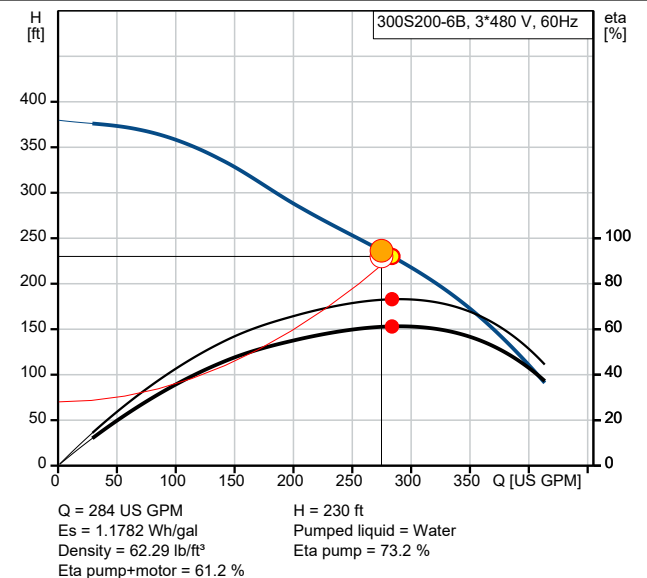
1 HEATING WATER SYSTEM SCHEMATIC
N.T.S.



2 GROUND SOURCE WATER SYSTEM SCHEMATIC
N.T.S.

Pump Curve - Question 33

Description	Value
General information:	
Product name:	300S200-6B
Product No:	14B735C6
EAN number:	5700393985872
Technical:	
Pump speed on which pump data are based:	3450 rpm
Actual calculated flow:	284 US GPM
Rated flow:	317 US GPM
Resulting head of the pump:	230 ft
Rated head:	196.9 ft
Stages:	6
Number of reduced-diameter impellers:	B
Shaft seal for motor:	SIC/SICNBR
Approvals:	CULDWUS,CCSAUS
Approvals for drinking water:	PROP65
Curve tolerance:	ISO9906:2012 3B
Model:	B
Motor version:	T40
Return valve:	YES
Materials:	
Pump:	Stainless steel
	EN 1.4301
	AISI 304
Impeller:	Stainless steel
	EN 1.4301
	AISI 304
Motor:	Stainless steel
	DIN W.-Nr. 1.4301
	AISI 304
Installation:	
Maximum ambient pressure:	870.23 psi
Maximum operating pressure:	870.23 psi
Maximum outlet pressure:	169.69 psi
Type of connection:	NPT(F)
Size of connection:	3 inch
Motor diameter:	6 inch
Minimum borehole diameter:	6.1 in
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	5 .. 104 °F
Max liquid t at 0.15 m/sec:	104 °F
Electrical data:	
Motor type:	MS6000
Motor flange design:	Grundfos
Rated power - P2:	20 HP
Power (P2) required by pump:	20 HP
KVA code:	J
Mains frequency:	60 Hz
Rated voltage:	3 x 440-460-480 V
Service factor:	1.15
Rated current:	33.5-32.5-32.0 A
Requested voltage:	480 V
Rated current at this voltage:	32.5 A
Starting current:	520-570-610 %
Cos phi - power factor:	0.85-0.84-0.81
Rated speed:	3450-3470-3480 rpm





Company name:

Created by:

Phone:

Date:

27/08/2025

Description	Value
Start. method:	direct-on-line
Enclosure class (IEC 34-5):	IP68
Insulation class (IEC 85):	F
Built-in motor protection:	NONE
Thermal protec:	external
Built-in temp. transmitter:	yes
Motor No:	96166166
Cable number:	N/A
Windings:	Enamelled
Others:	
Minimum efficiency index, MEI ≥:	-.--
DOE Pump Energy Index CL:	0.92
Net weight:	169 lb
Gross weight:	235 lb
Shipping volume:	8.19 ft ³
Country of origin:	US
Custom tariff no.:	8413.70.2004

DYNAMIC HEAD CALCULATIONS - Question 33

Table X. Well and Piping Distribution Dynamic Head

Barnard Geothermal System
Bozeman, Montana

Hazens-Williams Friction Loss Calculations

System Component	Type	Location	Length (ft)	Loss/100'	Diameter (in)	Head Loss (ft of H ₂ O)	
Piping	PVC Sch 120	Pump to Surface x 2	300	3.81	4	11.43	
	PVC C900 DR 14	Well EX-1 to EX-2	160	3.5	4.07	5.6	
	PVC C900 DR 14	Well EX-2 to Bldg	40	2.15	5.86	0.86	
	PVC C900 DR 14	Bldg to IN-1 Valve Box	500	2.15	5.86	10.75	
	PVC C900 DR 14	Valve Box to IN-1	20	2.15	5.86	0.43	
	PVC C900 DR 14	Valve Box to IN-2	150	2.15	5.86	3.225	
	PVC Sch 120	Injection Wells x 2	10	3.5	4	0.35	
						32.645	
Valve(s)	Gate Valve	Line from EX-1 at EX-2	2	0.14	4	0.28	
		Line to IN-1 and IN-2	2	0.12	6	0.24	
	Elbow	45	Distr. Piping	6	0.24	6	1.44
		90	Well Heads and splits	6	0.45	6	2.7
	Ts	4x6	4" to 6" at EX-2	2	0.3	6	0.6
						5.26	
Formation Pressure (est.)						0	
Pumping Head ¹						150	
Building Heat Exchange (See Page 80)						43.7	
Total Loss						231.605	

Notes:

Loss / 100 ft: Loss per 100 ft of 4 inch PVC calculated for 275 gpm (Max / Peak demand flow)

Loss per 100 ft of 6-inch PVC calculated for 550 gpm (Max / Peak demand flow)

Average flow will be approx. 60% of max / peak demand flow

¹ - Pumping head estimated from drawdown during 72-Hr test at max pump rate. Average rate will be 60% of max.

Project Name: **Barnard Building**
Project Number: **2200.051**
Engineer: **JRH**
Input date: **14-Dec-22**
Print: 30-Jul-25

Pump Head Calculation - Closed Systems

Pump Tag: **WWP-1/2** Design GPM: **550.0**
Equipment or Area Served: **Well Water Loop**
(Internal to building pressure loss only)

Loss Item				Head Loss, ft of H2O
Piping:				
Pipe:	Length	Loss/100'		0.7
	35	1.9		
Fitting:	Percent of pipe loss:	150.0%		1.0
Centrifugal Separator:				
Separator				13.8
Check Valve	CV	408		1.8
Balance Valve				5.4
Isolation Valve	CV	1542		0.1
Isolation Valve	CV	1542		0.1
Heat Exchanger:				
Heat Exchanger				10.8
Strainer				0.6
Balance Valve				1.8
Isolation Valve	CV	1542		0.1
Isolation Valve	CV	1542		0.1
SubTotal:				36.4
Glycol Correction:				
(Water = 1.00)		1.00		36.4
Safety factor:		20%		7.3
Total Design Head Loss:				43.7

Pipe / Materials Specifications - Question 34



MALE-X-MALE NPT DROP PIPE COUPLING IS AVAILABLE IN A WIDE RANGE OF SIZES AND PIPE SCHEDULES

The Male-X-Male PVC drop pipe with stainless steel coupling eliminates corrosion issues and provides longer well life than corrosion-sensitive steel drop pipe.

Offered in Schedule 80 and 120, the Male-X-Male drop pipe provides the most economical solution for water well applications.

ASSEMBLY TIPS

- Apply a high quality, non-petroleum, pipe paste sealant, approved for PVC, to each thread joint
- Do not pre-assemble pipe lengths – assemble or disassemble one length at a time in a vertical position
- Tighten joints one to a maximum of two turns beyond finger tight – **DO NOT OVERTIGHTEN**
- Avoid using tools which may gouge or damage PVC – this can lead to premature failure
- Contact Bilfinger Water Technologies for PVC handling and storage instructions, and a free PVC Drop Pipe Design Program

BEST PRACTICES

- Keep flow rate in pipe lower than 8 fps
- Torque arrestors are recommended in all submersible pump installations
- Water hammer-suppressors, 100 psi pressure relief valves placed within 30 ft. of well head, torque arrestors and/or soft start controls are always recommended for PVC pipe (required for 40 HP or higher pumps)
- Good system design will take into consideration appropriate outlet flow rates and pressures when selecting pump size

The above information only applies when Johnson Screens products are stored, handled and installed correctly. Contact your local Johnson Screens product representative for higher or lower pressures or different system design conditions.

BILFINGER WATER TECHNOLOGIES

JOHNSON SCREENS® PVC DROP PIPE MALE-X-MALE, NPT

Advantages of the Male-X-Male, NPT drop pipe include:

- Stainless steel couplings for a variety of sizes; exclusive design for 3 to 8 in. (76 to 203 mm)
- Simple alignment and engagement
- Quick makeup
- Watertight seal
- Sizes range from 1 to 8 in. (25 to 203 mm)
- Available in Schedule 80 and 120
- Coupling can be ordered pre-installed on the pipe to eliminate insufficient couplings at the job site



BILFINGER

**WATER
TECHNOLOGIES**

Blue Brute | C900

PRESSURE-RATED PVC PIPE



AWWA C900-16, CSA B137.3
ASTM D1784 Cell Class 12454
ANSI/NSF 61/14, UL 1285

Gasket: ASTM F477
Joint: ASTM D3139



DELIVERING GOOD WATER TO YOU

MARKETS



Potable



Irrigation



Reclaim



Sewer

DESCRIPTION



Available Pipe Sizes (CIOD)

4", 6", 8", 10", 12", 14", 16", 18", 20", 24", 30", 36", 42", 48"

Nominal Laying length = 20 feet (Laying length tolerances are in accordance with AWWA and CSA standards)

Color:

☒ Blue

☐ Green

☐ Purple

☐ White

AWWA C900-16

305 psi	(DR 14)
235 psi	(DR 18)
200 psi	(DR 21)
165 psi	(DR 25)
125 psi	(DR 32.5)
100 psi	(DR 41)
80 psi	(DR 51)

Note: FM Approvals Pressure Class 185 psi for DR18 and 250 psi for DR14.

CSA B137.3

309 psi	(DR 14)
235 psi	(DR 18)
167 psi	(DR 25)



BENEFITS

INSTALLATION



Field-cut with a power saw or handsaw; bevel without complicated machinery.

Does not need lining, wrapping, coating, or cathodic protection to prevent galvanic corrosion.

FEATURES



Corrosive resistant, safe, long-lasting, and stable solution for a modern infrastructure.

Consistency in carrying capacity (flow coefficient, C=150), for savings in pumping costs, and size of the pipe.

Made in America

JM Eagle
50
YEAR
WARRANTY
ON PLASTIC PIPE

Blue Brute | C900

PRESSURE-RATED PVC PIPE



DELIVERING GOOD WATER TO YOU

SUBMITTAL AND DATA SHEET

PIPE SIZE (IN)	AVERAGE O.D. (IN)	NOM. I.D. (IN)	MIN. T. (IN)	APPROX. E ₁ (IN)	APPROX. E ₂ (IN)	APPROX. D' (IN)	APPROX. WGT (LBS/FT)
PRESSURE CLASS 305 psi (DR 14)							
PIPE STIFFNESS: 815 psi							
4	4.80	4.07	0.343	4.5	5.5	6.365	3.2
6	6.90	5.86	0.493	5.25	6.25	8.887	6.7
8	9.05	7.68	0.646	6.25	7.25	11.499	11.6
10	11.10	9.42	0.793	7.25	8.25	14.072	17.6
12	13.20	11.20	0.943	8.25	9.25	16.57	25.1
16	17.40	14.85	1.242	7.25	8.75	21.637	43.77
24	25.80	21.89	1.843	9.75	11.25	31.958	98.33
PRESSURE CLASS 235 psi (DR 18)							
PIPE STIFFNESS: 364 psi							
4	4.80	4.23	0.267	4.5	5.5	6.204	2.6
6	6.90	6.09	0.383	5.25	6.25	8.654	5.3
8	9.05	7.98	0.503	6.25	7.25	11.195	9.2
10	11.10	9.79	0.617	7.25	8.25	13.699	13.9
12	13.20	11.65	0.733	8.25	9.25	16.125	19.7
14	15.30	13.50	0.850	6.5	8	18.603	26.75
16	17.40	15.35	0.967	7.25	8.75	21.135	34.86
18	19.50	17.20	1.083	7.75	9.25	23.832	48.95
20	21.60	19.06	1.200	8.75	10.25	26.107	54.22
24	25.80	22.76	1.433	9.75	11.25	31.089	77.97
30	32.00	28.23	1.778	11.5	13.5	38.264	117.82
PRESSURE CLASS 200 psi (DR 21)*							
PIPE STIFFNESS: 224 psi							
14	15.30	13.75	0.729	6.5	8	18.347	23.07
16	17.40	15.64	0.829	7.25	8.75	20.097	30.04
18	19.50	17.53	0.929	7.75	9.25	23.505	37.27
20	21.60	19.42	1.029	8.75	10.25	25.744	46.71
24	25.80	23.19	1.229	9.75	11.25	30.656	67.53
30	32.00	28.77	1.524	11.5	13.5	37.725	103.71
36	38.30	34.43	1.824	13.25	15.25	44.753	152.16
PRESSURE CLASS 165 psi (DR 25)							
PIPE STIFFNESS: 129 psi							
4	4.80	4.39	0.192	4.5	5.5	6.045	1.9
6	6.90	6.31	0.276	5.25	6.25	8.427	3.9
8	9.05	8.28	0.362	6.25	7.25	10.896	6.7
10	11.10	10.16	0.444	7.25	8.25	13.332	10.1
12	13.20	12.08	0.528	8.25	9.25	15.69	14.4
14	15.30	14.00	0.612	6.5	8	18.098	19.48
16	17.40	15.92	0.696	7.25	8.75	20.561	25.38
18	19.50	17.85	0.780	7.75	9.25	23.19	31.99
20	21.60	19.77	0.864	8.75	10.25	25.395	39.46
24	25.80	23.61	1.032	9.75	11.25	30.239	56.98
30	32.00	29.29	1.280	11.5	13.5	37.208	88.49
36	38.30	35.05	1.532	13.25	15.25	44.134	128.41
42	44.50	40.73	1.780	15.5	17.5	51.56	176.02
48*	50.80	46.49	2.032	16.5	18.5	58.393	231.22
PRESSURE CLASS 125 psi (DR 32.5)*							
PIPE STIFFNESS: 57 psi							
14	15.30	14.30	0.471	6.5	8	17.799	15.14
16	17.40	16.27	0.535	7.25	8.75	20.219	19.63
18	19.50	18.23	0.600	7.75	9.25	22.808	24.75
20	21.60	20.19	0.665	8.75	10.25	24.973	30.54
24	25.80	24.12	0.794	9.75	11.25	29.734	44.11
30	32.00	29.91	0.985	11.5	13.5	36.582	68.45
36	38.30	35.80	1.178	13.25	15.25	43.383	99.22
48	50.80	47.49	1.563	16.5	18.5	57.399	178.49

PIPE SIZE (IN)	AVERAGE O.D. (IN)	NOM. I.D. (IN)	MIN. T. (IN)	APPROX. E ₁ (IN)	APPROX. E ₂ (IN)	APPROX. D' (IN)	APPROX. WGT (LBS/FT)
PRESSURE CLASS 100 psi (DR 41)							
PIPE STIFFNESS: 28 psi							
14	15.30	14.52	0.373	6.5	8	17.599	12.01
16	17.40	16.51	0.424	7.25	8.75	19.992	15.63
18	19.50	18.50	0.476	7.75	9.25	22.555	19.72
20	21.60	20.49	0.527	8.75	10.25	24.691	24.31
24	25.80	24.48	0.629	9.75	11.25	29.397	35.10
30	32.00	30.35	0.780	11.5	13.5	36.163	54.65
36	38.30	36.30	0.934	13.25	15.25	42.885	78.97
42	44.50	42.18	1.085	15.5	17.5	50.108	108.19
48	50.80	48.14	1.239	16.5	18.5	56.736	142.10
PRESSURE CLASS 80 psi (DR 51)*							
PIPE STIFFNESS: 14 psi							
30	32.00	30.67	0.627	11.5	13.5	35.836	44.08
36	38.30	36.71	0.751	13.25	15.25	42.478	64.32
42	44.50	42.65	0.872	15.5	17.5	49.652	88.10
48	50.80	49.69	0.996	16.5	18.5	56.217	115.79

Product Standard: ANSI/AWWA C900-16

CSA B137.3* (DR 18, 25, 4"-18"; DR 14, 4"-12")

Pipe Compound: ASTM D1784 Cell Class 12454

Gasket: ASTM F477

Integral Bell Joint: ASTM D3139

Certifications: ANSI/NSF 61, ANSI/NSF 14*

UL 1285 (DR 14, 18, 25, up to 24"); FM 1612* (DR 14 / DR 18; 4-12"), CSA B137.3*

Note: FM Approvals Pressure Class 185 psi for DR 18 and 250 psi for DR 14.

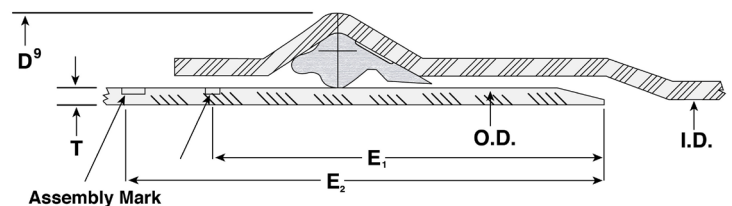
Nominal Laying Length: 20 feet

(Laying length tolerances with AWWA and/or CSA standards)

Installation: JM Eagle™ Blue Brute Installation Guide

Manning Coefficient (n) = 0.009 • Hazen-Williams Coefficient (c) = 150

*Please call regarding availability.



I.D.: Inside Diameter

O.D.: Outside Diameter

T: Wall Thickness

D⁹: Bell Outside Diameter

E₁: Distance between 1st Insertion/Assembly Mark to the end of spigot.

E₂: Distance between 2nd Insertion/Assembly Mark to the end of spigot.



SCHEDULE 120 MALE-X-MALE DROP PIPE

Nominal Pipe Size (in.)	OD (in.)	Min. Wall (in.)	Approx. Weight (lbs./ ft.)	ASTM Water Pressure Rating (psi)	Flow Rate		Friction Loss psi/ 100 ft.	Rec Max Depth (ft.) Surface Discharge Pressure				Tensile Strength (lbs.)
					GPM	ft./ sec.		30 psi	40 psi	50 psi	60 psi	
1	1.32	0.20	0.46	360	11	5	5.20	680	660	640	620	700
					17	8	12.40	590	570	550	540	
					21	10	18.90	530	510	500	480	
1.25	1.66	0.22	0.65	300	19	5	3.50	580	550	530	510	980
					30	8	8.80	520	500	480	460	
					37	10	13.40	480	460	440	420	
1.5	1.90	0.23	0.79	270	26	5	2.90	520	500	480	450	1,180
					41	8	7.20	470	450	430	410	
					52	10	11.60	430	420	400	380	
2	2.38	0.25	1.20	240	43	5	2.20	460	440	420	390	1,670
					69	8	5.60	430	400	390	370	
					86	10	8.80	400	380	360	340	
3	3.50	0.35	2.40	220	97	5	1.50	420	400	380	350	Call*
					155	8	3.80	400	380	360	340	
					192	10	5.90	380	360	340	320	
4	4.50	0.44	3.80	215	162	5	1.20	420	400	380	360	Call*
					260	8	3.00	410	390	360	340	
					322	10	4.50	390	370	350	330	
5	5.56	0.50	5.40	200	260	5	1.00	380	360	340	320	Call*
					410	8	2.50	370	350	330	300	
					510	10	3.80	360	340	320	290	
6	6.63	0.56	7.10	185	370	5	0.80	360	340	320	300	Call*
					590	8	2.00	350	330	310	290	
					740	10	3.10	340	320	300	280	
8	8.63	0.72	11.80	180	630	5	0.60	340	320	290	270	Call*
					1020	8	1.60	330	310	290	260	
					1260	10	2.40	320	300	280	260	

NOTE: In practice, field installations encompass flow velocities from 5 - 10 ft./sec. To avoid potentially dangerous surge pressures and to minimize friction losses, keep pipe flow velocities below 8 ft./sec. Tensile values assume nominal thread engagement and are based on 6,000 PSI yield and minimum wall with 6:1 safety factor.

*Please contact Customer Service Department Representative for recommendations regarding your installation.





6" I.D. STANDARD INDUSTRIAL PARTS BREAKDOWN

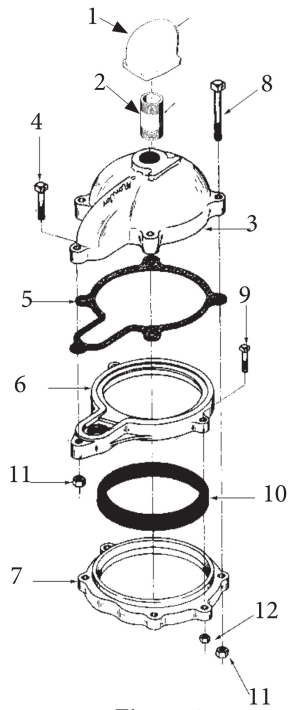


Figure 1

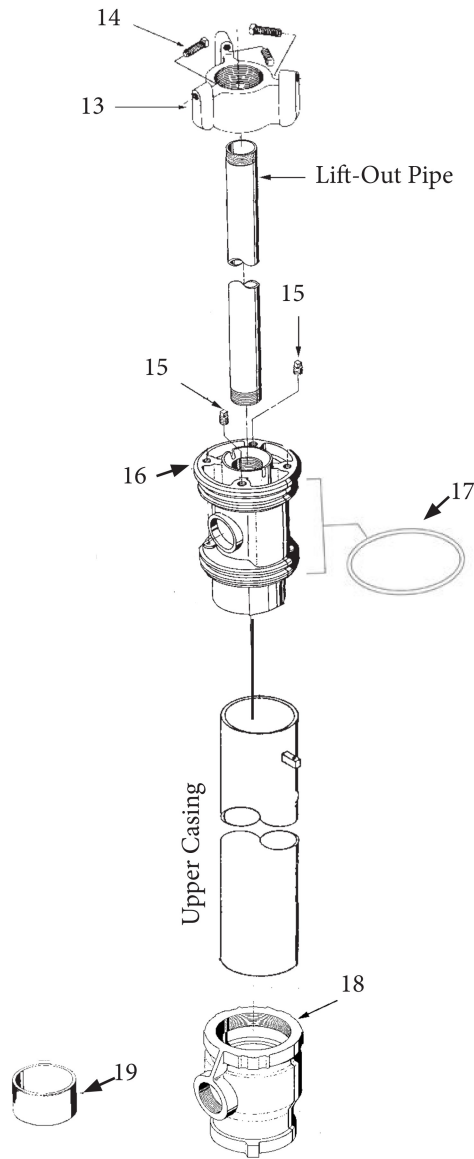


Figure 2

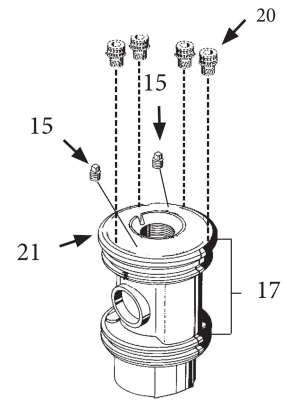


Figure 3-Flowing Well Spool

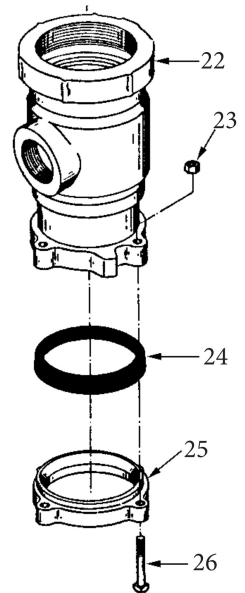


Figure 4

All Industrial cap bolts are made of stainless steel

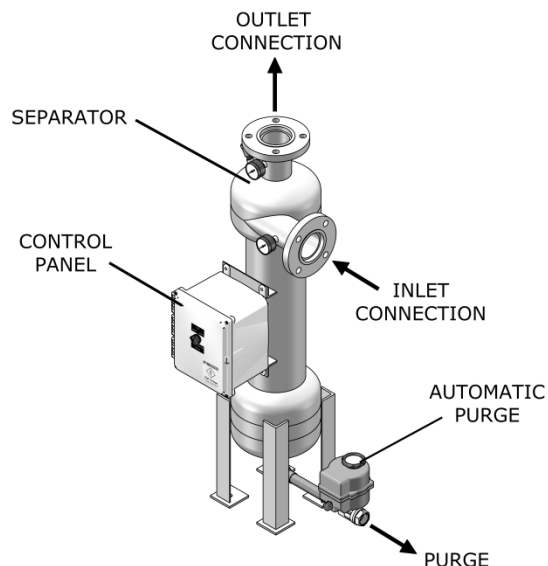
OM1422-6 (00-2014)

Baker Manufacturing Co., LLC - Monitor Division • Evansville, WI 53536
Phone: 800-356-5130 • Fax: 608-882-3777 • Website: www.bakermonitor.com



ENGINEERING • MANUFACTURING • SERVICE

PF-61-030 SPECIFICATION SHEET FLANGED SEPARATOR



Features:

- True tangential entry
- 150 psi working pressure
- Five year limited warranty
- Electrically actuated ball valve

Options:

- Manual purge
- Isolation valve kit
- Wall mounting brackets
- Inspection port

SYSTEM COMPONENTS

Separator :

- Carbon steel construction
- Fusion-bond polyester coated vessel
- Manual air bleed valve
- Inlet/Outlet pressure gauges

Electrical Controls :

- NEMA 4X Enclosure
- Short circuit protection
- Purge switch selector
- Adjustable purge timer

SPECIFICATIONS	PF-61-030
Flow Range	160-315 GPM
System Inlet Connection	3" Flg
System Outlet Connection	3" Flg
Purge Connection	1" fpt
Manual Air Bleed Valve	1/4" fpt
Volume	7 GAL
Est. Weight, Dry	98 lbs
Est. Weight, Operating	156 lbs

PRESSURE DROP vs. FLOW RATE							
Pressure Drop	3 psi	4 psi	6 psi	8 psi	10 psi	12 psi	CV Factor
Flow (GPM)	158	183	224	259	289	317	91.5

*(Flow rate / CV values may vary slightly)

To determine the approximate pressure drop at flow rates not shown in this chart, use the following formula $\Delta P = (\text{FLOW RATE} / \text{CV})^2$

CV Factor: CV is defined as the flow in gallons per minute (GPM) that will produce a one pound pressure drop across the separator

Pressure Drop at 325 GPM = 12.6 psi

Technical specification

Gasketed Plate Heat Exchanger



Project ref: Barnard Office HQ

Line ref:

Model: T5-BFG

No of units: 1

Page: 1(2)

Date: 07/24/2023

		Hot side	Cold Side
Fluid:		35.0% Prop.glycol	50.0% Prop.glycol
Density:	lb/ft ³	63.13	64.18
Specific heat capacity:	Btu/(lb·°F)	0.9293	0.8719
Thermal conductivity:	Btu/(ft·h·°F)	0.2630	0.2208
Viscosity inlet:	cP	1.29	4.70
Viscosity outlet:	cP	1.82	3.03
Volume flow rate:	GPM	68.2	71.0
Inlet temperature:	°F	120.0	80.0
Outlet temperature:	°F	100.0	100.0
Pressure drop:	psi	3.7	4.7
Heat exchanged:	kBtu/h	639.5	
LMTD:	°F	20.0	
Heat transfer area:	ft ²	52.7	
Relative directions of fluids:		Countercurrent	
Connection positions and flow directions:		S1->S2	S3->S4
Connections: S1,S2,S3,S4		ASME B1.20.1 - 2-11.5 NPT, ALLOY 316L, 101 mm	
External loads according to API:		No loads	
Design pressure (MAWP):	psi	150	150
Test pressure:	psi	196	196
Design temperature max.:	°F	200.0	200.0
Design temperature min. (MDMT):	°F	-18.0	-18.0
Pressure vessel approval:		ASME UM-stamp	
Number of plates:		57	
Nominal A-dimension:	mm	131	
Plate material/thickness:		ALLOY 316/0.5 mm	
Gasket material and attachment:		NBRB Clip-on	NBRB Clip-on
Approx. outer dimensions (L x W x H)	in	14.6 x 10.2 x 27.6	
Approx. weight, empty / operating:	lb	218 / 237	
Type of package:		Skid base + box (domestic)	
Approx. packed weight:	lb	292.957	

The performance of the equipment is conditioned by the process media and process parameters being consistent with the provided customer data. Data, specifications, and other kind of information of technological nature set out in this document and submitted by Alfa Laval to you (Proprietary Information) are intellectual proprietary rights of Alfa Laval. The Proprietary Information shall remain the exclusive property of Alfa Laval and shall only be used for the purpose of evaluating Alfa Laval's quotation. The Proprietary Information may not, without the written consent of Alfa Laval, be used or copied, reproduced, transmitted or communicated or disclosed in any other way to a third party.

Engineering Specification

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____

LEAD FREE*

Series 77F-DI-125, 77F-DI-FDA-125 Flanged, Wye Pattern, Cast Iron Strainers

2" – 12"

Series 77F-DI-125, 77F-DI-FDA-125 Flanged, Wye Pattern, Cast Iron Strainers feature 304 stainless steel perforated screens, a cast iron flanged retainer cap and a drain/blowoff connection furnished with a closure plug. Series 77F-DI-FDA-125 also features a double coated, heat fused epoxy coating on the interior and exterior for NSF/ANSI/CAN 61 approved sanitary applications.

Features

- Flanges conform to American National Standards Institute, Class 125 (ANSI B16.1) and WW-S-2739 Type 2
- Lead Free* cast iron body
- 304 Stainless steel perforated screens
- Cast iron flanged retainer cap with gasket tapped for closure plug
- Drain/Blowoff connection furnished with closure plug
- Series 77F-DI-FDA-125 comes with heat fused NSF/ANSI/CAN 61 approved epoxy coating (interior and exterior)

Models

77F-DI-125 — 2" – 12" with flanged connections for water and steam service

77F-DI-FDA-125 — 2" – 12" with flanged connections and double coated, heat fused NSF/ANSI/CAN 61 approved epoxy coating (interior and exterior) for water service only

Specification (77F-DI-125)

A flanged, wye pattern, cast iron strainer to be installed as indicated on the plans. The strainer must have flanges that conform to American National Standards Institute, Class 125, 304 stainless steel perforated screens and a drain/blowoff connection furnished with a closure plug. Pressure rating no less than 200psi (13.8 bar) WOG non-shock and 125psi (8.6 bar) WSP. Strainer shall be a Watts Series 77F-DI-125.

*The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.



77F-DI-FDA-125

Pressure – Temperature

Maximum Operating Pressure:
 200psi (13.8 bar) WOG, non-shock, @ 210°F (99°C)
 125psi (8.6 bar) WSP @ 353°F (178°C)

Standard Screens

2" – 5": 1/16" perforation
 6" – 8": 1/8" perforation
 10" – 12": 3/16" perforation

Screen Options

Wire Mesh Liners: 304 stainless steel (#20, #40, #60, #80, #100)
 Perforated Screens: 304 stainless steel (3/64", 1/16", 1/8", 3/16")

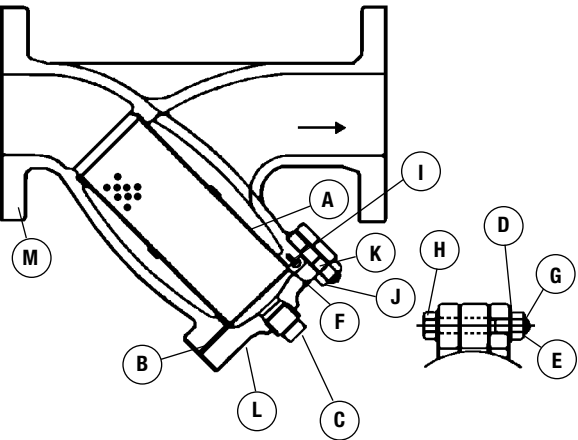
Specification (77F-DI-FDA-125)

A flanged, wye pattern, cast iron strainer with a double coated, heat fused, NSF/ANSI/CAN 61 approved epoxy coating on the interior and exterior surfaces for NSF/ANSI/CAN 61 sanitary applications. Flanges to conform to ANSI B16.1 Class 125, 304 stainless steel perforated screens, and a drain/blowoff connection furnished with a closure plug. Pressure rating 200psi (13.8 bar) WOG. Strainer shall be a Watts Series 77F-DI-FDA-125.

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product. Inquire with governing authorities for local installation requirements.

Materials



- A. Screen AISI 304SS
- B. Cover Gasket Graphite
- C. Plug *ASTM A47
- D. Washer ASTM A6
- E. Cotter Pin ASTM A112
- F. Plate *ASTM A6
- G. Bolt Nut ASTM A6
- H. Bolt ASTM A6
- I. Set Screw ASTM B16
- J. Cover Bolt Nut ASTM A6
- K. Cover Bolt ASTM A6
- L. Cover *ASTM A-126 Class B
- M. Body *ASTM A-126 Class B

Note:* 77F-DI-FDA-125 component parts epoxy coated internally and externally.

Standards

Tested and Certified by NSF International



Dimensions – Weights

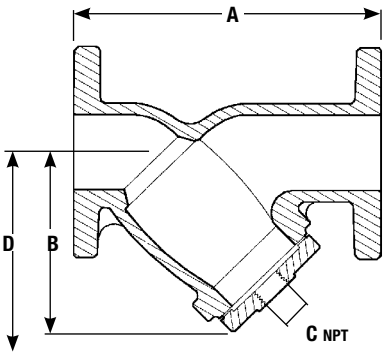
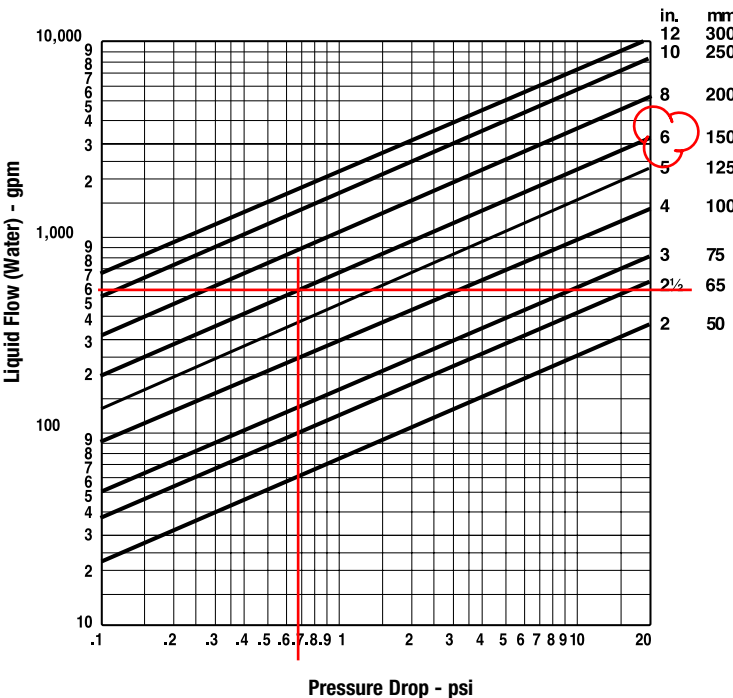
Call customer service if you need assistance with technical details.

SIZE			DIMENSIONS						WEIGHT		
	A		B		C(NPT)		D*		Screen Area		
<i>in.</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>sq.in.</i>	<i>lbs.</i>	<i>kgs.</i>
2	7⅞	200	5¼	133	½	13	7	178	36	18	8
2½	10	254	6½	165	1	25	9¼	248	56	28	13
3	10⅞	257	7	178	1	25	10	254	75	34	15
4	12⅞	308	8¼	210	1½	38	12	305	121	60	27
5	15⅞	397	11¼	286	2	51	17	432	210	95	43
6	18½	470	13½	343	2	51	20	508	278	133	60
8	21⅞	551	15½	394	2	51	22¾	578	387	247	112
10	26	660	18½	470	2	51	28	711	577	370	168
12	29⅞	759	21¾	552	2	51	30	762	795	579	262

* D dimension is minimum clearance for screen removal.



Flow/Pressure Drop Chart



Engineering Specification

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____

LEAD FREE*

Butterfly Valves Series BF-03-M2 Full Lug and BF-04-M2 Wafer

Sizes: 2" – 12"* 200psi (13.8 bar)
 14" – 24"*** 150psi (10.3 bar)**

Watts Series BF resilient seated butterfly valve is available in sizes 2" – 24"*** in wafer or lug body design. Incorporating a 200psi (13.8 bar) pressure rating for 2" – 12"*** and a 150psi (10.3 bar) pressure rating 14" – 24"***, the BF series butterfly is standardly constructed of a ductile iron body with a choice of either ductile iron, aluminum bronze, or 316 stainless steel discs and 416 stainless steel or 316 stainless steel shaft. A phenolic-backed seat (2"–12")** or aluminum-backed seat (14" – 24")** prevents the seat from collapsing or dislodging. Standard seat materials available include EPDM, Buna-N and Viton. The BF Series mounting pad is designed to ISO 5211 standard to accommodate lever handles, gear operators, or actuation.

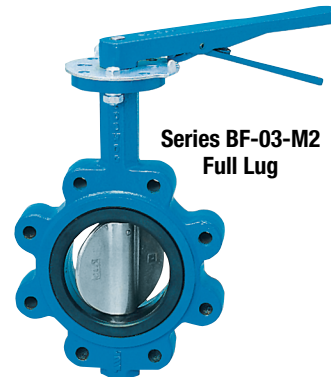
The Watts Series BF butterfly valves are designed and manufactured for use with ANSI 125 or 150 Class flanges and comply with API 609 and MSS-SP 67 standards to meet the stringent requirements of HVAC, Irrigation, OEM, Commercial, Institutional, and Industrial applications.

Approvals

The valves are MSS-SP-67 Type I – Valves for tight shut-off (tested per section 10.2.1). As specified in MSS-SP-67, we conduct 100% shell testing at 1.5 times rated pressure and seat leakage testing at 1.1 times rated pressure.

Features

- **Body** – Available in Full Lug (BF-03-M2) and Wafer (BF-04-M2) styles designed for use between ANSI 125 and 150 flanges. Face-to-face dimensions comply with API 609 and MSS-SP-67. All valves are designed to accommodate 2" of insulation. The mounting pad is designed to ISO 5211 standard. The body material is ASTM A-536 ductile iron.
- **Disc** – Disc edge is machined and polished 360 degrees to assure leak-tight shutoff while minimizing operating torque. Positive, disc-to-shaft connection is provided by stainless steel precision taper pins. Discs are available in ductile iron, aluminum bronze, or 316 stainless steel.
- **Seat** – Phenolic or aluminum backed, non-collapsible, resilient seat is mechanically secured to allow for dead-end service usage to the full pressure rating in lug style valves. Full 360 degrees sealing isolates the body components from the media and provides the primary shaft seal. Seats are available in EPDM, Buna-N, and Viton.



Series BF-03-M2
Full Lug



Series BF-04-M2
Wafer



EPDM seat only

- **Shaft** – One-piece shaft delivers positive disc-to-seat location with maximum strength. 416SS is standard shaft with ductile iron and aluminum bronze disc. 316SS shaft is standard with 316SS disc models.

Three shaft bushings provide shaft support for proper alignment and minimal shaft deflection. Bi-directional shaft seals prevent external contamination of the stem area and provide backup for the primary shaft seal formed by the disc/seat interface.

- **Handle** – ISO 5211 top work design allows for standard 10 position handle 2" – 6"*** and manual, worm gear operators for 8" – 24"*** sizes. An infinite positioning locking handle is an available option on 2" – 12"*** valves. The posi-lok handle provides an infinite position stop, a memory stop, and a pad-locking device in the fully closed position.

NOTICE

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NOTICE

Inquire with governing authorities for local installation requirements

***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

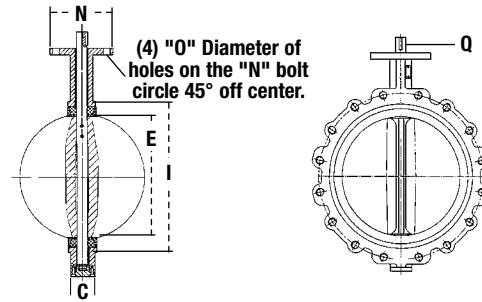
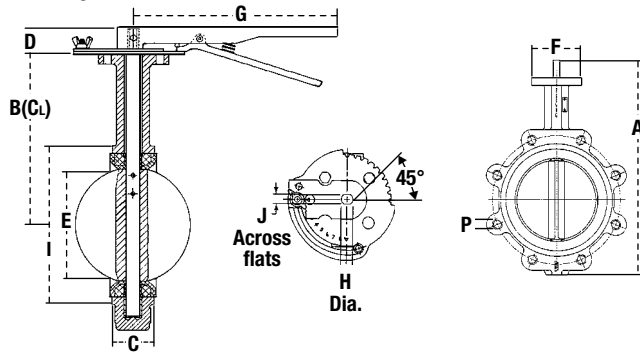
****This product is produced with ASME/ANSI flanged end connections.**

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.



