Montana Department of Environmental Quality

Water Protection Bureau
P.O. Box 200901
Helena, MT 59620-0901

PERMIT FACT SHEET

MONTANA GROUND WATER POLLUTION CONTROL SYSTEM (MGWPCS)

Permittee/Applicant:	Alpine Pacific Utilities, LLC
Permit Number:	MTX000164
Permit Type:	Domestic Wastewater
Application Type:	Major Modification
Facility Name:	Glacier Ranch Subdivision
Facility Location:	SESE, Section 09, Township 29 North, Range 21 West Latitude: 48.28400°, Longitude: -114.27052° Flathead County
Facility Contact:	Justin Ahmann, Alpine Pacific Utilities, LLC
Treatment Type:	Level 2
Receiving Water:	Class I Ground Water
Number of Outfalls:	3
Outfall / Type:	001/Subsurface Drainfield 002/Subsurface Drainfield 003/Subsurface Drainfield
Effluent Type:	Domestic Strength Wastewater
Mixing Zone:	001/240 foot Department Modified 002/200 foot Department Modified 003/200 foot Department Modified
Flow Rate:	001/Approved Design Capacity: 52,000 gpd 002/Approved Design Capacity: 22,000 gpd 003/Approved Design Capacity: 45,600 gpd
Fact Sheet Date:	June 02, 2025
Prepared By:	Chris Boe

1.0 PERMIT INFORMATION

The following fact sheet outlines the basis for issuing a modified Montana Ground Water Pollution Control System (MGWPCS) wastewater discharge permit to Alpine Pacific Utilities, LLC (Permittee) for the Glacier Ranch Subdivision. The MGWPCS permit application and supplemental materials provide the information that serves as the bases for the development of the effluent limits, monitoring requirements, and special conditions as outlined within this fact sheet. The scope of this permitting action is for the operation and maintenance of the wastewater treatment and disposal systems.

DEQ issues MGWPCS permits for a period of five years. The permit may be renewed at the end of the period, subject to timely application, reevaluation of compliance, water quality, and operations and maintenance.

1.1 APPLICATION

An application to modify the existing permit was received on February 03, 2022. Information sharing continued until January 21, 2025, when the most recent application materials were received.

1.2 PERMIT HISTORY/CHANGES

The first permit issued in 2007 was for the existing drainfield located within the Glacier Ranch Subdivision (Outfall 001). In 2022, the Permittee proposed to add additional capacity with new drainfields located on the Glacier Park International Airport facility (Outfalls 002, 003, and 004). DEQ will be addressing all sites within the modified permit.

No changes have been made to Outfall 001. DEQ has authorized Outfalls 002 and 003 and established effluent limits for total nitrogen, total phosphorus, and discharge flow rates. This permitting action does not authorize Outfall 004.

2.0 FACILITY INFORMATION

2.1 LOCATION

The Glacier Ranch wastewater system is located in the northern portion of the Flathead Valley, close to the Glacier Park International Airport (**Figure 1, Figure 2**).

Figure 1: Regional Map of Glacier Ranch and the Glacier Park International Airport.

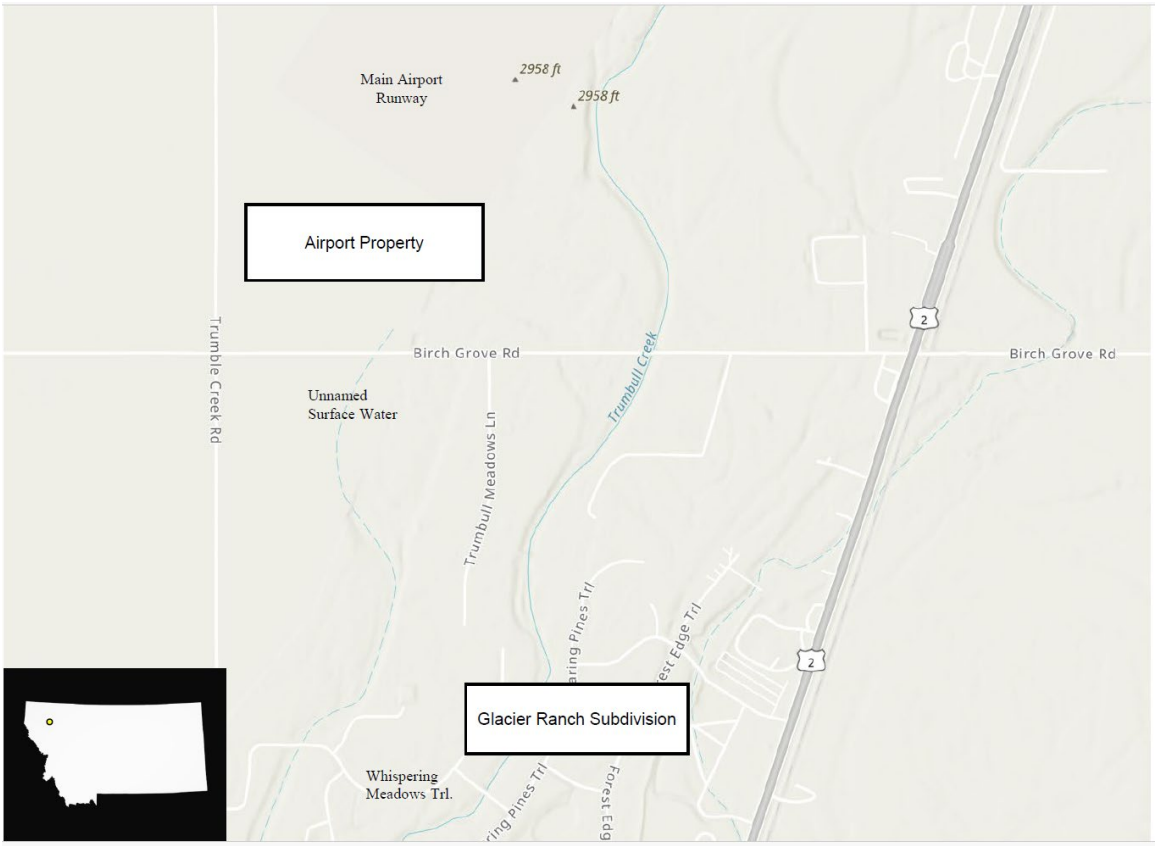

Figure 2: Vicinity Map of Glacier Ranch and the Glacier Park International Airport.

2.2 OPERATIONS

The existing treatment system was designed to process wastewater generated by the existing Glacier Ranch Subdivision. The Permittee recently requested a modification to increase overall capacity allowing it to treat and discharge wastewater generated by the Glacier Park International Airport.

The existing drainfield (Outfall 001) will be maintained to treat and dispose of wastewater from the Glacier Ranch Subdivision. To meet the capacity of the new airport connection, new drainfields have been proposed on airport property. The proposed location is to the Southwest of the main airport runway, approximately 3,000 feet to the North of the Glacier Ranch Subdivision. Due to the spatial separation of drainfield groups, three new outfalls were proposed: Outfall 002, Outfall 003, and Outfall 004 (**Figure 3**).

The existing Outfall 001 will be maintained at the existing capacity of 52,000 gpd. For the new outfalls, a preliminary engineering report was not included in application materials. Therefore, the design capacity was estimated based off the aerial sizes of the submitted drainfield diagram (**Figure 4**). The design capacity for all new drainfield areas equal 100,000 gpd per the application.

During review, DEQ identified concerns with the proposed drainfield layout. Concerns include: lack of a preliminary engineering review, no seasonal ground water flow directions, adjacent private property, nearby domestic water wells, and required setbacks (e.g. well isolation zone, neighboring property; ARM 17.36.323, ARM 17.36.918, ARM 17.36.122). To protect public health, DEQ placed restrictions on areas where drainfields cannot be built. This includes a portion of Outfall 003 and all of Outfall 004 (**Figure 5, Figure 6**).

While authorization of the expansion plans will not be approved as a whole; overall, approximately 67,600 gpd of new capacity has been approved under the proposed modifications of this discharge permit. For water quality, approximately 12.37 lbs/day in additional nitrogen loading is available between the two new outfalls. As mentioned above, DEQ has yet to receive a preliminary engineering review for the new modifications. As such, DEQ Engineering programs may have additional regulatory restrictions in addition to this discharge permit. System operation information, including the existing and proposed design capacities are provided below in **Table 1**.