Dimensions

2" through 24"



SIZE	DIMENSIONS									
in.	A	B	C	D	E	F	G	H	I	J
mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
2	10 3/4	273	6 1/4	161	1 1/4	42	1 1/4	32	2 1/4	54
2 1/2	11 1/4	295	6 1/4	175	1 1/4	45	1 1/4	32	2 1/4	64
3	12 1/4	308	7 1/4	181	1 1/4	45	1 1/4	32	3 1/4	77
4	13 3/4	346	7 1/4	200	2	52	1 1/4	32	3 1/4	79
5	14 5/8	372	8 1/4	213	2 1/4	56	1 1/4	32	4 1/4	105
6	15 5/8	397	8 1/4	226	2 1/4	56	1 1/4	32	4 1/4	124
8	18 1/4	479	10 1/4	260	2 1/4	60	1 1/4	32	6 1/4	156
10	21 1/4	540	11 1/4	292	2 1/4	66	1 1/4	45	9 1/4	251
12	24 5/8	626	13 1/4	337	3	76	1 1/4	45	11 1/4	301
14	26 3/4	679	14 1/4	368	3	76	1 1/4	45	13 1/4	333
16	30	762	15 1/4	400	3 1/4	87	2	50	15 1/4	391
18	31 1/4	800	16 1/4	422	4 1/4	105	2	50	17 1/4	442
20	35 1/4	897	18 1/4	480	5 1/4	130	2 1/4	53	19 1/4	493
24	42 1/4	1088	22 1/4	562	6	152	2 1/4	58	23 1/4	594

SIZE	TOP PLATE DRILLING		TAPPED LUG DATA		KEY WAY		WEIGHT LBS. †		C _v RATING (Full Open)	
in.	N	O	BOLT CIRCLE	NO. HOLES	BOLT P	Q	88	87	Size	C _v Rating
mm	mm	mm	mm		mm	mm			in.	
2	2	50	1/4	7	4 1/4	121	4	4	1/4	135
2 1/2	2	50	1/4	7	5 1/2	140	4	4	1/4	220
3	2	50	1/4	7	6	150	4	4	1/4	302
4	2 3/4	70	3/8	10	7 1/2	191	8	8	1/2	600
5	2 3/4	70	3/8	10	8 1/2	216	8	8	1/2	1,022
6	2 3/4	70	3/8	10	9 1/2	241	8	8	1/2	1,579
8	4	102	1/2	13	11 3/4	298	8	8	1/2	3,136
10	4	102	1/2	13	14 1/4	362	12	12	3/4	5,340
12	5	125	1/2	13	17	432	12	12	3/4	8,250
14	5	125	1/2	13	18 3/4	476	12	12	3/4	11,917
16	5 1/2	140	1/2	18	21 1/4	540	16	16	1	16,388
18	5 1/2	140	1/2	18	22 3/4	578	16	16	1	21,705
20	5 1/2	165	7/8	22	25	635	20	20	1 1/4	27,908
24	5 1/2	165	7/8	22	29 1/2	750	20	20	1 1/4	43,116

†Weights are for valves with ductile iron or aluminum bronze discs. 2" - 12" have levers; 14" - 24" have bare shafts. Refer to Watts F-CDBF for gear operator weights.

How to Order Watts Series BF-M2

Size: **14** **BF** **03** **121** **1G** **M2**

Series: 2" thru 24"

Body: 03: Full Lug, 04: Wafer

Disc: 1: Ductile Iron

Seat: 1: Ductile Iron
2: Aluminum Bronze
3: 316 Stainless Steel*

Shaft: 1: 416 Stainless Steel
316SS on stainless steel disc models*

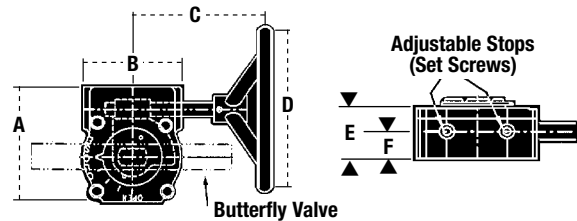
Operator: 1: EPDM 3: Viton
2: Buna-N

0: No handle - 2" thru 24"
G: Gear Operator - 2" thru 24"
5: Standard handle (10-position only) - 2" thru 12"
P: Positioning / Locking Kit with handle - 2" thru 12"

M2 = Series

SEATING TORQUE BUNA-N, EPDM		
SIZE	Wet	Dry
in.	in.-lbs.	in.-lbs.
2	134	214
2 1/2	190	289
3	250	387
4	390	644
5	600	959
6	907	1,542
8	1,697	2,919
10	2,500	4,857
12	3,300	7,071
14	3,500	7,305
16	5,500	10,027
18	8,200	13,437
20	10,000	17,925
24	18,680	28,020

GEAR DIMENSIONS: STD. WEATHERPROOF W/ HANDWHEEL									
VALVE		CL			CL			TURNS	
		TO	HW.	DIA.	TO	HW.	DIA.	OPEN/	CLOSE/
SIZE	DEPTH	WIDTH	HW	DIA.	HEIGHT	MT PAD	CL	WEIGHT	UNIT
in.	A	B	C	D	E	F			lbs.
2, 2 1/2, 3	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
4	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
5, 6	5.0	4.2	6.5	6.0	2.7	1.5	7.0	10.0	
8	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5	
10	7.0	6.2	9.5	12.0	3.0	1.8	7.5	27.5	
12, 14	7.8	6.4	9.5	12.0	3.0	2.0	12.5	33.0	
16	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
18	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
20	11.5	9.6	15.0	16.0	4.2	2.5	20.0	70.5	
24	12.6	9.1	15.0	24.0	4.5	2.0	20.0	80.0	



Materials

- Body: ASTM A-536 Ductile Iron epoxy electrostatic sprayed (RAL5015F-NSF).
- Bushing: Duralon(3); Teflon® - Dacron inner liner bonded to fiberglass - epoxy resin outer shell 2"-12"***, Bronze 14"-24"***
- Stem O-rings: Buna-N
- Disc: ASTM A-395 Ductile Iron / Electroless Nickel Plated
ASTM B-148 Aluminum Bronze
ASTM A-351 316 Stainless Steel
- Shaft: 416 Stainless Steel
316 Stainless Steel on 316SS Disc Models
- Seat: EPDM: +5°F to 248°F (-15°C to +120°C)
Buna-N: +14°F to 176°F (-10°C to +80°C)
Viton: -4°F to 302°F (-20°C to +150°C)

NOTICE

Do not use EPDM when hydrocarbons are present.



Steel Models

VW, VG, VF, AW, AG, AF, EF, ER**Differential Pressure: Inches W.C. 16 to 260 GPM**

Differential Pressure: Inches W.C.													
Flow GPM	Models												
	200L	200H	250L	250H	300L	300H	400L	400H	500L	500H	600L	600H	800L
16	10												
18	13												
20	16												
22	19												
24	23												
26	27	10	11										
28	31	11	12										
30	36	13	14										
32	41	15	16										
34	46	17	18										
36	52	19	20										
38	58	21	23										
40	64	23	25										
42	71	26	28										
44	77	28	30										
46	85	31	33										
48	92	33	36										
50	100	36	39										
55	121	44	47		11								
60	144	52	56	11	14								
65	169	61	66	13	16								
70	196	71	77	15	18								
75	225	82	88	17	21								
80	256	93	100	20	24								
85	289	105	113	22	27								
90	324	118	127	25	30								
95	361	131	141	28	34		10						
100	400	145	156	31	38		11						
120		209	225	44	54	13	16						
130		245	264	52	64	15	19	10	11				
140		285	306	60	74	17	22	12	12				
150		327	352	69	85	20	25	13	14				
160		372	400	79	96	23	28	15	16				
170		420	452	89	109	26	32	17	18				
180		470		100	122	29	36	19	20				
190				111	136	32	40	21	23				
200				123	151	36	44	24	25				
220				149	182	43	54	29	30				
240				178	217	51	64	34	36		10		
260				209	254	60	75	40	42	10	12		

Steel Models

VW, VG, VF, AW, AG, AF, EF, ER

Differential Pressure: Inches W.C. 280 to 775 GPM

Differential Pressure: Inches W.C.													
Flow GPM	Models												
	200L	200H	250L	250H	300L	300H	400L	400H	500L	500H	600L	600H	800L
280				242	295	70	87	47	49	12	14		
300				278	339	80	100	54	56	13	16		
325				326	396	94	117	63	66	16	19		
350				278	461	109	136	73	77	18	22		
375				434		125	156	84	88	21	25		
400				494		143	178	95	100	24	28		
425						161	201	107	113	27	32		11
450						180	225	120	127	30	36		12
475						201	251	134	141	33	40	10	13
500						223	278	149	156	37	44	11	15
525						246	305	164	172	40	48	13	16
550						270	336	180	189	44	53	14	18
575						295	367	197	207	49	58	15	19
600						321	400	214	225	53	63	16	21
625						348	434	232	244	57	69	18	23
650						376	469	251	264	62	74	19	25
675						406		271	285	67	80	21	27
700						437		291	306	72	86	22	29
725						468		313	329	77	92	24	31
750								335	352	83	99	26	33
775								357	375	88	106	27	35

Notes:

1. Permanent pressure loss equals 10 percent of differential pressure (DP).
2. The recommended ranges are shown in bold. All differentials have been rounded to the nearest inch.
3. Generally, the recommended low DP signal is 24" so it can be read on most HVAC instruments. DPs below 12" are not accurate on some sizes.
4. The upper DP limit is an effort to minimize the permanent pressure loss which is 10 percent of the DP signal. Any venturi can be operated above the recommended range if the permanent pressure drop is acceptable.
5. The DPs in the table were calculated using the following formula:

$$DP = \left(\frac{GPM \times 17.3}{FF} \right)^2$$



[EXTERNAL] RE: Deficiency Letter for Beneficial Water Use Permit Application No. 41H 30165312

From Pat Thomson <pthomson@waterenvtech.com>

Date Mon 11/10/2025 10:25 AM

To Ellis, Kendrew <Kendrew.Ellis@mt.gov>

Cc Strasheim, Kerri <kstrasheim@mt.gov>

Good Morning Kindrew,

Just checking in on the Barnard permit. Are you able to give me an update on the status of the permit?

Thanks,
Pat

From: Pat Thomson

Sent: Monday, October 20, 2025 10:16 AM

To: 'Ellis, Kendrew' <Kendrew.Ellis@mt.gov>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>

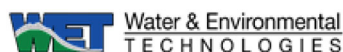
Subject: RE: Deficiency Letter for Beneficial Water Use Permit Application No. 41H 30165312

Hi Kindrew,

The following link to Form 600 for Permit App No. 41H 30165312 has been amended in response to DNRCs deficiency letter dated October 14, 2025. Please let me know if you have any questions.

 [600_Barnard_signed_102025_revised.pdf \[wetenvtech-my.sharepoint.com\]](#)

Thanks,
Pat



Patrick J. Thomson, PG

Senior Hydrogeologist

P: (406) 723-1532

C: (406) 490-0329

[waterenvtech.com \[waterenvtech.com\]](#)

From: Ellis, Kendrew <Kendrew.Ellis@mt.gov>
Sent: Tuesday, October 14, 2025 2:15 PM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>
Subject: Deficiency Letter for Beneficial Water Use Permit Application No. 41H 30165312

WARNING - This email originated from an EXTERNAL SOURCE. Do not reply, click any link or open attachments unless you can confirm the sender. *Please report suspicious emails to itsupport*

Pat-

The Department of Natural Resources and Conservation (DNRC or Department) has begun reviewing Application for Beneficial Water Use Permit No. 41H 30165312 by Barnard Construction, Inc. The attached letter is to notify you of the deficiencies in the application as required in ARM 36.12.1501(1) and §85-2-302(5)(b), MCA. Please submit the information specified above to the Bozeman Regional Office by February 11, 2026. This is the only deficiency letter that will be sent. An application not corrected or completed within 120 days from the date of this letter is terminated per ARM 36.12.1501(2) and §85-2-302(6)(a), MCA.

The attached letter was sent in the mail today, 10/14/2025. The deficiency response is due in 120 days, by 2/11/2026.

Please let me know if you have any questions.

-Kendrew



Kendrew Ellis (she/her) | Water Resource Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715
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Website | **Facebook** [\[facebook.com\]](https://www.facebook.com) [\[facebook.com\]](https://www.facebook.com) [\[twitter.com\]](https://www.twitter.com) [X](https://www.twitter.com)
[\[twitter.com\]](https://www.twitter.com) [T](https://www.twitter.com) [\[twitter.com\]](https://www.twitter.com) [witter](https://www.twitter.com) [\[twitter.com\]](https://www.twitter.com) | **Instagram**
[\[instagram.com\]](https://www.instagram.com)
How did we do? Let us know here: [\[forms.office.com\]](https://forms.office.com) **Feedback Survey**
[\[forms.office.com\]](https://forms.office.com)

Technical Analyses Report/ Scientific Credibility Review

- Departmental Technical Analyses Report/ Scientific Credibility Review
- Any correspondence relating to the Technical Analyses Report

Technical Analyses
Report /
Scientific Credibility
Review

THE MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

GOVERNOR GREG GIANFORTE



DNRC DIRECTOR AMANDA KASTER

DNRC

2273 Boot Hill Ct, STE 110

Bozeman, MT 59715

July 7, 2025

Barnard Construction

701 Gold Avenue

Bozeman, MT 59715

Subject: Completed Technical Analyses Report for Beneficial Water Use Permit Preapplication No. 41H 30165312

Dear Applicant:

As designated on the submitted Preapplication Meeting Form per §85-2-302(3)(b), MCA, the Department of Natural Resources and Conservation (DNRC or Department) has completed the technical analyses for Beneficial Water Use Permit Preapplication No. 41H 30165312 based on the information provided in your Preapplication Meeting Form accepted by the Department on 5/23/2025. The technical analyses can be found in the attached report. Please note this Groundwater Permit Technical Analyses Report is a two-part publication, comprised of a Part A completed by Evan Norman and a Part B completed by Kendrew Ellis.

This Technical Analyses Report **IS**: A collection of facts that the DNRC has gathered, including content provided in the Preapplication Meeting Form materials. The Department will use these data to analyze the criteria in §85-2-311, MCA if you submit an application for the project described in the completed Preapplication Meeting Form.

This Technical Analyses Report **IS NOT**: An analysis or discussion of whether the Preapplication Meeting Form as filed meets the criteria (§85-2-311, MCA).

You have 180 days to submit the Beneficial Water Use Permit Application Form 600 considering the information provided in the technical analyses and Preapplication Meeting Form. If the Application Form is not submitted to the Bozeman Regional Office by 1/3/2026, a new preapplication meeting will be required to process the Application with expedited timelines (ARM 36.12.1302(6)(b)). If any details described in the submitted Application are changed from that of the submitted Preapplication Meeting Form, the discounted filing fee and expedited timelines will not apply (ARM 36.12.1302(6)(a)). Please note that the technical analyses will expire one year from the date of this letter (ARM 36.12.1302(8)).

Please let me know if you have any questions.

Sincerely,

A handwritten signature in blue ink that reads "Kendrew Ellis". The signature is fluid and cursive, with the first name "Kendrew" and last name "Ellis" clearly distinguishable.

Kendrew Ellis

Water Resources Specialist

Bozeman Water Resources Office

Water Resources Division

CC, via email: Pat Thomson, pthomson@waterenvtech.com



DNRC.MT.GOV



Groundwater Permit Technical Analyses Report - Part A

Department of Natural Resources and Conservation (DNRC)

Water Resources Division

Evan Norman, Groundwater Hydrologist, Water Sciences Bureau (WSB)

Application No.	41H 30165312	Point of Diversion Legal Land Description	Section 27 and 22, Township 01 South, Range 5 West
Applicant	Barnard Construction		

Overview

This report is Part A of a two-part publication which analyzes data submitted by the Applicant in support of the above-mentioned water right application. This report provides technical analyses as required under the Administrative Rules of Montana (ARM) 36.12.1303 in support of the water rights criteria assessment as required in §85-2-311, Montana Code Annotated (MCA). For applications in closed basins, this report fulfills the requirements of MCA 85-2-361.

This Groundwater Permit Technical Analyses Report – Part A contains the following sections:

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1.0 Executive Summary

Application Details

The Applicant requests to divert 550.0 gallons per minute (gpm) and up to 298.40 acre-feet (AF) of groundwater from two points of diversion (wells) for geothermal cooling purposes. The two Extraction Wells, Montana Bureau of Mines and Geology (MBMG) Groundwater Information Center (GWIC) IDs [335313](#) and [335315](#), would each divert water at a rate of 275.0 gpm. Two injection Wells, GWIC IDs [335309](#) and [335811](#), would each inject water at a rate of 275.0 gpm back into the aquifer via an open-loop geothermal cooling system.

Recommended and Approved Variances from ARM 36.12.121

The required variances, rationale, and recommended action to grant the variance requests were sent in an Aquifer Testing Addendum Review checklist to the Bozeman Regional Office on April 7, 2025. Variances from aquifer test requirements found in ARM 36.12.121: 3(a), 3(g), 3(h), and 3(e)(iii) were approved by the Bozeman Regional Office on April 14, 2025.

WSB Technical Analyses Findings

Based on information submitted, the WSB estimated aquifer properties, evaluated the extraction well(s) available water column, quantified the water available in the source aquifer, and evaluated potential impacts to existing groundwater and surface water rights. These technical analyses are in support of the following criteria assessment: adequacy of diversion, physical availability, and adverse effect. A summary of WSB findings described in subsequent sections are listed below.

TECHNICAL ANALYSES FINDINGS

AQUIFER TEST ANALYSIS	Using the Cooley-Case (1973) solution, saturated thickness (b) of 218 feet (ft), and submitted 72.2-hour aquifer testing data for GWIC ID 335315, estimates of aquifer properties include a Transmissivity (T) of 873 ft ² /day and Storativity (S) of 1.1×10^{-4} .
MODELING INPUTS	The following aquifer properties were used to complete adequacy of diversion, physical availability and adverse effect technical analyses: T of 873 ft ² /day, S of 1.1×10^{-4} . The estimated leakage parameter (r/B ; β), storage ratio in aquitard (S'/Sy), and dimensionless height of capillary fringe (L/b') are identified in figures below. Pumping schedules and boundaries used to model each criterion are identified within the document.
ADEQUACY OF DIVERSION	The aquifer adjacent to GWIC ID 335313 and 335315 would experience 54.20 and 58.90 ft of drawdown after the first year, leaving approximately 134 ft and 159 ft of available water column above the bottom of the perforated intervals, respectively.
PHYSICAL AVAILABILITY	The model predicted the 0.01-foot drawdown contour, or zone of influence (ZOI), has a width of approximately 14,000 ft in the predominate direction of groundwater flow. The northeastern and eastern extent of the ZOI was



	truncated to the East Gallatin River. The total flux through the ZOI is equal to 1,024 AF/year. There are 152 existing groundwater rights with a status of active and severed within the ZOI. (Appendix A) .
ADVERSE EFFECT (DRAWDOWN IN EXISTING WELLS)	The 1-foot drawdown contour extends out approximately 4,100 ft from GWIC ID 335313 and 335315 at the end of July of the fifth year of pumping. 13 water rights are predicted to experience drawdown equal to or greater than 1-foot (Appendix B) .
ADVERSE EFFECT (NET DEPLETION TO SURFACE WATER)	The East Gallatin River is identified as being hydraulically connected to the source aquifer. There would be no consumed volume associated with the proposed geothermal purpose, and therefore no net depletion to hydraulically connected surface waters.

2.0 Hydrogeologic Setting

As identified in **Figure 1**, the Production Wells GWIC ID 335313 and 335315 (Extraction Wells 1 & 2) were completed to 202 and 232 ft below ground surface (bgs) in Section 27 and 22, Township 01 South, Range 05 East, Gallatin County, respectively. Both wells are completed in the Tertiary aged valley-fill sediments (120SDMS) with perforated interval lengths of 35 ft. The wells, GWIC IDs 335309 and 335811 (Reinjection Wells 1 & 2) are completed to 300 and 215 ft bgs, respectively, in Section 22, Township 01 South, Range 05 East, Gallatin County. The injection wells are also completed in the source aquifer 120SDMS with perforated interval lengths of 144 and 100 ft. Well logs near the project location primarily describe alternating lenses of sand and gravel, clay-bound gravels, and clay which may act as localized leaky-confining units.

The surficial geology is mapped as Quaternary braided plain alluvium deposits of cobbles, boulders, sand, silt and clay up to 30 ft thick (Vuke et al., 2014). The Quaternary sediments are underlain by Tertiary Madison Valley member silt, siltstone, sandstone and conglomerates, in some parts of the valley up to 300 ft thick (Vuke et al., 2014).

The Gallatin Valley Quaternary and Tertiary aquifer system contains shallow unconfined, semi-confined (leaky confined), confined, and possibly even perched groundwater (English, 2018). Generally, groundwater and surface water flows from southeast to northwest across the valley and is recharged by irrigation, stream losses, and ditch leakage ultimately discharging to the Gallatin River (Hackett et al., 1960). The wells are on the edge of the Bozeman hydrogeologic subarea (Fan) adjacent to the Upper East Gallatin and Belgrade hydrogeologic subareas mapped by Hackett et al. (1960). Recent studies suggest that recharge from the surrounding bedrock aquifer and leakage from canals and ditches are the two largest components of groundwater recharge to the Gallatin Valley Aquifer (Michalek and Sutherland, 2020).

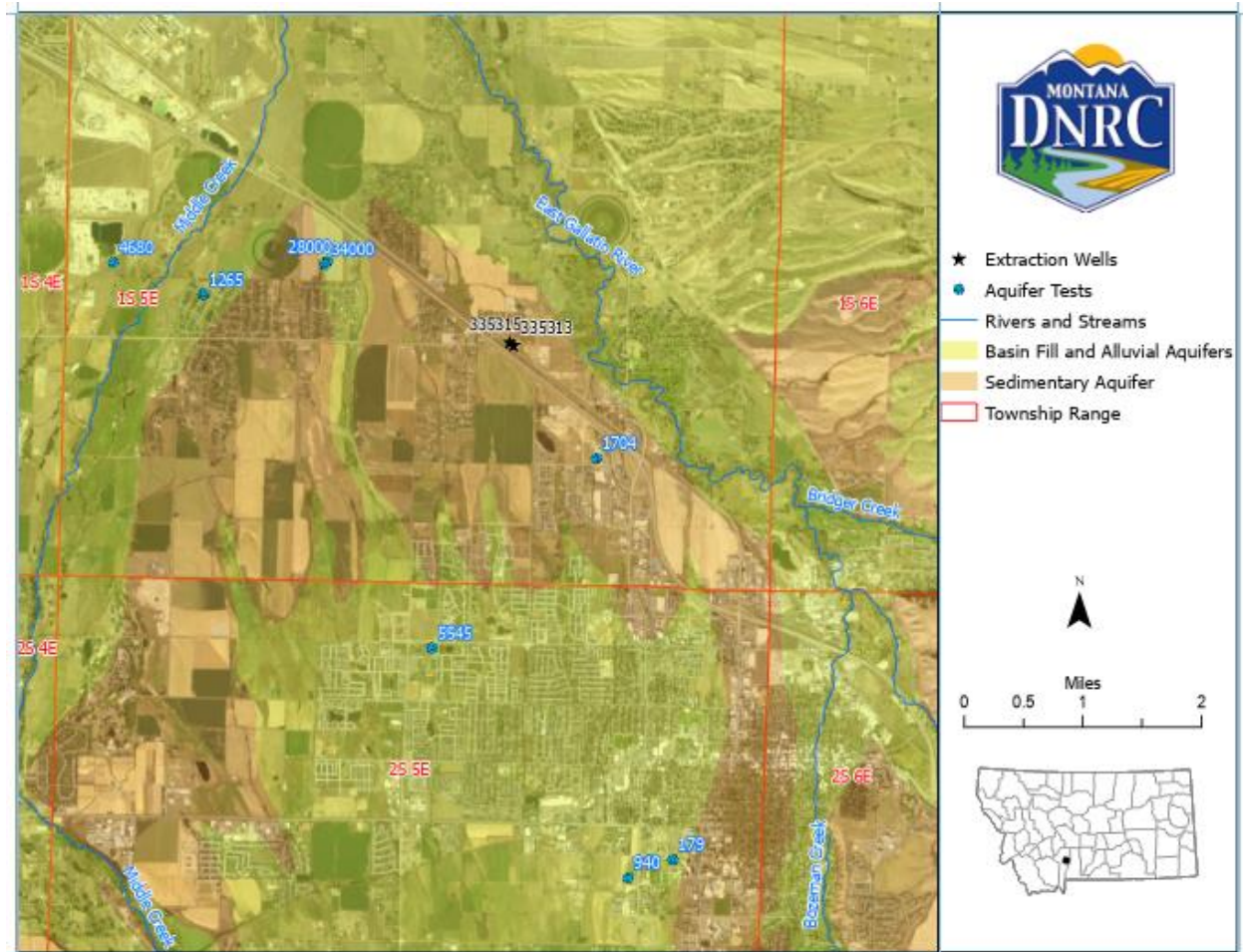


Figure 1: Map of the Applicant's aquifer test location and nearby T values derived from aquifer tests (Table 4).

3.0 Aquifer Test Summary

DNRC requires two different types of tests: "Aquifer Tests" and "Drawdown and Yield Tests." which aid DNRC in analyzing different application criteria.

- An "aquifer test" is a pumping test that is meant to provide data to model aquifer properties. The minimum duration of these tests is either 24-hours or 72-hours, depending on the proposed flow rate and volume (AMR 36.12.121(3)(e)), and DNRC only requires one of these tests per application. Aquifer Tests must include observation well data and pre-test monitoring data as well as post-test recovery data.
- A "drawdown and yield test" is a pumping test that is meant to evaluate well construction and the ability of the aquifer to yield water to the well. This is also known as demonstrating "adequacy of diversion." The minimum duration of these tests is 8 hours, and every well that is a part of the application, that did not have an aquifer test, must be



tested for at least 8 hours. Observation wells, pre-test background data, and post-test recovery data are not required for Drawdown and Yield Tests.

Field Methods and Equipment

A 72.2-hour aquifer test was conducted on the Production Well, GWIC ID 335315. Water pressure was collected using an In-situ LevelTROLL 400 water level logger and corrected using a BaroTROLL 400 data logger in the Production Well and Observation Wells (GWIC ID [335313](#) and [304409](#)). Manual water level measurements were collected using a Geotech water level meter. Observation Wells GWIC ID 335313 and 304409 are 163 and 430 ft from the Production Well and completed in the same source aquifer. The discharge was measured with a Blue-White Brand F-300 flow meter attached to a 4-inch discharge pipe.

Background Data

A variance for ARM 36.12.121 was granted for 3(g) and therefore, limited background data was collected as part of the 72.2-hour aquifer test. Background level trends did not appear to affect the drawdown and recovery data.

Drawdown Data

The 72.2-hour aquifer test started on July 23, 2024, at 12:00 P.M. on the Production Well and is considered ($t = 0$) for the computation of drawdown. The average pumping rate was 269.5 gpm. The pumping rate varied during the test beyond a margin of 5% of the average discharge (+/- 5% average discharge). The additional drawdown and yield test was submitted to meet the total requested flow rate of 550.0 gpm.

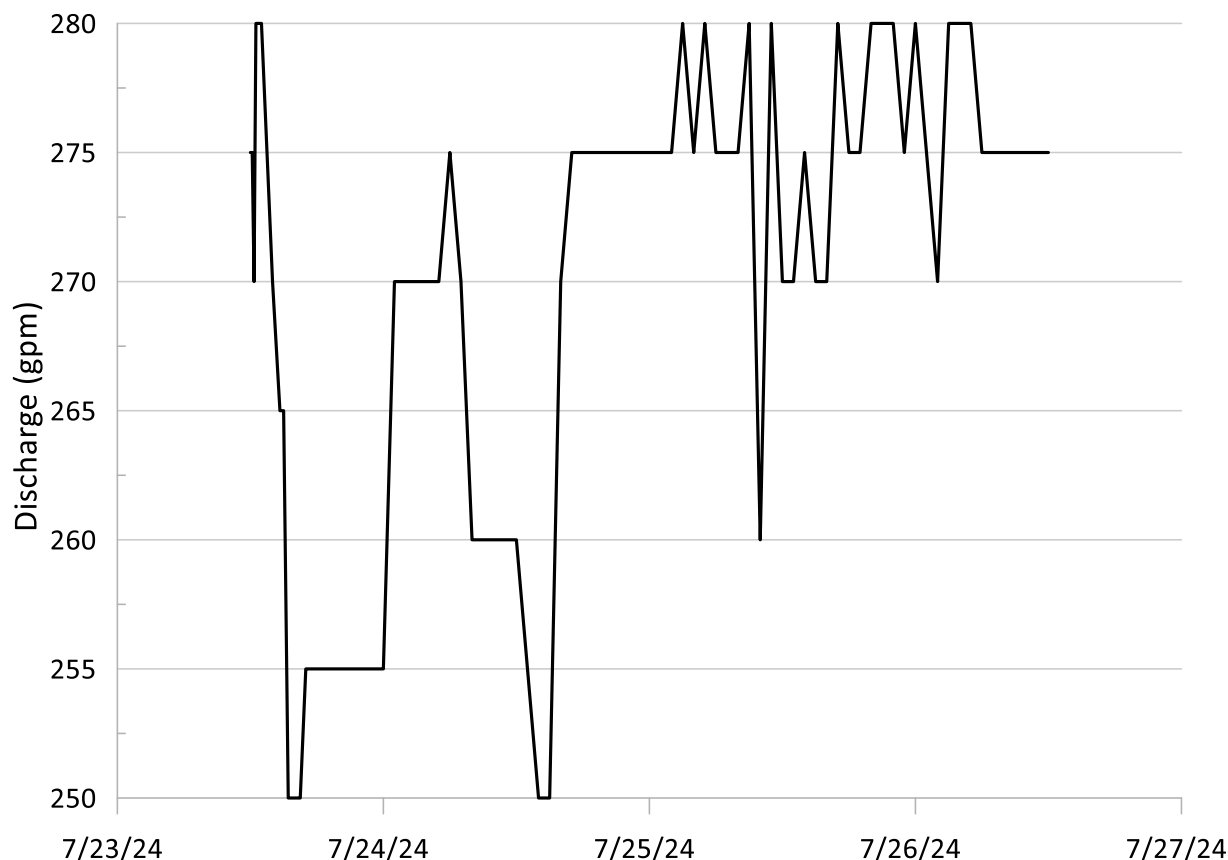


Figure 2: Measured discharge for Production Well GWIC ID 335315 during the 72.2-hour test.

The maximum drawdown in the Production Well was 87.86 ft below the static water level (swl) of 16.05 ft below top of casing (btc) leaving approximately 130 ft of available water column above the bottom of the perforated interval. Observation Well, GWIC ID 335313, experienced a maximum drawdown of 24.22 ft below the swl of 14.94 ft btc leaving approximately 165 ft of available water column above the bottom of the perforated interval. Observation Well, GWIC ID 304409, did not have observable drawdown as a result of the aquifer testing. A plot of drawdown and recovery for the Production and Observation Wells with measured drawdown is shown in **Figure 3**.

Recovery Data

Recovery groundwater level data was monitored for 72-hours in the Production Well GWIC ID 335315 and Observation Well GWIC ID 335313. At the end of the recovery period the Production and Observation Wells were both -0.05 ft from pre-test swls, respectively.

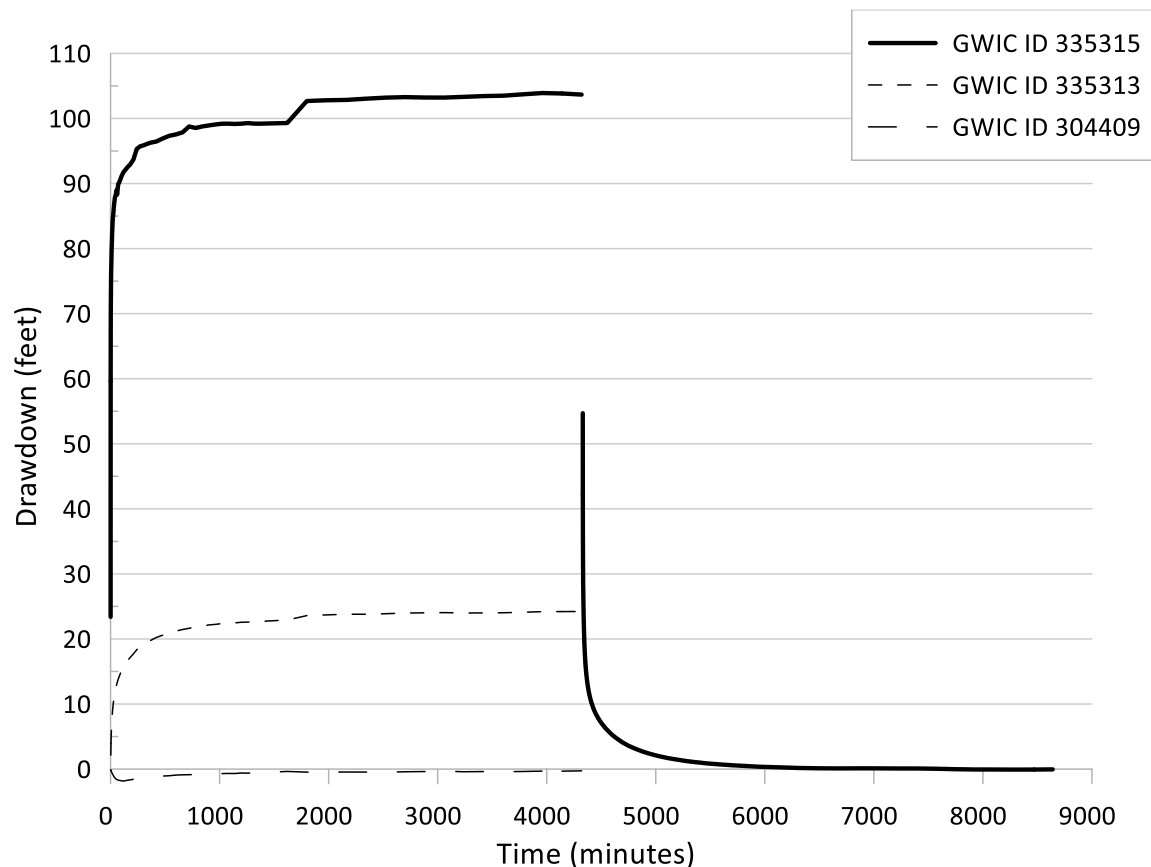


Figure 3: Drawdown and recovery data for Production and Observation Wells during the 72.2-hour aquifer test.

4.0 Aquifer Test Analysis

Methods

The DNRC utilized AQTESOLV® (HydroSOLVE, Inc., 2007) to analyze drawdown data from the aquifer test and obtain estimates of aquifer properties. Aquifer properties were used in forward modeling to evaluate the available water column in the well, quantity of water available in the source aquifer, and potential impacts to groundwater and surface water rights. AQTESOLV® is an analytical modeling software that uses image-well theory and the principle of superposition to simulate aquifer stress tests. Drawdown data and measured flow rates from the aquifer test, and the spatial location of each well are input into the model. Using this compilation of data, aquifer properties including T and S are identified based on a best-fit visual and statistical match between the observed and theoretical drawdown data.

Analyses

Analytical groundwater solutions were matched to Production and Observation Well drawdown data to generate estimates of aquifer properties for the source aquifer. As identified in **Figure 4** through **Figure 6**, theoretical AQTESOLV® predicted derivatives (red line) were compared to the



calculated derivatives from the observed drawdown (black triangles) and predicted drawdown (blue line) compared to the observed drawdown (black squares).

For estimation of aquifer properties, the Production and Observation Wells were assumed to be fully penetrating, and a saturated thickness (b) of 218 ft was used, which is length between the bottom of the perforated interval and the swl for the Production Well. Drawdown data and measured flow rates from the aquifer test, and the relative location of the Production Well and Observation Wells were input into AQTESOLV®. As shown in **Figure 4** and **Figure 5**, the Cooper-Jacob (1946) solution was used to perform a preliminary analysis of T and S using the Production and Observation Wells. The drawdown data for the Production Well and Observation Well show slight declines in the derivative throughout the aquifer testing, indicative of leaky-confined aquifer conditions.

The Cooley-Case (1973) solution for leaky-confined aquifers with a water-table aquitard was used to analyze T, S, and the leakage parameters for Observation Well GWIC ID 335313 based on the best-fit visual and statistical match between the observed and theoretical drawdown (**Figure 6**). The Cooley-Case (1973) model assumes a homogenous, isotropic leaky confined aquifer with instantaneous drainage at the water table from storage. **Table 3** lists the aquifer test analyses for the Production and Observation wells. The recommended aquifer T and S to be used in forward modeling is 873 ft²/day and 1.1×10^{-4} from the Cooley-Case (1973) solution for Observation Well GWIC ID 335313. The estimated parameters are supported by existing hydrogeologic data below and the conceptual model of the project location described in the hydrogeologic setting above.

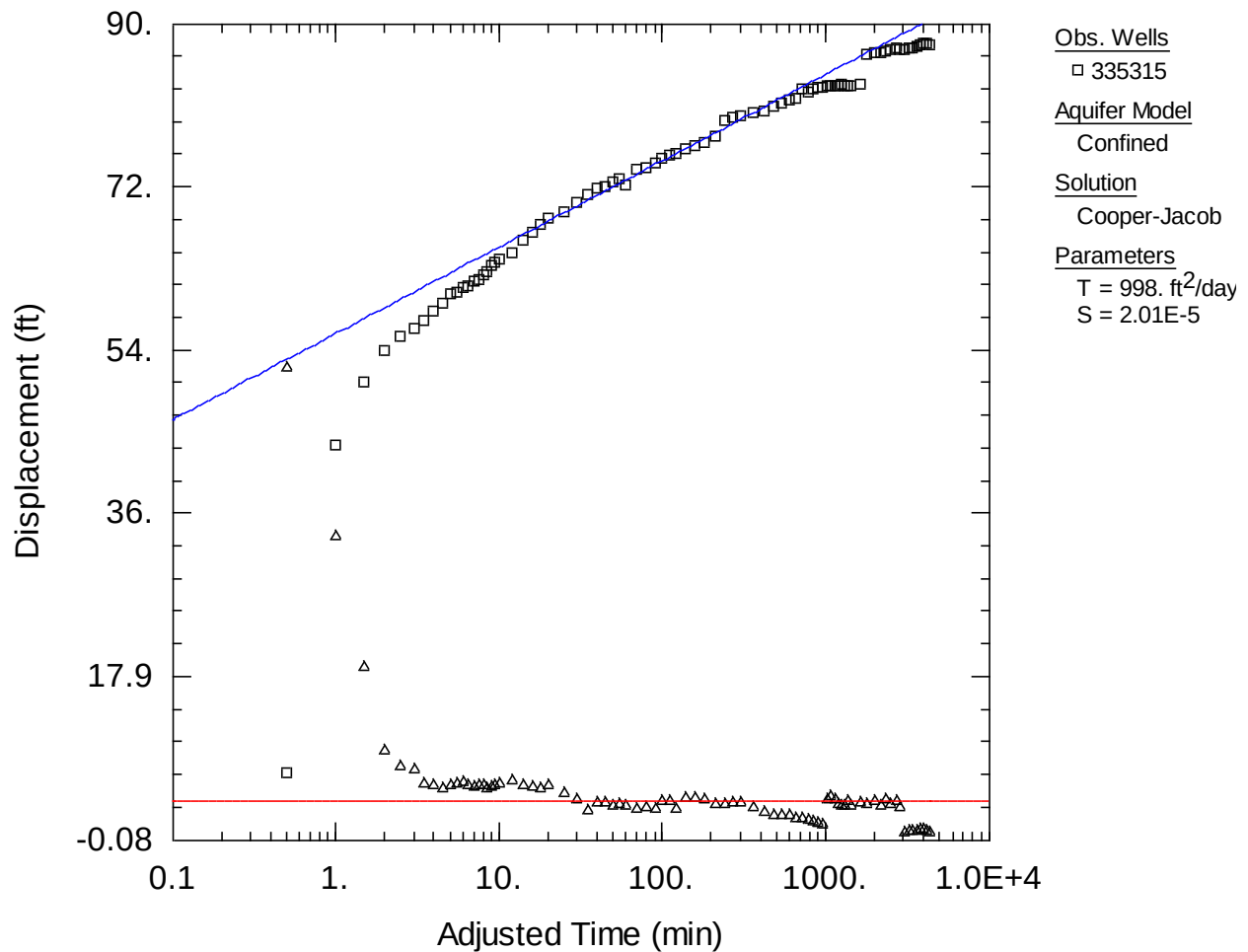


Figure 4: Cooper-Jacob (1946) time-drawdown and derivative analysis for the Production Well GWIC ID 335315.

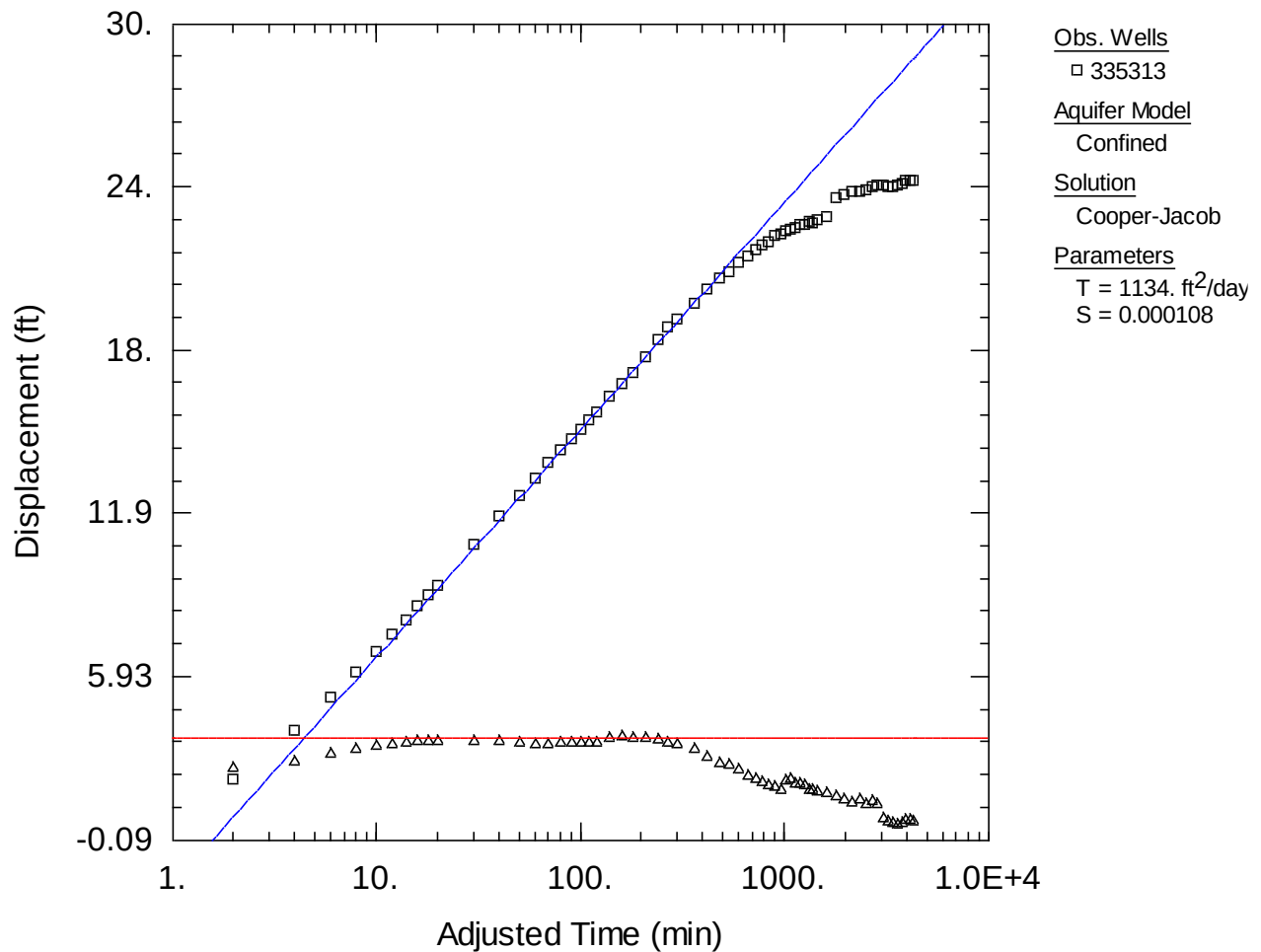


Figure 5: Cooper-Jacob (1946) time-drawdown and derivative analysis for the Observation Well GWIC ID 335313.

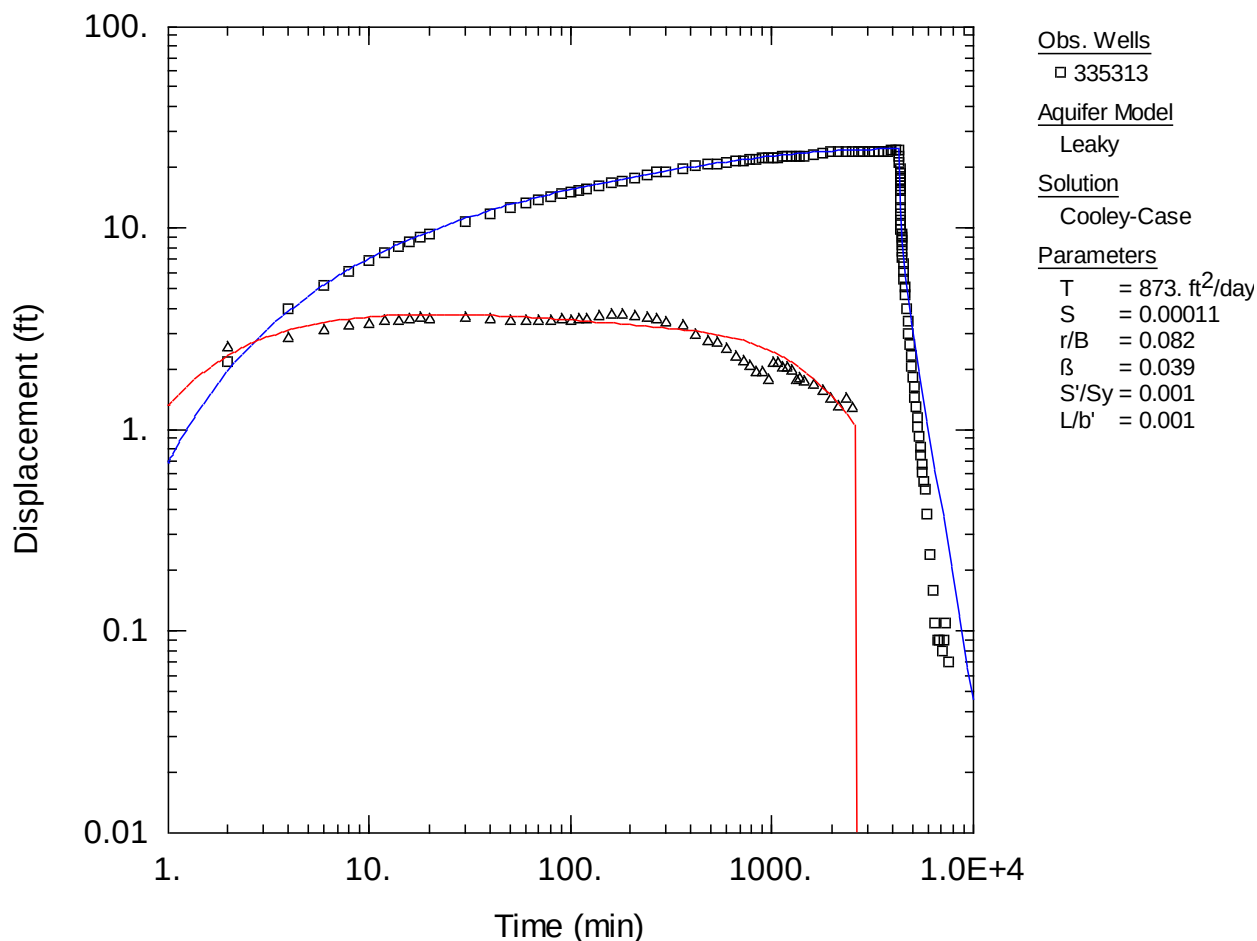


Figure 6: Cooley-Case (1973) time-drawdown and derivative analysis for the Observation Well GWIC ID 335313.

Table 3: Aquifer test analyses for 72.2-hour test completed on the Production Well.

Production Well (GWIC ID, Phase)	Well Analyzed (GWIC ID)	Analysis Solution	T (ft ² /day)	S
335315, Drawdown	335315	Cooper-Jacob (1946)	998	NA
335315, Drawdown	335313	Cooper-Jacob (1946)	1,134	1.1×10^{-4}
335315, Drawdown & Recovery	335313	Cooley-Case (1973)	873	1.1×10^{-4}



Table 4: Nearby Aquifer Tests and estimates of T and S when available.

Water Right No.	GWIC ID	Well Completion Depth (ft)	Distance from Proposed Project (miles)	Aquifer Test Length (hours)	Pumping Rate (gpm)	T (ft ² /day)	S
41H 30127867	304056	155	1.2	72	240	1,704	1.0E-3
41H 30109060	292561	178	1.7	76	397	28,000	0.1
41H 30109060	292562	158	1.7	72	388	34,000	0.1
41H 30115127	296973	280	2.6	72	206	5,545	4.0E-4
41H 30000136	205719	146	2.6	24	250	1,265	0.1
41H 30010803	215306	140	3.4	72	200	4,680	---
41H 30009188	183089	282	4.5	72	583	179	---
41H 30048037	95855	171	4.6	72	583	940	0.2

The Quaternary and Tertiary sediments of the Bozeman fan have T ranges of 602 to 8,689 ft²/day and 40 to 361 ft²/day, respectively (Hackett et al. 1960). Further, Custer et al. (1991) provided a T range for the Quaternary and Tertiary sediments of 214 ft²/day to 10,694 ft²/day. The reported S range of 4.0×10^{-4} to 0.2 in **Table 4**, supports the confined to unconfined conditions of the Quaternary and Tertiary aquifer system introduced by English (2018). The range of values shown from the aquifer test data in **Table 4**; published literature values; and findings that the Tertiary sediments in the Bozeman Fan subarea are generally less conductive than surrounding basin-fill and sedimentary rock aquifer subareas (Sutherland, 2023), support the recommended property values shown **Figure 6** and **Table 3**.

5.0 Drawdown and Yield Test

An 8.0-hour drawdown and yield test was conducted on the Production Well, GWIC ID 335313. Water levels during the test were collected using an In-situ Leveltroll 400 transducer. The discharge rate was measured with a 4-inch diameter discharge pipe and averaged 275 gpm. Per ARM 36.12.121 and Form 633, background level and recovery data are not required for drawdown and yield tests on additional Production Wells. However, the data was collected and is found in submitted Form No. 633 for GWIC ID 335313 as part of Application No. 41H 30165312.



Drawdown Data

The 8.0-hour drawdown and yield test started on August 12, 2024, at 09:46 A.M. on the Production Well and is considered ($t = 0$) for the computation of drawdown. The maximum drawdown in the Production Well was 73.69 ft below the static water level (swl) of 16.06 ft below top of casing (btc), leaving approximately 114 ft of available water column above the bottom of the perforated interval adjusting for the well casing stick-up height of 2-ft.

6.0 Modeling Inputs

Technical analyses in support of the following criteria assessment: adequacy of diversion, physical availability, and adverse effect (drawdown in existing wells) were modeled in AQTESOLV[®] (HydroSOLVE INC., 2007) using the following inputs:

- Cooley-Case (1973) solution for fully penetrating wells in an isotropic aquifer
- Well radius of 0.33 ft
- $T = 873 \text{ ft}^2/\text{day}$
- $S = 1.1 \times 10^{-4}$
- r/B ; $1/B = 1.7 \times 10^{-4}$; 5.0×10^{-4}
- β ; $\beta/r = 7.8 \times 10^{-5}$; 2.4×10^{-4}
- $S'/S_y = 0.001$
- $L/b' = 0.001$

The leakage parameters used to forward model multiple wells were adjusted from r/B and β shown in **Figure 6** to account for the distance of the Observation Well GWIC ID 335313 used to derive aquifer properties from the Production Well 335315 ($r = 163 \text{ ft}$). Leakage parameters used to forward model one well were adjusted from r/B and β shown in **Figure 6** to account for the radius of the modeled well (0.3 ft). The storage ratio in the aquitard (S'/S_y) of 0.001 was taken from **Figure 6** and verified as a representative input using the above estimated parameters, and representative vertical hydraulic conductivity and thickness of the aquitard. The dimensionless height of the capillary fringe (L/b') was taken from **Figure 6**. Monthly pumping schedules and boundaries used to complete technical analyses are identified in subsequent criteria sections.

7.0 Adequacy of Diversion Analysis

An evaluation of the potentially available water column remaining in the proposed wells was modeled in FWD:SOLV (HydroSOLVE INC., 2007) using the following pumping schedule:

- The monthly pumping and injection schedule identified in column 4 and column 7 of **Table 5** for one year of pumping.

Predicted theoretical drawdown for the proposed wells was modeled for the period of diversion using the monthly pumping schedule for each well identified in **Table 5**. The Applicant requests



298.40 AF, which was apportioned evenly to each Extraction and Injection Well based on the monthly pumping schedule provided by the Applicant.

Table 5: Proposed monthly extraction and injection schedule for the Applicant's wells.

Month	Extraction Schedule GWIC ID 335313 and 335315			Injection Schedule GWIC ID 335309 and 335811		
	Volume (AF)	Flow Rate (gpm)	Flow Rate (gpm/well)	Volume (AF)	Flow Rate (gpm)	Flow Rate (gpm/well)
January	19.2	140.0	70.0	-19.2	-140.0	-70.0
February	17.3	140.0	70.0	-17.3	-140.0	-70.0
March	19.2	140.0	70.0	-19.2	-140.0	-70.0
April	18.6	140.0	70.0	-18.6	-140.0	-70.0
May	21.2	154.5	77.2	-21.2	-154.5	-77.2
June	28.0	210.9	105.4	-28.0	-210.9	-105.4
July	46.9	342.2	171.1	-46.9	-342.2	-171.1
August	45.3	330.3	165.2	-45.3	-330.3	-165.2
September	25.7	193.7	96.9	-25.7	-193.7	-96.9
October	19.4	141.9	71.0	-19.4	-141.9	-71.0
November	18.6	140.0	70.0	-18.6	-140.0	-70.0
December	19.2	140.0	70.0	-19.2	-140.0	-70.0
Total	298.40	---	---	-298.40	---	---



As identified in **Table 6**, total drawdown is the sum of interference drawdown and predicted drawdown with well loss. Two extraction and two injection wells are proposed; interference drawdown was calculated using the pumping and injection schedule for each well. Predicted drawdown with well loss is calculated by dividing the predicted theoretical maximum drawdown by a well efficiency value. Well efficiency is calculated by dividing the maximum modeled drawdown for the aquifer test by the maximum observed drawdown of the aquifer test.

The aquifer adjacent to extraction wells GWIC ID 335313 and GWIC ID 335315 would experience a predicted total drawdown of 54.20 ft and 58.90 ft at the end of the first year, respectively. The remaining available water columns for GWIC ID 335313 and 335315 are approximately 134 and 159 ft, respectively. The remaining available water column is equal to the available drawdown above the bottom of the perforations minus total drawdown including interference drawdown.

Table 6: The remaining available water column for extraction wells.

Drawdown Estimate	GWIC ID 335313	GWIC ID 335315
Total Depth at Bottom of Perforated Interval (ft btc) ¹	204	234
Pre-Test Static Water Level (ft btc)	16.06	16.05
Available Drawdown Above Bottom of Perforations (ft)	188	218
Aquifer Test Observed Drawdown (ft)	73.69	87.86
Modeled Drawdown Using Average Aquifer Test Rate (ft)	81.00	77.00
Well Efficiency (%)	100	88
Predicted Theoretical Maximum Drawdown from assumed monthly pumping schedule (ft)	52.00	52.00
Predicted Drawdown with Well Loss (ft)	52.00	59.33
Interference Drawdown (ft)	2.20	-0.40
Total Drawdown (ft)	54.20	58.90
Remaining Available Water Column (ft)	134	159

¹The total well depth measuring point (bgs) was adjusted to the top of well casing based on a 2-foot stickup reported on the well logs.

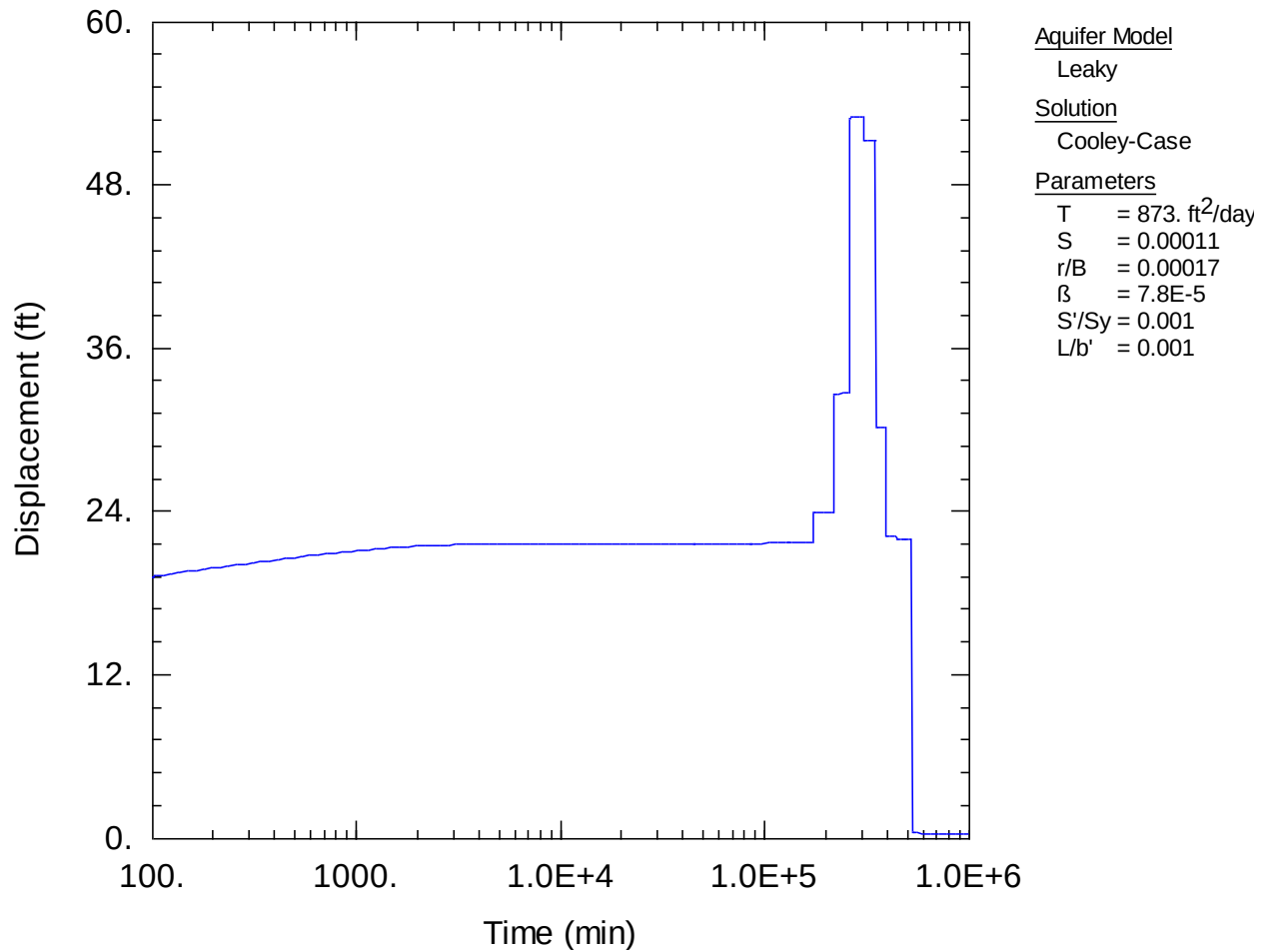


Figure 7: Cooley-Case (1973) time-drawdown plot of the predicted theoretical drawdown in the extraction wells at the end of the first year of the assumed monthly pumping schedule.

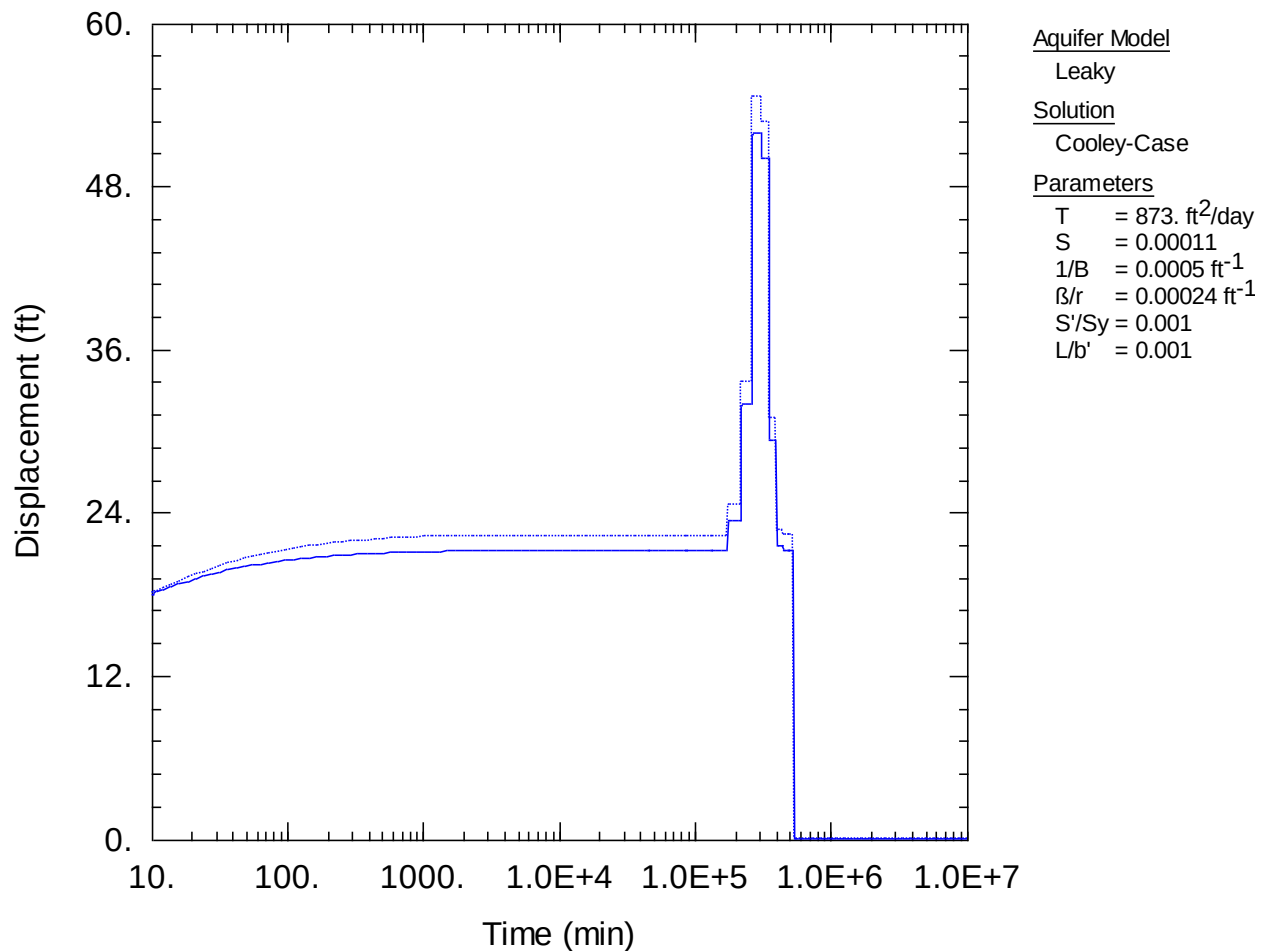


Figure 8: Cooley-Case (1973) time-drawdown plot of the predicted theoretical drawdown in GWIC ID 335313 (dotted line) and GWIC ID 335315 (solid line) including interference drawdown at the end of the first year of the assumed monthly pumping schedule.

8.0 Physical Availability Analysis

An evaluation of groundwater availability in the source aquifer for the purpose of evaluating physical and legal availability was done by calculating groundwater flux through a zone of influence (ZOI) corresponding to the 0.01-foot drawdown contour. The 0.01-foot drawdown contour was modeled in AQTESOLV[®] (HydroSOLVE INC., 2007) using the following pump schedule and boundaries:

- Constant pumping rate of 240.7 gpm and -240.7 gpm for the Extraction and Injection Wells, respectively, for one year of pumping.

The normalized pumping rate required to produce the adjusted annual volume for the Extraction and Injection Wells is 240.7 gpm and -240.7 gpm, respectively. As shown in **Figure 9**, the 0.01-foot drawdown has an average width of approximately 14,000 ft perpendicular to direction of



groundwater flow to the northwest and is truncated to the East Gallatin River. **Appendix A** provides a list of groundwater rights that are within the 0.01-foot drawdown contour.

The calculation for groundwater flux (Q) through the delineated area is given by Eq. 1 and is 122,220 ft³/day or 1,024 AF/year:

$$Q = TWi$$

where:

T = Transmissivity = 873 ft²/day

W = Width of Zone of Influence = 14,000 ft

i = Groundwater gradient (English (2018); Sutherland (2023)) = 0.01 ft/foot

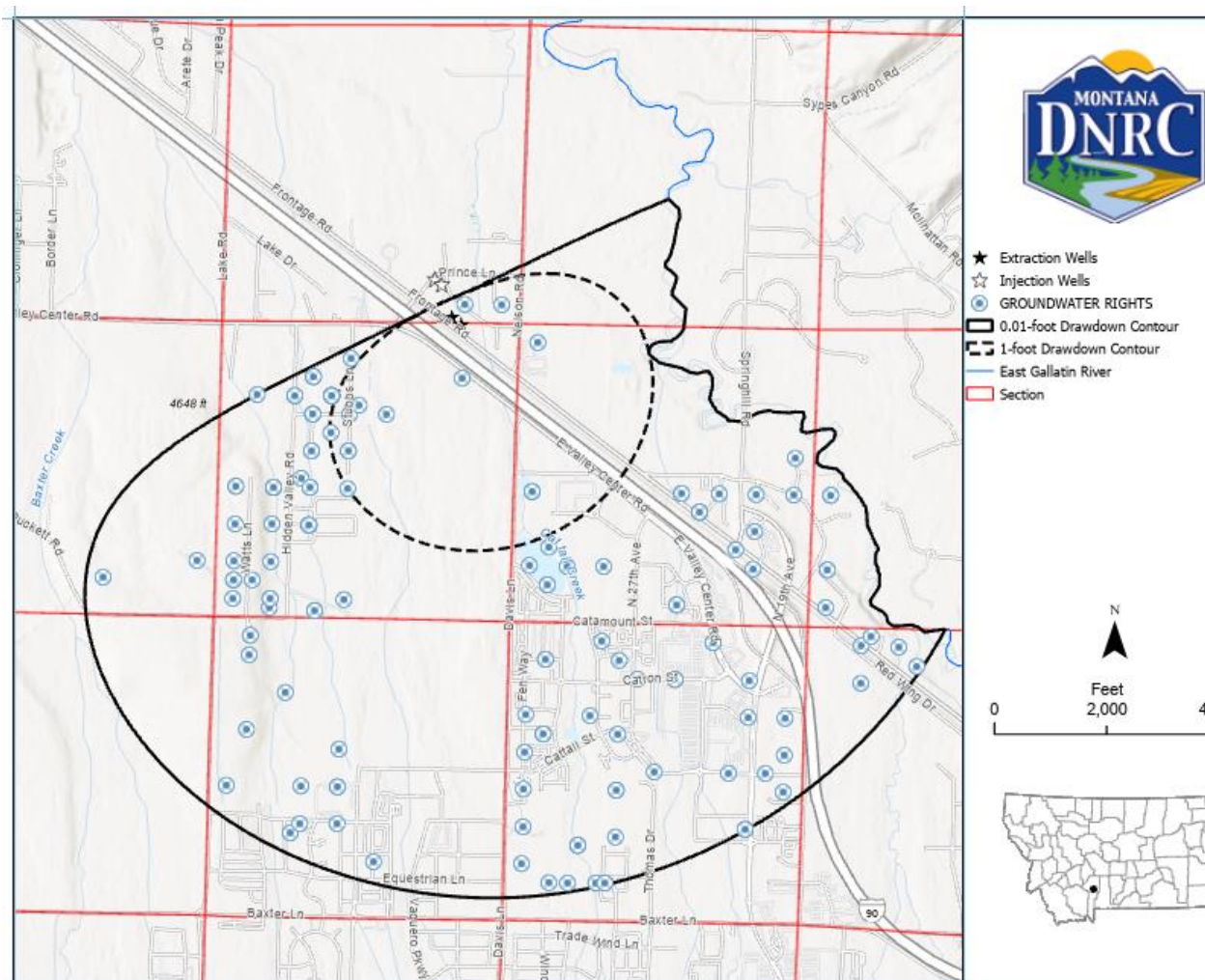


Figure 9: 0.01-foot and 1-foot drawdown contour and water rights (active, severed) within each contour extent for Permit Application No. 41H 30165312.



9.0 Adverse Effect Analyses

Using the Applicant's proposed pump schedule and associated annual volume, potential impacts to existing water rights are evaluated by modeling drawdown in nearby wells and net depletions to surface water(s).

9.1 Groundwater - Drawdown in Existing Wells

The drawdown in existing wells was modeled in AQTESOLV[®] (HydroSOLVE, Inc., 2007) using the following pump schedule and boundaries:

- The monthly pumping and injection schedule identified in column 4 and column 7 of **Table 5** assigned to the Extraction and Injection Wells for five years of pumping.

The drawdown is the largest at the end of July of the fifth year using the proposed pumping schedule. As identified in **Figure 9**, the 1-foot drawdown contour extends to a maximum of approximately 4,100 ft from the Extraction Wells at the end of July of the fifth year of pumping. The 1-foot drawdown contour includes 13 water rights that are predicted to experience drawdown equal to or greater than one foot (**Appendix B**).

9.2 Surface Water - Net Depletion

Pursuant to *Montana Trout Unlimited v. DNRC*, 2006 MT 72, 331 Mont. 483, 133 P.3d 224, the DNRC recognizes the connection between surface water and groundwater, and the effect of pre-stream capture and induced infiltration on surface waters.

Net depletions to surface water depend on propagation of drawdown to areas of the aquifer from which water can be captured. Captured water consists of two possible sources – a reduction in the natural discharge (outflow) rate of groundwater from the aquifer (pre-stream capture) or an increase in the natural/artificial recharge (inflow) rate to the aquifer (e.g. induced infiltration). Two important assumptions are made when evaluating net depletions: first the stream and underlying aquifer remain hydraulically connected by a continuous saturated zone, and second, the stream does not become dry. In addition, net depletion is not a function of groundwater flow rate or direction (Theis, 1938; Leake, 2011) and drawdown from pumping can propagate through the entire thickness of the confining layer to overlying aquifers or surface waters (Konikow and Neuzil, 2007).

As such, net depletions are identified for hydraulically connected surface water sources, not including ditches or ephemeral streams. Net depletion is equal to consumption for proposed groundwater use and is described as the calculated volume, rate, timing, and location of reductions to surface water that are offset by return flows (non-consumed water). Net depletion is evaluated by 1) quantifying the consumed volume associated with the proposed use; 2) identifying hydraulically connected surface waters; and 3) calculating the monthly rate and timing of net depletions to affected surface water(s).



1. Consumed Volume

Consumed groundwater does not return to the source aquifer. Consumed volume depends on the proposed use and its associated percentage of known consumption. Depletion is assumed to be equivalent to consumption on an annual basis unless return flows do not accrete to the potentially affected surface water.

Monthly consumption for irrigation, not including turf grass, can be calculated using ARM 36.12.115 irrigation standards and associated efficiency values or the net irrigation requirement (dry year 80% chance) calculated using the USDA Natural Resources Conservation Service (NRCS) IWR program with inputs consistent with DNRC consumptive use rules in ARM 36.12.1902. Monthly consumption for irrigation of turf grass (lawns) is calculated using either a minimum efficiency value of 70% and ARM 36.12.115 lawn and garden standards or the net irrigation requirement from IWR with inputs consistent with DNRC (2010) Consumptive Use Methodology for turf grass.

Consumption for other purposes are listed in **Table 7** and are based on the results of studies by Kimsey and Flood (1987), Vanslyke and Simpson (1974), Paul, Poeter, and Laws (2007), DNRC (2018), wastewater treatment method, operation of systems, or DNRC policy. Net evaporation is calculated using gridded monthly net evaporation values and methodologies associated with DNRC (2023).

Table 7: Percent consumption by purpose.

Purpose	Method of treatment/Use	Consumed
Domestic/Municipal*/Commercial/Institutional	Individual drainfields	10%
Domestic/Municipal*/Commercial/Institutional	Central treatment facility with minimal consumption	5%
Domestic/Municipal*/Commercial/Institutional	Evaporation basin or land application	100%
Municipal Use for Municipality	Variable	100%
Water Marketing/Agriculture Spraying/Stock Water/some Industrial Uses	Variable	100%
Geothermal	Open-loop geothermal cooling system with pumping and reinjection wells.	0%
Commercial/Industrial	Aggregate Washing – construction standard for moisture allowed in the finished aggregate product.	5%
Commercial	Snow Making – depends on time of day, machine, weather at time of operation, etc.	10-30%
Fisheries, Recreation, Storage for Irrigation	Net evaporation off reservoir surface, gridded monthly net evaporation values and	AF/acre

*Municipal use for a non-municipality, such as a Water District.



WSB Findings

For the subject application, the proposed project includes an open-loop geothermal cooling system, and therefore, will have no consumed volume.

2. Hydraulically Connected Surface Water(s) and Location of Net Depletion

Potentially affected surface waters in a net depletion evaluation are identified by their hydraulic connection, both direct and indirect, to the source aquifer of a proposed groundwater diversion. Hydraulic connection depends on the depth to groundwater beneath the beds of surface waters, connection between deep and overlying shallow aquifers, vertical gradients, and can vary along a reach and with time of year.

Procedures for evaluating hydraulic connection and identifying one or more potentially affected surface water(s) for a proposed well in an unconfined/confined aquifer or regional bedrock aquifer can be found in DNRC (2018) and DNRC (2019), respectively. Net depletion is apportioned between multiple potentially affected surface waters generally following procedures described in Section 3.2 of a guidance document developed by the Province of British Columbia (2016) for determining the effect of groundwater diversion on specific streams.

Following protocols in DNRC (2018) **Table 8** identifies published information used to assess hydraulically connected surface water(s). Not all data may be available for each project and is noted as “NA” when that occurs.

Table 8: Published information used to identify hydraulically connected surface water(s).

Published Information	Surface Water Source
	East Gallatin River
USGS National Hydrographic Dataset (NHD) ¹	Perennial
USGS PROSPER Dataset ²	Perennial (0.9+)
MBMG GWIC wells, less than 50 ft deep, within 1,000 ft of surface water, static water levels above or within 10 ft of elevation of stream bed (DNRC, 2018) ³	Mapped GWIC ID's 91805, 91796, 91789, 151869, 151868, 151867, 151871, 165050, 91779 (Figure 13)
Published Water Table Maps, Publications, Previous Water Rights, etc. ⁴	Sutherland (2023), Madison (2022), Provisional Permit No. 41H 30115965
Gridded National Soil Survey Geographic Database ⁵	Hydric conditions mapped along river (Figure 13)
Aerial imagery	Wet channel (NAIP 2013-2024)
Affidavits, photographs, etc.	NA

¹ Review NHD to identify perennial, intermittent, and ephemeral classifications for surface water sources most proximal to the proposed diversion(s).

² USGS PROSPER probability of streamflow permanence (greater than 50 percent of the time it flows).

³ Per DNRC (2018) hydraulic connection of individual stream reaches to groundwater is evaluated by comparing streambed elevations to static ground water elevations measured in MBMG GWIC wells less than 50 ft deep and within 1,000 ft of surface water or from published water table maps. Surface water within that area is considered



hydraulically connected to the unconfined aquifer if static ground water elevations are above or within 10 ft of the elevation of the stream bed.

⁴No water table maps available.

⁵ Review Gridded National Soil Survey Geographic Database to identify hydric soils or shallow water tables near surface water sources.

WSB Scientific Findings

Based on the review of the published information in **Table 8**, the source aquifer is hydraulically connected to the East Gallatin River, a perennial surface water source. As identified in **Figure 13** the starting point of the depleted reach starts along the northern side of the NWSEW of Section 23, Township 01 South, Range 05 East, Gallatin County.

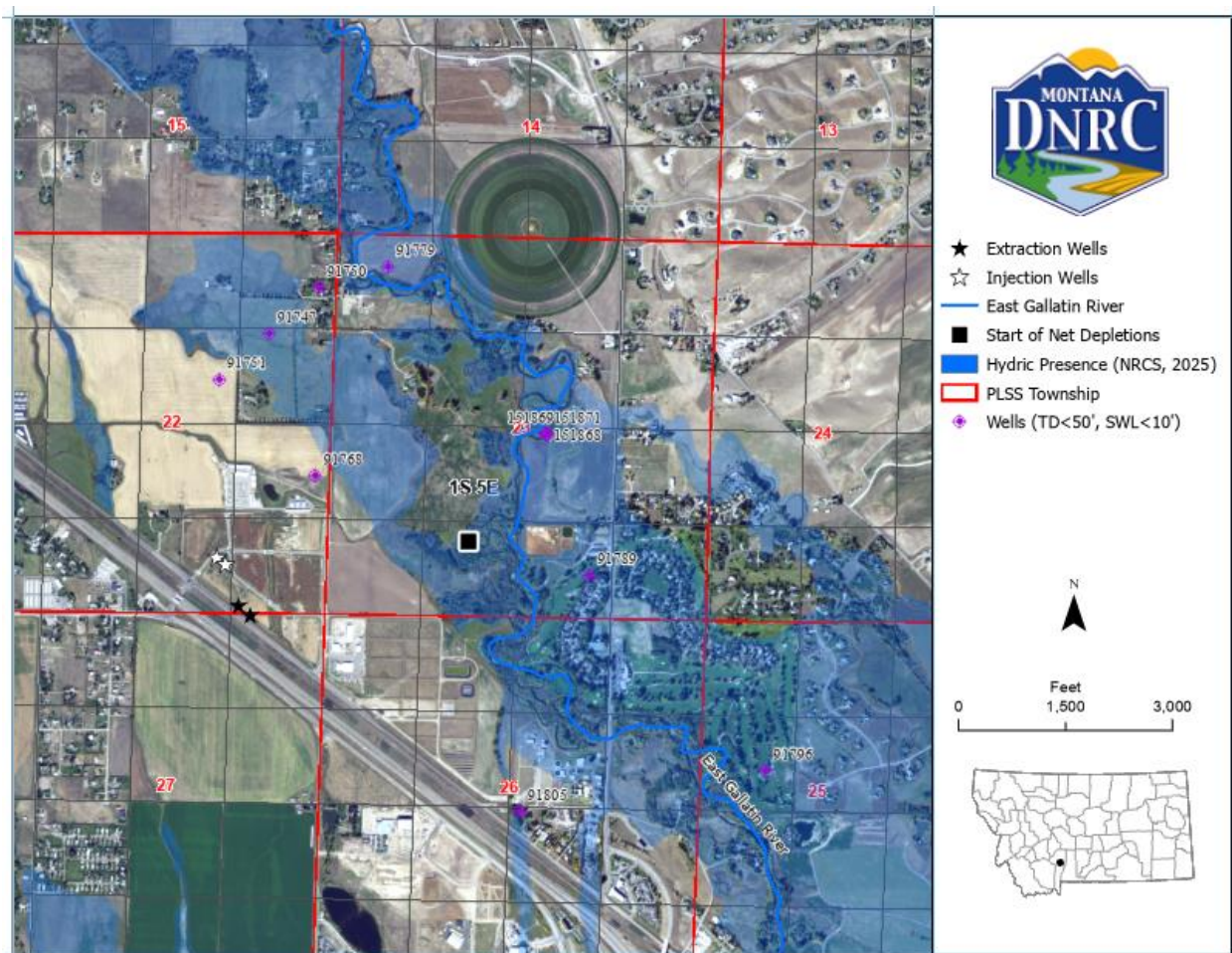


Figure 13: Information used to assess hydrologic connection and location of starting point of the depleted reach on the East Gallatin River for Permit Application No. 41H 30165312.



3. Rate and Timing of Depletions

Evaluations of the rate and timing of depletions caused by pumping are based on the basic concept that groundwater pumping eventually is offset by an equivalent increase in recharge or decrease in discharge (Theis, 1940; Leake et al., 2008), a process defined as capture by Lohman (1972). Capture occurs as drawdown propagates to surface water and areas of phreatophyte vegetation (areas of groundwater discharge) that takes water directly from groundwater. In the absence of credible evidence to the contrary, capture of ET by phreatophytes is neglected and net depletion is assumed to equal total capture. This assumption is justified because published estimates for conditions common in Montana alluvial valleys indicate capture of ET generally is less than 10 percent of total capture (Xunhong, 2006). Capture of ET in ephemeral drainages may be significant and will be evaluated on an application-by-application basis.

The rate and timing of net depletion caused by pumping may be modeled using a variety of analytical and numerical models selected to fit site-specific conditions and needs. Simple models including the Alluvial Water Accounting System (AWAS), the Well Pumping Depletion Model (WPDM) or FWD:SOLV (HydroSOLVE, Inc. 2024) typically are used by DNRC to model depletions to one source with simple aquifer boundaries. Adjustments may be made for more complex conditions or multiple sources using methods like those described by Contor (2011), analytical models by Hunt (2003) and Butler et al. (2001) or a superposition numerical groundwater flow model.

Modeling may not be necessary in some situations such as where a proposed use is constant year-round, the source aquifer is confined, or the distance to potentially affected stream reaches is greater than one mile. Modeling net depletions can be simplified if the proposed place of use is located the same relative distance from the potentially affected surface water as the proposed wells and all non-consumed water infiltrates the source aquifer and returns to the potentially affected surface water as return flows. Under those simplifying assumptions, net depletion can be modeled based on withdrawal of the monthly consumed amounts. Otherwise, net depletion by the full withdrawals and return flows need to be modeled separately with net depletion calculated as depletion minus return flows.

The proposed use is geothermal, water will be extracted and injected simultaneously. There would be no consumed volume, and therefore, no timing of net depletions was completed as part of Application No. 41H 30165312.

Review

This document has been reviewed on June 30, 2025 in accordance with Category 7 of [DNRC's Water Sciences Bureau Minimum Standards of Review](#), Version 2, February 2024.