Table 1: Operations Summary

Sources and Treatment
Contributing Sources of Wastewater: Domestic-in-Nature, Residential Strength Standard Industrial Code(s) (SIC) of contributing sources: 4952, 6552 Treatment System: Centralized Santec Sequencing Batch Reactor with extended aeration and secondary treatment by a Parkenson sand filter and with tertiary treatment via alum injection. Location of System: SESE, Section 09, Township 29 North, Range 21 West Latitude: 48.28400°, Longitude: -114.27052° Flathead County
Sampling/Monitoring
Wastewater System: INF-001: Influent wastewater sample to be collected from the sample port (tee) with a capped riser, located between the lift station and the comminutor. Sample collected will be representative of influent wastewater quality for Outfall 001, Outfall 002, and Outfall 003. EFF-001: Effluent wastewater sample point located at the Outfall 001 drainfield dose tank (or sample port). Sample collected will be representative of treated wastewater quality discharged to Outfall 001, Outfall 002, and Outfall 003. FM-001: Master Flow, Aaliant BEP, magnetic flow meter. Flows representative of treated effluent to Outfall 001. Currently located prior to the sand filter, the meter may need to be relocated due to the construction of additional outfalls. A representative location may be on the Outfall 001 drainfield/dose tank wastewater line. FM-002: Unknown, meter will need to represent effluent flows from Outfall 002. A representative location may be on the Outfall 002 drainfield/dose tank wastewater line. FM-003: Unknown, meter will need to represent effluent flows from Outfall 003. A representative location may be on the Outfall 003 drainfield/dose tank wastewater line. FM-005(INF): Master Flow, Aaliant BEP, magnetic flow meter. Located in between the equalization tank and first aeration tank. Flow representative of influent to centralized treatment system prior to distribution. The permittee is required to submit preliminary engineering plans and as-built reports specifically addressing drainfield location, dimensions, setbacks, and design capacities. The permittee is required to develop (or update) and implement a **Wastewater Sampling, Analysis, and Reporting Plan** for their system (**Section 7**).
Disposal Operation
Outfall 001 - Subsurface Drainfield - Existing - Authorized Method of Disposal: Pressure dosed subsurface infiltration to groundwater. Location: NENE, Section 16, Township 29 North, Range 21 West; Latitude: 48.28356°, Longitude: -114.27033° Design Capacity: Average Daily Flow (gpd): 52,000 Maximum Daily Flow (gpd): 52,000
Outfall 002 - Subsurface Drainfield - Proposed - Authorized Method of Disposal: Pressure dosed subsurface infiltration to groundwater. Location: SWNE, Section 09, Township 29 North, Range 21 West; Latitude: 48.29422°, Longitude: -114.27431° Proposed Application - Design Capacity: Average Daily Flow (gpd): estimated at 22,000 Prohibited Drainfield Area - None as proposed Authorized Drainfield Area - estimated at 22,000 gpd
Outfall 003 - Subsurface Drainfield - Proposed - Partially Authorized Method of Disposal: Pressure dosed subsurface infiltration to groundwater. Location: SWNE, Section 09, Township 29 North, Range 21 West; Latitude: 48.29340°, Longitude: -114.27198° Proposed Application Design Capacity: Average Daily Flow (gpd): estimated at 57,000 Prohibited Drainfield Area - approx. 20% of proposed area Authorized Drainfield Area - estimated at 45,600 gpd
Outfall 004 - Subsurface Drainfield - Proposed - Not Authorized Method of Disposal: Pressure dosed subsurface infiltration to groundwater. Location: SENW, Section 09, Township 29 North, Range 21 West; Latitude: 48.29294°, Longitude: -114.27718° Proposed Application Design Capacity: Average Daily Flow (gpd): estimated at 20,000 Prohibited Drainfield Area - 100% Authorized Drainfield Area - zero (0) gpd, not currently authorized

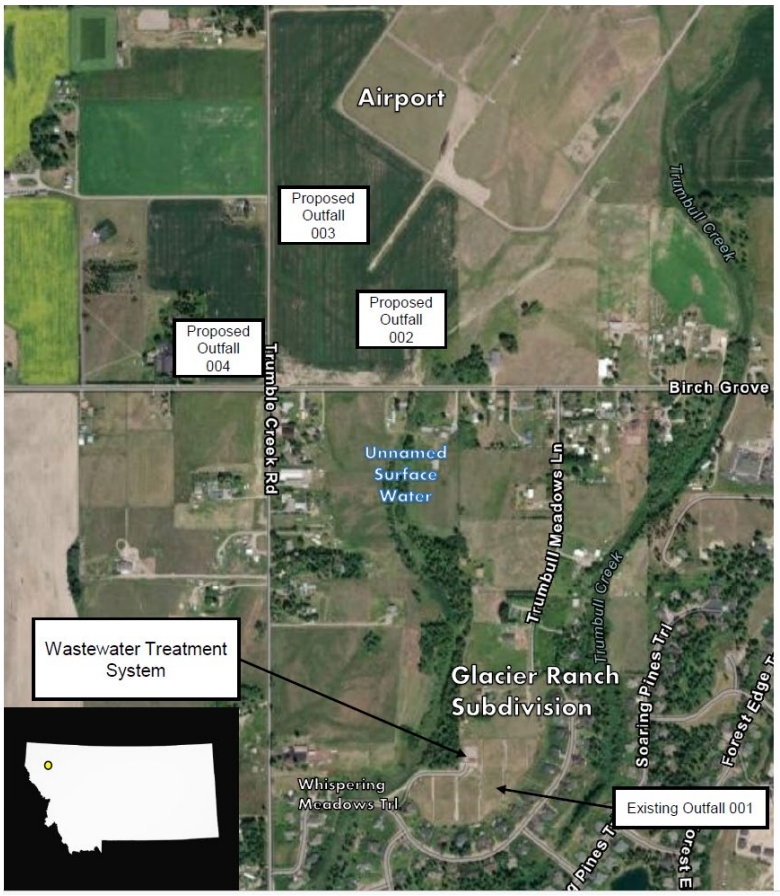

Figure 3: Facility Map

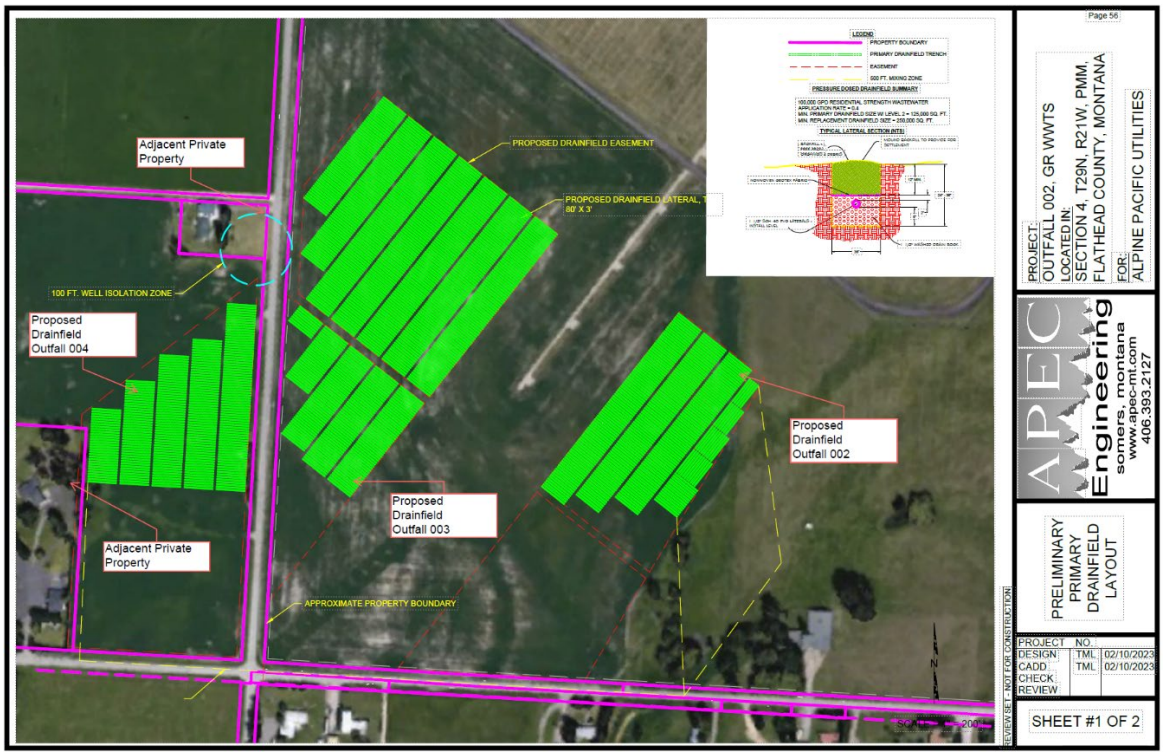

Figure 4: New Drainfield Layouts

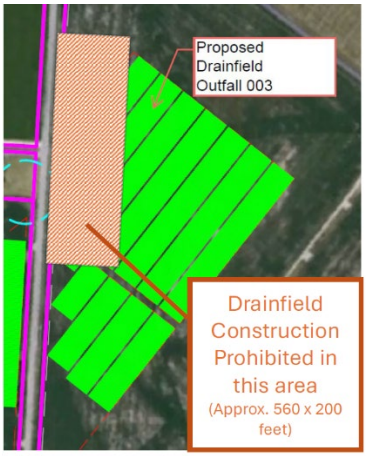

Figure 5: Outfall 003 Restricted Area

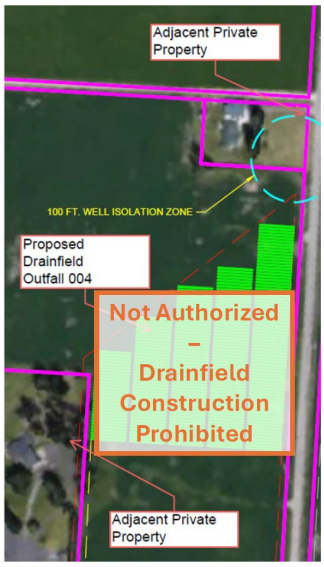

Figure 6: Outfall 004 Prohibited Area

2.3 GEOLOGY/HYDROGEOLOGY/HYDROLOGY

A summary of the site characteristics are provided in **Table 2**. Aquifer testing information is provided in **Appendix A**.