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Appendix A: Groundwater Rights within Area of Potential Impact



WRNUMBER	ALL_OWNERS
41H 30127867	FLIR SYSTEMS INC
41H 100672 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST
41H 80659 00	CRESTVIEW LAKE LLC
41H 113364 00	CECILIA R VANIMAN; DONALD D VANIMAN
41H 115518 00	HIDDEN VALLEY OWNER LLC
41H 115515 00	HIDDEN VALLEY OWNER LLC
41H 40130 00	HIDDEN VALLEY OWNER LLC
41H 39225 00	HIDDEN VALLEY OWNER LLC
41H 115516 00	HIDDEN VALLEY OWNER LLC
41H 115517 00	HIDDEN VALLEY OWNER LLC
41H 42480 00	DALE LILLEJORD
41H 59866 00	LYNN C WINDHAM
41H 60759 00	MICHAEL D COK
41H 90747 00	D2BZ1 LLC
41H 108859 00	JULIE OGHIGIAN; MATTHEW OGHIGIAN
41H 117208 00	WOODY LAURIE BATES REVOCABLE TRUST DATED 4/4/95
41H 96799 00	9019 LLC
41H 30125032	KEVIN KENT
41H 30000996	SARAH HALL
41H 30063822	MICHAEL D COK
41H 30045047	CRESTVIEW LAKE LLC
41H 108896 00	JULIE OGHIGIAN; MATTHEW OGHIGIAN
41H 30162630	KAMERON KELSEY; SALLY KELSEY
41H 25895 00	ABIGAIL L MINFORD; BENJAMIN D PRENTISS
41H 100708 00	COSTCO WHOLESALE
41H 107598 00	GALLATIN CENTER LTD PRTRNSHP
41H 116445 00	BOZEMAN MONTANA HOLDINGS LLC
41H 100715 00	NINETEENTH STREET PARTNERSHIP
41H 30162633	KAMERON KELSEY; SALLY KELSEY
41H 30045048	CRESTVIEW LAKE LLC
41H 39213 00	TRACEY PETER REVOCABLE TRUST
41H 40108 00	S&S DAVIS LLC
41H 30069875	JOSHUA N GRUENBERG; MIKARON F GRUENBERG
41H 116444 00	BOZEMAN MONTANA HOLDINGS LLC
41H 30103555	PETER E GARCIA; TASHA D GARCIA
41H 36789 00	MARY ELLEN BRUHN
41H 80669 00	CAROLYN J TATARKA; RAYMOND J TATARKA
41H 107475 00	JOHN HECHT
41H 107601 00	GALLATIN CENTER LTD PRTRNSHP
41H 113372 00	JOHN D HECHT; MARY HECHT
41H 30148873	KRUSE, KELLY R LIVING TRUST; KRUSE, PATRICIA A LIVING TRUST
41H 40413 00	ROBERT A WHITTMYER; SHARON WHITTMYER
41H 79512 00	CHRISTINA RIFFLE; SCOTT RIFFLE



41H 93745 00	BOB DAVIS; ROXI M DAVIS
41H 30149453	BARTIMCO PROPERTIES LLC
41H 111644 00	JOHN D HECHT; MARY HECHT
41H 139045 00	HEMINGWAY, PATRICK & CAROL T TRUST
41H 6741 00	BOZEMAN, CITY OF
41H 30020414	FHG CONSTRUCTION INC
41H 42468 00	JOHN D HECHT
41H 32752 00	BARBARA F MCLAUGHLIN
41H 30120927	MICHAEL W DINKINS
41H 114302 00	SUSAN R TAYLOR
41H 138 00	NICOLE R BOWER; SPENCER J BOWER
41H 104756 00	ORVILLE WAY LLC
41H 30067919	KENNETH WIRTZ
41H 30106534	STEVEN SMITH
41H 30161488	BURT HAMNER; EMILY MORRILL
41H 39221 00	LARRY D KIRKPATRICK; KAREN S LANZ
41H 47327 00	BMCH RENTALS LLC
41H 96656 00	BRANDON BEAMER
41H 30170704	RICHARD A NOONAN; LEAH J REUTER; RICHARD J REUTER; CAROLYN G WIDMAN
41H 111645 00	FIRST INTERSTATE BANK OF COMMERCE
41H 14010 00	4 CLOVERS LLC; OREILLY PARTNERSHIP LLC; SEVEN OX SEVEN LLC
41H 39746 00	LANTANA CORPORATION
41H 45560 00	BOZEMAN HEALTH URGENT CARE LLC
41H 53161 00	RUSSELL HOSNER LLC
41H 106106 00	KELLER SUPPLY CO
41H 30105693	MONTANA, STATE OF DEPT OF TRANSPORTATION
41H 30047249	CRESTVIEW LAKE LLC
41H 30047250	CRESTVIEW LAKE LLC
41H 103121 00	JERRI K ALEXANDER; LOREN C ALEXANDER
41H 31114 00	BOZEMAN ELEMENTARY DISTRICT NO. 7
41H 95370 00	FETTIS, WILLIAM J TRUST
41H 19409 00	DALLAS J PEUSE
41H 103232 00	G AND S FAMILY TRUST
41H 89705 00	KENNETH WIRTZ
41H 99364 00	SANDAN LLC
41H 59783 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST
41H 23019 00	DAROLD E BRUHN; NORMA J BRUHN
41H 23316 00	JAMES D BRUHN
41H 104707 00	VALLEY CENTER LTD PRTRNSHP
41H 114952 00	BOZEMAN 6 RE LLC
41H 16414 00	WALDO E KUCHLING
41H 17696 00	FLOYD MATHISON
41H 17715 00	K SCOTT HALL; TERESA C HALL
41H 18751 00	KEVIN KENT



41H 21416 00	JOHN WESEN
41H 22014 00	ORR F MARY; MICHAEL J SWEENEY
41H 22940 00	FIVEFOLD HOLDINGS LLC
41H 23687 00	MARY S SEED; RAYMOND B SEED
41H 28957 00	JOSEPHINE Z HOWE; ROBERT H HOWE
41H 31360 00	LAURA F BARRY; STEPHEN R BARRY
41H 32618 00	LINDA K ANDERSON
41H 34684 00	JOSHUA C CAMPBELL
41H 36426 00	RONALD D GREEN; RUTH A GREEN
41H 37428 00	BOZEMAN ELEMENTARY DISTRICT NO. 7
41H 40139 00	DEBRA A GILL; MICHAEL L GILL
41H 44265 00	CRAYTON, ROBERT F & CYNTHIA REVOCABLE LIVING TRUST
41H 44266 00	CRAYTON, ROBERT F & CYNTHIA REVOCABLE LIVING TRUST
41H 49600 00	PATTERSON PLACE LLC
41H 55200 00	KEVIN J FRANK
41H 58361 00	TODD J PIERONI
41H 75642 00	ROBERT L ADAMS; JOHN L MARCELLA; PAMELA J MARCELLA
41H 9574 00	DYPEX INC
41H 30149451	BARTIMCO PROPERTIES LLC
41H 89647 00	RR1045 LLC
41H 104721 00	ANITA L SAUNDERS; R ED SAUNDERS
41H 110100 00	CARRIE MCCLAUGHRY; TOBIAS H MCCLAUGHRY
41H 30047450	CHAD MUESKE
41H 30048611	SOUTH HAMILTON COURT CONDO ASSN
41H 30105386	TAC INVESTMENTS LLC
41H 30043137	CATKIN CONDOMINIUM OWNERS ASSN INC
41H 30147910	ARMKNECHT STEVEN R REVOCABLE LIVING TRUST
41H 100809 00	AMERICAN SIMMENTAL ASSOC INC
41H 30065502	NATHAN S NAPRSTEK
41H 30161243	BRIAN LAPKA
41H 30161244	BRIAN LAPKA
41H 73705 00	ROGER S KIRK
41H 30115761	DERRICK SALVESON; JYLISSA SALVESON
41H 40136 00	CASNURSPROP LLC
41H 108962 00	RIVERGLEN CONDOMINIUMS
41H 30050963	BOZEMAN SCHOOL DIST 7
41H 114948 00	BOZEMAN 6 RE LLC
41H 11915 00	CASNURSPROP LLC
41H 139905 00	ROBERT D LANE; THOMAS E LANE
41H 30005476	JAMES ARMSTRONG; NINA ARMSTRONG
41H 30010468	KINGMA REVOCABLE TRUST
41H 30011859	SANDAN LLC
41H 30012764	SANDAN LLC
41H 30013046	SANDAN LLC



41H 30016832	RICHTER, DELBERT L & DENA S REVOCABLE LIVING TRUST
41H 30021277	P ANDREW VAN ORDEN
41H 30021278	C&C MANAGEMENT LLC
41H 30023647	JASON A DARROW
41H 30024622	BAXTER MEADOWS MASTER COMMUNITY ASSN INC
41H 30024623	BAXTER MEADOWS MASTER COMMUNITY ASSN INC
41H 30025056	SANDAN LLC
41H 30028964	BRENT J SCHMOLL
41H 30029336	TURNQUIST REVOCABLE TRUST
41H 30030867	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30030868	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30031011	JACQUELINE J REYGERS; LODY E REYGERS
41H 30041929	HENRY J BOUMA
41H 30042369	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30042370	GALLATIN COUNTY SCHOOL DISTRICT # 7
41H 30044488	URBAN VILLA HOMEOWNERS ASSN
41H 30145989	LACEY BUCZALA; ROBERT BUCZALA
41H 361 00	RUSSELL HOSNER LLC
41H 362 00	RUSSELL HOSNER LLC
41H 5099 00	TATARKA FAMILY FARMS LLC
41H 636 00	RONALD K LEWIS



Appendix B: Groundwater Rights Within 1-foot Drawdown Contour



WRNUMBER	ALL_OWNERS	Well Depth (ft)	Static Water Level (ft)	Drawdown (ft)	Available Water Column (ft)
41H 30161243	BRIAN LAPKA	52	17	8.8	26
41H 30103555	PETER E GARCIA; TASHA D GARCIA	63	23	1.7	38
41H 30041929	HENRY J BOUMA	60	16	2.6	41
41H 107475 00	JOHN HECHT	60	17	1.2	42
41H 30149453	BARTIMCO PROPERTIES LLC	72	5	17.2	50
41H 111644 00	JOHN D HECHT; MARY HECHT	60	6	1.4	53
41H 30065502	NATHAN S NAPRSTEK	82	25	1.2	56
41H 59783 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST	74	10	1.6	62
41H 30105693	MONTANA, STATE OF DEPT OF TRANSPORTATION	80	10	5	65
41H 30149451	BARTIMCO PROPERTIES LLC	88	9	6.9	72
41H 113364 00	CECILIA R VANIMAN; DONALD D VANIMAN	100	12	1.6	86
41H 30047450	CHAD MUESKE			1	
41H 100672 00	VANIMAN, CECILIA R TRUST; VANIMAN, DONALD D TRUST			1.6	



Groundwater Permit Technical Analyses Report – Part B

Department of Natural Resources and Conservation (DNRC or Department) Water Resources Division

Kendrew Ellis, Water Resource Specialist, Bozeman Regional Office

Application No.	41H 30165312	Proposed Point of Diversion	SWSESE Section 22, T1S, R5E, Gallatin County
Applicant	Barnard Construction		

Overview

This report is Part B of a two-part publication which analyzes data submitted by the Applicant in support of the above-mentioned water right application. This report provides technical analyses as required under the Administrative Rules of Montana (ARM) 36.12.1303 in support of the water rights criteria assessment as required in § 85-2-311, Montana Code Annotated (MCA).

This Groundwater Permit Technical Analyses Report – Part B contains the following sections:

Overview.....	1
Variances	2
1.0 Application Details	2
2.0 Surface Water Analysis of Depleted Surface Water	1
3.0 Area of Potential Impact Analysis of Depleted Surface Water	1
Review	2
References	2



Variances

A variance from the requirements found in ARM 36.12.121(3)(a) “pumping must be maintained throughout the duration of the test and the rate may not depart from the average pumping rate by more than 5%” was granted from the Bozeman Regional Office April 14, 2025. Multiple times throughout the first 1,620 minutes of the aquifer testing, the measured discharged fluctuated slightly more than 5% from the average measured discharge rate of 269.5 gpm. From 1,620 minutes until the end of the test, the pumping was maintained at a constant discharge rate and consistent drawdown was collected in both the Production and Observation Wells.

A variance from the requirements found in ARM 36.12.121(3)(e)(iii) “the testing procedures for a minimum eight-hour drawdown and yield test performed on any production well must follow (a), (d), and (h)” was also granted from the Bozeman Regional Office on April 14, 2025. During the first 16 -minutes of the eight-hour drawdown and yield test, the discharge started at 225 gpm and was raised to up to approximately 275 gpm with an average measured discharge rate of 263.8 gpm. The discharge deviation greater than 5 % at the start of well testing is common, and the remainder of the pumping was maintained at a constant discharge rate. The requirements for drawdown at yield test under 3(e)(iii), specifically 3(d) and 3(h) were met.

A variance from the requirements found in ARM 36.12.121(3)(g) “to monitor background groundwater levels in the production well and observation well(s) at frequent intervals for at least two days prior to beginning the aquifer test according to Form No. 633” was also granted from the Bozeman Regional Office on April 14, 2025. The background water levels in the Production Well and Observation Well 1 were collected two days prior to the day of aquifer testing. The water level difference in the Production Well on the day prior to the aquifer testing was 0.1 ft. The drawdown and recovery data in the Production Well and Observation Well 1 did not appear to be affected by any background level trends. The background level data collected for Observation Well 2 represented the start of the aquifer testing. However, clear interference drawdown was shown in Observation Well 2 and impacts from background levels were not recognizable.

A variance from the requirements found in ARM 36.12.121(3)(h) “water levels in the production well and/or observation well(s) must be reported with 0.01-foot precision according to the schedule specified on Form No. 633” was also granted from the Bozeman Regional Office on April 14, 2025. The Applicant does not follow minimum required time increment schedule for Observation Well 1 and 2 for first 60 minutes of data collection. The remainder of the data collection period fulfilled the requirements of 3(h) and is adequate for obtaining aquifer properties.

1.0 Application Details

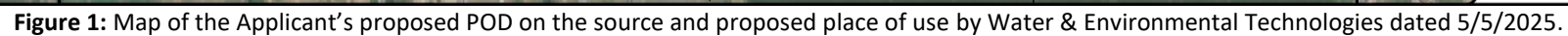
The Applicant proposes to divert groundwater from 1/1 to 12/31 for non- consumptive geothermal use from two extraction well points of diversion (PODs) in the SWSESE Section 22,



T1S, R5E, Gallatin County (EX-1 and EX-2). The two injection wells for the project are located in SESWSE Section 22, T1S, R5E, Gallatin County (IN-1 and IN-2). The wells will divert a total 298.38 AF at a total flow rate of 550 GPM (275 GPM per well) from 1/1 to 12/31 to provide geothermal cooling for the commercial building in SESWSE and SWSESE Section 22 and NWNENE Section 27, T1S, R5E, all in Gallatin County, as seen in **Table 1** and **Figure 1**.

Table 1. Summary of the proposed use.

Source	Flow Rate	Diverted Volume	Consumed Volume	Purpose	Period of Use	Place of Use	Point(s) of Diversion	Period of Diversion
Groundwater	550 GPM	298.38 AF/yr	0 AF	Geothermal	1/1-12/31	SESWSE & SWSESE Section 22, T1S, R5E, Gallatin County NWNENE Section 27, T1S, R5E, Gallatin County	SWSESE Section 22, T1S, R5E, Gallatin County SWSESE Section 22, T1S, R5E, Gallatin County	1/1-12/31





2.0 Surface Water Analysis of Depleted Surface Water

As net depletions to the surface water source are 0 AF, the Department did not find the physical availability of the surface water source for later comparison to downstream legal demands.

3.0 Area of Potential Impact Analysis of Depleted Surface Water

The Area of Potential Impact for this application is: The proposed use is non-consumptive, and a net depletion of 0 AF was identified for the hydraulically connected surface water. No area of potential impact for surface water was identified because no net depletion will occur.



Review

This document has been reviewed by the Department on July 7, 2025.

References

Department Standard Practice for Determining Physical Availability of Surface Water
Department Standard Practice for Area of Potential Impact Analysis

Preapplication Materials

- Preapplication Meeting Request
- Preapplication Meeting Form
- All attachments
- All correspondence prior to application receipt

Preapplication Materials



**PREAPPLICATION MEETING FORM
PERMIT**
§ 85-2-302
Form No. 600P (Revised 4/2024)

For Department Use Only

Application # 30165312 Basin 41H
Meeting Date 2/11/2025 Time 1:00 AM/PM
Completed Form Deadline 8/10/2025

RECEIVED

MAY 01 2025

DNRC

BOZEMAN WATER RESOURCES

PREAPPLICATION MEETING FEE

\$ 500

FILING FEE REDUCTION & EXPEDITED TIMELINE

An application will be eligible for a filing fee reduction and expedited timelines if the applicant completes a preapplication meeting with the Department (ARM 36.12.1302(1)), which includes submitting any follow-up information identified by the Department (ARM 36.12.1302(3)(c)) and receiving either Department-completed technical analyses or Department review of applicant-submitted technical analyses (ARM 36.12.1302(4) and (5)). An application for the proposed project also must be submitted within 180 days of delivery of Department technical analyses or scientific credibility review and no element on the submitted application can be changed from the completed preapplication meeting form (ARM 36.12.1302(6)).

Completed Form Received _____
Fee Rec'd \$ 500 Check # _____
Deposit Receipt # CC
Payor WET
Refund \$ _____ Date _____

The Department will fill out Form No. 600P and will identify follow-up during the preapplication meeting. The Department and Applicant will sign the Preapplication Meeting Affidavit and Certification within five business days. Within 180 days of the preapplication meeting, the Applicant will complete identified follow-up on a separate document with the question numbers clearly labeled.

Applicant Information: Add more as necessary.

Applicant Name Barnard Construction
Mailing Address 701 Gold Avenue City Bozeman State MT Zip 59715
Phone Numbers: Home _____ Work 406-586-1995 Cell 406-595-2201
Email Address matthew.engel@barnard-inc.com

Applicant Name _____
Mailing Address _____ City _____ State _____ Zip _____
Phone Numbers: Home _____ Work _____ Cell _____
Email Address _____

Contact/Representative Information: Add more as necessary.

Contact/Representative is: ☐ Applicant ☒ Consultant ☐ Attorney ☐ Other (describe) _____
Contact/Representative Name Pat Thomson (WET)
Mailing Address 480 East Park St City Butte State MT Zip 59701
Phone Numbers: Home _____ Work 406-782-5220 Cell 406-490-0329
Email Address pthomson@waterenvtech.com

NOTE: If a contact person is identified as an attorney, all communication will be sent only to the attorney unless the attorney provides written instruction to the contrary. If a contact person is identified as a consultant, employee, or lessee, the individual filing the water right form or objection form will receive all correspondence and a copy may be sent to the contact person.

Meeting Attendees: Add more as necessary.

Name	Organization	Position
Pat Thomson	WET	Senior Hydrogeologist
Matt Engel	Barnard Construction	Project Manager
Evan Norman	DNRC	Groundwater Hydrologist
Kerri Strasheim	DNRC	Regional Manager
Kendrew Ellis	DNRC	Water Resources Specialist
Derek Rasmussen	DNRC	Water Resources Specialist
Lyra Reynolds	DNRC	Hydrologist

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Application Details

The following questions are mandatory and must be filled out before the Preapplication Meeting Form is determined to be complete. Narrative responses that are larger than the space provided can be answered in an attachment. If an attachment is used, mark the see attachment ("A") checkbox on this form and label the attachment with the question number. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Label units in narrative responses. Responses in the form of a table may be entered into the table provided on this form or in an attachment. Responses in the form of a table that are larger than the table provided on this form should be placed in an attachment. If an attachment is used, the table must have the exact headings found on this form, and the see attachment ("A") checkbox must be marked. For tables in this form, circle correct unit at header of column when faced with a choice of units. For tables in attachments, label all units. Questions that require Applicant to submit items to the Department have a submitted ("S") checkbox, which is marked when the required item is attached to the Preapplication Meeting Form. Label all submitted items with the question number for which they were submitted. For all questions where follow-up is necessary, mark the "F" checkbox in the "Follow-Up" column and write the question number on the "Follow-Up Page".

Questions, Narrative Responses, and Tables					Check-boxes	Follow-Up
1. Do you elect to have DNRC conduct Technical Analyses?					☒ Y ☐ N	☐ F
2. Provide a map created on an aerial photograph or topographic map that shows the following: section corners, township and range, a north arrow, all proposed points of diversion labeled with a unique POD ID number, all proposed places of use, all proposed conveyance structures, all proposed places of storage, and places of use for all overlapping water rights.					☐ S	☒ F
3. Is the project located in a Controlled Groundwater Area or Basin Closure Area? If yes, immediately go to Project-Specific Questions 47 to 52 because Form 600 may be the incorrect form, or this project may not meet the requirements for the Department to accept a Form 600.					☒ Y ☐ N	☐ F
4. Is the proposed use temporary?					☐ Y ☒ N	☐ F
a. If yes, when will the appropriation cease? _____					☐ A	☐ F
5. Describe the proposed purpose information, including period of diversion (MM/DD-MM/DD), period of use (MM/DD-MM/DD), flow rate (GPM or CFS) and volume (AF).					☐ A	☐ F

Purpose	Period of Diversion	Period of Use	Flow Rate			Volume
	(MM/DD-MM/DD)	(MM/DD-MM/DD)	Flow Rate	GPM	CFS	(AF)
Geothermal Cooling	1/1-12/31	1/1-12/31	550	☒	☐	0
				☐	☐	
				☐	☐	
				☐	☐	
Total			550	☒	☐	0



6. Describe the proposed location of the point(s) diversion to the nearest 10 acres, if source is groundwater (GW) or surface water (SW), source name, and means of diversion (e.g., pump, headgate, well). Label each POD with the POD ID number used for the project map (question 2).	☐ A	☐ F
--	----------------------------	----------------------------

POD #	1/4	1/4	1/4	Sec	Twp	Rge	County	Lot	Block	Tract	Subdivision	Gov Lot	SW or GW	Source Name	Means
1	SE	SW	SE	22	1S	5E	GALLATIN	26	7		NELSON MEADOWS		GW	GROUNDWATER	WELL
2	SE	SW	SE	22	1S	5E	GALLATIN	26	7		NELSON MEADOWS		GW	GROUNDWATER	WELL

7. What are the geocodes of the place of use?	☐ A	☐ F
---	----------------------------	----------------------------

06-0904-22-4-01-25-0000	

8. Describe the legal land description for the proposed place of use and, if an irrigation or lawn and garden purpose, list the number of irrigated acres.	☐ A	☐ F
--	----------------------------	----------------------------

Acres	Gov't Lot	Block	1/4	1/4	1/4	Sec	Twp	Rge	County
			SE	SW	SE	22	1S	5E	GALLATIN
			SW	SE	SE	22	1S	5E	Gallatin
			NW	NE	NE	27	1S	5E	Gallatin
		Total							

9. Will other water right(s) supplement or overlap the place of use to contribute to the purpose(s)?	☐ Y ☒ N	☐ F
--	--	----------------------------

a. If yes, summarize how the water rights will be operated as a whole to serve the purpose(s).	☐ A	☐ F



6. Describe the proposed location of the point(s) diversion to the nearest 10 acres, if source is groundwater (GW) or surface water (SW), source name, and means of diversion (e.g., pump, headgate, well). Label each POD with the POD ID number used for the project map (question 2).	☐ A	☐ F
--	----------------------------	----------------------------

POD #	¼	¼	¼	Sec	Twp	Rge	County	Lot	Block	Tract	Subdivision	Gov Lot	SW or GW	Source Name	Means
1	SE	SW	SE	22	1S	5E	GALLATIN	26	7		NELSON MEADOWS		GW	GROUNDWATER	WELL
2	SE	SW	SE	22	1S	5E	GALLATIN	26	7		NELSON MEADOWS		GW	GROUNDWATER	WELL

7. What are the geocodes of the place of use?	☐ A	☐ F
---	----------------------------	----------------------------

06-0904-22-4-01-25-0000	

8. Describe the legal land description for the proposed place of use and, if an irrigation or lawn and garden purpose, list the number of irrigated acres.	☐ A	☐ F
--	----------------------------	----------------------------

Acres	Gov't Lot	Block	¼	¼	¼	Sec	Twp	Rge	County
			SE	SW	SE	22	1S	5E	GALLATIN
	Total								

9. Will other water right(s) supplement or overlap the place of use to contribute to the purpose(s)?	☐ Y ☒ N	☐ F
a. If yes, summarize how the water rights will be operated as a whole to serve the purpose(s).	☐ A	☐ F



10. For each supplemental or overlapping water right, please list the water right number, purpose, typical period of diversion and use (MM/DD-MM/DD), flow rate (GPM or CFS), and the volume of water (AF) contributed.					☐ A	☐ F
Water Right No.	Avg. Period of Diversion (MM/DD-MM/DD)	Avg. Period of Use (MM/DD-MM/DD)	Flow Rate (GPM or CFS)	Volume Contributed (AF)		

11. Will this application supplement contract water from a Federal Project, ditch company, or other source?	☐ Y ☒ N	☐ F
a. If yes, explain. 	☐ A	☐ F
12. Does the project involve one or more place(s) of storage with a capacity of greater than 0.1 acre-feet? This does not include storage tanks and cisterns. If yes, answer questions 53 to 61 for place of storage.	☐ Y ☒ N	☐ F
13. Does the project involve one or more conveyance ditches? If yes, answer questions 62 to 64 for ditch-specific questions.	☐ Y ☒ N	☐ F
14. Does the project involve an appropriation that is greater than 5.5 CFS and 4,000 AF? If yes, you must submit a Criteria Addendum Application for Beneficial Water Use Permit for Appropriations Greater than 5.5 CFS and 4,000 AC-FT (Form 600-B) with application submittal. The criteria are found in §85-2-311(3), MCA.	☐ Y ☒ N	☐ F
15. Will you be transporting water for use outside of Montana? If yes, you will need submit an Out-of-State Use Addendum (Form 600/606-OSA) with the application. The out-of-state use criteria are outlined in §85-2-402(6), MCA.	☐ Y ☒ N	☐ F
16. Does the project include the water marketing purpose? If yes, answer questions 65 to 71 for water marketing. A Water Marketing Purpose Addendum (Form 600/606-WMA) will be required with application submittal.	☐ Y ☒ N	☐ F
17. Is the project located in designated sage grouse habitat? If yes, you must have a consultation with and review of your project by the Montana Sage Grouse Habitat Conservation Program. The review letter will be required at application submittal.	☐ Y ☒ N	☐ F



Surface Water

☐ **Applicable**, move on to question 18. ☒ **Not Applicable**, skip to question 29.

The following questions are mandatory for surface water permit applications and must be filled out before the Preapplication Meeting Form is determined to be complete.

Surface Water: Physical Availability

Questions, Narrative Responses, and Tables						<u>Check-boxes</u>	<u>Follow-Up</u>
18. What is the flow rate (GPM or CFS), volume (AF), period of diversion start date and end date (MM/DD-MM/DD), and source type (e.g., perennial, ephemeral) at each point of diversion? Use the same POD # as the project map (question 2) to label each point of diversion.						☐ A	☐ F
POD #	Flow Rate (GPM or CFS)	Volume (AF)	Period Start (MM/DD)	Period End (MM/DD)	Source Type		

19. What is the source type of the surface water diversion? _____						☐ A	☐ F
Perennial or intermittent	Answer question 20	Ephemeral	Answer questions 22 to 24	Lakes	Answer question 25	Other	Answer question 26

Surface Water: Physical Availability: Perennial or Intermittent

☐ Applicable ☐ Not Applicable

20. Is stream gage data available?	☐ Y ☐ N	☐ F
a. If yes, answer the following questions related to the number of stream gages that are available.		
i. One stream gage is available		
1. What is the gage name? _____		☐ F



2. Who operates and maintains the gage? _____		☐ F
3. Is the stream gage upstream or downstream of point(s) of diversion? _____		☐ F
4. Is there a limiting or controlling factor that would make the Drainage Area Method not practical? This includes dams that control the flow and streams with large gaining and/or losing reaches. If you have questions about this, please contact the Regional Hydro-Specialist or the Water Sciences Bureau.	☐ Y ☐ N	☐ F
5. Is the period of record greater than or equal to 10 years?	☐ Y ☐ N	☐ F
6. How frequently is stage data recorded? _____		☐ F
7. If data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?	☐ Y ☐ N	☐ F
8. Was the rating curve established and maintained throughout the duration of the period of record using measurements taken near the reference gage and stage recorder according to USGS protocols?	☐ Y ☐ N	☐ F
9. Were there requirements for maintaining a permanent gage datum and meeting specified accuracy limits?	☐ Y ☐ N	☐ F
10. Does the gage data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?	☐ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 27.		
b. If no, answer question 20.b.		
ii. More than one stream gage is available		
1. List the gage names. _____		☐ F
2. Who operates and maintains the gages? _____		☐ F
3. Is one stream gage upstream and one downstream of point(s) of diversion?	☐ Y ☐ N	☐ F
4. Do the stream gages have similar periods of record?	☐ Y ☐ N	☐ F
5. Are the periods of record each greater than or equal to 10 years?	☐ Y ☐ N	☐ F



6. How frequently is stage data recorded at each gage? _____		☐ F
7. For each gage, if data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?	☐ Y ☐ N	☐ F
8. Were the rating curves established and maintained throughout the duration of the period of record using measurements taken near the reference gages and stage recorders according to USGS protocols?	☐ Y ☐ N	☐ F
9. For each gage, were there requirements for maintaining a permanent gage datum and meeting specified accuracy limits?	☐ Y ☐ N	☐ F
10. Does the gage data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?	☐ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 27.		
b. If no, answer question 20.b.		
b. If no gage data is available or if available gage data does not meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion, is the source otherwise measured?	☐ Y ☐ N	☐ F
i. If yes,		
1. Submit available measurements to the Department.	☐ S	☐ F
2. Who collected the measurements? _____	☐ A	☐ F
3. With what method was the data collected? _____ _____	☐ A	☐ F
4. What is the period of record? _____		☐ F
5. What is the frequency of measurement? _____		☐ F
6. Are there gaps in the data?	☐ Y ☐ N	☐ F



a. If yes, what is the nature of the gaps and how are gaps handled to ensure data quality? _____ _____ _____	☐ A	☐ F
7. Is there a process for maintaining the data and meeting specified accuracy limits?	☐ Y ☐ N	☐ F
a. If yes, explain. _____ _____ _____	☐ A	☐ F
8. Does available measurement data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?	☐ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 27.		
b. If no, answer question 21.		
21. Does the available measurement data, gage and/or otherwise measured, meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for calibration of a department-accepted estimation technique?	☐ Y ☐ N	☐ F
a. If yes, describe the estimation technique. _____ _____ _____ _____ _____	☐ A	☐ F
b. If no,		
i. Will measurements be collected prior to submission of a completed Form No. 600P that meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for calibration of a department-accepted estimation technique?	☐ Y ☐ N	☐ F
1. If yes,		
a. With what method will the data be collected? _____ _____ _____	☐ A	☐ F



b. What will be the interval of measurement? _____		☐ F
c. Describe the proposed estimation technique. _____ _____ _____ _____	☐ A	☐ F
2. If no,		
a. Describe your plan to comply with the requirements of ARM 36.12.1702(1). _____ _____ _____	☐ A	☐ F
b. Do you plan on requesting a variance from measurement requirements pursuant to ARM 36.12.1702(1)(b)?	☐ Y ☐ N	☐ F

Surface Water: Physical Availability: Ephemeral

☐ Applicable ☐ Not Applicable

22. If you will conduct Technical Analyses, what is your plan to calculate mean annual runoff? If DNRC will conduct Technical Analyses, write N/A. _____ _____	☐ A	☐ F
23. Where do you plan to obtain climate and drainage area data? _____ _____	☐ A	☐ F
24. Where is the downstream point of diversion, which will be used to delineate the drainage basin? _____	☐ A	☐ F



Surface Water: Physical Availability: Lakes

☐ Applicable ☐ Not Applicable

25. Do you have a design plan?	☐ Y ☐ N	☐ F
a. If yes, provide the design plans to DNRC	☐ S	☐ F
b. If no, has the lake volume been quantified by a qualified entity based on bathymetric data?	☐ Y ☐ N	☐ F
i. If yes, provide this information to DNRC.	☐ S	☐ F
ii. If no, answer the following questions,		
1. When do you plan to collect this information? _____		☐ F
2. With what method will it be collected? _____ _____	☐ A	☐ F

Surface Water: Physical Availability: Other

☐ Applicable ☐ Not Applicable

26. Have you measured the source?	☐ Y ☐ N	☐ F
a. If yes, answer the following questions,		
i. With what method was the data collected? _____ _____	☐ A	☐ F
ii. What is the measurement interval? _____		☐ F
1. Does the interval meet the requirements of 36.12.1702(4)?	☐ Y ☐ N	☐ F
b. If no or if the measurement interval does not meet the requirements of 36.12.1702(4)		
i. When do you plan to measure? _____		☐ F
ii. With what method will the measurements be collected? _____ _____ _____	☐ A	☐ F



Surface Water: Identification of Legal Demands in Area of Potential Impact

27. If you are conducting Technical Analysis, how will the Area of Potential Impact be defined? If Department is conducting Technical Analyses, write N/A. _____ _____ _____ _____	☐ A	☐ F
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Surface Water: Basin Closure Area

28. Is the project located in a Basin Closure Area? If yes, explain how the project meets a closure exception. More information about basin closures online at: https://dnrc.mt.gov/Water-Resources/Water-Rights/Basin-Closures-Stream-Depletion-Controlled-Ground-Water-Areas. Answer the follow-up questions for specific Basin Closure Areas in the “Project-Specific Questions: Controlled Groundwater Areas and Basin Closures” section (questions 51 to 52). _____ _____ _____ _____ _____ _____	☐ Y ☐ N	☐ F
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Groundwater

☒ **Applicable**, move on to question 29. ☐ **Not Applicable**, skip to question 47.

The following questions are mandatory for groundwater permit applications and must be filled out before the Preapplication Meeting Form is determined to be complete.

<u>Questions, Narrative Responses, and Tables</u>	<u>Check-boxes</u>	<u>Follow-Up</u>
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Groundwater: Physical Availability

29. What is the type of groundwater diversion? <u>Well</u>					☐ A	☐ F
Well/Pit	Answer questions 30 to 32	Developed Spring	Answer question 33	Pond	Answer questions 34 to 38	

Groundwater: Physical Availability: Well/Pit

☒ Applicable ☐ Not Applicable

30. Provide the Aquifer Testing Addendum (Form 600-ATA). This form will be required before the Preapplication Meeting Form is deemed complete.	☐ S	☒ F
31. Have you submitted a completed Form 633 to DNRC for review?	☐ Y ☒ N	☐ F
a. If no, submit Form 633 to DNRC for review. Form 633 is required by the time the Preapplication Meeting Form is deemed complete.	☐ S	☒ F
b. If yes, did the Department identify deficiencies?	☐ Y ☐ N	☐ F
i. If yes, are variances from ARM 36.12.121 needed?	☐ Y ☐ N	☐ F
1. If yes,		
a. Do you have data for aquifer characteristics?	☐ Y ☐ N	☐ F
i. If yes, provide the data to the Department.	☐ S	☐ F
b. Have you submitted Form 653 to the Department?	☐ Y ☐ N	☐ F
i. If yes, was the variance granted?	☐ Y ☐ N	☐ F
32. Do you have a map with the location of each well/pit labeled and, if available, with the GWIC ID?	☐ Y ☐ N	☒ F
a. If no, have all the wells/pits been constructed?	☐ Y ☐ N	☐ F



i. If yes, provide a map with the wells/pits labeled and, if available, with the GWIC ID. Create map on an aerial photograph or topographic map that also includes the following: section corners, township and range, and a north arrow.	☐ S	☐ F
ii. If no, answer the following questions,		
1. When will the wells/pits be constructed? _____		☐ F
2. Do you have an initial map with the proposed location of wells/pits?	☐ Y ☐ N	☐ F
a. If yes, provide an initial map to the Department. Create map on an aerial photograph or topographic map that also includes the following: section corners, township and range, and a north arrow.	☐ S	☐ F
3. Is the requested volume for each new well/pit known?	☐ Y ☐ N	☐ F
a. If no, what is the total requested volume (AF) and the number of new PODs? _____		☐ F

Groundwater: Physical Availability: Developed Spring☐ Applicable ☒ Not Applicable

33. Have you measured the source?	☐ Y ☐ N	☐ F
a. If yes, answer the following questions,		
i. Do you have flow rate (GPM or CFS) and volume measurements?	☐ Y ☐ N	☐ F
ii. With what method were measurements collected? _____ _____	☐ A	☐ F
iii. What is the interval of measurements? _____		☐ F
iv. Is the interval of measurements sufficient to comply with ARM 36.12.1703(1)?	☐ Y ☐ N	☐ F
b. If no, or if measurements do not comply with ARM 36.12.1703(1),		
i. When do you plan to measure? _____		☐ F



ii. With what method and at what interval will measurements be collected? 	☐ A	☐ F
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Groundwater: Physical Availability: Ponds

☐ Applicable ☒ Not Applicable

34. Have you submitted Form 653 to apply for a variance from ARM 36.12.121 for the Aquifer Test?	☐ Y ☐ N	☐ F
a. If yes, did the Department approve the variance request?	☐ Y ☐ N	☐ F
35. Have you submitted measurements to the Department? If yes, describe. _____	☐ Y ☐ N	☐ F
36. Submit pond bathymetry data, survey, or engineering plans to the Department.	☐ S	☐ F
37. Please submit a map identifying the location of the proposed pond to the Department. Create map on an aerial photograph or topographic map that also includes the following: section corners, township and range, and a north arrow.	☐ S	☐ F
38. If you are conducting Technical Analyses, what is your plan to determine depth, surface area, and net evaporation of the pond? If DNRC is conducting Technical Analyses, write N/A. 	☐ A	☐ F

Groundwater: Identification of Groundwater Legal Demands

All information to calculated Zone of Influence was collected in previous questions.

Groundwater: Adverse Effect to Existing Groundwater Rights

All information to calculate One-Foot Drawdown Contour was collected in previous questions.

Groundwater: Physical Availability of Depleted Surface Water Source(s)

39. What are the hydraulically connected surface water source(s)? <u>East Gallatin River</u>		☐ F
40. For each hydraulically connected surface water source, is gage data available?	☐ Y ☐ N	☐ F
a. If yes, answer the following questions for the number of stream gages that are available.		



i. One stream gage is available			
1. What is the gage name? <u>East Gallatin River abv Water Reclamation Fa nr Bozeman MT USGS 06048560</u>			☐ F
2. Who operates and maintains the gage? <u>USGS</u>			☐ F
3. Is the stream gage upstream or downstream of point(s) of diversion? <u>Upstream</u>			☐ F
4. Is there a limiting or controlling factor that would make the Drainage Area Method not practical? This includes dams that control the flow and streams with large gaining and/or losing reaches. If you have questions about this, please contact the Regional Hydro-Specialist or the Water Sciences Bureau.		☐ Y ☒ N	☐ F
5. Is the period of record greater than or equal to 10 years?		☒ Y ☐ N	☐ F
6. How frequently is stage data recorded? <u>15 minutes</u>			☐ F
7. If data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?		☒ Y ☐ N	☐ F
8. Was the rating curve established and maintained throughout the duration of the period of record using measurements taken near the reference gage and stage recorder according to USGS protocols?		☒ Y ☐ N	☐ F
9. Were there requirements for maintaining a permanent gage datum and meeting specified accuracy limits?		☒ Y ☐ N	☐ F
10. Does the gage data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?		☒ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 42.			
b. If no, answer question 40.b.			
ii. More than one stream gage is available			
1. List the gage names. _____			☐ F
2. Who operates and maintains the gages? _____			☐ F
3. Is one stream gage upstream and one downstream of point(s) of diversion?		☐ Y ☐ N	☐ F



4. Do the stream gages have similar periods of record?	☐ Y ☐ N	☐ F
5. Are the periods of record each greater than or equal to 10 years?	☐ Y ☐ N	☐ F
6. How frequently is stage data recorded at each gage? _____		☐ F
7. For each gage, if data gaps were to occur, are they identified and left unfilled or estimated using interpolation, ice correction, or indirect discharge measurements methods?	☐ Y ☐ N	☐ F
8. Were the rating curves established and maintained throughout the duration of the period of record using measurements taken near the reference gages and stage recorders according to USGS protocols?	☐ Y ☐ N	☐ F
9. For each gage, were there requirements for maintaining a permanent gage datum and meeting specified accuracy limits?	☐ Y ☐ N	☐ F
10. Does the gage data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?	☐ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 42.		
b. If no, answer question 40.b.		
b. If no gage data is available or if available gage data does not meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion, is the source otherwise measured?	☐ Y ☐ N	☐ F
i. If yes,		
1. Submit measurements to the Department.	☐ S	☐ F
2. Who collected the measurements? _____	☐ A	☐ F
3. With what method was the data collected? _____ _____	☐ A	☐ F
4. What is the period of record? _____		☐ F
5. What is the frequency of measurement? _____		☐ F
6. Are there gaps in the data?	☐ Y ☐ N	☐ F



a. If yes, what is the nature of the gaps and how are gaps handled to ensure data quality _____ _____ _____ _____	☐ A	☐ F
7. Is there a process for maintaining the data and meeting specified accuracy limits?	☐ Y ☐ N	☐ F
a. If yes, explain. _____ _____ _____ _____	☐ A	☐ F
8. Does available measurement data meet the Department's standard to be sufficient to calculate the median of the mean monthly flow rate and volume during the proposed months of diversion?	☐ Y ☐ N	☐ F
a. If yes, this section is complete. Skip to question 42.		
b. If no, answer question 41.		
41. For each hydraulically connected surface water source, does the available measurement data, gage and/or otherwise measured, meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for calibration of a department-accepted estimation technique?	☒ Y ☐ N	☐ F
a. If yes, describe the estimation technique. <u>USGS maintained gage with record greater than 10 years</u> _____ _____	☐ A	☐ F
b. If no,		
i. Will measurements be collected prior to submission of a completed Form No. 600P that meet the Department's standard of including a minimum of high, moderate, and low flows to be sufficient to use for calibration of a department-accepted estimation technique?	☐ Y ☐ N	☐ F
1. If yes,		
a. With what method will the data be collected? _____ _____ _____	☐ A	☐ F



b. What will be the interval of measurement? 		☐ F
c. Describe the proposed estimation technique. 	☐ A	☐ F
2. If no, describe your plan to comply with the measurement requirements for hydraulically connected surface water sources. 	☐ A	☐ F

Groundwater: Legal Availability of Depleted Surface Water Source(s)

All information to determine legal demands for depleted surface water source(s) was collected in previous questions.