Table 2: Geology/Hydrogeology/Hydrology Summary	
Geology	The facility is located within the Flathead Valley which is an intermontane basin filled with unconsolidated Pleistocene glacial or glacial lake deposits and post glacial quaternary alluvial sediment. The basin is bounded by north to south trending mountain ranges of Precambrian bedrock.
Hydrogeology	The facility is located on the Evergreen aquifer which is generally described as located in between the Whitefish and Flathead Rivers of the Flathead Valley. This shallow aquifer generally flows with the rivers (north to south) and may daylight near the confluence of the Stillwater and Flathead Rivers (LaFave, 2004). Aquifer recharge is primarily from precipitation and surficial water losses from local surface waters (Konizeski, 1968). The aquifer is primarily composed of unconsolidated alluvial gravel, with minor amounts of sand and silt. This unconfined aquifer is underlain by glacial till and glacio-lacustrine sediment deposits which tend to have low permeability (LaFave, 2004). Ground water flow direction at Outfall 001 is generally considered to be S22˚E. The flow direction at Outfall 002, 003, and 004 is currently unknown. Regional studies show potentiometric maps with general flow directions to the South and South-east. The applicant submitted a one-time three point solution indicating a Southern ground water flow; however, multiple measurements reflecting seasonal changes were not completed. It is also unknown whether the monitoring well measuring point elevations were surveyed in for accuracy purposes. Special permit conditions (**Section 7**) have been established to collect additional site-specific and seasonal hydrogeologic data. The top contact of the water bearing zone near Outfall 001 is approximately 11 feet in depth and may be unconfined. The top contact near the proposed drainfields is approximately 10 feet in depth and may be unconfined. Additional site-specific and seasonal hydrogeology information will be required (**Section 7**) in order for the permittee to construct the proposed drainfields where they may not impact human health and private property.
Hydrology	For Outfall 001, Trumbull Creek is the nearest surface water body and is located approximately 256 feet from the eastern edge of the drainfield. Very little information is known about the daylighted Trumbull Creek and the hydraulic relation with the shallow aquifer. It is likely that the shallow aquifer is hydraulically connected to surface waters, though local groundwater and surface water connectivity is yet to be studied. A stream characterization study is critical to understanding the creek. Outfall 002 and 003 are located in between Trumbull Creek and the Whitefish River. The nearest surface water was identified by the applicant as a drainage that runs parallel to Trumbull Creek. The unnamed drainage is located 557 feet to the South of Outfall 002, and 1,750 feet Southeast of Outfall 003. It is likely that the shallow aquifer is hydraulically connected to these surface waters. A stream characterization study is critical to understanding the creek.

2.4 GROUND WATER MONITORING NETWORK

There are nine existing monitoring wells: five for Outfall 001, and four associated with the proposed drainfields area (Outfall 002, 003, and 004). DEQ proposes an additional nine monitoring wells, three for each of the new outfalls. Some of the existing monitoring wells may be used for the proposed monitoring network. The construction of the monitoring wells associated with the unauthorized Outfall 004 may be postponed to a later date.

Monitoring well maps are shown in **Figure 7 and Figure 8**. Existing and proposed well information is provided in **Table 3. Monitoring Well Installation Plan** requirements are discussed in **Section 7**. Existing well lithology and construction diagrams are provided in **Appendix B.**