Groundwater: Adequacy of Diversion

<u>Questions, Narrative Responses, and Tables</u>						<u>Check-boxes</u>	<u>Follow-Up</u>
42. What is the flow rate (GPM or CFS), volume (AF), and period of diversion required (MM/DD-MM/DD) at each groundwater point of diversion? If the POD is a well, provide the well depth (FT), if available, or estimated well depth (FT). Please use the same POD # as the project map (question 2) to match this information with the location information.						☐ A	☐ F
POD #	Flow Rate (GPM or CFS)	Volume (AF)	Period of Diversion (MM/DD-MM/DD)	Well Depth (FT)	Measured or Estimated		
1	275 GPM	0	1/1-12/31	300	measured		
2	275 GPM	0	1/1-12/31	215	measured		

43. Will the monthly pumping schedule differ from an allocation of diverted volume by the number of days in the month for year-round uses or the IWR 80% net irrigation requirements for irrigation/lawn & garden uses (IWR, NRCS 2003)?	☐ Y ☒ N	☐ F
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a. If yes, provide the alternative pumping schedule in the table below. Use the same POD # as the project map (question 2).						☐ A	☐ F
Month	POD #	Volume (AF)	Month	POD #	Volume (AF)		
January			July				
February			August				
March			September				
April			October				
May			November				
June			December				

Groundwater: Basin Closure Area

44. Are the point(s) of diversion located in a basin closure area? If yes, fill out questions 45 to 46.	☒ Y ☐ N	☐ F
45. Did you elect in question 1 for the Department to conduct Technical Analysis?	☒ Y ☐ N	☐ F
a. If yes, the Basin Closure Area Addendum (Form 600-BCA), Hydrogeologic Report Addendum (Form 600-HRA), and Hydrogeologic Report are not required at this time. The Department's Technical Analyses will meet requirements of §85-2-360 for Form 600-HRA. Form 600-BCA will be required with application submittal.		
b. If no, submit the Basin Closure Area Addendum (Form 600-BCA), Hydrogeologic Report Addendum (600-HRA), and Hydrogeologic Report with your Technical Analysis.	☐ S	☐ F
46. If the Hydrogeologic Report indicates that the proposed groundwater use will impact a surface water source, which of the following three options best describe your plan to mitigate depletions of hydraulically connected surface water? A separate Preapplication Meeting will be required for each application to change a water right to a mitigation or aquifer recharge purpose to maintain expedited timelines and reduced filing fees for the project.		
a. Application to Change a Water Right to mitigate the adverse effects created.	☐ Y ☒ N	☐ F
b. Alternative mitigation plan.	☐ Y ☒ N	☐ F
c. Documentation to show a mitigation plan is not required.	☐ Y ☒ N	☐ F



Project-Specific Questions

The following questions are mandatory when applicable and must be filled out before the Preapplication Meeting Form is determined to be complete.

<u>Questions, Narrative Responses, and Tables</u>	<u>Check-boxes</u>	<u>Follow-Up</u>
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Project-Specific Questions: Controlled Groundwater Areas and Basin Closures

47. Is the project located in the East Valley Controlled Groundwater Area?	☐ Y ☒ N	☐ F
a. If yes,		
i. Do you have written approval from (1) Lewis and Clark County Board of Health, (2) Lewis and Clark County Water Quality Protection Bureau, (3) the U.S. Environmental Protection Agency, (4) the Montana State Dept. of Environmental Quality and (5) the Montana State Dept. of Natural Resources and Conservation? If the agencies have established a Technical Advisory Group, prior approval by the Technical Advisory Group satisfies this requirement.	☐ Y ☐ N	☐ F
ii. Is the project in Zone 2?	☐ Y ☐ N	☐ F
i. If yes, provide in the written approval the following recommendations which will also be included as conditions on the appropriation.	☐ S	☐ F
a. Well design and construction requirements necessary to measure the water level and water quality for any well;		
b. Water level measurement and water quality sample reporting requirements for any new well;		
c. Any other requirements necessary to ensure new wells can be operated in a manner consistent with purpose of the EVCWA.		
iii. Is the project in Zone 1? If yes, a Form 600 cannot be accepted by the Department.	☐ Y ☐ N	☐ F
48. Is the project located in the South Pine Controlled Groundwater Area?	☐ Y ☒ N	☐ F
a. If yes, have you completed an Application for Beneficial Water Use Permit South Pine Controlled Groundwater Area Addendum? The addendum needs to be completed by application submittal.	☐ Y ☐ N	☐ F
49. Is the project located in the Yellowstone Controlled Groundwater Area?	☐ Y ☒ N	☐ F
a. If yes, is the use over 35 GPM or 10 AF per year?	☐ Y ☐ N	☐ F
i. If no, this is the incorrect form. Use instead the Yellowstone Controlled Groundwater Area Permit Application (600-YCGA).		
ii. If yes, answer the remaining parts of question 49. A Yellowstone Controlled Groundwater Area Addendum (600 Y over35) will be required with application submittal.		
1. Does the proposed use require a point of diversion with water temperature of 60 degrees Fahrenheit or more?	☐ Y ☐ N	☐ F
2. What is the ground elevation at the point of diversion? _____		☐ F



3. What is the specific conductance at the point of diversion? _____		☐ F
4. If an application is in a basin tributary to a category 3 or 4 stream (generally in or upstream of YNP), provide a report prepared by a professional qualified in the science of groundwater hydrology, verifying that the appropriation is not hydrologically connected to surface flow that is tributary to the reserved portion of category 3 or 4 streams.	☐ S	☐ F
50. Is the project located in one of the Controlled Groundwater Areas listed on the Department's website (https://dnrc.mt.gov/Water-Resources/Water-Rights/Basin-Closures-Stream-Depletion-Controlled-Ground-Water-Areas)?	☐ Y ☒ N	☐ F
a. If yes, list which one and describe how the proposed project meets the requirements of the Controlled Groundwater Area. An application must meet the specific requirements of the Controlled Groundwater Area to be accepted by the Department. _____ _____ _____ _____	☐ A	☐ F
51. Is the project located in one of the administrative, Department ordered, or legislative closures listed on the Department's website (https://dnrc.mt.gov/Water-Resources/Water-Rights/Basin-Closures-Stream-Depletion-Controlled-Ground-Water-Areas)?	☒ Y ☐ N	☐ F
a. If yes, list which one and describe how the proposed project meet the requirements of the closure. An application must meet the specific requirements of the closure to be accepted by the Department. <u>Upper Missouri Basin Closure - nonconsumptive use</u> _____ _____ _____	☐ A	☐ F
52. Is the project located in one of the compact closures listed on the Department's website (https://dnrc.mt.gov/Water-Resources/Water-Rights/Basin-Closures-Stream-Depletion-Controlled-Ground-Water-Areas)?	☐ Y ☒ N	☐ F
a. If yes, list which one and describe how the proposed project meet the requirements of the compact closure. An application must meet the specific requirements of the compact closure to be accepted by the Department. _____ _____ _____	☐ A	☐ F



Project-Specific Questions: Place of Storage

53. Does the proposal include at least one place of storage? If yes, answer questions 54 to 61 for each individual place of storage (use Additional Place of Storage Sheet for additional places of storage). If no, this section is complete, and you can skip to question 62.	☐ Y ☒ N	☐ F
54. Provide a map showing the location of the place of storage. Create map on an aerial photograph or topographic map that also includes the following: section corners, township and range, and a north arrow.	☐ S	☐ F
55. Is this application to enlarge an existing reservoir?	☐ Y ☐ N	☐ F
a. If yes, what is the water right number for the existing reservoir? _____		☐ F
56. Is the place of storage located on-stream?	☐ Y ☐ N	☐ F
a. If no, explain the conveyance means to and from the off-stream place of storage and any losses that may occur with that conveyance. _____ _____ _____	☐ A	☐ F
57. What is the capacity of the proposed place of storage or the existing place of storage after it is enlarged? Use bathymetry data, survey, or engineering plans for capacity. Submit the data source used with this form. In lieu of these data sources, use the following equation: <i>Surface Acres x Maximum Depth (FT) x 0.5 (0.4-0.6 depending on side slope) = Capacity (AF)</i> _____	☐ A	☐ F
58. Will the place of storage include primary and/or emergency spillways? Preliminary design specifications for primary and emergency spillways must be included with application submittal (ARM 36.12.113).	☐ Y ☐ N	☐ F
59. Will the place of storage be lined?	☐ Y ☐ N	☐ F
60. What is the annual net evaporation of water from the place of storage using the standards in ARM 36.12.116(1)? Gridded net evaporation layer is available from DNRC upon request. _____		☐ F
61. Is the place of storage capacity calculated to be greater than 50 acre-feet?	☐ Y ☐ N	☐ F
a. If yes, have you made an application to the DNRC Water Operations Bureau for a determination of whether the dam or reservoir is a high-hazard dam?	☐ Y ☐ N	☐ F

Project-Specific Questions: Ditch-Specific Questions

62. Does the proposal include at least one conveyance ditch? If yes, answer question 63 and, for each ditch, answer question 64. If no, this section is complete, and you can skip to question 65.	☐ Y ☒ N	☐ F
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63. Submit a Ditch Map that shows every ditch conveying water for the proposed project. Label the ditch name(s), POD(s), the POU(s), and the ditch measurement locations (requested in question 64.c). The map should be created on an aerial photograph or topographic map with the following: section corners, township and range, and a north arrow.	☐ S	☐ F
64. For each conveyance ditch, answer the following. If there is more than one conveyance ditch, use an Additional Ditch Sheet for each additional conveyance ditch.		
a. What is the ditch name? _____		☐ F
b. What is the distance water will be carried by the conveyance ditch? Only include segments between the POD and start of the POU; do not include segments within the POU. _____ _____	☐ A	☐ F
c. Provide at least one set of ditch measurements, which include width (FT), depth (FT), and slope (%). Discuss ditch characteristics with DNRC to determine the minimum number of ditch measurements. Include the location of each measurement, labeled with the 2-digit measurement ID number, used on the map submitted for question 63.	☐ S	☐ F

ID #	Width (FT)	Depth (FT)	Slope (%)	Date of Measurement

d. What is a reasonable Manning's n value? List the factors used for estimation. If you do not know this value, please work through estimation with the Department. _____ _____	☐ A	☐ F
e. What type of soils compose the proposed conveyance ditch? For lined ditches, write "lined" instead. _____ _____	☐ A	☐ F
f. Are other water rights conveyed by the conveyance ditch?	☐ Y ☐ N	☐ F
i. If yes,		
1. What are the water right numbers? _____ _____	☐ A	☐ F



2. What is the sum of the flow rates (GPM or CFS) for water rights conveyed? _____ _____ _____	☐ A	☐ F
3. Provide a map with your best estimate of where the existing POUs begin for the other water rights conveyed by the conveyance ditch for all POUs between the proposed POD and your proposed POU. Create map on an aerial photograph or topographic map that also includes the following: section corners, township and range, and a north arrow.	☐ S	☐ F

Project-Specific Questions: Water Marketing

65. Does the proposal include water marketing? If yes, please answer the questions in this section (questions 66 to 71). If no, this section is complete, and you can skip to question 72.	☐ Y ☒ N	☐ F
66. Identify the flow rate (GPM or CFS) and volume (AF) of water that will be marketed. _____		☐ F
67. Will the marketed water return to the source?	☐ Y ☐ N	☐ F
a. Explain how this determination was made. _____ _____ _____	☐ A	☐ F
68. For what purpose(s) will the marketed water be used? _____ _____	☐ A	☐ F
69. How will you control or limit access to the water? _____ _____	☐ A	☐ F
70. Do you have contracts for the entire volume and flow rate sought?	☐ Y ☐ N	☐ F
71. Provide a service area map. Create map on an aerial photograph or topographic map and shows the following: general service area boundary, section corners, township and range, and a north arrow.	☐ S	☐ F



Non-Mandatory Questions for Criteria Analysis

The following questions are not mandatory. They should be discussed in the Preapplication Meeting, but do not need to be filled out before the Preapplication Meeting Form is determined to be complete.

Adverse Effect

<u>Questions, Narrative Responses, and Tables</u>	<u>Check-boxes</u>
72. Do you have evidence that water is legally available in the proper flow rate, volume, and timing?	☒ Y ☐ N
73. If water is not found to be legally available for part or all the proposed period of diversion, what is the plan to address this with the permitting process? <u>Reduce flow rate to meet legally available quotient; or, purchase mitigation water to subsidize.</u>	☐ A
74. Describe your plan to ensure that existing water rights will be satisfied during times of water shortage. <u>Reduce flow rate to meet legally available quotient; or, purchase mitigation water to subsidize.</u>	☐ A
75. Explain how you can control your diversion in response to call being made. <u>Each diversion is a groundwater well and can be either powered down, or the system is equipped with variable frequency drives that will allow control of flow rates.</u>	☐ A
76. Are you aware of any calls that have been made on the source of supply or depleted surface water source?	☐ Y ☒ N
a. If yes, explain. _____ _____	☐ A
77. Does a water commissioner distribute water or oversee water distribution on your proposed source or depleted surface water source?	☐ Y ☒ N

Adequate Diversion Means and Operation

78. Provide a diagram of how you will operate your system from the point of diversion to the place of use.	☐ S
79. Describe specific information about the capacity of the diversionary structure(s). This may include, where applicable: pump curves and total dynamic head calculations, headgate design specifications, and dike or dam height and length. <u>Submersible pump information will be submitted with application</u>	☐ A



80. Is the diversion capable of providing the full amount requested through the period of diversion?	☒ Y ☐ N
81. Describe the size and configuration of infrastructure to convey water from point of diversion to place of use. This may include, where applicable: ditch capacity and/or pipeline size and configuration. <u>Well drop pipe is 4-inch diameter feeding to a 6-inch diameter distribution line passing through heat exchange, discharging again to 6-inch lateral line to injections wells.</u>	☐ A
82. Describe any losses related to conveyance. <u>The system is closed from the pump to the injection well with no net loss.</u>	☐ A
83. Is the conveyance infrastructure capable of providing the required flow and volume and any losses?	☒ Y ☐ N
84. Does the proposed conveyance require easements?	☐ Y ☒ N
a. If yes, explain. _____	☐ A
85. Describe any places of storage, including whether drainage devices will be installed, and provide preliminary designs, if available. Preliminary designs will be required at application submittal. _____ _____ _____	☐ A
86. Describe specific information about how water is delivered within the place of use. This may include, where applicable, the range of flow rates needed for a pivot and output and configuration of sprinkler heads. <u>The system is closed from the pump to the injection well</u> _____ _____ _____	☐ A
87. Is the water delivery system capable of providing the requested beneficial use?	☒ Y ☐ N
88. Will your system be designed to discharge water from the project?	☒ Y ☐ N
a. If yes, explain the way water will be discharged and the wastewater disposal method. <u>Injection wells</u> _____ _____	☐ A



89. Provide a plan of operations. <u>This will be included with the application</u> _____ _____	☐ A
90. Can the plan of operations deliver the flow rate and volume for the beneficial use being requested?	☒ Y ☐ N
91. Do you have any plans to measure your diversion and use?	☒ Y ☐ N
a. If yes, describe the plan and the type of measurements you will take. <u>The system is equipped with a flow meter / volumizer</u> _____ _____	☐ A

Beneficial Use

92. Why is the requested flow rate and volume the amount needed for the purpose? <u>Demand is based on cooling demands of building. The maximum flow rate is based on the peak cooling day demands and will only be required during short-term periods of record temperature.</u> _____	☐ A
93. Does the Department have a standard for the purposes for which water is used? Department standards can be found in ARM 36.12.112.	☐ Y ☒ N
a. If yes, does the proposed beneficial use fall within Department standards?	☐ Y ☐ N
94. If no standard, or if proposed beneficial use falls outside of Department standards, explain how the use is reasonable for the purpose. <u>The purpose is to provide geothermal cooling capacity for a commercial building and is designed as a non-consumptive open-loop well system with extraction and injection wells returning 100 percent of water back to source aquifer.</u> _____ _____	☐ A
95. Will your proposed project be subject to DEQ requirements for a public water supply (PWS) system or Certificate of Subdivision Approval (COSA)?	☐ Y ☒ N
a. If yes,	
i. Have you researched or consulted with DEQ regarding those requirements?	☐ Y ☐ N
96. Are you proposing to use surface water for in-house domestic use?	☐ Y ☒ N
a. If yes, does a COSA exist for the proposed place of use?	☐ Y ☐ N
i. If yes, please submit the COSA.	☐ S
ii. If no, have you researched or consulted with DEQ regarding their requirements?	☐ Y ☐ N



Possessory Interest

97. Do you have possessory interest, or the permission of the party with possessory interest, of the proposed place of use? Proof of possessory interest or permission of the party with possessory interest is required at application submittal.	☒ Y ☐ N
a. If no, explain. _____ _____ _____	☐ A



PREAPPLICATION MEETING AFFIDAVIT & CERTIFICATION

“We attest that the information on this form accurately describes the proposed project discussed during the preapplication meeting and that the items marked for follow-up will require the applicant to provide additional information before the form is deemed complete.”

“Applicant acknowledges that any information provided by the Department during the preapplication is preliminary and subject to change.”

“Applicant acknowledges that if the follow-up information provided to the Department substantially changes the proposed project, for example in a way that alters which sections of the form are applicable or which technical analyses are required, or who is to complete the technical analyses, the applicant will need to schedule a new preapplication meeting so that the department can identify any additional information necessary for completion of the technical analyses (ARM 36.12.1302(3)(c)).”

Upon Department receipt of the completed form (within 180 days following the meeting), the Department reserves the first five days of the 45-day period in ARM 36.12.1302(4) or (5) to return the form to the applicant if:

- 1 – the completed form does not include all necessary follow-up information identified in the meeting, OR
- 2 – the completed form is not adequate for the Department to proceed with technical analyses, OR
- 3 – the applicant has elected to complete technical analyses and has not submitted each piece of technical analysis required, OR
- 4 – the applicant has substantially changed the details of the proposed project, such as in a way that alters which sections of the form are applicable, which technical analyses are required, or who is to complete the technical analyses.

If the Department returns the form to the Applicant within these five days due to reasons 1-3 above, the Applicant can use the balance of their 180-day period in ARM 36.12.1302(4) or (5) to gather the remaining follow-up information needed. If there is no time remaining in the 180-day period, the Applicant can submit a written request for a new preapplication meeting, pursuant to ARM 36.12.1302(2). Even if there is still time remaining, the Applicant can choose to schedule a new preapplication meeting. The Department shall transfer the \$500 payment received to the new preapplication meeting, or refund the payment to the Applicant if the Applicant desires. If the Department returns the form to the Applicant within these five days due to reason (4) above, the Applicant must submit a written request for a new preapplication meeting, pursuant to ARM 36.12.1302(2). The Department shall transfer the \$500 payment received to the new preapplication meeting, or refund the payment to the Applicant if the Applicant desires.

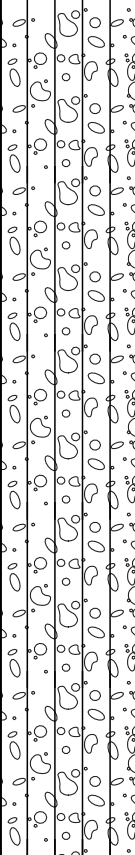
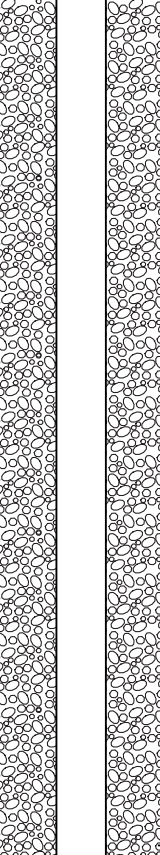
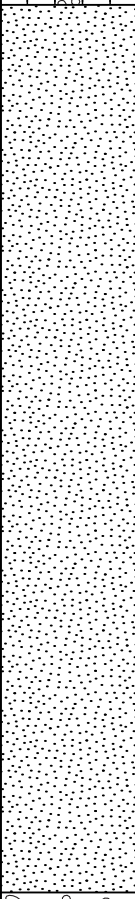
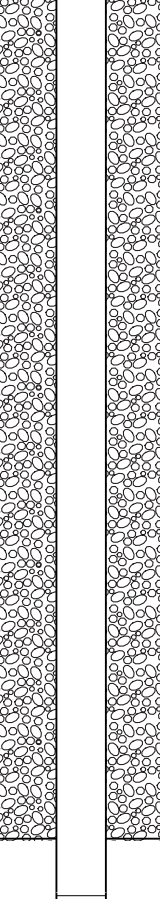
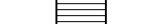
<i>Matthew Engel</i>	2/11/2025
Applicant Signature	Date
Applicant Signature	Date
<i>Lyra Reynolds</i>	2/11/2025
Department Signature	Date



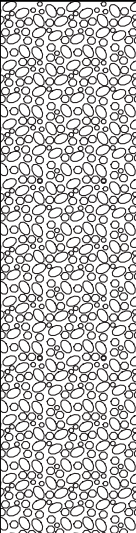
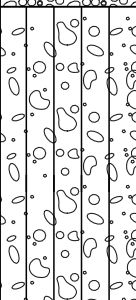
BORING AND WELL CONSTRUCTION LOG IN - 2

PROJECT NUMBER THINKM01		DRILLING COMPANY Bridger Drilling		COORDINATES ,		
PROJECT NAME Barnard Geotherm		DRILLER Tyler Sampson		COORD SYS		
CLIENT Barnard		DRILL RIG Foremost DR 24		SURFACE EL. (ft AMSL)		
START DATE 10/08/24		DRILLING METHOD Dual Wall Rotary		WELL TOC (ft)		
END DATE		CHECKED BY J Rose		LOGGED BY Pat Thomson		
MP ELEVATION FT AMSL		TOTAL DEPTH OF BORING FT 225.00		DEPTH TO WATER FT		
SCREENED INTERVAL FT 115-215				TOTAL WELL DEPTH FT 215		
BOREHOLE DEPTH (ft) 225.00		SURFACE COMPLETION		GROUT Bentonite		
BOREHOLE DIAMETER (in)		CASING TYPE Steel		FILTER PACK 10/20 Sand		
		SCREEN TYPE Stainless Steel Continuous wire w		SEAL TYPE Bentonite		
COMMENTS						
Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
5 						

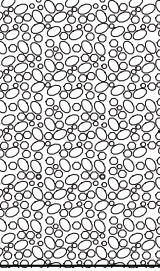
BORING AND WELL CONSTRUCTION LOG IN - 2

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
50						50
55						-55
60						-60
65						-65
70						-70
75						-75
80						-80
85			SW	GRAVELLY SAND, (SW), medium to coarse grained, with silt		-85
90						-90
95						-95
100						-100
105						-105
110						-110
115			GW-GM	SILTY GRAVEL, (GW), medium to coarse grained, gray		-115

BORING AND WELL CONSTRUCTION LOG IN - 2

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
120				brown, with sand, dense		-120
125						-125
130						-130
135						-135
140			ML	GRAVELLY SILT, tan, with sand		-140
145						-145
150			GP	GRAVEL, coarse grained, gray green, with sand, dense		-150
155						-155
160						-160
165						-165
170			ML	GRAVELLY SILT, tan brown, some clay		-170
175						-175
180						-180

BORING AND WELL CONSTRUCTION LOG IN - 2

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
185						-185
190			GW-GM	GRAVEL, medium to coarse grained, with sandy silt		-190
195						-195
200						-200
205						-205
210			GW-GM	SANDY GRAVEL, coarse grained, with silt		-210
215						-215
220					Natural backfill	-220
225				Termination Depth at: 225.00 ft.		-225
230						-230
235						-235
240						-240
245						-245

BORING AND WELL CONSTRUCTION LOG EX-1

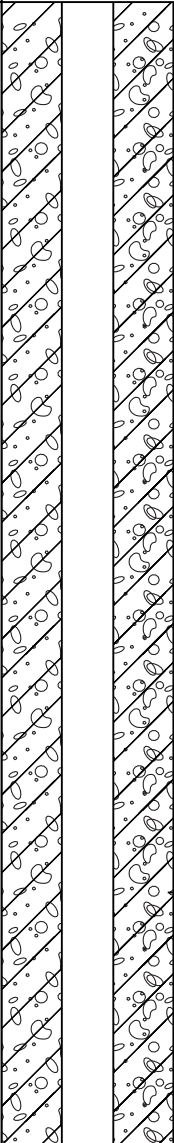
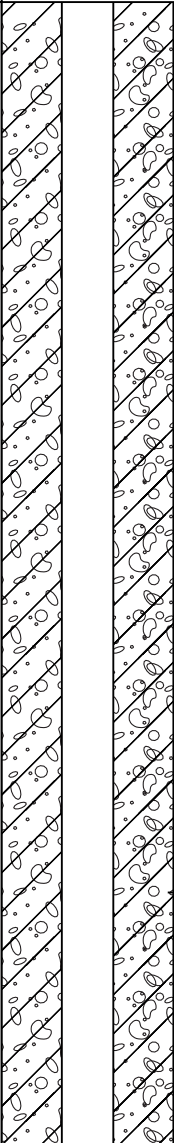
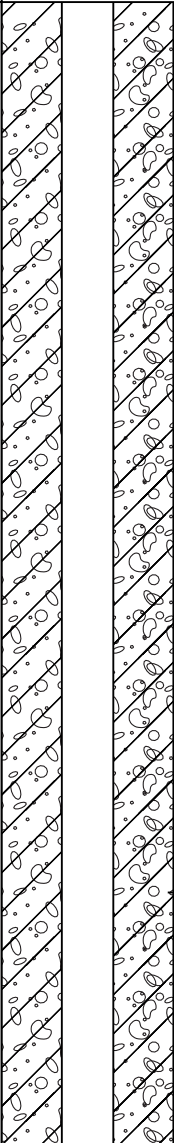
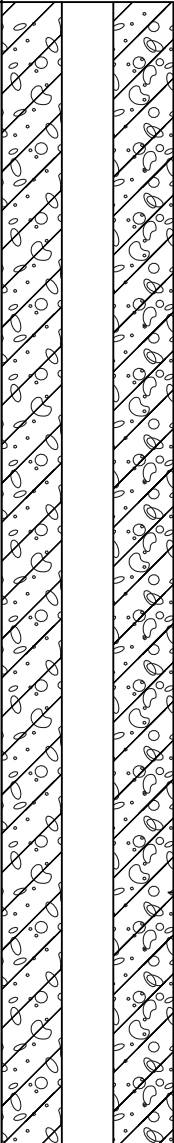
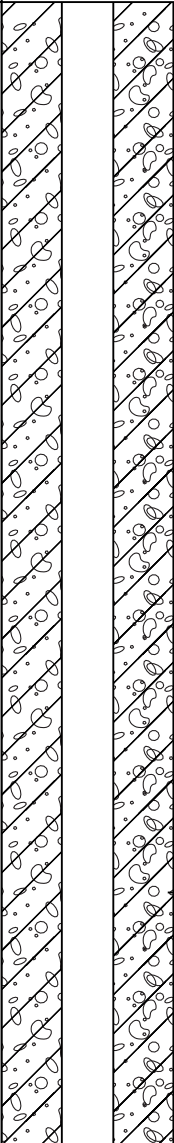
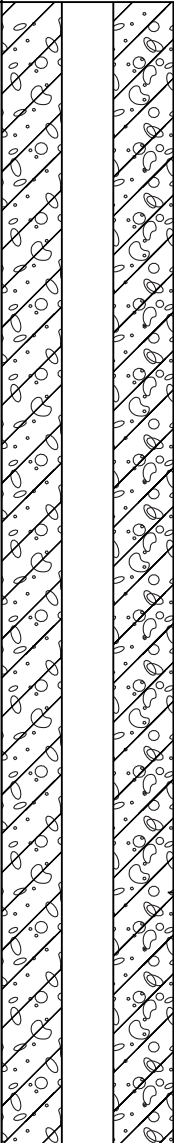
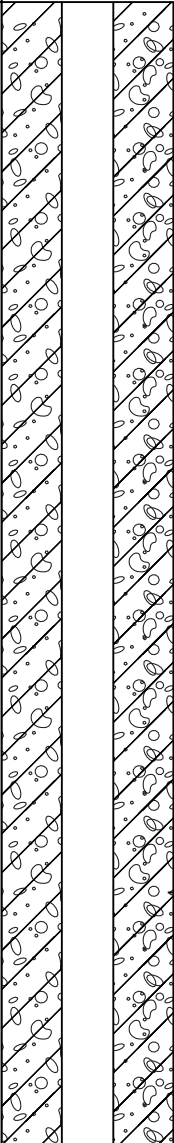
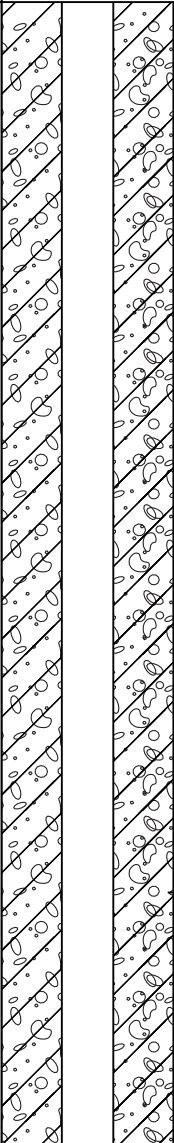
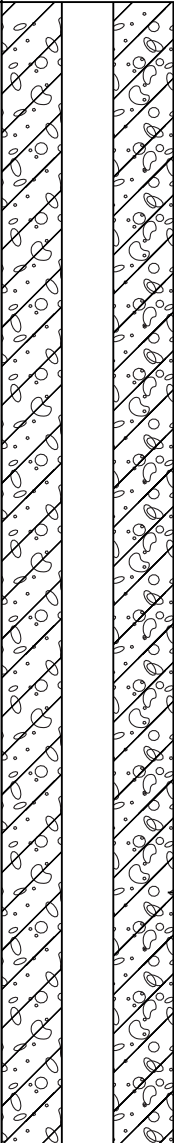
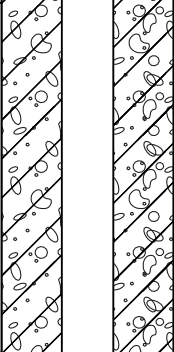
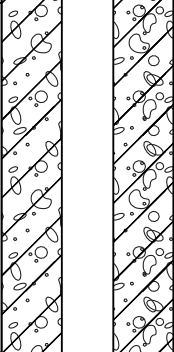
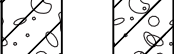
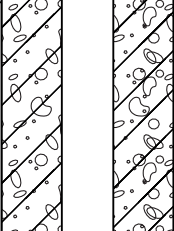
PROJECT NUMBER THINKM01	DRILLING COMPANY Bridger Drilling	COORDINATES -111.086637, 45.729356
PROJECT NAME Barnard Geotherm	DRILLER Tyler Sampson	COORD SYS
CLIENT Barnard	DRILL RIG Foremost 24	SURFACE EL. (ft AMSL) 4,608
START DATE 05/20/24	DRILLING METHOD Dual Wall Rotary	WELL TOC (ft) -2.5
END DATE 06/03/24	CHECKED BY Pat Thomson	LOGGED BY Pat Thomson
MP ELEVATION FT AMSL 4610.5	TOTAL DEPTH OF BORING FT 255.00	DEPTH TO WATER FT 12.37
SCREENED INTERVAL FT 182-202		TOTAL WELL DEPTH FT 202.0

BOREHOLE DEPTH (ft) 255.00	SURFACE COMPLETION Well Install	GROUT bentonite
BOREHOLE DIAMETER (in) 8	CASING TYPE Steel	FILTER PACK Natural gravel and gravel pack
	SCREEN TYPE 6-inch telescoping stainless steel	SEAL TYPE bentonite

COMMENTS

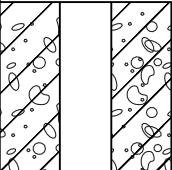
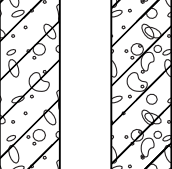
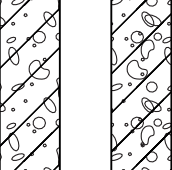
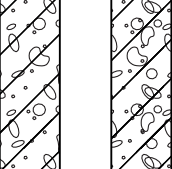
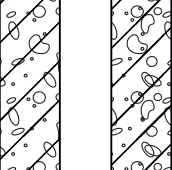
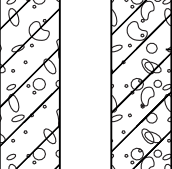
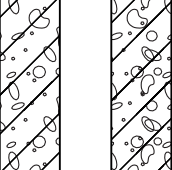
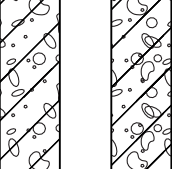
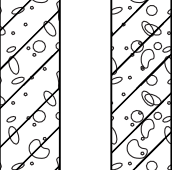
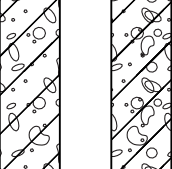
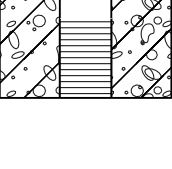
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
0		CL	TOPSOIL		4610
5		CL-ML	CLAYEY SILT, (CL-ML), low plasticity, pale orange, few coarse rounded gravel, dry to moist, soft, blocky		4605
10		GW-GM	SILTY GRAVEL, (GW-GM)		4600
15					4595
20					4590
25					4585
30					4580
35					4575
40					4570
45					4565

BORING AND WELL CONSTRUCTION LOG EX-1

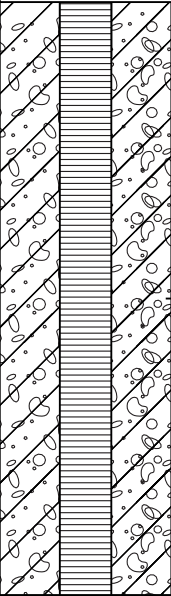
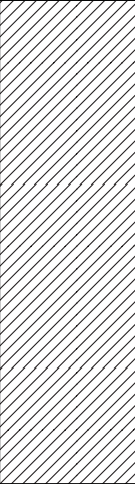
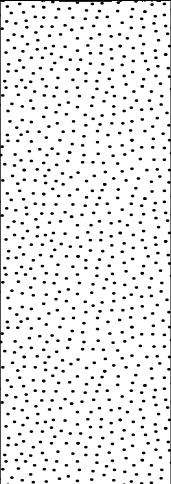
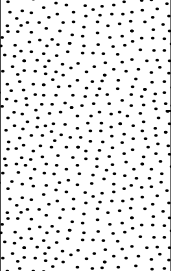
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
50					4560
55					4555
60					4550
65					4545
70					4540
75					4535
80					4530
85					4525
90					4520
95		CL-ML	SILTY CLAY, (CL-ML), medium plasticity, pale orange to tan, with silt, to wet, to medium stiff, homogeneous		4515
100					4510
105		SC	CLAYEY SAND, (SC), medium to coarse grained, subrounded, loose to medium dense		4505
110		GW	SANDY GRAVEL, (GW), coarse grained, light tan and, some silt, dense to very dense		4500
					4495

natural
silty-sandy-gravel

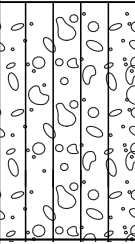
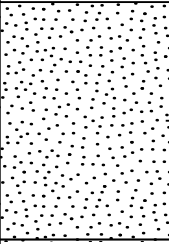
BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
115					4490
120		GW	SILTY GRAVEL, (GW), coarse grained, dark brown to gray, with sand, to dense		4485
125					4480
130					4475
135					4470
140					4465
145		CH	GRAVELLY SILT, (CH), low plasticity, tan, with clay, medium stiff to stiff		4460
150					4455
155					4450
160		CH	GRAVELLY SILT, (CH), low plasticity, light tan, with clay, to medium stiff		4445
165					4440
170					4435
175					4430
180		SW	GRAVELLY SAND, (SW), coarse grained, well graded,		

BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
180			subrounded, pink to olive, trace silt, dense to very dense		4425
185					4420
190					4415
195					4410
200					4405
205		CL	SILTY CLAY		4400
210					4395
215					4390
220					4385
225					4380
230		SC	SILTY SAND, (SC), tan to light brown, with medium to coarse subrounded gravel		4375
235					4370
240					4365
245					
245					

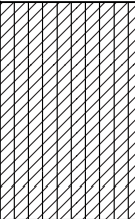
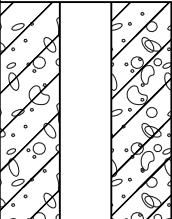
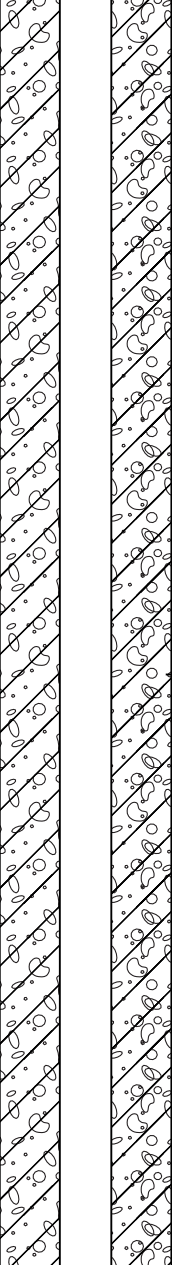
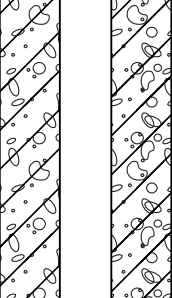
BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
250				 washed gravel	4360
255					4355
255			Termination Depth at: 255.00 ft.		4350
260					4345
265					4340
270					4335
275					4330
280					4325
285					4320
290					4315
295					4310
300					4305
305					4300
310					

BORING AND WELL CONSTRUCTION LOG EX-2

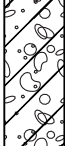
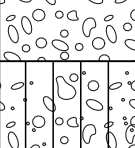
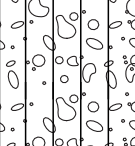
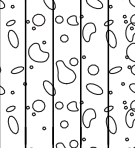
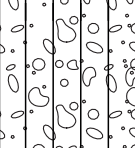
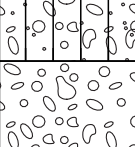
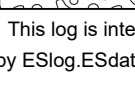
PROJECT NUMBER THINKM01		DRILLING COMPANY Bridger Drilling		COORDINATES -111.0874, 45.72986		
PROJECT NAME Barnard Geotherm		DRILLER Tyler Sampson		COORD SYS		
CLIENT Barnard		DRILL RIG Foremost 24		SURFACE EL. (ft AMSL) 4,608		
START DATE 06/07/24		DRILLING METHOD Dual Wall Rotary		WELL TOC (ft) -3.1		
END DATE 06/10/24		CHECKED BY Pat Thomson		LOGGED BY Pat Thomson		
MP ELEVATION FT AMSL 4611.1		TOTAL DEPTH OF BORING FT 260.00		DEPTH TO WATER FT 12.82		
SCREENED INTERVAL FT 205-230				TOTAL WELL DEPTH FT 232		
BOREHOLE DEPTH (ft) 260.00		SURFACE COMPLETION Well Install		GROUT bentonite		
BOREHOLE DIAMETER (in) 8		CASING TYPE steel		FILTER PACK natural gravel and gravel pack		
		SCREEN TYPE 6-inch telescoping stainless steel		SEAL TYPE bentonite		
COMMENTS						
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram		EL. (ft AMSL)
0						4610
			TOPSOIL			
5		CL-ML	CLAYEY SILT, (CL-ML), light orange, some coarse rounded gravel, dry to moist, soft to medium stiff, homogeneous			4605
						4600
10		GW	SANDY GRAVEL, (GW), medium to coarse grained, well graded, rounded, gray, dry to wet, medium dense to dense			4595
15						4590
20						4585
25						4580
30						4575
35		CL-ML	CLAYEY SILT, (CL-ML), low plasticity, pale orange, with coarse rounded gravel, medium stiff to stiff			4570
40						4565
45						

BORING AND WELL CONSTRUCTION LOG EX-2

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
50		GM	SILTY GRAVEL, (GM), medium to coarse grained, rounded, with clayey sand, to wet		4560
55					4555
60		GM	SILTY GRAVEL, (GM), medium to coarse grained, rounded, with clayey sand, to wet		4550
65					4545
70					4540
75					4535
80					4530
85					4525
90					4520
95					4515
100					4510
105					4505
110		GW	SANDY GRAVEL, (GW), medium to coarse grained, subrounded, with silt, to wet, dense to very dense		4500
					4495

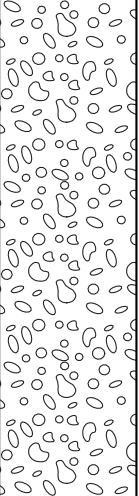
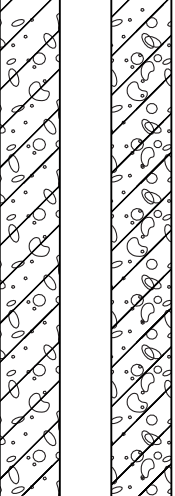
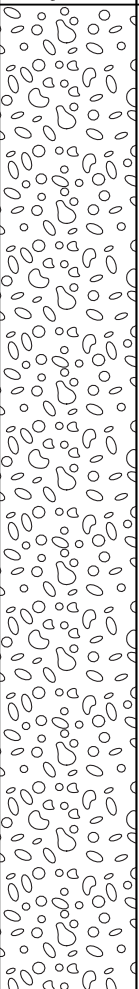
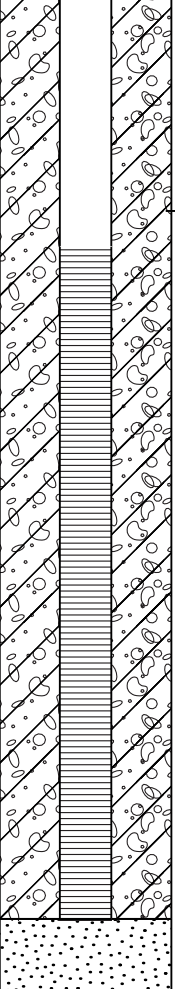
natural
silt-sand-gravel
backfill

BORING AND WELL CONSTRUCTION LOG EX-2

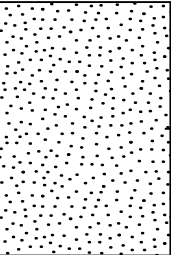
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
115					4490
120					4485
125					4480
130		GP	SILTY GRAVEL, (GP), medium to coarse grained, subrounded, some clay		4475
135					4470
140					4465
145					4460
150					4455
155					4450
160					4445
165					4440
170		GW-GM	SILTY GRAVEL, (GW-GM), medium to coarse grained, subrounded, gray to tan, with clay, to dense		4435
175					4430

natural
silt-sand-gravel
backfill

BORING AND WELL CONSTRUCTION LOG EX-2

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
180		GW	SANDY GRAVEL, (GW), coarse grained, well graded, subrounded, gray to dark gray, with silt, to very dense		4425
185					4420
190					4415
195					4410
200					4405
205		GM	SILTY GRAVEL, (GM), medium to coarse grained, subrounded, gray to light brown, with clay, to wet, to dense		4400
210					4395
215					4390
220					4385
225					4380
230					4375
235					4370
240					4365
245					

BORING AND WELL CONSTRUCTION LOG EX-2

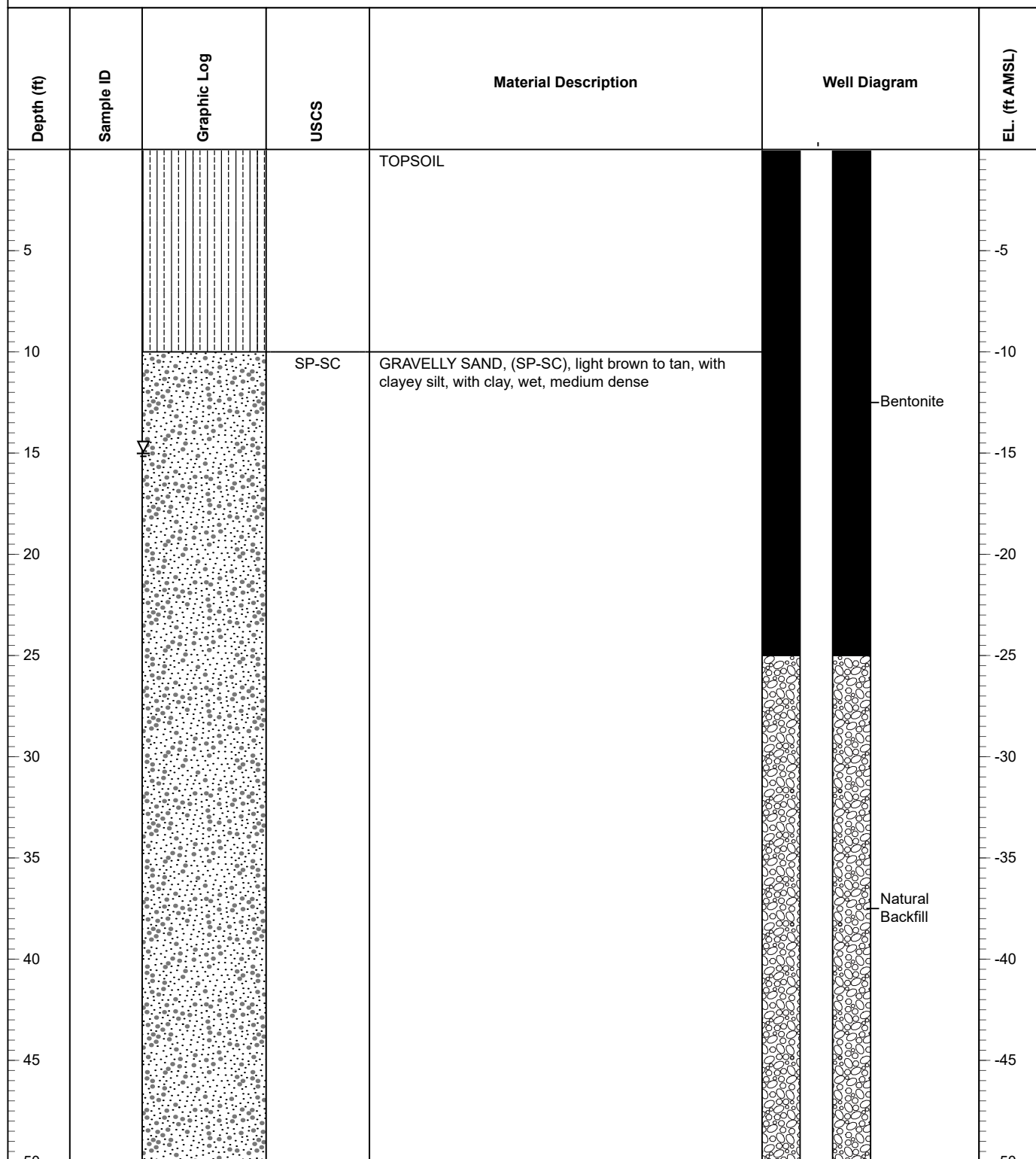
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250				 Filter Pack	4360
255					4355
260			Termination Depth at: 260.00 ft. Target depth		4350
265					4345
270					4340
275					4335
280					4330
285					4325
290					4320
295					4315
300					4310
305					4305
310					4300

BORING AND WELL CONSTRUCTION LOG IN - 1

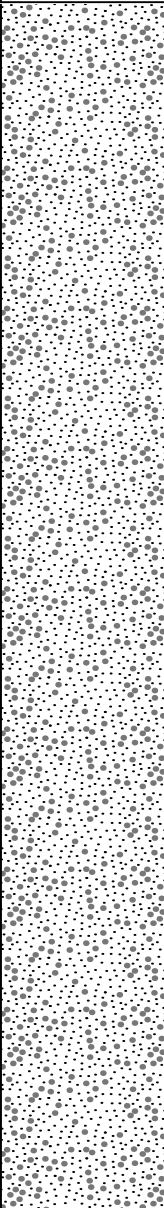
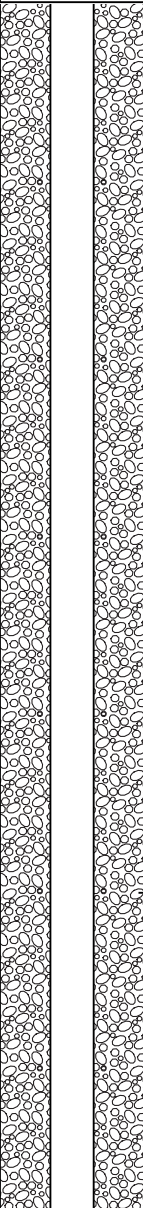
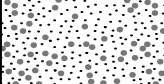
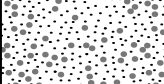
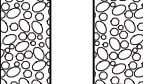
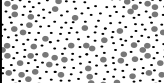
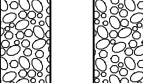
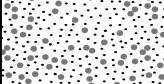
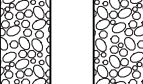
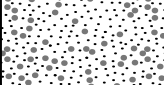
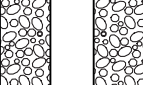
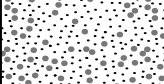
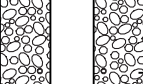
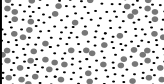
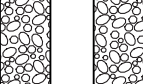
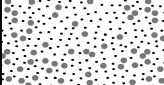
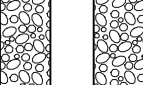
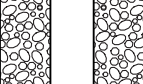
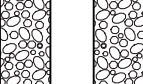
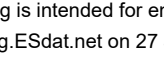
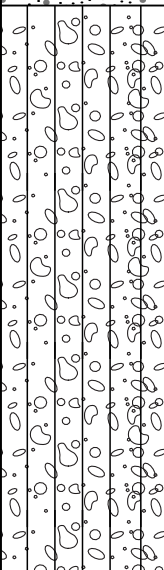
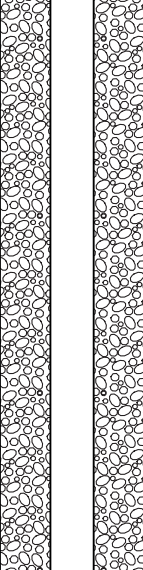
PROJECT NUMBER THINKM01	DRILLING COMPANY Bridger Drilling	COORDINATES ,
PROJECT NAME Barnard Geotherm	DRILLER Tyler Sampson	COORD SYS
CLIENT Barnard	DRILL RIG Foremost DR 24	SURFACE EL. (ft AMSL)
START DATE 08/29/24	DRILLING METHOD Dual Wall Rotary	WELL TOC (ft)
END DATE 08/29/24	CHECKED BY J Rose	LOGGED BY Pat Thomson
MP ELEVATION FT AMSL	TOTAL DEPTH OF BORING FT 340.00	DEPTH TO WATER FT 15.00
SCREENED INTERVAL FT 160-280		TOTAL WELL DEPTH FT 280

BOREHOLE DEPTH (ft) 340.00	SURFACE COMPLETION Sand	GROUT Bentonite
BOREHOLE DIAMETER (in) 8	CASING TYPE Steel	FILTER PACK 10/20 Filter sand
	SCREEN TYPE Stainless Steel continuous wrap	SEAL TYPE Bentonite

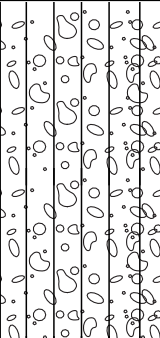
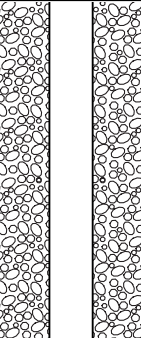
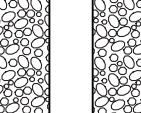
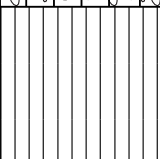
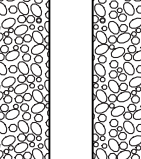
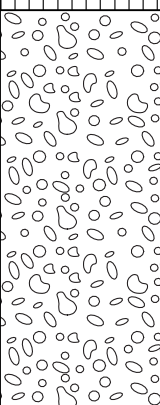
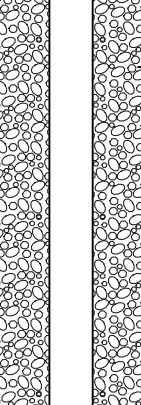
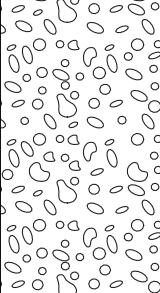
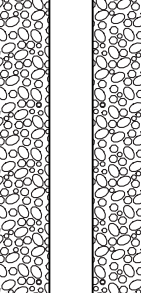
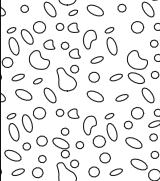
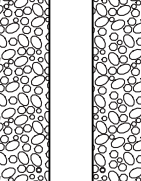
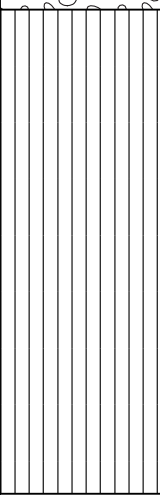
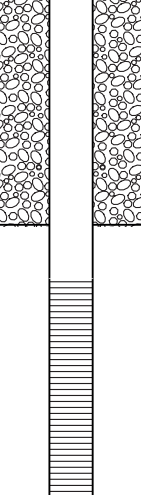
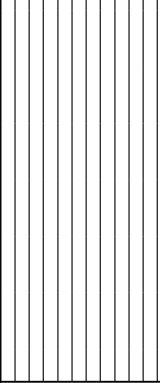
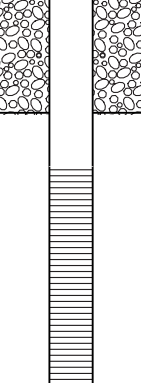
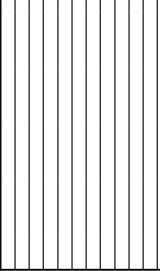
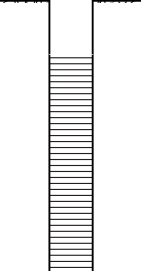
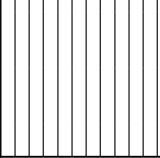
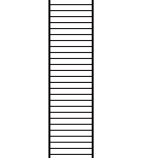
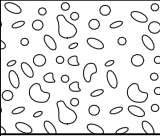
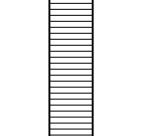
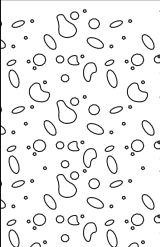
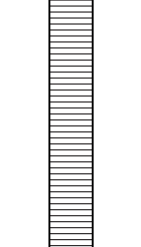
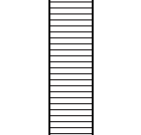
COMMENTS



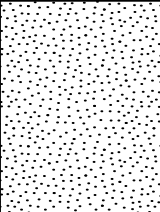
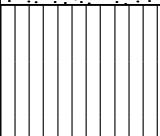
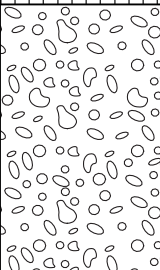
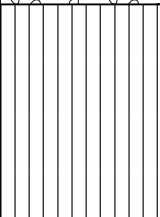
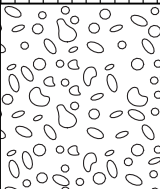
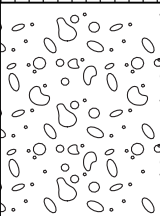
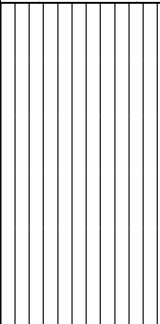
BORING AND WELL CONSTRUCTION LOG IN - 1

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
50						50
55						55
60						60
65						65
70						70
75						75
80						80
85						85
90						90
95						95
100						100
105						105
110						110
115						115
			GP-GM	SILTY GRAVEL, light brown to gray, with sandy silt, silty clay, dense	 Natural Backfill	

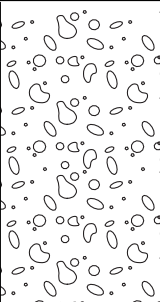
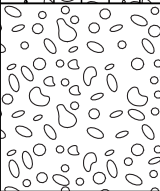
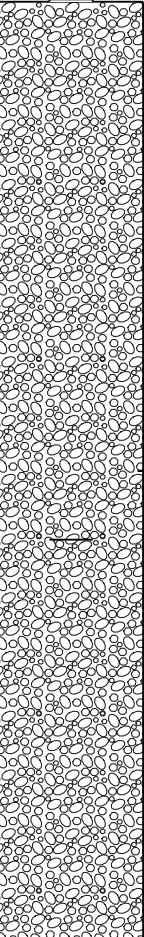
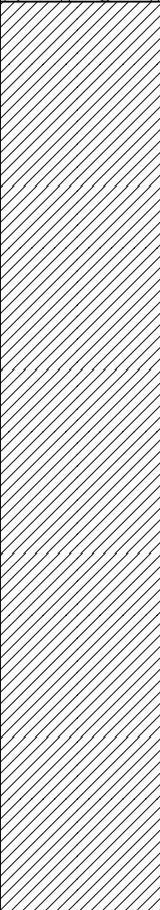
BORING AND WELL CONSTRUCTION LOG IN - 1

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
120						-120
125						-125
130			ML	GRAVELLY SILT, (ML), with sand		-130
135			GW	GRAVEL, (GW), with sand		-135
140						-140
145						-145
150			ML	SANDY SILT, tan to brown		-150
155						-155
160						-160
165						-165
170			GW	SANDY GRAVEL, (GW), coarse grained, dark gray to olive		-170
175			SP-SM	GRAVELLY SAND, with sandy silt		-175
180						-180

BORING AND WELL CONSTRUCTION LOG IN - 1

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
185						-185
190			SW	GRAVELLY SAND, (SW), coarse grained, gray to brown, dense		-190
195			ML	GRAVELLY SILT, (ML), tan brown		-195
200			GW	SANDY GRAVEL, (GW), coarse grained, gray to brown, dense		-200
205						-205
210			ML	GRAVELLY SILT, (ML), with silt, and clay		-210
215						-215
220			GW	SANDY GRAVEL, (GW)		-220
225			ML	SANDY SILT, (ML)		-225
230			GP	SANDY GRAVEL, and		-230
235			ML	SILT, with sand		-235
240						-240
245			GP-GM	SANDY GRAVEL, with silt		-245

BORING AND WELL CONSTRUCTION LOG IN - 1

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
250						-250
255						-255
260			GM	Silty Gravel		-260
265						-265
270						-270
275			GW	Well Graded Gravel		-275
280						-280
285			CL	CLAYEY SILT, (Lean Clay with Sand) brown, with sand, stiff to hard		-285
290						-290
295						-295
300						-300
305						-305
310						-310

Natural
Backfill

BORING AND WELL CONSTRUCTION LOG IN - 1

Depth (ft)	Sample ID	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
315						-315
320						-320
325						-325
330						-330
335						-335
340						-340
345				Termination Depth at: 340.00 ft.		-345
350						-350
355						-355
360						-360
365						-365
370						-370
375						-375
380						-380

Submittal Data

PROJECT:	UNIT TAG:	QUANTITY:
REPRESENTATIVE:	TYPE OF SERVICE:	DATE:
ENGINEER:	SUBMITTED BY:	DATE:
CONTRACTOR:	APPROVED BY:	DATE:
	ORDER NO.:	DATE:

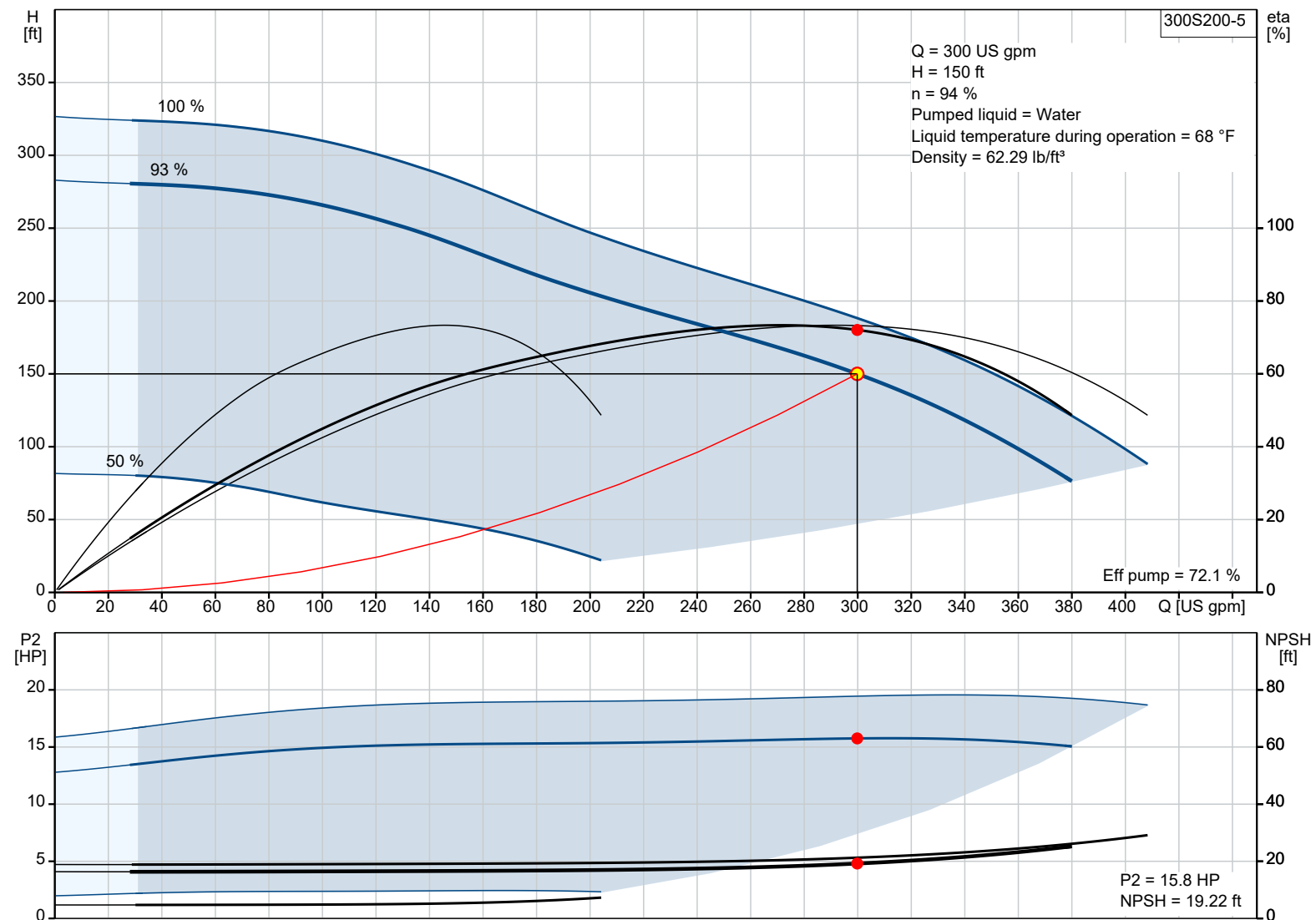


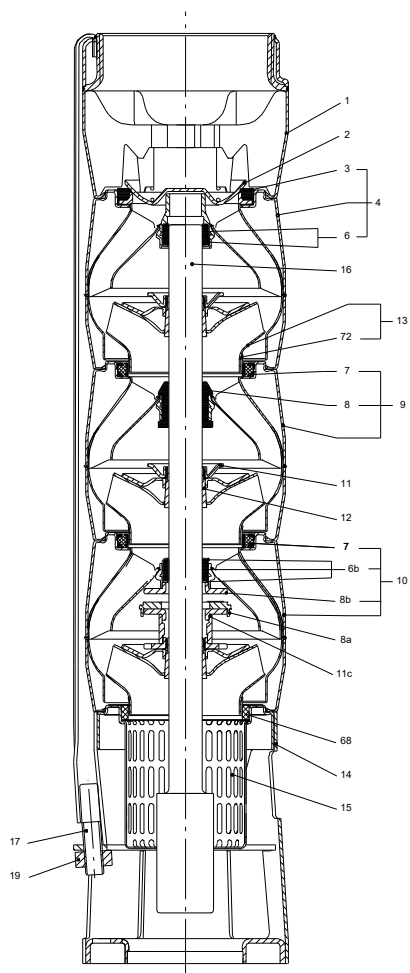
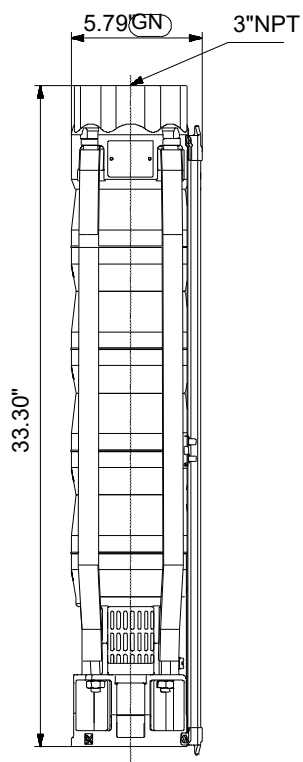
300S200-5

Submersible pumps in stainless steel. EN 1.4301 (AISI 304). EN 1.4401 (AISI 316). EN 1.4539 (AISI 904L). Typical application: Ground water, Irrigation, Mining, Fountain, Off-shore etc.

Product photo could vary from the actual product

Conditions of Service	Pump Data	Motor Data
Flow: 300 US gpm Head: 150 ft Efficiency: % Liquid: Water Temperature: 68 °F NPSH required: 19.22 ft Specific Gravity: 1.000	Liquid temperature range: 5 .. 140 °F Product number: 14B70005	Main frequency: 60 Hz





Materials:

Impeller: Stainless steel

Impeller: AISI 304

Impeller: EN 1.4301



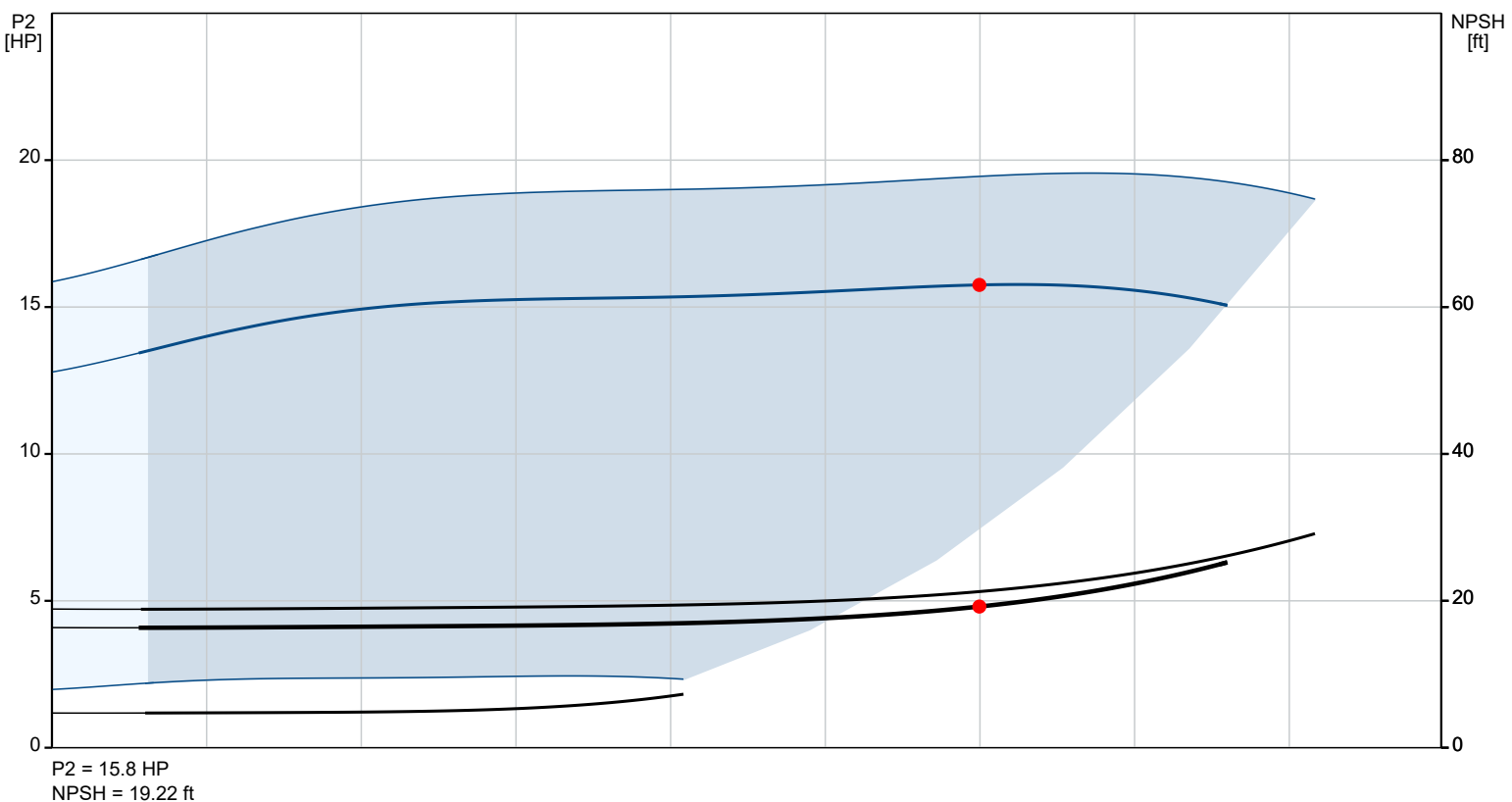
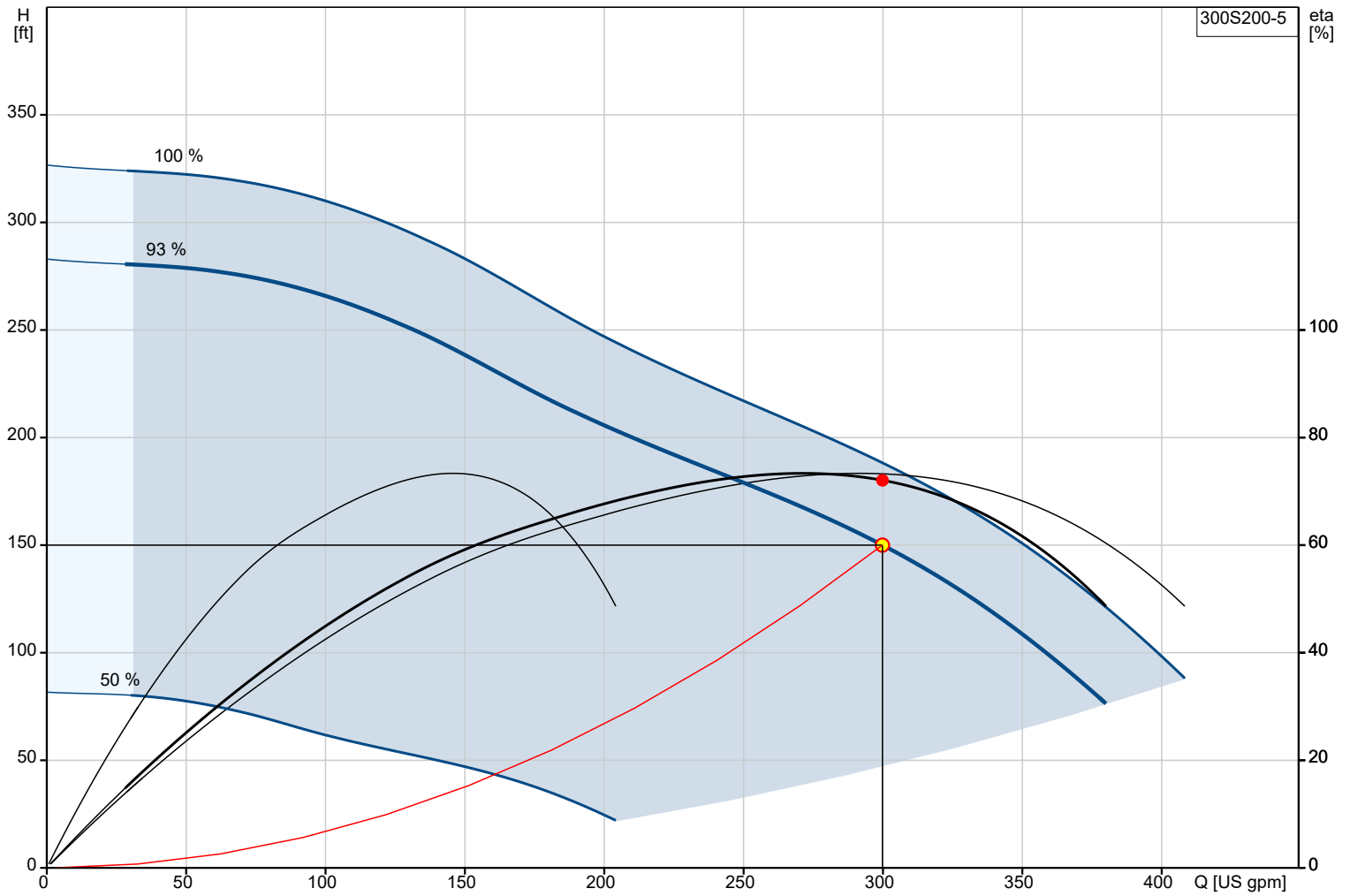
Company name: Northwest Pipe Fittings Inc.
Created by: Scott Bond
Phone: 4062520142
Email: sbond@northwestpipe.com
Date: 10/14/2024

Count	Description
1	300S200-5 Product No.: 14B70005 Pump without motor Multi-stage submersible pump for raw water supply, groundwater lowering and pressure boosting. The pump is suitable for pumping clean, thin, non-aggressive liquids without solid particles or fibers. horizontal and vertical installation. The pump is fitted with a built-in non-return valve. Liquid: Pumped liquid: Water Liquid temperature range: 5 .. 140 °F Selected liquid temperature: 68 °F Density: 62.29 lb/ft³ Technical: Pump speed on which pump data are based: 3450 rpm Actual calculated flow: 300 US gpm Rated flow: 317 US gpm Resulting head of the pump: 150 ft Rated head: 177.2 ft Approvals: CULDWUS,CCSAUS Approvals for drinking water: PROP65 Curve tolerance: ISO9906:2012 3B Return valve: YES Materials: Pump: Stainless steel EN 1.4301 AISI 304 Impeller: Stainless steel EN 1.4301 AISI 304 Installation: Maximum operating pressure: 870.23 psi Maximum outlet pressure: 104.43 psi Type of connection: NPT(F) Size of connection: 3 inch Motor diameter: 6 inch Minimum borehole diameter: 6.1 in Electrical data: Motor flange design: Grundfos Power (P2) required by pump: 20 HP Others: Minimum efficiency index, MEI ≥: --- DOE Pump Energy Index CL: 0.92 Net weight: 37.9 lb Gross weight: 43.7 lb Shipping volume: 1.13 ft³ Country of origin: US Custom tariff no.: 8413.70.2004



Company name: Northwest Pipe Fittings Inc.
Created by: Scott Bond
Phone: 4062520142
Email: sbond@northwestpipe.com
Date: 10/14/2024

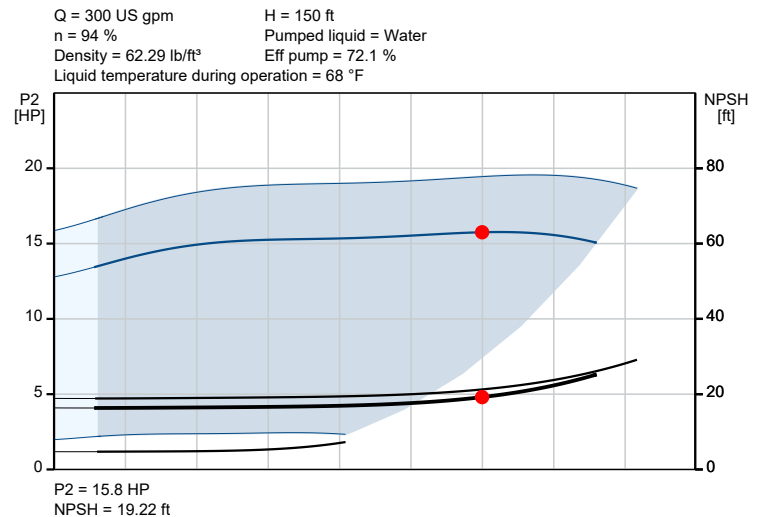
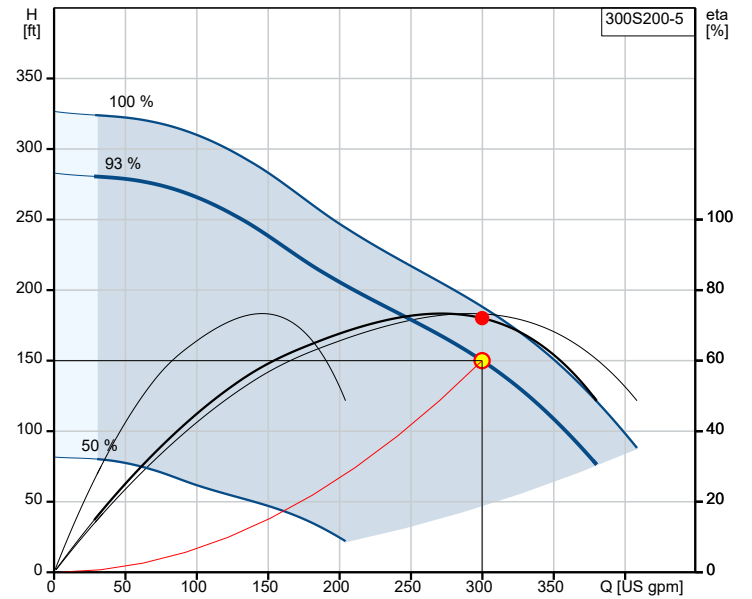
14B70005 300S200-5 60 Hz





Company name: Northwest Pipe Fittings Inc.
Created by: Scott Bond
Phone: 4062520142
Email: sbond@northwestpipe.com
Date: 10/14/2024

Description	Value
General information:	
Product name:	300S200-5
Product No.:	14B70005
EAN:	5700391744167
Price:	\$ 5123
Technical:	
Pump speed on which pump data are based:	3450 rpm
Actual calculated flow:	300 US gpm
Rated flow:	317 US gpm
Resulting head of the pump:	150 ft
Rated head:	177.2 ft
Stages:	5
Number of reduced-diameter impellers:	NONE
Approvals:	CULDWUS,CCSAUS
Approvals for drinking water:	PROP65
Curve tolerance:	ISO9906:2012 3B
Model:	B
Return valve:	YES
Materials:	
Pump:	Stainless steel
Pump:	EN 1.4301
Pump:	AISI 304
Impeller:	Stainless steel
Impeller:	EN 1.4301
Impeller:	AISI 304
Installation:	
Maximum operating pressure:	870.23 psi
Maximum outlet pressure:	104.43 psi
Type of connection:	NPT(F)
Size of connection:	3 inch
Motor diameter:	6 inch
Minimum borehole diameter:	6.1 in
Liquid:	
Pumped liquid:	Water
Liquid temperature range:	5 .. 140 °F
Selected liquid temperature:	68 °F
Density:	62.29 lb/ft³
Electrical data:	
Motor flange design:	Grundfos
Power (P2) required by pump:	20 HP
Others:	
Minimum efficiency index, MEI ≥:	---
DOE Pump Energy Index CL:	0.92
Net weight:	37.9 lb
Gross weight:	43.7 lb
Shipping volume:	1.13 ft³
Country of origin:	US
Custom tariff no.:	8413.70.2004



FOLLOW-UP PAGE

Applicant will provide all responses to questions marked for follow-up on a separate document entitled “Follow-up Responses” with the question number labeled. Answer questions in the same format as the form. For responses in the form of checkboxes, write “Y”, “N”, or “S”. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Label units in narrative responses and tables. Tables must have the exact headings found on the form. Questions that require items to be submitted to the Department may be marked “S” when the required item is attached to the Preapplication Meeting Form. Label all submitted items with the question number for which they were submitted. The Applicant may not alter the Preapplication Meeting Form signed at the Preapplication Meeting. Instead, the Applicant must use the Amended Responses procedure defined below. Do not include additional information for questions not marked for follow-up here; instead include any additional information pursuant to the process for amending responses defined below.

Questions marked for follow-up

2	
30	
31.a.	
32 - all	



AMENDED RESPONSES PAGE

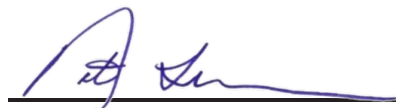
The Applicant may not alter the Preapplication Meeting Form signed at the Preapplication Meeting or the Follow-up Page. If a response has changed to a question answered at the preapplication meeting, the Applicant can provide a new response in a separate document entitled “Amended Responses” with the question number labeled. Answer questions in the same format as the form. For responses in the form of checkboxes, write “Y”, “N”, or “S”. Constrain narrative responses to the specific question as is asked on the form; do not respond to multiple questions in one narrative. Label units in narrative responses and tables. Tables must have the exact headings found on the form. Questions that require items to be submitted to the Department may be marked “S” when the required item is attached to the Preapplication Meeting Form. Label all submitted items with the question number for which they were submitted. The Applicant will mark all question numbers with an amended response in the table below and note for each question whether the response will replace the response given at the preapplication meeting or will provide additional information to consider in conjunction with the response given at the preapplication meeting. The Applicant will return the “Amended Responses” document with the “Follow-up Responses” document and the signed Preapplication Meeting Form.

Questions with amended responses

[illegible]

FOLLOW-UP PAGE AFFIDAVIT & CERTIFICATION

“I/we attest that this preapplication meeting form, follow-up page, and amended responses page accurately portray my proposed project. I am aware that my application for this project will not qualify for a discounted filing fee and expedited timelines if upon submittal of the application to the department, I change any element of the proposed application from the preapplication meeting form and follow-up materials (ARM 36.12.1302(6)(a)).”



Applicant Signature

5/1/25

Date

Applicant Signature

Date

“We confirm that the preapplication form and follow-up information are adequate for the Department to proceed with technical analyses in ARM 36.12.1303. Or, if the applicant has elected to complete technical analyses, we confirm they have submitted each piece of technical analysis required based on the proposed project and the Department is able to proceed with the scientific credibility review (ARM 36.12.1303(8)).”