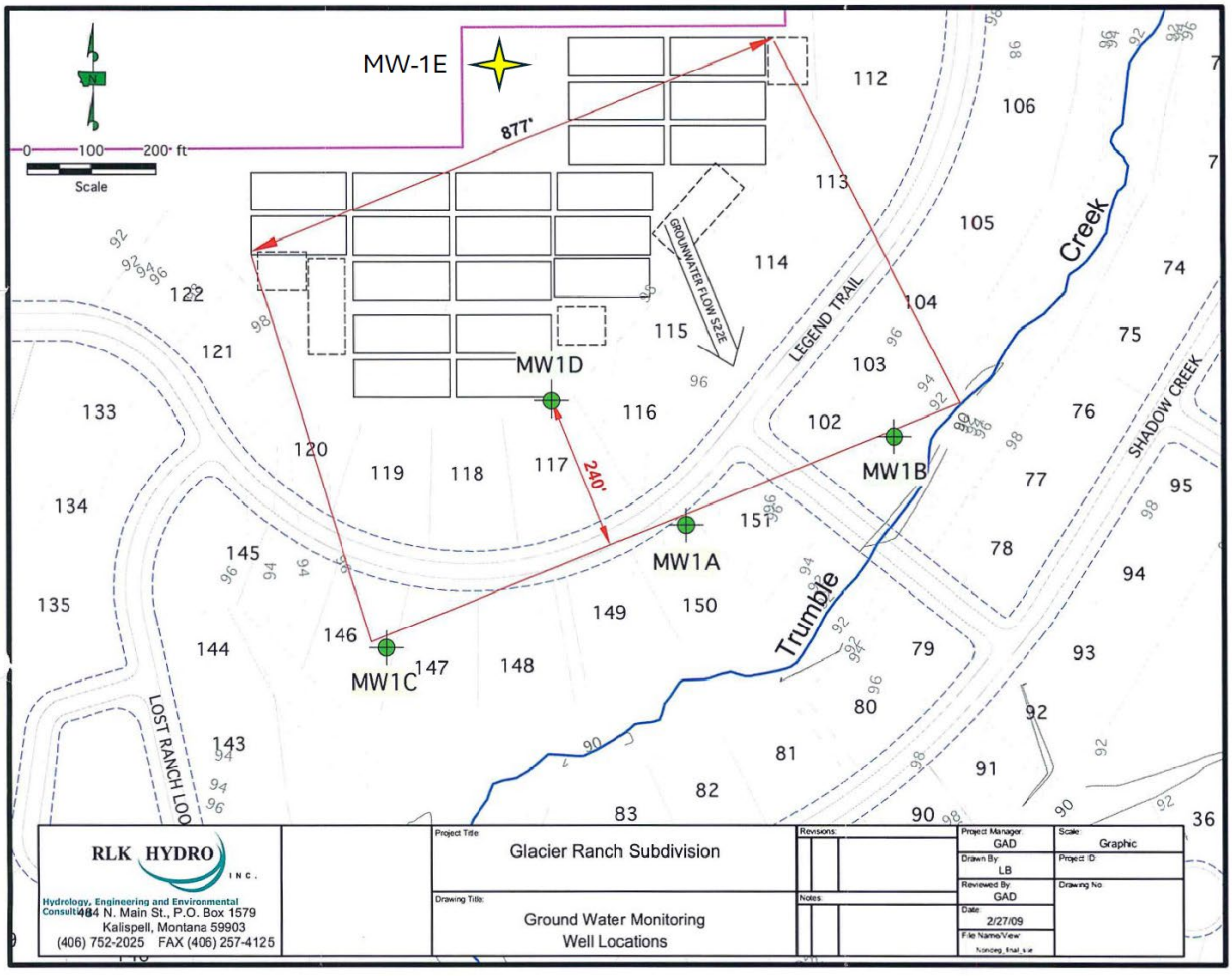

Figure 7: Monitoring Well Map – Outfall 001

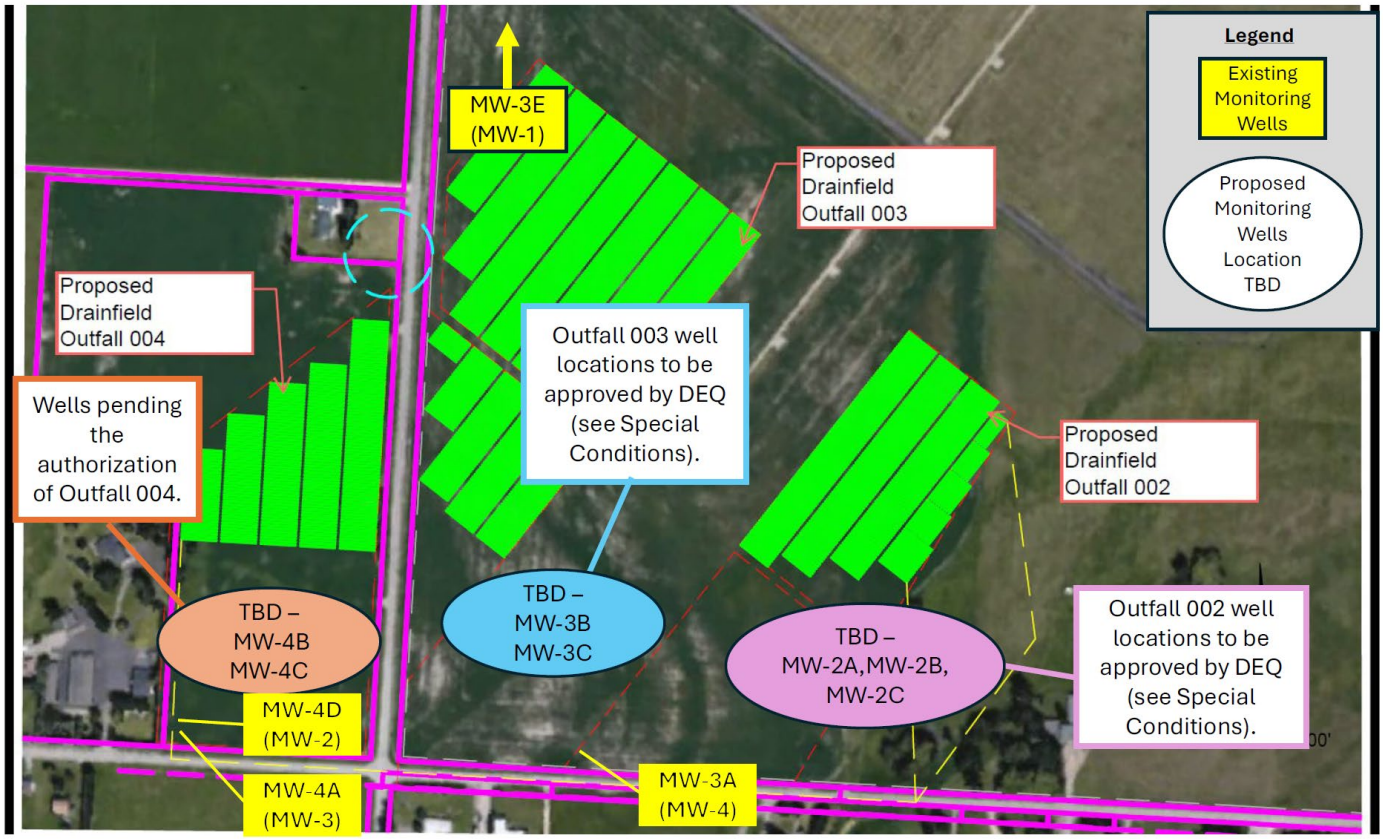

Figure 8: Monitoring Well Map – Outfall 002, 003, 004

Table 3: Monitoring Well Summary
Monitoring Well: MW-1A
MBMG GWIC #: Not Reported
Status: Active. Constructed on 07/22/2009.
Location: Located 160 feet southwest of the road intersection of Whispering Meadows Trail and Shadow Creek Trail. Latitude: 48.28234 Longitude: -114.26943
Representation: Shallow ground water downgradient of the Outfall 001 discharge structure. Located 300 feet to the Southeast of the Southeastern corner of the existing drainfield.
Monitoring Well: MW-1B
MBMG GWIC #: Not Reported
Status: Active. Constructed on 07/22/2009.
Location: Located 240 feet east of the road intersection of Whispering Meadows Trail and Shadow Creek Trail. Latitude: 48.28270 Longitude: -114.26816
Representation: Shallow ground water downgradient of the Outfall 001 discharge structure. Located 500 feet to the Southeast of the Eastern portion of the existing drainfield.
Monitoring Well: MW-1C
MBMG GWIC #: Not Reported
Status: Active. Constructed on 07/22/2009.
Location: Located 580 feet southwest of the road intersection of Whispering Meadows Trail and Shadow Creek Trail. Latitude: 48.28193 Longitude: -114.27119
Representation: Shallow ground water downgradient of the Outfall 001 discharge structure. Located 350 feet South of the Western portion of the existing drainfield.

Monitoring Well: MW-1D
MBMG GWIC #: Not Reported
Status: Active. Constructed on 07/23/2009.
Location: Located 300 feet west of the road intersection of Whispering Meadows Trail and Shadow Creek Trail. Latitude: 48.28286 Longitude: -114.27034
Representation: Shallow ground water downgradient of the Outfall 001 discharge structure. Located on the Southern boundary of the existing drainfield.
Monitoring Well: MW-1E
MBMG GWIC #: 311066
Status: Active. Constructed on 12/01/2020.
Location: Located 300 feet west of the road intersection of Whispering Meadows Trail and Shadow Creek Trail. Latitude: 48.28440 Longitude: -114.27082
Representation: Shallow ground water upgradient of the Outfall 001 discharge structure. Located 40 feet to the Northwest of the treatment system building.
Monitoring Well: MW-2A
MBMG GWIC #: TBD
Status: Active. To be constructed and monitored within 24 months of the effective date of the permit
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 002. The three monitoring wells for Outfall 002 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-2B
MBMG GWIC #: TBD
Status: Active. To be constructed and monitored within 24 months of the effective date of the permit
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 002. The three monitoring wells for Outfall 002 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-2C
MBMG GWIC #: TBD
Status: Active. To be constructed and monitored within 24 months of the effective date of the permit
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 002. The three monitoring wells for Outfall 002 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).

Monitoring Well: MW-3A (MW-4)
MBMG GWIC #: 331536
Status: Active. Constructed on 05/13/2024.
Location: Located 460 feet to the Southeast of the Southern corner of the proposed layout of Outfall 003. Located 500 feet to the East of the intersection of Trumble Creek Road and Birch Grove Road. Depending on the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**, this well may be used as one of the three downgradient monitoring wells. Final determinance will be made by the DEQ approved **Monitoring Well Installation Plan**. Latitude: 48.29128 Longitude: -114.27436
Representation: Shallow ground water possibly downgradient of the proposed Outfall 003 discharge structure.
Monitoring Well: MW-3B
MBMG GWIC #: TBD
Status: Active. To be constructed and monitored within 24 months of the effective date of the permit
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 003. The three monitoring wells for Outfall 003 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-3C
MBMG GWIC #: TBD
Status: Active. To be constructed and monitored within 24 months of the effective date of the permit
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 003. The three monitoring wells for Outfall 003 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-3E (MW-1)
MBMG GWIC #: 331537
Status: Active. Constructed on 05/14/2024.
Location: Located 450 feet to the North of the Northern corner of the proposed layout of Outfall 003. Located 2,200 feet to the North of the intersection of Trumble Creek Road and Birch Grove Latitude: 48.29676 Longitude: -114.27587
Representation: Ambient well. Shallow ground water upgradient of the proposed discharge structures: Outfall 002, 003, and 004).
Monitoring Well: MW-4A (MW-3)
MBMG GWIC #: 331538
Status: Not Active. Pending authorization of Outfall 004. Constructed on 05/15/2024.
Location: Located 430 feet to the South of the Southern boundary of the proposed layout of Outfall 004. Located 450 feet to the West of the intersection of Trumble Creek Road and Birch Grove Road. Depending on the findings of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**, this well may be used as one of the three downgradient monitoring wells. Final determinance will be made by the DEQ approved **Monitoring Well Installation Plan**. Latitude: 48.29122 Longitude: -114.27819
Representation: Pump test well. Shallow ground water downgradient of the proposed Outfall 004 discharge structure.

Monitoring Well: MW-4B
MBMG GWIC #: TBD
Status: Not Active. Pending authorization of Outfall 004.
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey** and **Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 004. The three monitoring wells for Outfall 004 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-4C
MBMG GWIC #: TBD
Status: Not Active. Pending authorization of Outfall 004.
Location: Will be based on the DEQ approved **Monitoring Well Installation Plan** taking into account the findings of the **Monitoring Well Survey** and **Seasonal Ground Water Flow Direction Report**. Latitude: TBD Longitude: -TBD
Representation: Shallow ground water downgradient of the proposed discharge structure Outfall 004. The three monitoring wells for Outfall 004 will be evenly spaced on the downgradient boundary of the mixing zone (or modified as approved by DEQ within the **Monitoring Well Installation Plan**).
Monitoring Well: MW-4D (MW-2)
MBMG GWIC #: 331539
Status: Not Active. Backup for MW-4A. Located close to MW-4A. Constructed on 05/15/2024.
Location: Located 350 feet to the South of the Southern boundary of the proposed layout of Outfall 004. Located 460 feet to the Northwest of the intersection of Trumble Creek Road and Birch Grove Road. Latitude: 48.29143 Longitude: -114.27821
Representation: Observation well for pump test completed on MW-4A (MW-3). Shallow ground water downgradient of the proposed Outfall 004 discharge structure.

If a DEQ-approved monitoring well is abandoned, destroyed or decommissioned, or is no longer able to be sampled due to fluctuations in the ground water table, the permittee must install or designate a new well to replace the abandoned, destroyed, decommissioned, or non-viable well.

2.5 QUALITY INFORMATION

The existing treatment system will be used to treat wastewater discharged at all approved outfalls (currently 001, 002, and 003). The centralized system currently meets Level 2 standards with an average total nitrogen discharge of 19.3 mg/L. A summary of the estimated effluent characteristics is provided in **Table 4**.