Department Signature

Date

Department Signature

Date



Certificate Of Completion

Envelope Id: 2E0A5725-97EB-44BB-B807-D53B406EFBBE

Status: Completed

Subject: Complete with Docusign: 600P_41H_30165312_BarnardConstruction_PreappMeetingForm.pdf

Source Envelope:

Document Pages: 33

Signatures: 2

Envelope Originator:

Certificate Pages: 5

Initials: 0

Lyra Reynolds

AutoNav: Enabled

1539 11th Avenue

Envelopeld Stamping: Enabled

Helena, MT 59601

Time Zone: (UTC-07:00) Mountain Time (US & Canada)

Lyra.Reynolds@mt.gov

IP Address: 161.7.117.90

Record Tracking

Status: Original

Holder: Lyra Reynolds

Location: DocuSign

2/11/2025 4:10:08 PM

Lyra.Reynolds@mt.gov

Security Appliance Status: Connected

Pool: StateLocal

Storage Appliance Status: Connected

Pool: Montana Dept of Natural Resources & Conservation

Location: DocuSign

Signer Events

Signature

Timestamp

Lyra Reynolds

lyra.reynolds@mt.gov

Montana Department of Natural Resources and Conservation

Security Level: Email, Account Authentication (None)

Lyra Reynolds

Signature Adoption: Pre-selected Style
Using IP Address: 161.7.117.90

Sent: 2/11/2025 4:14:36 PM

Viewed: 2/11/2025 4:15:02 PM

Signed: 2/11/2025 4:15:14 PM

Electronic Record and Signature Disclosure:

Not Offered via DocuSign

Matthew Engel

matthew.engel@barnard-inc.com

Security Level: Email, Account Authentication (None)

Matthew Engel

Signature Adoption: Pre-selected Style
Using IP Address: 66.9.182.124
Signed using mobile

Sent: 2/11/2025 4:15:18 PM

Viewed: 2/11/2025 4:37:13 PM

Signed: 2/11/2025 4:37:32 PM

Electronic Record and Signature Disclosure:

Accepted: 2/11/2025 4:37:13 PM

ID: 2f3356a3-6b74-4c81-a89c-21b00363072b

In Person Signer Events

Signature

Timestamp

Editor Delivery Events

Status

Timestamp

Agent Delivery Events

Status

Timestamp

Intermediary Delivery Events

Status

Timestamp

Certified Delivery Events

Status

Timestamp

Carbon Copy Events

Status

Timestamp

Pat Thomson

pthomson@waterenvtech.com

Senior PM

Security Level: Email, Account Authentication (None)

COPIED

Sent: 2/11/2025 4:15:18 PM

Viewed: 2/11/2025 4:38:09 PM

Electronic Record and Signature Disclosure:

Carbon Copy Events	Status	Timestamp
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Not Offered via DocuSign

Witness Events	Signature	Timestamp
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Notary Events	Signature	Timestamp
---------------	-----------	-----------

Envelope Summary Events	Status	Timestamps
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Envelope Sent	Hashed/Encrypted	2/11/2025 4:14:36 PM
Certified Delivered	Security Checked	2/11/2025 4:37:13 PM
Signing Complete	Security Checked	2/11/2025 4:37:32 PM
Completed	Security Checked	2/11/2025 4:37:32 PM

Payment Events	Status	Timestamps
----------------	--------	------------

Electronic Record and Signature Disclosure
--

Form 600-P - Follow-Up Items

Questions Marked for Follow-Up:

<u>Questions, Narrative, Responses, and Tables</u>	<u>Response</u>
2. Provide a map created on an aerial photograph or topographic map that shows the following: section corners, township and range, a north arrow, all proposed points of diversion labeled with a unique POD ID number, all proposed places of use, all proposed conveyance structures, all proposed places of storage, and places of use for all overlapping water rights.	Attached
30. Provide the Aquifer Testing Addendum (Form 600-ATA). This form will be required before the Preapplication Meeting Form is deemed complete.	Submitted: See below
31. Have you submitted a completed Form 633 to DNRC for review?	Submitted: See below
32. Do you have a map with the location of each well/pit labeled and, if available, with the GWIC ID?	Attached

2. A site map with Township, Range, Section corners and north arrow, and all labelled points of diversion, conveyance line and injection wells is provided on the attached figure.

30. Form 600-ATA was submitted on March 4, 2025 for a completion review. The review was completed by DNRC and response provided on March 7, 2025.

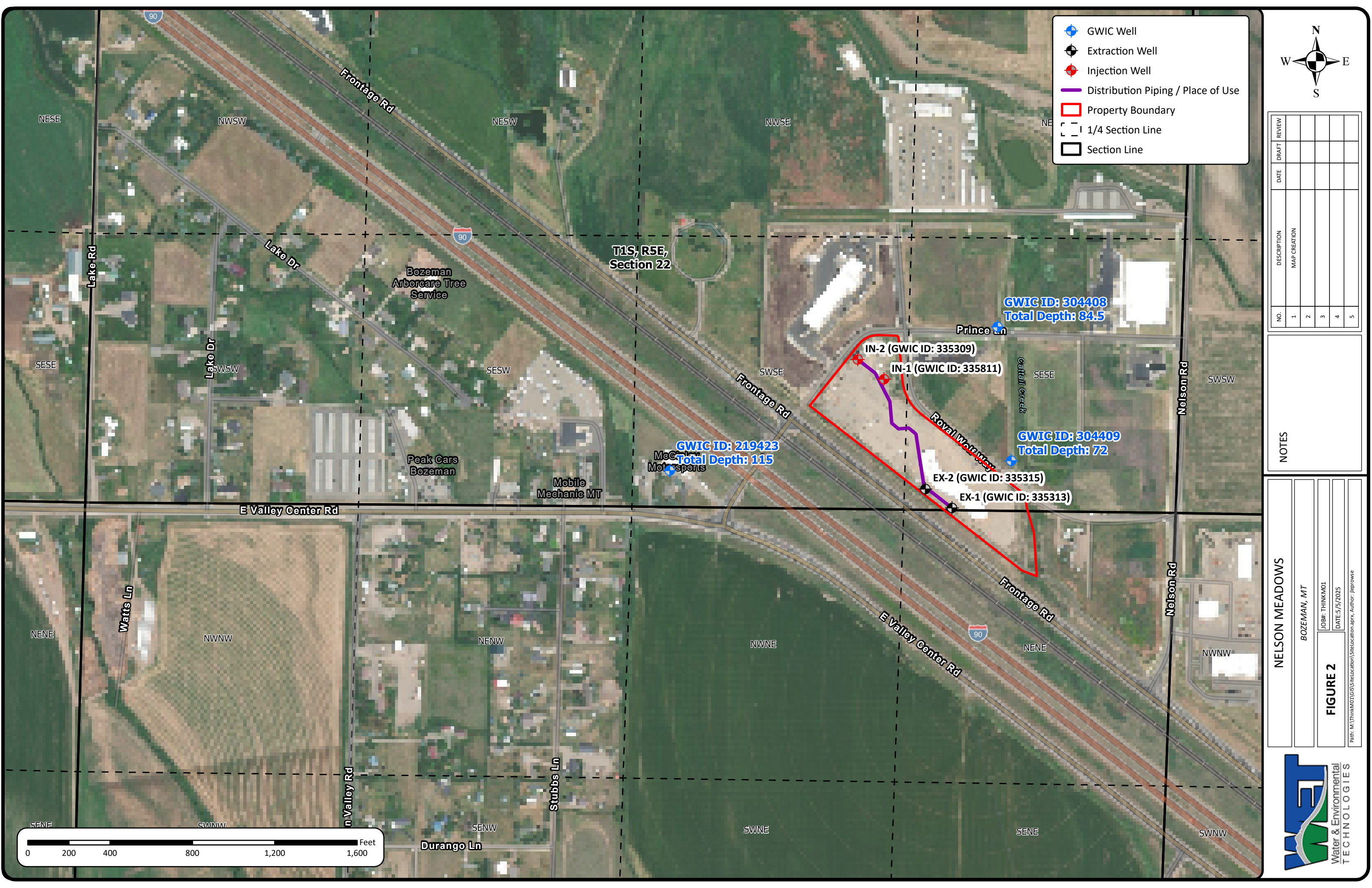
31. Form 633 was also submitted to DNRC on March 4, 2025. The review resulted in a request for completion of Form 653 variance request.

- Form 653 was submitted to DNRC on March 7, 2025. DNRC provided a variance grant letter to the applicant on April 14, 2025 (attached).

32. Consistent with item 2. above, the attached well map provides points of diversion, conveyance, and injection wells including associated GWIC IDs.

Variance Grant Letter

Site Map



GWIC Well

Extraction Well

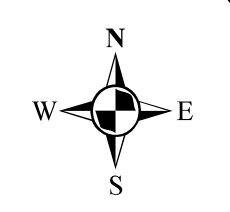
Injection Well

Distribution Piping / Place of Use

Property Boundary

1/4 Section Line

Section Line



NO.	DESCRIPTION	DATE	DRAFT	REVIEW
1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS

BOZEMAN, MT

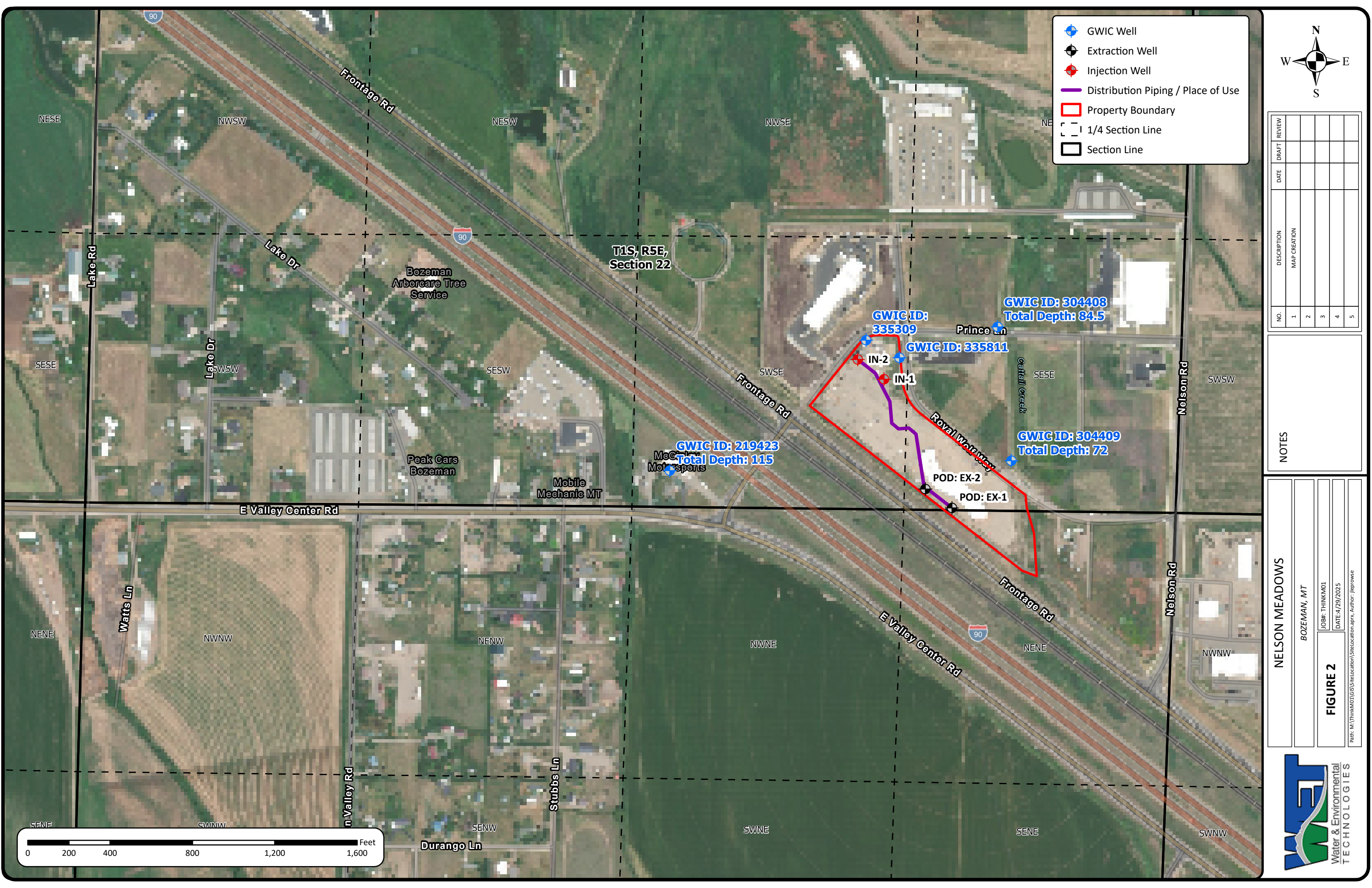
JOB#: THINKM01

DATE: 5/5/2025

FIGURE 2

Path: M:\ThinkM01\GIS\SiteLocation\SiteLocation.aprx, Author: jleprosse





GWIC Well

Extraction Well

Injection Well

Distribution Piping / Place of Use

Property Boundary

1/4 Section Line

Section Line

N
W
E
S

NO.	DESCRIPTION	DATE	DRAFT	REVIEW
1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS

BOZEMAN, MT

FIGURE 2

Path: M:\ThinkM01\GIS\SiteLocation\Site Location.aprx, Author: jleprosse



Variance Grant Letter

THE MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

GOVERNOR GREG GIANFORTE



DNRC DIRECTOR AMANDA KASTER

DNRC
2273 Boot Hill Ct, STE 110
Bozeman, MT 59715
406-586-3136

April 14, 2025

Barnard Construction Co., Inc
701 Gold Avenue
Bozeman, MT 59715

Subject: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Dear Applicant:

This letter is to inform you that your request for an aquifer testing requirement variance from the Aquifer Testing Requirements under ARM 36.12.121 for proposed Permit Application No. 41H 30165312 has been granted. Multiple DNRC staff reviewed this request, and the aquifer test information has been fully reviewed. Based on these reviews, I grant the variance request in your letter dated March 7, 2025. In addition to this general granting of the aquifer testing variance, the specifics being granted are outlined below.

The variance is granted from the following aquifer testing requirements (ARM 36.12.121):

- 3(a) Pumping must be maintained throughout the duration of the test. The rate may not depart from the average pumping rate by more than +/- 5%.
- 3(g) Background groundwater levels in the production well and observation well(s) must be monitored at frequent intervals for at least two days prior to beginning the aquifer test according to Form No. 633.
- 3(h) Groundwater levels in the production and/or observation well(s) must be reported with 0.01-foot precision according to the schedule specified on Form No. 633.
- 3(e)(iii) The testing procedures for a minimum of eight-hour drawdown and yield test performed on any production well must follow (a), (d), and (h).

In summary, the Department is able to grant variances from ARM 36.12.121(3(a)), 36.12.121(3(e)(iii)), 36.12.121(3(g)), and 36.12.121(3(h)). Granting of variances does not mean a water right will be granted. Please contact the Bozeman Regional Office if you have any questions.

Thank you,

A handwritten signature in blue ink, appearing to read "K. Strasheim", is placed above the printed name.

Kerri Strasheim

Regional Manager

Bozeman Water Resources Office

Water Resources Division

Cc, via email: Pat Thomson, Consultant

pthomson@waterenvtech.com



DNRC.MT.GOV

600P_41H_30165312_BarnardConstruction_PreappMeetingForm_signed

Interim Agreement Report

2025-05-01

Created:	2025-05-01
By:	Patrick Thomson (pthomson@waterenvtech.com)
Status:	Archived
Transaction ID:	CBJCHBCAABAAO1--rc7RMp6aKnSWV8879K-UxoGsRguM

Agreement History

Agreement history is the list of the events that have impacted the status of the agreement prior to the final signature. A final audit report will be generated when the agreement is complete.

"600P_41H_30165312_BarnardConstruction_PreappMeetingForm_signed" History

 Document created by Patrick Thomson (pthomson@waterenvtech.com)
2025-05-01 - 4:29:35 PM GMT

Starting Feb. 1, 2025, the online payment surcharge will change from \$1 to 1.5% per transaction, with a maximum fee of \$20. Note that this is separate from the 3% credit card processing fee.

Montana Department of Natural Resources and Conservation



Receipt

04/30/25 12:47 PM MST

WR# : 41H 30165312

Payment Type : Credit/Debit Card

Transaction Id : 10661568738

Description	Price	Quantity	Amount
Water-Filing Fees (All Forms)	\$500.00	1	\$500.00
Surcharge			\$20.00
TOTAL			\$520.00

Billing Information
WATER & ENVIRONMENTAL TECHNOLOGIES
PATRICK THOMSON
480 E. PARK
BUTTE, MT 59701
4064900329
pthomson@waterenvtech.com

Thank you for your payment!

Montana Department of Natural Resources and Conservation



REQUEST FOR PREAPPLICATION MEETING

ARM 36.12.1302(2)
(Revised 01/2024)

Instructions

Use this optional form to submit a written request for a preapplication meeting, as required in ARM 36.12.1302(2) for applicants electing to complete a preapplication meeting with the department prior to submitting an application for a beneficial water use permit or change in appropriation right pursuant to §85-2-302, MCA. Use additional sheets as necessary.

Submit this form to the appropriate regional office; see contact information on the last page of this form.

For Department Use Only

RECEIVED
14 JAN 2024
BOZEMAN WATER
RESOURCES
(rec'd via email to BOZ RO)

Date Received _____

Received By _____

Scheduled Meeting Date _____

1. Applicant Name Barnard Construction

Mailing Address 3520 Royal Wolf Way

City Bozeman State MT Zip 59718

Home Phone _____ Other Phone 406-586-1995

Email: matthew.engel@barnard-inc.com

2. Representative Name (if other than Applicant) Pat Thomson

☒ Representative is Consultant ☐ Representative is Attorney ☐ Representative is Other

Mailing Address 3520 Royal Wolf Way

City Bozeman State MT Zip 59718

Home Phone _____ Other Phone 406-723-1532

Email: pthomson@waterenvtech.com

3. Are you requesting a preapplication meeting for a permit or change application?

☒ Permit ☐ Change

4. Identify the following elements of the proposed permit or change in appropriation.

a) The flow rate and volume of water required:

Flow Rate 550 ☒ GPM ☐ CFS Volume 0 Acre-Feet

b) The point of diversion:

Point of Diversion #1 SE 1/4 SW 1/4 SE 1/4 Section 22, Township 1 ☐ N ☒ S, Range _____ ☒ E ☐ W
County Gallatin

Lot/Tract 26 Block 7 Subdivision Name Nelson Meadows

Point of Diversion #2 SE 1/4 SW 1/4 SE 1/4 Section 22, Township 1 ☐ N ☒ S, Range 5 ☒ E ☐ W
County Gallatin

Lot/Tract 26 Block 7 Subdivision Name Nelson Meadows

c) The place of use:

_____ Acres _____ Lot _____ Block _____ 1/4 _____ 1/4 _____ 1/4 Sec _____, Twp _____ ☐ N ☐ S, Rge _____ ☐ E ☐ W

_____ Acres _____ Lot _____ Block _____ 1/4 _____ 1/4 _____ 1/4 Sec _____, Twp _____ ☐ N ☐ S, Rge _____ ☐ E ☐ W

_____ Acres _____ Lot _____ Block _____ 1/4 _____ 1/4 _____ 1/4 Sec _____, Twp _____ ☐ N ☐ S, Rge _____ ☐ E ☐ W

_____ Acres _____ Lot _____ Block _____ 1/4 _____ 1/4 _____ 1/4 Sec _____, Twp _____ ☐ N ☐ S, Rge _____ ☐ E ☐ W



_____ Acres _____ Lot _____ Block _____ 1/4 _____ 1/4 _____ 1/4 Sec _____, Twp _____ ☐ N ☐ S, Rge _____ ☐ E ☐ W

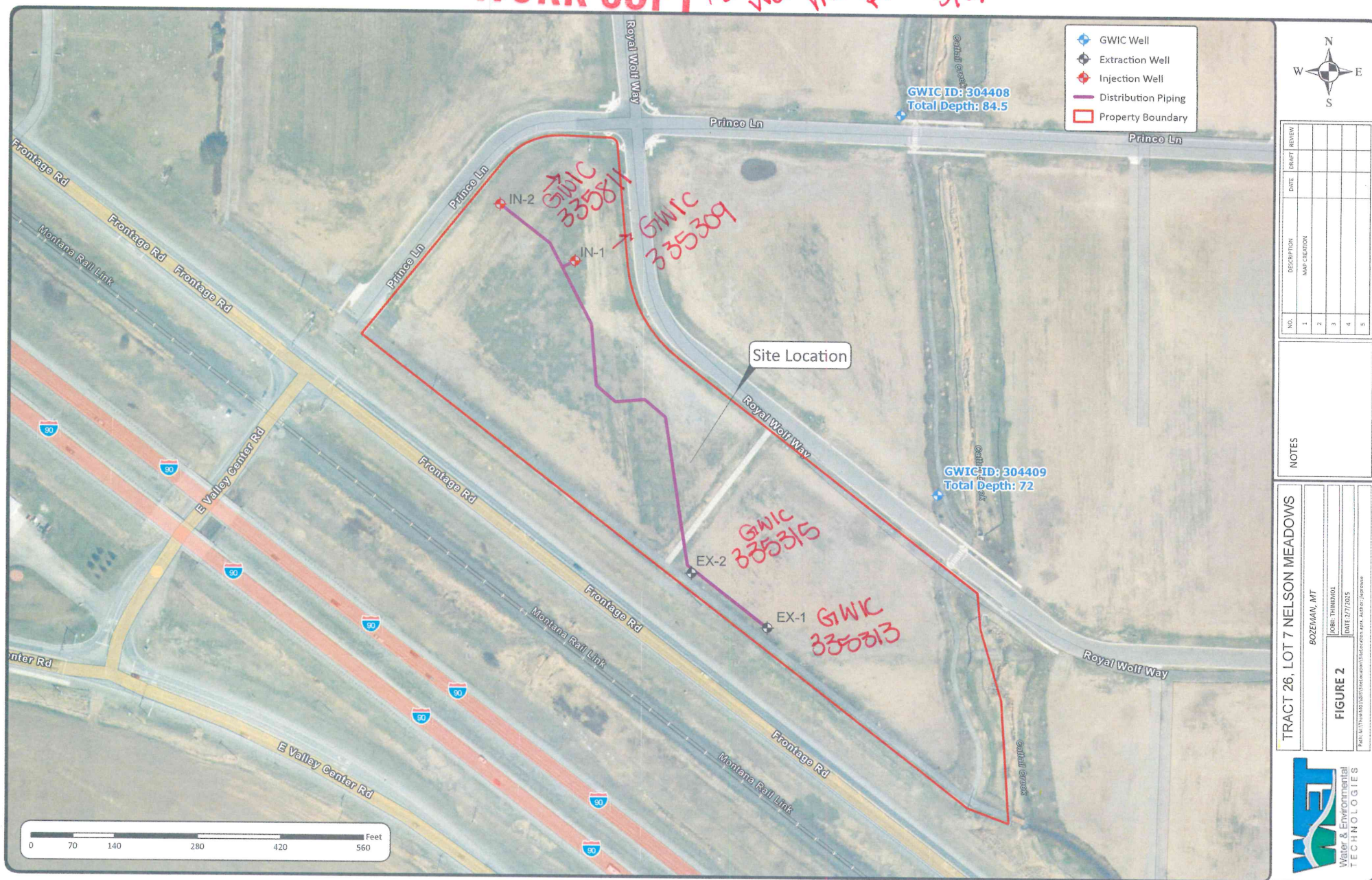
- d) The source of water: groundwater
- e) The proposed purpose: Non-Consumptive Open Loop Geothermal cooling
- f) For a change in appropriation right, the water right(s) proposed for change:
- Type of water right _____ Basin _____ Water Right # _____
- Type of water right _____ Basin _____ Water Right # _____
- Type of water right _____ Basin _____ Water Right # _____
- g) For a change in appropriation right, an explanation of historical use of the right(s) proposed for change:

- h) Any proposed place of storage, if applicable (only if storage capacity is greater than 0.1 acre-feet):
- #1 Capacity: Surface Acres _____ x Max Depth (feet) _____ x (.4 for dams/.5 for pits) = _____ Acre-Feet
- Location: _____ 1/4 _____ 1/4 _____ 1/4 Section _____, Township _____ ☐ N ☐ S, Range _____ ☐ E ☐ W
- #2 Capacity: Surface Acres _____ x Max Depth (feet) _____ x (.4 for dams/.5 for pits) = _____ Acre-Feet
- Location: _____ 1/4 _____ 1/4 _____ 1/4 Section _____, Township _____ ☐ N ☐ S, Range _____ ☐ E ☐ W
- #3 Capacity: Surface Acres _____ x Max Depth (feet) _____ x (.4 for dams/.5 for pits) = _____ Acre-Feet
- Location: _____ 1/4 _____ 1/4 _____ 1/4 Section _____, Township _____ ☐ N ☐ S, Range _____ ☐ E ☐ W
- i) For applications proposing a new well or wells, the well depth(s) and location:
- New Well #1 SE 1/4 SW 1/4 SE 1/4 Section 22, Township 1 ☐ N ☒ S, Range 5 ☒ E ☐ W
- County GALLATIN
- Lot/Tract 26 Block 7 Subdivision Name NELSON MEADOWS
- Estimated Well Depth 212 Feet
- New Well #2 SE 1/4 SW 1/4 SE 1/4 Section 22, Township 1 ☐ N ☒ S, Range 5 ☒ E ☐ W
- County GALLATIN
- Lot/Tract 26 Block 7 Subdivision Name NELSON MEADOWS
- Estimated Well Depth 242 Feet



WORK COPY

• LR, per well logs & maps provided 5/5/25



WORK COPY -LR



IN1 → GWIC 335309
IN2 → GWIC 335811

EX1 → GWIC 335313
EX2 → GWIC 335315

From: [Pat Thomson](#)
To: [Reynolds, Lyra](#)
Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal
Date: Monday, May 5, 2025 12:19:31 PM
Attachments: [image001.png](#)
[image002.png](#)
[Figure2.pdf](#)

Here you go.

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Monday, May 5, 2025 10:37 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-Application Meeting Form Submittal

WARNING - This email originated from an EXTERNAL SOURCE. Do not reply, click any link or open attachments unless you can confirm the sender. *Please report suspicious emails to itsupport*

Sounds great. Thank you!



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715
DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov
[Website](#) | [Facebook \[facebook.com\]](#) | [X \(Twitter \[twitter.com\]\)](#) | [Instagram \[instagram.com\]](#)
How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](#)

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Monday, May 5, 2025 10:36 AM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal

Hey Lyra,

Yes, you are right there is an issue with the labels. I missed the double well symbol when forwarding along. The IN-1 and IN-2 locations are correct. I'll have the figure corrected to show the GWIC ID for each new well in parentheses after the well names (i.e. EX-1 (GWIC ID: 335313), etc.) and identify the pre-existing GWIC wells as "Nearby GWIC Wells. How does that sound?

Thanks,
Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Monday, May 5, 2025 10:06 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-Application Meeting Form Submittal

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Hey Pat-

I have a really quick question about the map that was submitted in the Preapp Follow-Up materials. I can't tell if the well points were due to a formatting issue when the map was printed or if I am getting mixed up, but it looks like the GWIC ID points of the injection wells are off of the marks for the injection wells? I assume the blue points on the follow up map (attached) are based on the well log lat-long and that is why they are different from the red points.

I made two work copies of maps you have provided, which are attached. Are the GWIC IDs next to each well location the correct number for that well?

Thank you!

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715
DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Thursday, May 1, 2025 10:53 AM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal

Here you go.

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Wednesday, April 30, 2025 1:35 PM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-Application Meeting Form Submittal

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Hey Pat-

Would you please send me a copy of that receipt if you paid online? The payment takes a couple days to be processed in our system, but we would receipt it today as you paid the fee today. I just need confirmation of the payment.

Let me know if you have any questions.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist

Bozeman Water Resources Office

Montana Department of Natural Resources and Conservation

2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](https://forms.office.com)

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Wednesday, April 30, 2025 12:51 PM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal

Hey Lyra,

Sorry, I drifted past the link you had already provided – we're all good.

Thanks,

Pat

From: Pat Thomson

Sent: Wednesday, April 30, 2025 7:12 AM

To: Reynolds, Lyra <lyra.reynolds@mt.gov>

Subject: Pre-Application Meeting Form Submittal

Hey Lyra,

Attached please find the complete Pre-Application Meeting form with follow-up certification signature, and the Follow-Up responses. I wasn't able to determine how to pay the permit via the transaction portal. Is there a simple link I could follow to do this, or, is it possible to give you

a credit card number or similar?

Thanks for your help,

Pat



Patrick J. Thomson, PG

Senior Hydrogeologist

P: (406) 723-1532

C: (406) 490-0329

waterenvtech.com [waterenvtech.com]

From: [Pat Thomson](#)
To: [Reynolds, Lyra](#)
Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal
Date: Thursday, May 1, 2025 10:50:50 AM
Attachments: [image001.png](#)
[image002.png](#)
[600P_41H_30165312_BarnardConstruction_PreappMeetingForm_Follow-Up_signed.pdf](#)
[sign Audit Report.pdf](#)

Hey Lyra,

I'm definitely not the most tech savvy but believe I figured out what you need and have produced the validation page.

I re-signed the original completed form, saved a certified simply selected e-sign from the menu, and produced the audit report. Hopefully this is the ticket. If not, I may need more direction.

Thanks,
Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Wednesday, April 30, 2025 1:43 PM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-Application Meeting Form Submittal

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Pat-

One more thing. The signature on page 33 appears to be a copy of a wet signature. If it was electronically signed, we need the verification of signature page that is produced by the signing application (i.e. DocuSign summary page or Adobe certified signatures).

If this is a wet signature, our office must receive the original signature for the form to be received. You may mail in the signature separately, but we cannot receive the form until we have a wet signature or a verified e-signature.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](https://forms.office.com)

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Wednesday, April 30, 2025 12:51 PM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Subject: [EXTERNAL] RE: Pre-Application Meeting Form Submittal

Hey Lyra,

Sorry, I drifted past the link you had already provided – we're all good.

Thanks,
Pat

From: Pat Thomson
Sent: Wednesday, April 30, 2025 7:12 AM
To: Reynolds, Lyra <lyra.reynolds@mt.gov>
Subject: Pre-Application Meeting Form Submittal

Hey Lyra,

Attached please find the complete Pre-Application Meeting form with follow-up certification signature, and the Follow-Up responses. I wasn't able to determine how to pay the permit via the transaction portal. Is there a simple link I could follow to do this, or, is it possible to give you a credit card number or similar?

Thanks for your help,

Pat



Patrick J. Thomson, PG

Senior Hydrogeologist

P: (406) 723-1532

C: (406) 490-0329

[waterenvtech.com \[waterenvtech.com\]](https://waterenvtech.com)

From: [Pat Thomson](#)
To: [Reynolds, Lyra](#)
Subject: [EXTERNAL] Re: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312
Date: Tuesday, April 29, 2025 11:06:47 AM
Attachments: [image001.png](#)

great, thank you!

PThomson
406-490-0329

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Tuesday, April 29, 2025 9:36:58 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

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You can reference the 633 and 600-ATA items in your follow-up information. For example-
Follow-up Question 31: Form 633 was submitted to Department on DATE. Form 653 requesting variances was submitted to the Department on DATE. The variance grant letter is attached.

Please make sure you just address all the follow-up items. We have the 600-ATA, Form 633, and Form 653 on file so I feel ok with having you just reference them and not resubmit them.

Please include the variance grant letter as part of your follow-up to Question 31.

Thank you!
-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
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2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Tuesday, April 29, 2025 9:30 AM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] Re: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Regarding the 600-ATA and 633 items, am I able to reference a submittal date, or do these need submitting again?

Essentially, the only additions are two GWIC numbers on the well figure, and the fee.

Thanks

PThomson
406-490-0329

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Tuesday, April 29, 2025 9:08:21 AM

To: Pat Thomson <pthomson@waterenvtech.com>

Subject: RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

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Yes! You can submit it using this link: <https://opp.mt.gov/doa/opp/DNRWater/cart>

Just use the "Water-Filing Fees (All Forms)" item and item cost will be \$500. Please put the Application # in the WR# section if you do choose to use the online portal.

There is a fee associated with online payment, also.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist

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DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](https://forms.office.com)

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Tuesday, April 29, 2025 9:06 AM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Hey Lyra,

One more question – Is it possible to submit payment through the State Transaction portal?

From: Pat Thomson

Sent: Tuesday, April 29, 2025 8:27 AM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Great! Thanks for the clarification on Part B. We are getting under a timeline and I was out for a bit, and now in the field, so I am trying to avoid any hiccups.

I'll get things out to you as soon as possible.

Thanks again,

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Tuesday, April 29, 2025 8:21 AM

To: Pat Thomson <pthomson@waterenvtech.com>

Subject: RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

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Hey Pat-

We filled out the Preapplication Meeting Form (PMF) prior to the existence of a Part A and Part B. The PMF we completed at the February 11, 2025, meeting is just one document with follow-up questions identified at the end. I had sent you a copy of the form we completed in an email on 2/11 but have attached it to this email as well.

When you are ready to submit the form, please submit the following:

- The entire Preapplication meeting form
- All responses to follow-up items identified on page 31 of the form
- The \$500 preapplication fee
- The second signature, found on page 33 of the form

We will accept the form electronically but still require either a wet signature or a verified e-signature (DocuSign or Adobe Certified). You may also send the form electronically and mail in a wet signature separately, if you prefer.

Let me know if you have any other questions!

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist

Bozeman Water Resources Office

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2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Tuesday, April 29, 2025 7:43 AM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Hi Lyra,

Our first run-through and I just want to be clear on what is needed to complete the submittal. I see form 600-P Part B for responses to the questions marked for follow-up – Am I to use this form, or simply a stand-alone document with specific information for those items called out on the signed 600-P? I ask, because Part B appears to apply more to amended responses rather than responses.

Thanks,

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Monday, April 28, 2025 8:03 AM

To: Pat Thomson <pthomson@waterenvtech.com>

Cc: Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Strasheim, Kerri <kstrasheim@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

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Hi Pat-

We have not received the completed preapplication meeting form nor the \$500 fee. Once we have received the completed form, with all follow-up information, and the \$500 fee, we will review the form for completeness. If the form is deemed complete, the Department will proceed with preparing the Technical Analyses.

You/the Applicant still need to return the Preapplication Meeting Form with all follow-up information identified at our February 11, 2025, meeting, along with the fee.

Please let me know if you have any questions.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Friday, April 25, 2025 5:35 PM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Cc: Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Strasheim, Kerri <kstrasheim@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>
Subject: [EXTERNAL] RE: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

Hy Lyra,

I've been away for a bit and I'm glad to see the variance was granted. Are you able to provide a status of the pre-application form status, and has, or will the DNRC begin its technical analysis of the pumping test? Please let me know if there additional information you need from WET at this time?

Thanks,
Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Monday, April 14, 2025 3:30 PM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Strasheim, Kerri <kstrasheim@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>
Subject: Variance Request dated March 7, 2025, for Permit Preapplication 41H 30165312

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Pat-

The Department has granted an aquifer testing requirement variance from the Aquifer Testing Requirements under ARM 36.12.121 for proposed Permit Application No. 41H 30165312.

Attached are the aquifer testing addendum review and the variance grant letter that were mailed to the applicant today, April 14, 2025.

Please reach out if you have any questions.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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From: [Pat Thomson](#)
To: [Reynolds, Lyra](#)
Cc: [Strasheim, Kerri](#); [Norman, Evan](#)
Subject: [EXTERNAL] RE: Barnard Construction Preapplication Meeting Form
Date: Tuesday, March 4, 2025 4:01:18 PM
Attachments: [image002.png](#)
[image003.png](#)

Hi Lyra,

For review, the following link provides Form 600-ATA and attachments, including the electronic Form 633 for both the 72-hr and 8-hr tests. Please let me know if you have any issues accessing the files. Thanks for your help moving things along.

Pat

 [Barnard \[wetenvtech-my.sharepoint.com\]](#)

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Monday, March 3, 2025 11:23 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>
Subject: RE: Barnard Construction Preapplication Meeting Form

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Hi Pat-

The Form 633 and Form 600-ATA can be submitted anytime but have to be submitted before the Preapplication Meeting Form can be deemed complete. For the most efficient use of time for reviewing both forms, we recommend the Form 633 and 600-ATA be submitted prior to the Preapplication Meeting Form, follow-up information, and fee are submitted. This allows the hydrologist to review the aquifer testing information ahead of time, so if any variances are required those are identified prior to submitting the Preapp Form. Any variances must also be requested prior to deeming the Preapp form complete.

For the GWIC numbers and well logs themselves, if those were identified as follow-up questions on the Preapplication Meeting Form please submit them with the follow-up information as well.

Once the Preapplication Meeting Form, follow-up information, and \$500 fee are submitted to the office, we will take 5 business days to review the form for completeness. If the form is deemed complete, we will begin the Technical Analysis. If the form is deemed incomplete, we will return the form to the Applicant to complete the missing/inadequate information identified by the Department.

Let me know if you have any other questions.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
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From: Reynolds, Lyra

Sent: Friday, February 28, 2025 3:05 PM

To: Pat Thomson <pthomson@waterenvtech.com>

Subject: RE: Barnard Construction Preapplication Meeting Form

Hi Pat-

I am going to touch base with our groundwater hydrologist, Evan, to see if he prefers to receive the well information/Form 633 prior to Preapp submittal. He is doing field work today, so I hope to have an answer to you early next week.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

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How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Friday, February 28, 2025 9:19 AM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Barnard Construction Preapplication Meeting Form

Good Morning Lyra,

I am waiting on GWIC numbers for two of the new wells associated with this application. Am I able to

submit the application data etc. and follow up once they are established? Or, would you prefer to have them prior to submitting data, etc.?

Thanks

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Wednesday, February 12, 2025 8:21 AM

To: Matthew Engel <matthew.engel@barnard-inc.com>; Pat Thomson <pthomson@waterenvtech.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: RE: Barnard Construction Preapplication Meeting Form

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Thank you!

Attached is the copy with both Applicant and Department first signatures for your records.

-Lyra



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Bozeman Water Resources Office
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How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Matthew Engel <matthew.engel@barnard-inc.com>

Sent: Tuesday, February 11, 2025 4:38 PM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>; Pat Thomson <pthomson@waterenvtech.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: [EXTERNAL] Re: Barnard Construction Preapplication Meeting Form

Docusign complete. Thanks.

Matt

Sent from my Verizon, Samsung Galaxy smartphone

Get [Outlook for Android \[aka.ms\]](#)

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Tuesday, February 11, 2025 4:16:17 PM

To: Matthew Engel <matthew.engel@barnard-inc.com>; Pat Thomson <pthomson@waterenvtech.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: RE: Barnard Construction Preapplication Meeting Form

Matt-

This has been sent for you to sign. I have sent Pat a copy of the form as well.

Let me know if you have any other questions at this time.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist

Bozeman Water Resources Office

Montana Department of Natural Resources and Conservation

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DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](#)

From: Matthew Engel <matthew.engel@barnard-inc.com>

Sent: Tuesday, February 11, 2025 4:09 PM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>; Pat Thomson <pthomson@waterenvtech.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: [EXTERNAL] Re: Barnard Construction Preapplication Meeting Form

Please send via Docusign. We use something other than adobe for PDF.

Thanks.

Matt

BARNARD

People building for People.

Matt Engel

Project Manager

matthew.engel@barnard-inc.com

Phone: (406) 586-1995 | **Cell:** (406) 595-2201

701 Gold Avenue | Bozeman, MT 59715 | barnard-inc.com [barnard-inc.com]

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Tuesday, February 11, 2025 3:55 PM

To: Pat Thomson <pthomson@waterenvtech.com>; Matthew Engel <matthew.engel@barnard-inc.com>

Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>; Norman, Evan <Evan.Norman@mt.gov>

Subject: Barnard Construction Preapplication Meeting Form

Hello-

Attached is the Preapplication Meeting Form for Barnard Construction from today's meeting. Please sign the first signature page (page 30) within 5 days. We can accept a certified e-signature (DocuSign or Adobe Certified) or an original, wet signature. If you would like to digitally sign, please let me know and I can send this via DocuSign to Matt to sign as the Applicant.

The completed Preapplication Meeting Form (PMF), all follow-up information, the second signature (page 33), and the \$500 fee must be submitted to the Bozeman Office within 180-days of the Preapplication Meeting (meeting 2/11/2025, submit by **8/10/2025**). If any variances are required, a variance request must be submitted by day 138 (by **6/29/2025**). The Form 633 may be sent in prior to the PMF, but it must be submitted for the PMF to be deemed complete.

The hydraulically connected surface water information (Questions 39-41) has been filled out based on the Department's identification of the connected surface waters.

The Department will review the form for completeness within 5 business days of receipt of the fee. If the PMF is deemed complete, a technical analysis will be prepared within 45 calendar days. Once the technical analysis is returned to the applicant, the applicant has up to 180 days to submit an application (Form 600). An overview of the process is available on our website [here](#), and I have included a quick summary below of the path this application should follow at this time. If the project changes following the preapplication meeting or following the technical analysis, a new preapplication meeting may be required.

- Preapplication Meeting Held

- Applicant has up to 180 days to return complete Preapplication Meeting Form
- Department has 5 business days to review for completeness
 - If deemed incomplete, the form is returned to the Applicant
- Department prepares Technical Analysis within 45 days and sends to applicant
- Applicant has up to 180 days to submit Application after receipt of Technical Analysis
- Department has up to 15 business days to deem application correct and complete or issue a deficiency letter
 - If deficiency letter is sent, applicant has 120 days to respond
 - Department has 30 days after receipt of response to determine correct and complete
- Department has 60 days to complete a Draft Preliminary Decision
- Draft PD will go to Public Comment if PD to Grant
- If no comments are received, PD is finalized, and Permit can be issued

If you have any questions as you work through completing the preapplication meeting form, please do not hesitate to contact us.

Please let me know if you would like the form sent via DocuSign for the applicant to sign the first signature page.

Best,
-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

[Website](#) | [Facebook \[facebook.com\]](https://facebook.com) | [X \(Twitter \[twitter.com\]\)](https://twitter.com) | [Instagram \[instagram.com\]](https://instagram.com)

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From: [Pat Thomson](#)
To: [Reynolds, Lyra](#)
Subject: [EXTERNAL] RE: Pre-App Request
Date: Tuesday, February 11, 2025 11:45:54 AM
Attachments: [image001.png](#)
[image002.png](#)
[image003.png](#)

Hi Lyra,

The applicant does not plan to attend locally but will attend virtually for the initial part of the call. I am in the process of forwarding him the invite. His name is Matt Engel and he is the Barnard Construction project manager for the building construction.

Thanks
Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Tuesday, February 11, 2025 11:26 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-App Request

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I meant to add this to my previous email. The Applicant is not required to be at the meeting, but since they are local, I just wanted to double check they would not be attending in person (if they do attend).

Thanks Pat.
-Lyra



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From: Reynolds, Lyra
Sent: Tuesday, February 11, 2025 11:19 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-App Request

Perfect. Should we expect anyone in office today, like the Applicant?

Thank you!

-Lyra



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How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](https://forms.office.com)

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Tuesday, February 11, 2025 11:13 AM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Pre-App Request

Hi Lyra,

I do plan to attend virtually today.

Thanks,

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Sent: Monday, February 10, 2025 1:27 PM

To: Pat Thomson <pthomson@waterenvtech.com>

Subject: RE: Pre-App Request

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Pat-

Thank you for sending this information over. I will share it with our team.