Recently collected ground water quality characteristics confirm that the aquifer is Class I at both the existing Outfall 001 and the new drainfield areas. The beneficial use classification is based on specific conductance data. A summary of ambient ground water quality is provided in **Table 4.**

Table 4: Quality Summary

Analyte/Measurement	units	Wastewater Characteristics		Water Quality Standards & 2007 Permit Limits Outfall 001 *(in italics)*	Ambient Ground Water Quality	
		Influent	**Treated Existing System** May service all outfalls		**Outfall 001**	**Outfall 002 Outfall 003 Outfall 004**
Escherichia coli Bacteria	CFU/100ml	*	present	<1	<1	<1
Biochemical Oxygen Demand (BOD_5)	mg/L	343	11		*	*
Chloride [as Cl]	mg/L	*	*		*	7 to 13
Nitrogen, Ammonia [as N](1)	mg/L	*	0.09-23.50		*	*
Nitrogen, Kjeldahl, total [as N](1)	mg/L	58.0	1.0-17.7		*	ND to 1.25
Nitrogen, Nitrite + Nitrate [as N]	mg/L	0.06	0.13-49.91	7.5	1.17	0.90-1.54
Nitrogen, Total [as N]	mg/L	59.9	6.2-55.8		*	0.59-2.19
Nitrogen, Total [as N]	lbs/day	*	0.88-8.75	*6.51*	*	*
Oil & Grease [HEM]	mg/L	39	1		*	*
pH	s.u.	*	6.70-7.94		*	7.60-8.39
Phosphorus, Total [as P]	mg/L	*	2.4	Table 6	*	*
	lbs/day	*	0.07-1.32	*1.08*	*	*
Specific Conductivity [SC] @ 25°C	µS/cm	*	*		*	293-510
Solids, Total Suspended Solids (TSS)	mg/L	187	19		*	*
Solids, Total Dissolved (TDS)	mg/L	*	*		*	*

Footnotes:
CFU = Colony Forming Units
ft-bmp: feet below measuring point
MSL: mean sea level
s.u.: standard units
*Analyte was not sampled in the application process, or not required.
The median value is displayed for the parameters that have a skewed, variable, or limited data set; otherwise average is listed.
Flow rate from Outfall 001 was reported at an average of 19,593 gpd. The maximum rate was 32,332 gpd. Period of record: 01/20 to 12/24.
Ground water quality taken from the existing MW-1E associated with Outfall 001. Period of record: 5/17/24 to 10/10/2024.
Ground water quality taken from the four newly installed monitoring wells associated with Outfall 002, 003, and 004. Period of record: 5/24 to 10/24.
(1) Ammonia and organic nitrogen are the primary nitrogen components in untreated and minimally treated wastewater streams.

Downgradient ground water monitoring associated with Outfall 001 was completed over the previous permit cycle. A summary is provided in **Table 5**.

Table 5: Ground Water Monitoring Results - Outfall 001

Monitor Source[(1)]	Parameter	Units	Reported Minimum Value	Reported Average Value	Reported Maximum[(2)] Value	# of Samples	Source of Data
MW-1A	Chloride (as Cl)	mg/L	3	8	14	19	DMR
	Escherichia coli Bacteria	CFU/100 ml	<1	<1	<1	19	DMR
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.38	1.50	2.61	19	DMR
	Nitrogen, Total Kjeldahl (as N)	mg/L	<0.5	<0.5	0.5	19	DMR
	Nitrogen, Total (as N)	mg/L	0.4	1.6	2.6	19	DMR
	Specific Conductivity (@ 25°C)	µS/cm	284	395	465	19	DMR
	Static Water Level (SWL)	ft-bgs	6.75	9.49	10.50	19	DMR
MW-1B	Chloride (as Cl)	mg/L	4	8	14	19	DMR
	Escherichia coli Bacteria	CFU/100 ml	<1	<1	<1	19	DMR
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.82	1.32	2.10	19	DMR
	Nitrogen, Total Kjeldahl (as N)	mg/L	<0.5	<0.5	2.1	19	DMR
	Nitrogen, Total (as N)	mg/L	0.8	1.4	2.1	19	DMR
	Specific Conductivity (@ 25°C)	µS/cm	257	401	455	19	DMR
	Static Water Level (SWL)	ft-bgs	4.90	7.85	9.00	19	DMR
MW-1C	Chloride (as Cl)	mg/L	5	10	14	19	DMR
	Escherichia coli Bacteria	CFU/100 ml	<1	<1	<1	19	DMR
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.66	2.17	3.15	19	DMR
	Nitrogen, Total Kjeldahl (as N)	mg/L	<0.5	<0.5	3.1	19	DMR
	Nitrogen, Total (as N)	mg/L	1.2	2.3	3.1	19	DMR
	Specific Conductivity (@ 25°C)	µS/cm	347	432	542	19	DMR
	Static Water Level (SWL)	ft-bgs	5.90	9.03	12.20	19	DMR
MW-1D	*Escherichia coli* Bacteria	CFU/100 ml	<1	<1	0.7	19	DMR
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.64	2.64	11.32	19	DMR
	Static Water Level (SWL)	ft-bgs	7.80	11.43	17.12	19	DMR

Footnotes:
DMR = Self Reported Discharge Monitoring Reports
Period of Record: 01/2020 through 12/2024.
The median value is displayed for the parameters that have a skewed, variable, or limited data set; otherwise average is listed.
(1) Refer to Section II of the Fact Sheet for the existing or proposed location of the monitoring wells.
(2) Maximum value recorded of all monthly or quarterly reported values.

2.6 WATER WELL INFORMATION

Records from Montana Bureau of Mines and Geology (MBMG) Ground-Water Information Center (GWIC) for wells in the vicinity of the proposed drainfields is included in **Appendix C**. GWIC well records typicaly do not include acurate geospatial information. Therefore, DEQ is asking for additional water well information in order to juxtapose the proposed drainfields and mixing zones (**Section 7**). A reference map showing estimated locations is provided in **Appendix C**.

3.0 WATER QUALITY STANDARDS

Part of DEQ's mission is to protect, maintain, and improve the quality of state waters. Water quality standards provide the basis for limitations that protect state waters. These include maintenance of designated beneficial uses, specific water quality standards, and the State nondegradation policy. DEQ protects all designated uses of state water by basing effluent limitations on the most restrictive water quality standards intended to protect the most sensitive uses.

3.1 BENEFICIAL USES

The receiving state water is Class I ground water which is a high quality water of the state. The current and future beneficial uses of the aquifer must be protected. The beneficial uses and water quality standards necessary to protect those uses are listed below.

Beneficial uses:

- Public and private water supplies;
- Culinary and food processing purposes;
- Irrigation;
- Drinking water for livestock and wildlife; and,
- Commercial and industrial purposes.

Water quality standards are established to protect these beneficial uses. The applicable standards include the following:

- Ground water human health standards in DEQ 7;
- No increase in any parameter that renders receiving water harmful, detrimental, or injurious to the beneficial uses designated for Class I groundwater in ARM 17.30.1006; and,
- No increase of a parameter that causes violation of the nondegradation provisions in § 75-5-303, MCA.

DEQ protects all the assigned beneficial uses by protecting the most sensitive. The most restrictive standard will be used in formulating limitations (**Section 5**). The corresponding numeric and narrative standards are listed in **Table 6**.

Table 6: Water Quality Standards.

Parameter[1]	Units	Ground Water Human Health Standards	Pollutant Category[2]	Nonsignificance Criteria[3]
Bacteria [*Escherichia coli*]	CFU/100mL	< 1	-	-
Nitrogen, Nitrate + Nitrite [as N]	mg/L	10.0	T	7.5
Nitrogen, Total (TN)[4]	mg/L	10.0	-	7.5
Phosphorus, Total Inorganic	-	-	H	Surface water breakthrough time greater than 50 years[5]

Footnotes:
CFU = Colony Forming Unit
These standards establish the allowable changes in ground water quality and are the basis for limiting discharges to ground water.
(1) The list includes identified parameters of interest.
(2) Circular DEQ-7: Carcinogen (C), Harmful (H), and Toxic (T) parameter. Toxic pollutant with a Bioconcentrator (B) factor.
(3) Criteria indicates threshold for a significant activity that may lead to degradation.
(4) DEQ conservatively assumes all forms of nitrogen will convert to nitrates within the aquifer. DEQ recognizes that other nitrogen forms may be harmful to the beneficial uses therefore will use Total Nitrogen for projecting impacts and in formulation of compliance efforts (limitations).
(5) Changes in receiving ground water quality are not significant if water quality protection practices approved by the DEQ have been fully implemented and if the listed nonsignificance criteria is met.

3.2 NONDEGRADATION

Montana's nondegradation policy is intended to preserve the existing condition of high-quality state waters. Any water whose existing condition is better than the water quality standards must be maintained in that high quality. Nondegradation policy allows discharges to cause only nonsignificant changes in water quality.

Activities that cause a significant change in water quality may not be authorized without an authorization to degrade. See 75-5-303(3), MCA. The permittee has not requested nor received an authorization to degrade.