No specific need to come into the office tomorrow, a virtual meeting is just fine with us. There is a Teams Meeting link in the original invitation I sent, but I have included it in this email as well. Please use this to join the meeting if you attend virtually. Please also let us know ahead of time if you do plan to do virtual.

Microsoft Teams [Need help? \[aka.ms\]](#)

[Join the meeting now \[teams.microsoft.com\]](#)

Meeting ID: 269 796 344 044

Passcode: qh6oe7Cp

Dial in by phone

[+1 406-318-5487, 826916304#](#) United States, Billings

[Find a local number \[dialin.teams.microsoft.com\]](#)

Phone conference ID: 826 916 304#

Join on a video conferencing device

Tenant key: [291818717@t.plcm.vc](#)

Video ID: 111 051 856 4

[More info \[dialin.plcm.vc\]](#)

For organizers: [Meeting options \[teams.microsoft.com\]](#) | [Reset dial-in PIN \[dialin.teams.microsoft.com\]](#)

Let me know if you have any questions!

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist

Bozeman Water Resources Office

Montana Department of Natural Resources and Conservation

2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey \[forms.office.com\]](#)

From: Pat Thomson <pthomson@waterenvtech.com>

Sent: Monday, February 10, 2025 1:19 PM

To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>

Subject: [EXTERNAL] RE: Pre-App Request

Hi Lyra,

As a matter of fact, yes. Please see following link. I worked through the meeting form and have included figures with well locations, well logs, and a pump curve for the design pumps. WET completed a step-test prior to 72-hour and 8-hour tests on two production wells. James Rose was scheduled to be in the meeting tomorrow, however, he was pulled away to the field. James completed the testing and compiled a draft of form 633 and I'm hoping to confirm them final and I will forward these forms along as soon as available.

[Barnard \[wetenvtech-my.sharepoint.com\]](#)

Regarding our meeting tomorrow, do you feel there is significant benefit to meeting in your office? Given the temperatures, I'm considering calling in to the meeting.

Thanks

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Monday, February 10, 2025 10:00 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Subject: RE: Pre-App Request

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Hi Pat-

In preparation for our meeting tomorrow, I was curious if you all have any additional information you would like to send along.

We are looking forward to speaking with you tomorrow at 1:00 at the Bozeman office.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Tuesday, January 14, 2025 11:18 AM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>
Subject: [EXTERNAL] RE: Pre-App Request

Lyra,

I plan to forward along a prepared form and will have figures included.

Thanks,

Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Tuesday, January 14, 2025 11:03 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>
Subject: RE: Pre-App Request

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Pat-

Perfect, I will get that meeting scheduled. We will plan on having you in-person but will have a remote option just in case.

We will fill out the Preapplication Meeting Form at the meeting, but if you have prepared a copy in advance, we would appreciate if you would send that over. This way we can put your information into the form we will go through, which makes the meeting run smoother.

Any maps of the proposed project are also beneficial for us as we prepare for the meeting. We ask that you send any information over as soon as it is ready, if possible.

We will see you in February.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

Website | **Facebook** [facebook.com] | **X (Twitter)** [twitter.com] | **Instagram** [instagram.com]

How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Tuesday, January 14, 2025 10:55 AM
To: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>
Subject: [EXTERNAL] RE: Pre-App Request

Hi Lyra,

Please schedule our meeting to take place on February 11 at 1:00 pm. At this point, I plan to attend the meeting in person.

We have begun preparing the meeting form and please let me know what information you feel may be helpful prior to the meeting.

Thanks,
Pat

From: Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Sent: Tuesday, January 14, 2025 10:43 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: Strasheim, Kerri <kstrasheim@mt.gov>; Ellis, Kendrew <Kendrew.Ellis@mt.gov>; Rasmussen, Derek <Derek.Rasmussen@mt.gov>
Subject: RE: Pre-App Request

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Hi Pat-

We received the attached Request for a Preapplication Meeting. We are scheduling Preapplication Meetings about 30 days from receiving the request. Below are some times we have available for this meeting:

- Tuesday February 11th @ 1:00 PM – 3:00 PM
- Wednesday February 12th @ 1:00 PM – 3:00 PM
- Tuesday February 25th @ 9:00 AM – 10:00 AM
- Tuesday March 4th @ 9:00 AM – 10:00 AM

Please let me know if you will be attending this meeting in-person or virtually.

I look forward to hearing from you.

-Lyra



Lyra Reynolds (they/them/she/her) | Hydrologist/Specialist
Bozeman Water Resources Office
Montana Department of Natural Resources and Conservation
2273 Boot Hill Court, Suite 110; Bozeman, MT 59715

DESK: 406-556-4500 **EMAIL:** lyra.reynolds@mt.gov

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How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Tuesday, January 14, 2025 10:06 AM
To: Baumgardner, Shannon <Shannon.Baumgardner@mt.gov>
Cc: DNR BOZ WRD <DNRCBozemanWater@mt.gov>; Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Subject: [EXTERNAL] RE: Pre-App Request

Hi Shannon - thanks for the heads up

From: Baumgardner, Shannon <Shannon.Baumgardner@mt.gov>
Sent: Tuesday, January 14, 2025 9:57 AM
To: Pat Thomson <pthomson@waterenvtech.com>
Cc: DNR BOZ WRD <DNRCBozemanWater@mt.gov>; Reynolds, Lyra <Lyra.Reynolds@mt.gov>
Subject: RE: Pre-App Request

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Good morning, Pat-

I no longer work in the Bozeman Regional Office and do not process preapplication meeting requests. One of the New Appropriations staff members in Bozeman can assist you. I have cc'd Lyra; she'll be able to point you in the right direction.



Shannon Baumgardner | Acting New Appropriations Program Manager

Water Rights Bureau

Montana Department of Natural Resources and Conservation

2273 Boot Hill Ct Ste 110 Bozeman, MT 59715

DESK: 406-556-4537 **EMAIL:** shannon.baumgardner@mt.gov

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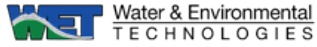
How did we do? Let us know here: [Feedback Survey](https://forms.office.com) [forms.office.com]

From: Pat Thomson <pthomson@waterenvtech.com>
Sent: Tuesday, January 14, 2025 9:24 AM
To: Baumgardner, Shannon <Shannon.Baumgardner@mt.gov>
Cc: DNR BOZ WRD <DNRCBozemanWater@mt.gov>
Subject: [EXTERNAL] Pre-App Request

Hi Shannon,

I also left you a voicemail this morning. The attached is a request for a preapplication meeting for an open-loop geothermal cooling well system in the Gallatin Valley. This project is now ready to move forward with pre-application meeting and permitting.

Thanks,
Pat



Patrick J. Thomson, PG

Senior Hydrogeologist

P: (406) 723-1532

C: (406) 490-0329

waterenvtech.com [waterenvtech.com]

Variance Information

- Variance Request Form
- WSB Variance Sheet
- Approval or Denial of Variance Request

Variance Information



ARM 36.12.121 - Aquifer Testing Addendum (ATA) - Review

Department of Natural Resources and Conservation (DNRC)
Water Sciences Bureau (WSB)

Applicant	Barnard Construction		
Pre-Application/Application No.	NA	Date Sent to RO	4/7/2025
Regional Office (RO)	Bozeman	WSB Staff Name	Evan Norman, Groundwater Hydrologist

This checklist identifies any deficiencies that would require a variance pertinent to Administrative Rules of Montana (ARM) 36.12.121. **Table 1** lists deficiencies that would require a variance, the recommended action and the rationale describing why the variance request could be considered appropriate. If the requirements of ARM 36.12.121 are satisfied for each item, the box will be checked next to that item indicating such.

Table 1: Deficiencies identified, recommended action and rationale from WSB.

☐ No Deficiencies Identified			
Test Duration	Variance (ARM) (R=Requested; A=Additional)	Recommend Granting Variance Request	Rationale:
72-hr	3(a) ☒ R ☐ A	☒ Yes ☐ No	Multiple times throughout the first 1,620 minutes of the aquifer testing, the measured discharged fluctuated slightly more than 5 % from the average measured discharge rate of 269.5 gpm. From 1,620 minutes until the end of the test, the pumping was maintained at a constant discharge rate and consistent drawdown was collected in both the Production and Observation Wells.
72-hr	3(g) ☒ R ☐ A	☒ Yes ☐ No	The background water levels in the Production Well and Observation Well 1 were collected on two days prior to the day of aquifer testing. The water level difference in the Production Well on the day prior to the aquifer testing was 0.1 ft. The drawdown and recovery data in the Production Well and Observation Well 1 did not appear to be affected by any background level trends. The background level data collected for Observation Well 2 represented the start of the aquifer testing. However, clear interference drawdown was shown in Observation Well 2 and impacts from background levels were not recognizable.
72-hr	3(h) ☒ R ☐ A	☒ Yes ☐ No	The Applicant does not follow minimum required time increment schedule for Observation Well 1 and 2 for first 60 minutes of data collection. The remainder of the data collection period fulfilled the requirements of 3(h) and is adequate for obtaining aquifer properties.
8-hr	3(e)(iii) ☒ R ☐ A	☒ Yes ☐ No	During the first 16-minutes of the eight-hour drawdown and yield test, the discharge started at 225 gpm and was raised to up



			to approximately 275 gpm with an average measured discharge rate of 263.8 gpm. The discharge deviation greater than 5 % at the start of well testing is common, and the remainder of the pumping was maintained at a constant discharge rate. The requirements for drawdown at yield test under 3(e)(iii), specifically 3(d) and 3(h) were met.
--	--	--	---

36.12.121 ☒ (1) ☐ NA Aquifer testing design and procedures must follow standards procedures that are discussed in hydrogeology textbooks and professional literature.

36.12.121(2): Minimum information that must be submitted with applications, check if provided:

- ☒ (a) Map with labeled location of production and observation wells; and
- ☒ (b) ☐ NA Well logs of the production and observation wells; and
- ☒ (c) ☐ NA Form No. 633, in electronic format, with *all* information and data provided.

36.12.121 (3): Minimum testing procedures are as follows, check if met:

- ☐ (a) ☐ NA Pumping must be maintained throughout the duration of the test. The rate may not depart from the average pumping rate by more than +/- 5%.
- ☒ (b) ☐ NA The average pumping rate must be equal to or greater than the proposed flow rate if the application is for one well or if the total proposed rate for multiple wells can be obtained from a single well.
- ☒ (c) ☐ NA The proposed pumping rate may be demonstrated by testing multiple wells as long as (e) is met by one well and the remaining flow rate is demonstrated by eight-hour drawdown and yield tests on additional production wells under (e)(ii) and e(iii).
- ☒ (d) ☐ NA Pumping rate must be measured with a reliable measuring device and recorded with clock time according to the schedule on Form No. 633.
- ☒ (e) ☐ NA Minimum duration of pumping during an aquifer test must be 24 hours for a proposed pumping rate and volume equal to or less than 150 GPM or 50 AF, or 72 hours for a proposed pumping rate and volume greater than 150 GPM or 50 AF.
- ☒ (e)(i) ☐ NA At a minimum an eight-hour drawdown and yield test is required on all new production wells.
- ☒ (e)(ii) ☐ NA In addition to (e), if more than one new production well is proposed, at a minimum an eight-hour drawdown and yield test is required on all subsequent new production wells.
- ☐ (e)(iii) ☐ NA The testing procedures for a minimum eight-hour drawdown and yield test performed on any production well must follow (a), (d), and (h).
- ☒ (f) ☐ NA One or more observation wells must be completed in the same source aquifer as the proposed production well and close enough to the production well so that drawdown is measurable and far enough that well hydraulics do not affect the observation well.



☐ (g) ☐ **NA** Background groundwater levels in the production well and observation well(s) must be monitored at frequent intervals for at least two days prior to beginning the aquifer test according to the Form No. 633.

☐ (h) ☐ **NA** Groundwater levels in the production and/or observation well(s) must be reported with 0.01-foot precision according to the schedule specified on Form No. 633.



VARIANCE REQUEST

ARM 36.12.123

Form No. 653 (Revised 11/2024)

For Department Use Only

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DNRC

BOZEMAN WATER RESOURCES

INSTRUCTIONS

Use this form to request a variance from the requirements of ARM 36.12.121 or 36.12.1702, as provided for in ARM 36.12.123.

Submit this completed form to the appropriate regional office by the deadline established during the preapplication meeting or, if a preapplication meeting is not held, include this request with your filed application or as part of a deficiency response.

Application # _____ Basin _____
Received Date 3/7/2025
Received By LR - via email

Applicant Name Barnard Construction, Inc., Josiah Kiehl

Mailing Address 3520 Royal Wolf Way

City Bozeman

State MT

Zip

59718

Home Phone 406-586-1995

Other Phone 406-586-1995

Email: matthew.engel@barnard-inc.com

Representative Name (if other than Applicant) Pat Thomson

☒ Representative is Consultant ☐ Representative is Attorney ☐ Representative is Other (describe) 5

Mailing Address 3520 Royal Wolf Way

City Bozeman

State MT

Zip

59718

Home Phone 406-782-5220

Other Phone 406-723-1532

Email: pthomson@waterenvtech.com

Identify from which section(s) of ARM 36.12.121 or 36.12.1702 you are requesting a variance. Refer to the rule for a full list of requirements in these sections.

☐ ARM 36.12.121 Aquifer Testing Requirements

☐ (2)(a) map with labeled location of production and observation wells

☐ (2)(b) well logs of the production and observation wells

☐ (2)(c) Form No. 633, in electronic format, with all information and data provided

☒ (3)(a) pumping rate may not depart from the average pumping rate by more than +/- 5%

☐ (3)(b) average pumping rate equal to or greater than the proposed flow rate if the application is for one well or if the total proposed rate for multiple wells can be obtained from a single well

☐ (3)(c) proposed pumping rate may be demonstrated by testing multiple wells as long as (e) is met by one well and the remaining flow rate is demonstrated by eight-hour drawdown and yield tests on additional production wells under (e)(i)(i)

☐ (3)(d) pumping rate must be measured with a reliable measuring device and recorded with clock time according to the schedule on Form No. 633

☐ (3)(e) minimum duration of pumping during an aquifer test must be 24 hours for a proposed pumping rate and volume equal to or less than 150 GPM or 50 AF, or 72 hours for a proposed pumping rate and volume greater than 150 GPM or 50 AF

☐ (3)(e)(i) at a minimum an eight-hour drawdown and yield test is required on all new production wells

☐ (3)(e)(ii) In addition to (e), if more than one new production well is proposed, at a minimum an eight-hour drawdown and yield test is required on all subsequent new production wells

☒ (3)(e)(iii) the testing procedures for a minimum eight-hour drawdown and yield test performed on any production well must follow (a), (d), and (h)

☐ (3)(f) one or more observation wells must be completed in the same source aquifer as the proposed production well and close enough to the production well so that drawdown is measurable and far enough that well hydraulics do not affect the observation well

☒ (3)(g) background groundwater levels in the production well and observation well(s) must be monitored at frequent intervals for at least two days prior to beginning the aquifer test according to the Form No. 633

☒ (3)(h) groundwater levels in the production and/or observation well(s) must be reported with 0.01-foot precision according to the schedule specified on Form No. 633



Explain the specific variance you are requesting and the reason for requesting it. Also identify your proposed alternative testing methodology or aquifer test data, if applicable. Attach additional sheets if necessary.

(3)(a) 72-hour test discharge variation; Pumping flow rates during the 72-hour test were generally maintained at the target flow rate. However, there was an approximate five-hour period during the first 12 hours when the flow departed the average rate by up to 7.8 percent without an adjustment. Following a meeting between site personnel, the flow was then generally maintained within the five percent requirement and drawdown was stable through the remainder of the test. Therefore, all data is considered to be valid and useful.

(3)(e)(iii) 8-Hour test discharge variation: while initiating the 8-hour test and adjusting flow rates, the first 16 minutes of the 8-hour test were below the target flow rate and outside the required 5% variation from average flow rate for the test. However, once the flow rates were stabilized they remained at the target flow rate and within the required variation for the remaining 460 minutes.

(3)(g); Initial submittal of 633 forms were incomplete for background measurements. An Updated 633 form. Background water levels were measured in the extraction wells following well completion and for one day prior to the initial 72-hour test and continuously between the 72-hour test and subsequent 8-hour test. Background water levels in observation well 2 were measured on the day of the test due to an existing operating irrigation pump in the well. Groundwater levels remained stable throughout.

☐ ARM 36.12.1702 Physical Surface Water Availability

☐ (1)(b) at a minimum, three measurements that reflect high, moderate, and low flows during the period of diversion

☐ (4) once monthly measurements at department-approved intervals during the proposed period of diversion

Explain the specific variance you are requesting and the reason for requesting it. Also identify your proposed alternative measurement methodology, if applicable. Attach additional sheets if necessary.

continued from above -

(3)(h) Drawdown measurement frequency; Initial drawdown measurements were limited due to inadequate personnel on site to collect all measurements at the required intervals, primarily over the first 10 minutes of test. All measurements were collected at the required interval following 60 minutes of pumping and the sum of all measurements provides adequate intervals to support analysis.



(3)(h) Drawdown measurement frequency; Initial drawdown measurements were limited due to inadequate personnel on site to collect all measurements at the required intervals, primarily over the first 10 minutes of test. All measurements were collected at the required interval following 60 minutes of pumping and the sum of all measurements provides adequate intervals to support analysis.



**APPLICATION FOR BENEFICIAL WATER USE PERMIT OR
APPLICATION TO CHANGE A WATER RIGHT
AQUIFER TESTING ADDENDUM
ARM 36.12.121**

Complete this addendum if the source of water for a Beneficial Water Use Permit or Water Right Change application is groundwater. Check the box denoting the information is attached or data was collected following minimum testing procedures. On a separate document, address the required information. Attachments must be labeled as shown in the sections below (i.e., ATA.3.a).

Section 1. Attachments must make specific reference to the section item shown.

VARIANCE INFORMATION:

- ATA.1.a** ☐ The Applicant submitted a variance request per ARM 36.12.123 for a variance from the requirements of ARM 36.12.121 and has provided a copy of the written request.

Section 2. Attachments must make specific reference to the section item shown.

MINIMUM INFORMATION THAT MUST BE SUBMITTED WITH APPLICATIONS:

- ATA.2.a** ☒ Provide a map with labeled location of production and observation wells.
- ATA.2.b** ☒ Provide well logs of production and observation wells.
- ATA.2.c** ☒ Provide Form No. 633, in electronic format, with all information and data provided.
- ATA.2.d** ☒ Provide a description of testing methods and quality of the aquifer test and data.

Section 3. Attachments must make specific reference to the section item shown.

MINIMUM TESTING PROCEDURES:

For any of the following, if the answer is "NO" or "NA", provide information explaining why on a separate attachment.

- ATA.3.a** YES ☐ NO ☒ NA ☐ Pumping was maintained throughout the duration of the test and the rate did not depart from the average pumping rate by more than 5%.
- ATA.3.b** YES ☒ NO ☐ NA ☐ The average pumping rate is equal to or greater than the proposed flow rate if the application is for one well or if the total proposed rate for multiple wells can be obtained from a single well.
- ATA.3.c** YES ☒ NO ☐ NA ☐ The proposed pumping rate was demonstrated by testing multiple wells, and 3.e was met by one well and the remaining flow rate demonstrated by eight-hour drawdown and yield tests on additional production wells under 3.e.ii and 3.e.iii.
- ATA.3.d** YES ☒ NO ☐ NA ☐ The pumping rate was measured with a reliable measuring device and recorded with clock time according to the schedule on Form No. 633.

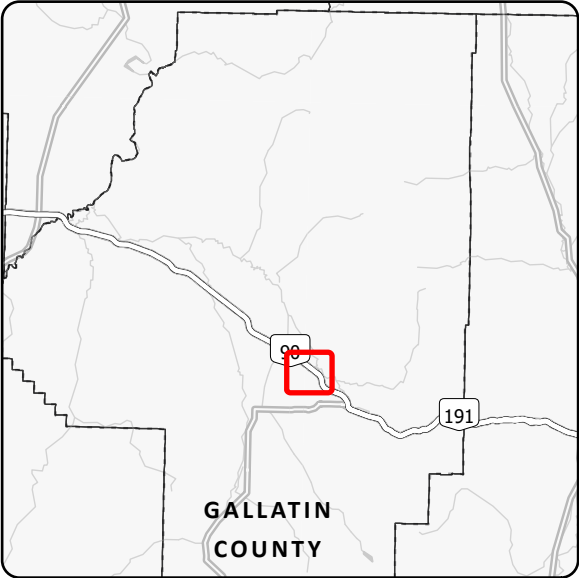


- ATA.3.e** YES ☐ NO ☐ NA ☐ The duration of pumping during an aquifer test was at least 24 hours for a proposed pumping rate and volume equal to or less than 150 gpm or 50 acre-feet, or at least 72 hours for a proposed pumping rate and volume greater than 150 gpm or 50 acre-feet.
- i. If a variance from 3.e was granted, at a minimum, eight-hour drawdown and yield tests were completed on all new production wells.
 - ii. In addition to 3.e, if more than one new production well is proposed, at a minimum, eight-hour drawdown and yield tests were completed on all subsequent new production wells.
 - iii. The testing procedures for a minimum eight-hour drawdown and yield test performed on any production well followed 3.a, 3.d, and 3.h.
- ATA.3.f** YES ☐ NO ☐ NA ☐ One or more observation wells were completed in the same source aquifer as the proposed production well and close enough to the production well so that drawdown is measurable and far enough away so that well hydraulics do not affect the observation well.
- ATA.3.g** YES ☐ NO ☐ NA ☐ Background groundwater levels in the production well and observation well(s) were monitored at frequent intervals for at least two days prior to beginning the aquifer test according to Form No. 633.
- ATA.3.h** YES ☐ NO ☐ NA ☐ Water levels in the production well and observation well(s) were reported with 0.01-foot precision according to the schedule specified on Form No. 633 (8-hour drawdown and yield test only need to provide water levels for drawdown; no background and recovery data are necessary).

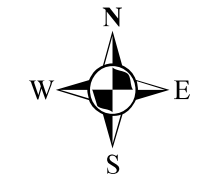
Form 600-ATA
ATTACHMENTS

Attachment ATA.2.a

Site Map



 Property Boundary



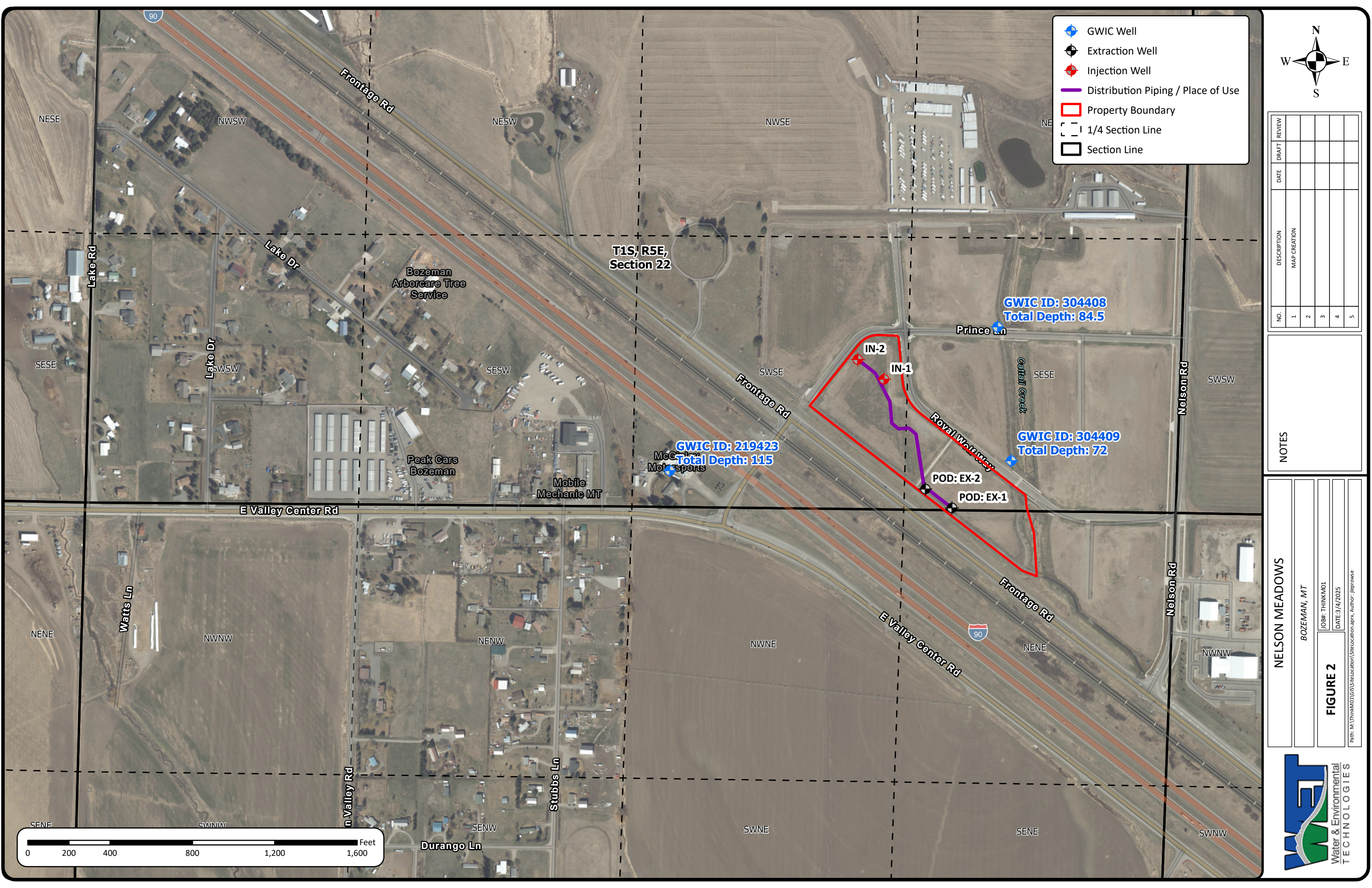
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1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS SITE LOCATION

BOZEMAN, MT
JOB#: THINKM01
DATE: 2/7/2025
FIGURE 1
Path: M:\ThinkM01\GIS\SiteLocation\Site Location.aprx, Author: jleprosse





GWIC Well

Extraction Well

Injection Well

Distribution Piping / Place of Use

Property Boundary

1/4 Section Line

Section Line

NO.	DESCRIPTION	DATE	DRAFT	REVIEW
1	MAP CREATION			
2				
3				
4				
5				

NOTES

NELSON MEADOWS

BOZEMAN, MT

FIGURE 2

Path: M:\ThinkM01\GIS\SiteLocation\SiteLocation.aprx, Author: jlepreux

Attachment ATA.2.b

Well Logs

BORING AND WELL CONSTRUCTION LOG EX-1

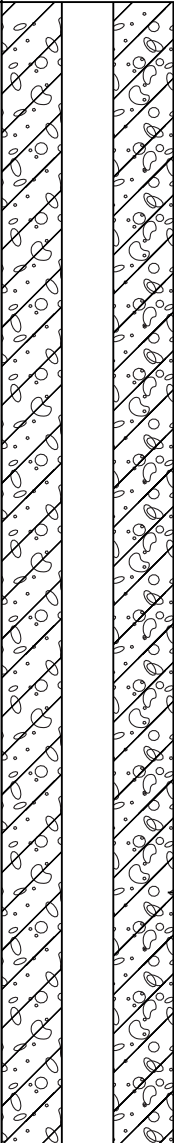
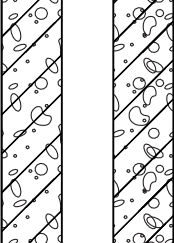
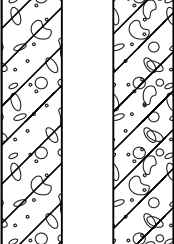
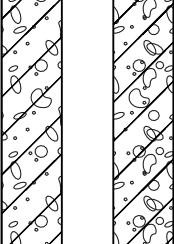
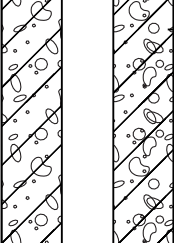
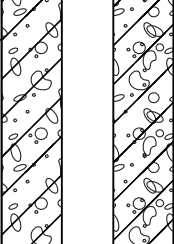
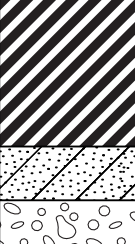
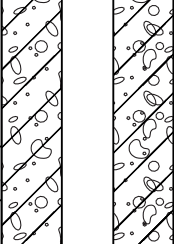
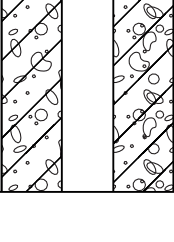
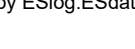
PROJECT NUMBER THINKM01	DRILLING COMPANY Bridger Drilling	COORDINATES -111.086637, 45.729356
PROJECT NAME Barnard Geotherm	DRILLER Tyler Sampson	COORD SYS
CLIENT Barnard	DRILL RIG Foremost 24	SURFACE EL. (ft AMSL) 4,608
START DATE 05/20/24	DRILLING METHOD Dual Wall Rotary	WELL TOC (ft) -2.5
END DATE 06/03/24	CHECKED BY Pat Thomson	LOGGED BY Pat Thomson
MP ELEVATION FT AMSL 4610.5	TOTAL DEPTH OF BORING FT 255.00	DEPTH TO WATER FT 12.37
SCREENED INTERVAL FT 182-202		TOTAL WELL DEPTH FT 202.0

BOREHOLE DEPTH (ft) 255.00	SURFACE COMPLETION Well Install	GROUT bentonite
BOREHOLE DIAMETER (in) 8	CASING TYPE Steel	FILTER PACK Natural gravel and gravel pack
	SCREEN TYPE 6-inch telescoping stainless steel	SEAL TYPE bentonite

COMMENTS

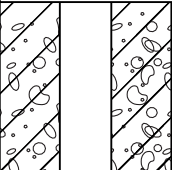
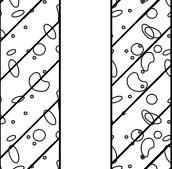
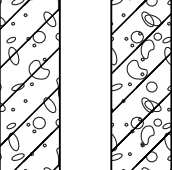
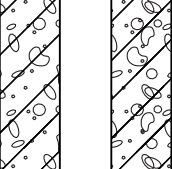
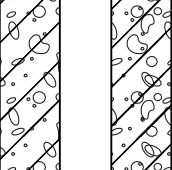
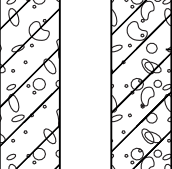
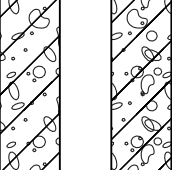
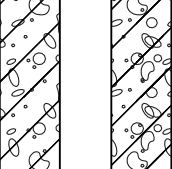
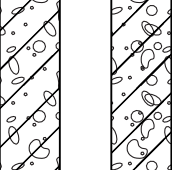
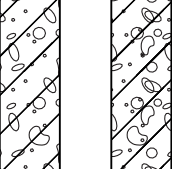
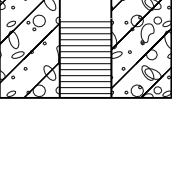
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
0		CL	TOPSOIL		4610
5		CL-ML	CLAYEY SILT, (CL-ML), low plasticity, pale orange, few coarse rounded gravel, dry to moist, soft, blocky		4605
10		GW-GM	SILTY GRAVEL, (GW-GM)		4600
15					4595
20					4590
25					4585
30					4580
35					4575
40					4570
45					4565

BORING AND WELL CONSTRUCTION LOG EX-1

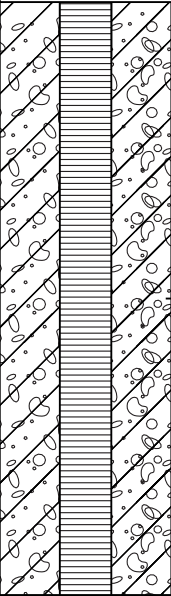
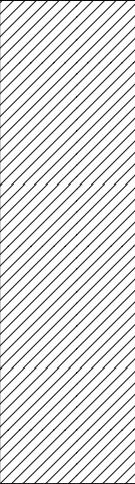
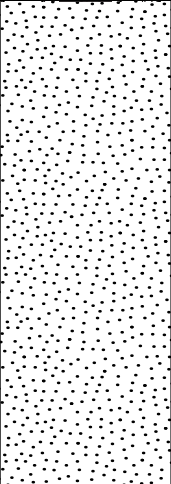
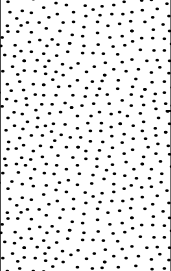
Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
50					4560
55					4555
60					4550
65					4545
70					4540
75					4535
80					4530
85					4525
90					4520
95					4515
100					4510
105					4505
110					4500
					4495

natural
silty-sandy-gravel

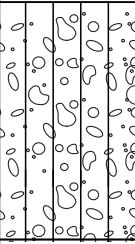
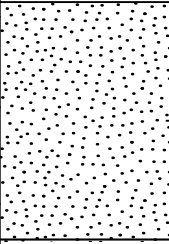
BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
115					4490
120		GW	SILTY GRAVEL, (GW), coarse grained, dark brown to gray, with sand, to dense		4485
125					4480
130					4475
135					4470
140					4465
145		CH	GRAVELLY SILT, (CH), low plasticity, tan, with clay, medium stiff to stiff		4460
150					4455
155					4450
160		CH	GRAVELLY SILT, (CH), low plasticity, light tan, with clay, to medium stiff		4445
165					4440
170					4435
175					4430
180		SW	GRAVELLY SAND, (SW), coarse grained, well graded,		

BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
180			subrounded, pink to olive, trace silt, dense to very dense		4425
185					4420
190					4415
195					4410
200					4405
205		CL	SILTY CLAY		4400
210					4395
215					4390
220					4385
225					4380
230		SC	SILTY SAND, (SC), tan to light brown, with medium to coarse subrounded gravel		4375
235					4370
240					4365
245					
245					

BORING AND WELL CONSTRUCTION LOG EX-1

Depth (ft)	Graphic Log	USCS	Material Description	Well Diagram	EL. (ft AMSL)
250				 washed gravel	4360
255					4355
255			Termination Depth at: 255.00 ft.		4350
260					4345
265					4340
270					4335
275					4330
280					4325
285					4320
290					4315
295					4310
300					4305
305					4300
310					

Other Options

[Return to menu](#)
[Plot this site in State Library Digital Atlas](#)
[Plot this site in Google Maps](#)

Section 7: Well Test Data

Total Depth: 72
Static Water Level: 5
Water Temperature:

Air Test *

55 gpm with drill stem set at 58 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 5 feet.
Pumping water level feet.

Quarter Sections

Geocode

Section 8: Remarks

Section 9: Well Log
Geologic Source

Unassigned

[illegible]

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: CURT SAMPSON
Company: BRIDGER DRILLING INC
License No: WWC-560
Date Completed: 12/18/2019

Date Completed: 12/18/2019

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-1.5	68.5	6	0.25		WELDED	A53B STEEL

From	To	Diameter	# of Openings	Size of Openings	Description
68.5	72	6			OPEN HOLE

From	To	Description	Cont. Fed?
0	25	BENTONITE	Y

Attachment ATA.2.c

Form 633

Attachment ATA.2.d
Aquifer Testing Methods

Introduction

Water and Environmental Technologies (WET) conducted and evaluated two aquifer pumping tests for newly completed geothermal extraction wells to support a water-use application request. The wells are part of an open-loop geothermal system at the ThinkOne, Barnard Construction, office building site on Royal Wolf Way, Bozeman, Montana.

The geothermal extraction wells are in the southwest corner of Township 01S, Range 05E, Section 22 (**Figure 2**). The site is adjacent to the frontage road on the north side of Interstate 90 in Gallatin County, Montana. When completed the geothermal system will consist of at least four wells, two-injection wells and the two tested extraction wells completed in the valley Tertiary sand and gravel aquifer. The anticipated groundwater pumping rates for the extraction wells is 275 gpm each (550 gpm combined) to support the buildings heating and cooling system. The pumping tests determined local aquifer hydrologic characteristics, wells efficiencies, and potential drawdown interference between the two pumping wells.

Table 1. Wells at the Barnard Construction, ThinkOne site. Location coordinates are in WGS84 datum (MAP XX).

Well	Latitude (decimal degrees)	Longitude (decimal degrees)	Screened interval ft	Total depth ft
Extraction Well #1	45.72943	-111.08654	182-202	212
Extraction Well #2	45.72966	-111.08709	212-232	232
Parkway irrigation well	45.730	-111.08548	Open hole	72

Wells Construction

Two geothermal extraction wells, (Extraction Well #1 and Extraction Well #2) were drilled and completed for the ThinkOne office building in May and June of 2024 (**Figure MAP**). Both boreholes were drilled 8.8-inches in diameter to 255 ft through relatively-clean fluvial sand and gravel layers interlayered with silt-and-clay-filled sand and gravels.

Extraction Well #1 Construction

Extraction Well #1 (EX-1) was backfilled from 255 ft to 202 ft. An 8-inch steel casing was set to 182 ft and a 6.89-inch telescoping well screen was installed from 182-202 ft (20 ft) at a water-producing gravelly-sand. The static-water level measured prior to pumping testing was 16.06 ft (includes a 2.5 ft stickup) (12.86 ft below ground level (bgl)). This well was pumped for the 8-hour pumping test and used as observation well #1 for the 72-hour test.

Extraction Well #2 Construction

Extraction Well #2 (EX-2) was backfilled with gravel from 255 ft to 232 ft. The 8-inch steel casing was set at 212 ft and the 6.89-inch diameter well screen was installed from 212 to 232 ft (20 ft) in a water producing sandy-gravel. The static-water level prior to the pumping tests was 15.92 ft (includes a 3.1 ft stickup) (12.82 ft bgl). This well was pumped for the 72-hour pumping test and used as observation well #1 for the 8-hour test.

Parkway Irrigation Well

The parkway irrigation well is north of the test wells across Royal Wolf Way (**Figure map**). The parkway well was monitored as a second observation well (OBS2) to monitor groundwater levels for both the 72-hour and the 8-hour pumping tests. Completion information for the parkway well (GWIC ID: 304409) was obtained from the Montana Bureau of Mines and Geology, Ground Water Information Center database (MBMG-GWIC, 2024). The irrigation well was completed in 2019 with 6-inch diameter steel casing to 72 feet below ground level (bgl) and completed in sand and gravel as an open hole with no screen (**Figure log**). The well is located within 50 ft of Cattail Creek. Prior to the pumping tests the static-water level in the parkway well on July 22, 2024, was 7.61 feet (ft), with a stickup of 2.33 ft (5.28 ft bgl).

Pumping Tests

Geothermal Extraction Wells EX-1 and EX-2 were used alternately as pumping wells or observation wells for two aquifer pumping tests. The parkway irrigation well (GWIC ID 304409), was monitored for both pumping tests. The extraction wells are spaced 163 ft apart. The irrigation well is 340 ft northeast from EX-1 and 428 ft from EX-2.

For the duration of the tests, WET staff measured water levels in all three wells at designated time intervals, monitored and recorded the pumping rate, and adjusted discharge flow in an attempt to maintain a constant 275 gallons per minute (gpm). Water levels were measured using water-level tapes that supplemented measurements from Insitu LevelTroll 400 unvented water-level transducers set in each well accompanied by an Insitu BaroTroll, barometric pressure logger.

Discharge for the pumping tests was measured with a Blue-White Brand F-300 flow meter attached to the 4-inch PVC discharge pipe near the well. Discharge water was routed from the well through a 4-inch pipe into a 6-inch diameter aluminum irrigation pipe that extended 650 feet east to where the water was discharged into north flowing Cattail Creek.

Background water levels

Background water levels were measured in the extraction wells following well completion and for one day prior to the initial 72-hour test and continuously between the 72-hour test and subsequent 8-hour test. Groundwater levels remained stable through the monitored periods.

Step-Drawdown Pumping Test

A step-drawdown pumping test was conducted on EX-2 on 7/22/24 to determine the optimum pumping rate for the constant-rate tests. The well was pumped for one hour at 175 gpm, 250 gpm, and at 275 gpm. The 275-gpm pumping rate from each well is the expected operating maximum rate for the geothermal system.

After one hour of pumping at 275 gpm the water level in EX-2 began to stabilize, suggesting the aquifer and the well-screen design did not interfere with the flow rate and laminar flow continued to enter the well screen. Based on results from the step-drawdown test, the pumping rate for the 72-hour pumping test was set at 275 gpm.

Extraction Well #2, 72-Hour Pumping Test

The 72-hour constant rate pumping test was conducted from July 23 through July 26, 2024, with water-level recovery monitoring continuing until July 29, 2024. The pumping well for this test was EX-2 with observation wells EX-1 (OBS1) and the parkway irrigation well (OBS2) (**Figure 2**). The test proceeded without interruption for 72-hours. Water levels were measured in each of the three monitored wells.

At the end of the 72-hour test the pump was shut off and the recovering water levels continued to be recorded by the transducers. The first one hour of recovery from the pumping well (EX-2) was also measured manually.

The water level measurements are reported on the included DNRC 633 form for the 72-hour pumping test.

Extraction Well #1, 8-Hour Pumping Test

WET conducted the 8-hour pumping test in EX-1 on August 12, 2024. WET personnel monitored water levels and pumping rates in EX-1, observation wells EX-2 and the parkway irrigation well (**Figure map**). Water levels measured in the monitored wells are in the included DNRC form 633 for the 8-hour pumping test.

Data Quality

All data quality is considered to be valid and useful. Pumping flow rates during the 72-hour test were generally maintained at the target flow rate. However, there was an approximate five-hour period during the first 12 hours when the flow was approximately 7.8 percent outside the average rate without an adjustment. Following a meeting between site personnel, the flow was then generally maintained within the five percent requirement.

Excel File Placeholder

The Form 633 spreadsheets are available outside of the application file.

*For **pending applications**, excel files available upon request from the regional office.*

*For **scanned applications**, excel files available in a separate FileNet link.*

Please contact the regional office for more information.