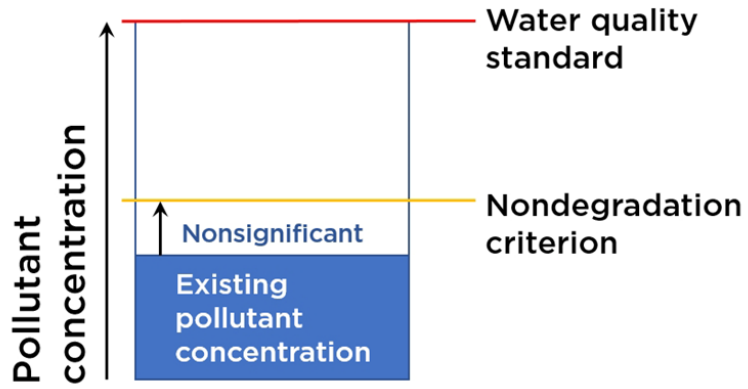

Figure 9: Nonsignificance schematic

3.3 SIGNIFICANCE CRITERIA AND DETERMINATION

Changes of nitrate as nitrogen in ground water are nonsignificant if the discharge will not cause degradation of surface water and the predicted concentration of nitrate as nitrogen at the boundary of the ground water mixing zone does not exceed 7.5 mg/L. See §§ 75-5-301(5)(c)(d), MCA, 75-5-317(2)(u), and ARM 17.30.715(1)(d). Using the nonsignificance criterion of 7.5 mg/L, DEQ will establish effluent limitations and long-term monitoring requirements for compliance at the end of the mixing zones (**Section 5**).

For phosphorus, a surface water breakthrough time of greater than 50 years is a nonsignificant change in water quality. See § 75-5-317(2)(u), and ARM 17.30.715(1)(e). The phosphorus criterion requires an analysis to determine a breakthrough time based on the adsorption capacity of the soil. Breakthrough occurs when the subsurface soils lose their capability to adsorb any more phosphorus, and it has a potential to reach surface water. DEQ's phosphorus breakthrough analyses estimates that phosphorus discharged to ground water from Outfall 001, 002, and 003 may respectively reach surface waters in 97, 133, and 164 years (**Appendix D**).

The predicted phosphorus breakthroughs are greater than 50 years, and therefore is not considered to be significant. Typically, these activities do not require a permit limitation. However, DEQ will be conservative and establish an effluent limitation based on a projected 50-year breakthrough. This will prevent degradation of downgradient surface water to ensure that changes in water quality are nonsignificant. Development of the effluent limit for phosphorus is discussed in **Section 5**.

These analyses show that the discharge activity authorized by the permit is not significant. The discharge permit requires that the permittee comply with the permit effluent limitations on a long-term basis.

3.4 CUMULATIVE EFFECTS

To protect beneficial uses, there shall be no increase of a pollutant to a level that renders the waters harmful, detrimental, or injurious. Therefore, no wastewaters may be discharged such that the wastewater either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard.

The allowable discharge will be derived from a mass-balance equation that determines the assimilative capacity of the receiving aquifer. This factors in the cumulative impacts of all existing upgradient discharges in the receiving aquifer. Testing of the aquifer was completed to determine the existing impacts of all upgradient discharge sources.

A ground water monitoring network has been established that will provide for long-term monitoring of the aquifer both upgradient and downgradient of the discharge. The ground water data collected will provide continual monitoring of the aquifer including the cumulative impacts of any nutrient source upgradient and downgradient of the permitted dischargers. This data is available to the public and used by DEQ to update future permit limitations. In addition, any update to limitations, including cumulative effect analyses, will be noticed to the public and will undergo public comment. Long-term monitoring and reporting, continual analysis and updates of permit conditions, and public notice and comment procedures is a benefit to having a system that is covered under a discharge permit.

3.5 REASONABLE POTENTIAL

The phosphorus breakthrough analysis is based upon distance and time to nearest surface water, inherently addressing the potential for degradation of surface water. Therefore, the analysis of reasonable potential for surface water degradation in this section is limited to nitrogen.

For the existing Outfall 001, Trumbull Creek is the surface water body located downgradient of the drainfield. To date, DEQ has little information on stream characterization, ground water/surface water interaction, and fate and transport; information that is needed to perform a reasonable potential analysis.

For the proposed drainfield areas, an unnamed creek was identified within the application as being downgradient. The creek is possibly located as close as 500 feet to the South of Outfall 002 (**Figure 3**). This creek runs parallel to Trumbull Creek and the Whitefish River. To date, DEQ has no information on stream characterization, ground water/surface water interaction, and fate and transport; information that is needed to perform a reasonable potential analysis.

The first step in analyzing for the potential measurable impacts on surface water is the collection of additional site-specific hydrogeology. The MGWPCS permit requires these additional studies through defined special permit conditions of **Section 7** (**Monitoring Well Survey and Seasonal Ground Water Flow Direction Report,** and **Monitoring Well Installation Plan and Report**). After successful completion, the next step would be a stream characterization study, ground water to surface water connectivity study, and possibly a fate and transport study at both project sites to determine if an impact to surface waters is anticipated.

All major discharge permitting actions, including the current action and any future actions, will include any substantive information derived from public input relating to potential impacts on the human environment and on water quality. All future actions related to this current action will be addressed by DEQ through additional discharge permitting process procedures. Actions that fall outside the purview of the discharge permit may not be addressed by DEQ until the next permitting action takes place.

4.0 MIXING ZONE

A mixing zone is an area of the receiving shallow ground water where the aquifer is able to assimilate wastewater pollutants. It is a specifically defined area of the receiving aquifer where water quality standards may be exceeded. The availability of dilution is based on the site-specific aquifer characteristics and the drainfield dimensions. The allowable level of dilution is limited by the permit to ensure that water quality standards are met at the end of the mixing zone.

A standard mixing zone extends 500 feet downgradient from the source. The existing Outfall 001 currently has a modified length of 240 feet to avoid intersection with the downgradient Trumbull Creek. The newly proposed Outfall 002 and 003 will both have a modified length of 200 feet to protect nearby domestic water wells and comply with setbacks (e.g. well isolation zone, neighboring property; ARM 17.36.323, ARM 17.36.918, ARM 17.36.122).

A standard mixing zone has a credit for aquifer dispersion that can widen the downgradient boundary. Typically, this credit is the tangent of 5° angles added to the drainfield width in the direction of ground

water flow (**Figure 10**). Due to the lack of site information discussed in Section 2, Outfall 002 and 003 will not be provided with this dispersion credit; the downgradient mixing zone widths will be equal to the upgradient drainfield width. This is a conservative assumption that limits the amount of dilution available to the discharge. This may be modified in the future after the site-specific studies of Section 7 are completed.

The mixing zone dimensions established in 2007 for Outfall 001 will remain the same.

All outfalls will receive the standard mixing zone depth extending 15 feet below the top contact of the ground water table.

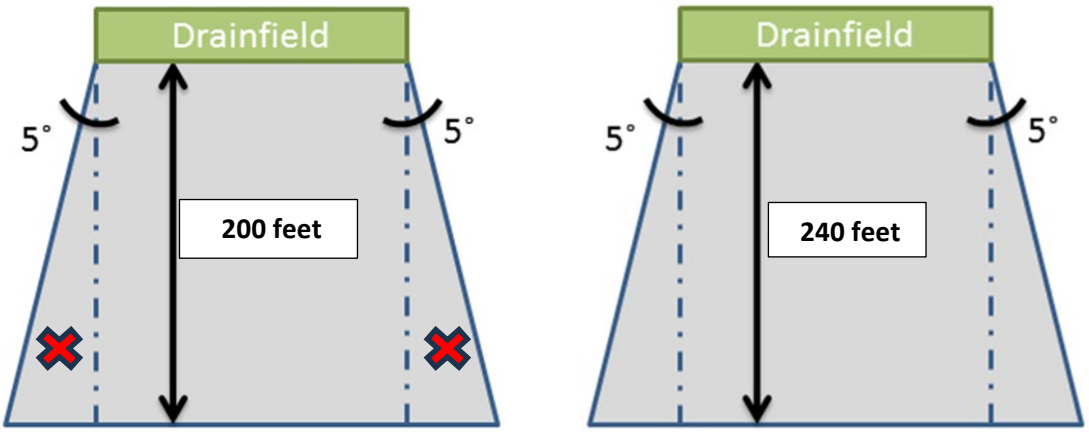

Figure 10: Mixing zone schematic (Left: Outfall 002 and 003; Right: Outfall 001)

Information below provides details on how DEQ calculates the available dilution of the receiving aquifer. A summary of each mixing zone is provided in **Table 7, 8 and 9.**

Based on the dimensions of the mixing zone, and the hydrogeologic characteristics (**Section 2**), the volume of ground water (Q_{gw}) available to mix with the wastewater is calculated using Darcy's Equation:

$$Q_{gw} = KIA$$

Where Q_{gw} = ground water flow volume (ft^3/day); K = hydraulic conductivity (ft/day); I = hydraulic gradient (ft/ft); and, A = cross-sectional area (ft^2) of flow at the downgradient boundary of the mixing zone.

The aquifer pump test information is provided in **Appendix A.**

Table 7: Hydrogeologic and Mixing Zone Information - Outfall 001		
Parameter	**Units**	**Value**
Mixing Zone Type	-	Department Modified
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	1.17
Ground Water Flow Direction	azimuth/ bearing	S22°E
Length of Mixing Zone	feet	240
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	877
Width of Mixing Zone at Down Gradient Boundary	feet	919
Cross Sectional Area of Mixing Zone (A)	ft^2	13,785
Hydraulic Conductivity (K)	feet/day	645.7
Hydraulic Gradient (I)	ft/ft	0.0033
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	29,373

Table 8: Hydrogeologic and Mixing Zone Information - Outfall 002		
Parameter	**Units**	**Value**
Mixing Zone Type	-	Department Modified
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	1.24
Ground Water Flow Direction	azimuth/ bearing	Unknown Predicted to be Southernly
Length of Mixing Zone	feet	200
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	615
Width of Mixing Zone at Down Gradient Boundary	feet	615
Cross Sectional Area of Mixing Zone (A)	ft^2	9,225
Hydraulic Conductivity (K)	feet/day	1,959.8
Hydraulic Gradient (I)	ft/ft	0.00051
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	9,220

Table 9: Hydrogeologic and Mixing Zone Information - Outfall 003		
Parameter	**Units**	**Value**
Mixing Zone Type	-	Department Modified
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	1.24
Ground Water Flow Direction	azimuth/ bearing	Unknown Predicted to be Southernly
Length of Mixing Zone	feet	200
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	775
Width of Mixing Zone at Down Gradient Boundary	feet	775
Cross Sectional Area of Mixing Zone (A)	ft^2	11,625
Hydraulic Conductivity (K)	feet/day	1,959.8
Hydraulic Gradient (I)	ft/ft	0.00051
Volume of Ground Water Available for Mixing (Q_{gw})	ft^3/day	11,619

5.0 LIMITATIONS

Discharge permits include conditions that ensure compliance with the Montana Water Quality Act and the regulations used to implement it. These conditions include effluent limits as well as any special conditions that DEQ deems necessary to protect the quality of the receiving water.

5.1 NITROGEN

To protect beneficial uses, there shall be no increase of a pollutant to a level that renders the waters harmful, detrimental, or injurious. Therefore, no wastewaters may be discharged such that the wastewater either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. DEQ will establish an effluent limitation for nitrogen within this permit. The limit will conservatively be based on the projection that the entire nitrogen load in the wastewater stream may ultimately be converted to nitrate.

The allowable discharge will be derived from a mass-balance equation which is a simple steady-state model that determines the assimilative capacity of the receiving aquifer. The equation factors in cumulative impacts of existing upgradient discharges in the receiving aquifer and any available dilution within the mixing zone. The mass-balance equation derived for ground water is as follows:

$$Q_{gw}C_{gw} + Q_{eff}C_{eff} = Q_{comb}C_{proj}$$

Where Q_{gw} = ground water available for mixing; C_{gw} = ambient receiving ground water concentration; Q_{eff} = design capacity of wastewater system; C_{eff} = effluent pollutant concentration; Q_{comb} = combined ground water and effluent volume; and, C_{proj} = projected pollutant concentration (after available dilution).

The mass-balance equation has been arranged to calculate the maximum amount of nitrogen that can be added to the aquifer without causing or contributing to an exceedance of the water quality standard:

$$C_{limit} = C_{std} + \frac{Q_{gw}}{Q_{eff}}(C_{std} - C_{gw})$$

Where C_{limit} = concentration-based effluent limit; C_{std} = water quality standard concentration; Q_{gw} = ground water available for mixing; Q_{eff} = design capacity of wastewater system; and, C_{gw} = ambient receiving ground water concentration.

Numeric effluent limits are often expressed as loads which inherently regulates both volume and strength of the discharge. The load limit ensures compliance with the ground water standard at the end of the mixing zone.

$$L_{limit} = C_{limit} Q_{eff} f_{con}$$

Where L_{limit} = load-based effluent limit (lb/day); C_{limit} = concentration-based effluent limit (mg/L); Q_{eff} = design capacity of wastewater system (gpd); and, f_{con} = conversion factor of 8.34×10^{-6}.

The resulting load limits are provided in **Table 10, 11, and 12**.

DEQ evaluates and recalculates the limits using updated water quality data as part of every permit renewal cycle. In this way, DEQ protects the receiving water quality by continually assessing impacts to the receiving water.

5.2 PHOSPHORUS

As discussed in **Section 3**, the phosphorus breakthrough analyses estimated the phosphorus breakthrough to occur greater than 50 years for all outfalls. DEQ will be conservative and establish an effluent limitation based on a predicted 50-year breakthrough. This will prevent degradation of downgradient surface water to ensure that changes in water quality are nonsignificant. The resulting load limits are provided in **Table 10, 11, and 12**.

5.3 DISCHARGE FLOWS

As discussed in **Section 2**, DEQ has placed restrictions on areas where the new drainfields cannot be built. This in turn limits the design capacity of the currently proposed outfalls. The resulting limitation on effluent flows are provided in **Table 10, 11 and 12**.

5.4 FINAL EFFLUENT LIMITS

The effluent limitations for this permit are summarized in **Table 10, 11, and 12.**

Table 10: Effluent Limitations – Outfall 001				
Parameter	**Units**	**Monthly Average**	**Daily Maximum**	**Annual Average**
Nitrogen, Total [as N]	lbs/day	6.51	-	-
Discharge Flow	gpd	-	52,000	-
Phosphorus, Total [as P]	lbs/year	-	-	394

Table 11: Effluent Limitations – Outfall 002				
Parameter	**Units**	**Monthly Average**	**Daily Maximum**	**Annual Average**
Nitrogen, Total [as N]	lbs/day	4.98		-
Discharge Flow	gpd	-	22,000	-
Phosphorus, Total [as P]	lbs/year	-		444

Table 12: Effluent Limitations – Outfall 003				
Parameter	**Units**	**Monthly Average**	**Daily Maximum**	**Annual Average**
Nitrogen, Total [as N]	lbs/day	7.39		-
Discharge Flow	gpd	-	45,600	-
Phosphorus, Total [as P]	lbs/year	-		1,120

Table 13: Effluent Limitations – Outfall 004				
Parameter	**Units**	**Monthly Average**	**Daily Maximum**	**Annual Average**
Outfall Not Currently Authorized				

6.0 MONITORING AND REPORTING

Long-term monitoring and reporting of wastewater and ground water will be established as a condition of the permit. Monitoring of the wastewater characteristics before and after treatment will help ensure operation, maintenance, and compliance with the permit limitations. Wastewater monitoring and reporting requirements are provided in **Tables 14, 15, 16 and 17**. The permittee must develop and implement a **Wastewater Sampling, Analysis, and Reporting Operation Manual**. This manual is further discussed in **Section 7**.

Ground water monitoring will provide DEQ with ongoing information on the current and future health of the aquifer. Ground water monitoring and reporting requirements are provided in **Table 18**. The permittee must develop and implement a **Ground Water Monitoring, Analysis, and Reporting Operational Manual**. This manual is further discussed in **Section 7**.

Reporting must be completed in use of Discharge Monitoring Reports (DMRs). The permittee or operator will file DMRs electronically through the online NetDMR program. Information and contacts for this program can be found here: https://deq.mt.gov/water/assistance.

Table 14: Influent Monitoring and Reporting Requirements

Analyte/Measurement	Monitor Location	Units	Sample Type[(1)]	Minimum Sample Frequency	Reporting Requirements[(1)(2)]	Report Frequency
Biochemical Oxygen Demand (BOD_5)	INF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Flow Rate, Effluent[(3)]	FM-005	gal/day	Contin-uous	Contin-uous	Monthly Average[(4)] Daily Maximum[(7)]	Monthly
	FM-005	gal/month	Contin-uous	Contin-uous	Monthly Total	Monthly
	FM-005	gal/year	Contin-uous	Contin-uous	Annual Total	Annually[(9)]
Nitrogen, Nitrite+Nitrate [as N]	INF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Ammonia [as N]	INF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)[as N]	INF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total [as N][(5)]	INF-001	mg/L	Calculate	1/Month	Monthly Average	Monthly
		lbs/day[(6)]	Calculate	1/Month	Monthly Average	Monthly
Total Suspended Solids (TSS)	INF-001	mg/L	Grab	1/Month	Monthly Average	Monthly

Footnotes:

EFF: Description provided in Table 1 of the Fact Sheet document.

INF: Description provided in Table 1 of the Fact Sheet document.

FM: Description provided in Table 1 of the Fact Sheet document.

If no discharge occurs through out the reporting period, "no discharge" shall be recorded on the wastewater Discharge Monitoring Report (DMR) report forms.

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above or within a deviation authorized by DEQ.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Monthly Average: The average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period.

(3) Requires recording device and/or totalizing meter. Equipment must be capable of recording daily, monthly, and annual effluent volumes.

(4) Monthly Average Flows: Determine total flows (gal/month) that occurred during the monthly reporting period. Divide total flow by the number of calendar days in the Monthly reporting period to get a unit of daily flow (gal/day).

(5) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

(6) Monthly Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period. Determine totalized monthly flows (gal/month): Total flow that occurred during the monthly reporting period. Convert to a daily flow average (gal/day): Divide the total monthly flow (gal/month) by the total calendar days (days) of the monthly reporting period. Calculate monthly load (lbs/day): Concentration (mg/L) x Flows (gal/day) x [8.34×10^{-6}].

(7) Daily Maximum: The highest daily flow occurring during the monthly reporting period.

(8) Annual Load calculation. Determine concentration (mg/L): Use the average of all reported daily concentrations (mg/L) reported during the annual reporting period. Determine totalized annual flows (gal/year): Total flow that occurred during the annual reporting period. Calculate annual load (lbs/year): Concentration (mg/L) x Flow (gal/year) x [8.34×10^{-6}].

(9) Annual average load and annual flows shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

Table 15: Effluent Monitoring and Reporting Requirements - Outfall 001

Analyte/Measurement	Monitor Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Requirements[1][2]	Report Frequency
Biochemical Oxygen Demand (BOD_5)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Flow Rate, Effluent[3]	FM-001	gal/day	Contin-uous	Contin-uous	Monthly Average[4] Daily Maximum[7]	Monthly
	FM-001	gal/month	Contin-uous	Contin-uous	Monthly Total	Monthly
	FM-001	gal/year	Contin-uous	Contin-uous	Annual Total	Annually[9]
Nitrogen, Nitrite+Nitrate [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Ammonia [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)[as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total [as N][5]	EFF-001	mg/L	Calculate	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
Phosphorus, Total [as P]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
		lbs/year[8]	Calculate	1/Year	Annual Average	Annually[9]
Total Suspended Solids (TSS)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly

Footnotes:

EFF: Description provided in Table 1 of the Fact Sheet document.

INF: Description provided in Table 1 of the Fact Sheet document.

FM: Description provided in Table 1 of the Fact Sheet document.

If no discharge occurs through out the reporting period, "no discharge" shall be recorded on the wastewater Discharge Monitoring Report (DMR) report forms.

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above or within a deviation authorized by DEQ.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Monthly Average: The average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period.

(3) Requires recording device and/or totalizing meter. Equipment must be capable of recording daily, monthly, and annual effluent volumes.

(4) Monthly Average Flows: Determine total flows (gal/month) that occurred during the monthly reporting period. Divide total flow by the number of calendar days in the Monthly reporting period to get a unit of daily flow (gal/day).

(5) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

(6) Monthly Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period. Determine totalized monthly flows (gal/month): Total flow that occurred during the monthly reporting period. Convert to a daily flow average (gal/day): Divide the total monthly flow (gal/month) by the total calendar days (days) of the monthly reporting period. Calculate monthly load (lbs/day): Concentration (mg/L) x Flows (gal/day) x [8.34×10^{-6}].

(7) Daily Maximum: The highest daily flow occurring during the monthly reporting period.

(8) Annual Load calculation. Determine concentration (mg/L): Use the average of all reported daily concentrations (mg/L) reported during the annual reporting period. Determine totalized annual flows (gal/year): Total flow that occurred during the annual reporting period. Calculate annual load (lbs/year): Concentration (mg/L) x Flow (gal/year) x [8.34×10^{-6}].

(9) Annual average load and annual flows shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

Table 16: Effluent Monitoring and Reporting Requirements - Outfall 002

Analyte/Measurement	Monitor Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Requirements[1][2]	Report Frequency
Biochemical Oxygen Demand (BOD_5)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Flow Rate, Effluent[3]	FM-002	gal/day	Contin-uous	Contin-uous	Monthly Average[4] Daily Maximum[7]	Monthly
	FM-002	gal/month	Contin-uous	Contin-uous	Monthly Total	Monthly
	FM-002	gal/year	Contin-uous	Contin-uous	Annual Total	Annually[9]
Nitrogen, Nitrite+Nitrate [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Ammonia [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)[as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total [as N][5]	EFF-001	mg/L	Calculate	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
Phosphorus, Total [as P]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
		lbs/year[8]	Calculate	1/Year	Annual Average	Annually[9]
Total Suspended Solids (TSS)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly

Footnotes:

EFF: Description provided in Table 1 of the Fact Sheet document.

INF: Description provided in Table 1 of the Fact Sheet document.

FM: Description provided in Table 1 of the Fact Sheet document.

If no discharge occurs through out the reporting period, "no discharge" shall be recorded on the wastewater Discharge Monitoring Report (DMR) report forms.

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above or within a deviation authorized by DEQ.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Monthly Average: The average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period.

(3) Requires recording device and/or totalizing meter. Equipment must be capable of recording daily, monthly, and annual effluent volumes.

(4) Monthly Average Flows: Determine total flows (gal/month) that occurred during the monthly reporting period. Divide total flow by the number of calendar days in the Monthly reporting period to get a unit of daily flow (gal/day).

(5) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

(6) Monthly Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period. Determine totalized monthly flows (gal/month): Total flow that occurred during the monthly reporting period. Convert to a daily flow average (gal/day): Divide the total monthly flow (gal/month) by the total calendar days (days) of the monthly reporting period. Calculate monthly load (lbs/day): Concentration (mg/L) x Flows (gal/day) x [8.34×10^{-6}].

(7) Daily Maximum: The highest daily flow occurring during the monthly reporting period.

(8) Annual Load calculation. Determine concentration (mg/L): Use the average of all reported daily concentrations (mg/L) reported during the annual reporting period. Determine totalized annual flows (gal/year): Total flow that occurred during the annual reporting period. Calculate annual load (lbs/year): Concentration (mg/L) x Flow (gal/year) x [8.34×10^{-6}].

(9) Annual average load and annual flows shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

Table 17: Effluent Monitoring and Reporting Requirements - Outfall 003

Analyte/Measurement	Monitor Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Requirements[1][2]	Report Frequency
Biochemical Oxygen Demand (BOD_5)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Flow Rate, Effluent[3]	FM-003	gal/day	Contin-uous	Contin-uous	Monthly Average[4] Daily Maximum[7]	Monthly
	FM-003	gal/month	Contin-uous	Contin-uous	Monthly Total	Monthly
	FM-003	gal/year	Contin-uous	Contin-uous	Annual Total	Annually[9]
Nitrogen, Nitrite+Nitrate [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Ammonia [as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)[as N]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
Nitrogen, Total [as N][5]	EFF-001	mg/L	Calculate	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
Phosphorus, Total [as P]	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly
		lbs/day[6]	Calculate	1/Month	Monthly Average	Monthly
		lbs/year[8]	Calculate	1/Year	Annual Average	Annually[9]
Total Suspended Solids (TSS)	EFF-001	mg/L	Grab	1/Month	Monthly Average	Monthly

Footnotes:

EFF: Description provided in Table 1 of the Fact Sheet document.

INF: Description provided in Table 1 of the Fact Sheet document.

FM: Description provided in Table 1 of the Fact Sheet document.

If no discharge occurs through out the reporting period, "no discharge" shall be recorded on the wastewater Discharge Monitoring Report (DMR) report forms.

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above or within a deviation authorized by DEQ.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Monthly Average: The average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period.

(3) Requires recording device and/or totalizing meter. Equipment must be capable of recording daily, monthly, and annual effluent volumes.

(4) Monthly Average Flows: Determine total flows (gal/month) that occurred during the monthly reporting period. Divide total flow by the number of calendar days in the Monthly reporting period to get a unit of daily flow (gal/day).

(5) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

(6) Monthly Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the monthly reporting period. Determine totalized monthly flows (gal/month): Total flow that occurred during the monthly reporting period. Convert to a daily flow average (gal/day): Divide the total monthly flow (gal/month) by the total calendar days (days) of the monthly reporting period. Calculate monthly load (lbs/day): Concentration (mg/L) x Flows (gal/day) x [8.34×10^{-6}].

(7) Daily Maximum: The highest daily flow occurring during the monthly reporting period.

(8) Annual Load calculation. Determine concentration (mg/L): Use the average of all reported daily concentrations (mg/L) reported during the annual reporting period. Determine totalized annual flows (gal/year): Total flow that occurred during the annual reporting period. Calculate annual load (lbs/year): Concentration (mg/L) x Flow (gal/year) x [8.34×10^{-6}].

(9) Annual average load and annual flows shall be reported (DMR) on an annual basis (due January 28 each year of the permit cycle).

Table 18: Ground Water Monitoring and Reporting Requirements

Analyte/Measurement	Monitor Location	Units	Sample Type[1]	Minimum Sampling Frequency	Reporting[2] Requirements	Report Frequency
Chloride [as Cl]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Escherichia coli Bacteria	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	CFU/ 100ml	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Nitrite+Nitrate [as N]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total Ammonia [as N]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN) [as N]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total [as N][3]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	mg/L	Calculate	1/Quarter	Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	µS/cm	Grab or Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Temperature	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	°C	Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Static Water Level (SWL)[4]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	ft-bmp	Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Well Depth[4]	MW-1A MW-1B MW-1C MW-1D MW-1E MW-2A MW-2B MW-2C MW-3A MW-3B MW-3C MW-3E	ft-bmp	Instant-aneous	1/Quarter	Quarterly Average	Quarterly

Footnotes:

CFU = Colony Forming Units

ft-bmp = feet below measuring point

Monitoring for MW-1A, MW-1B, MW-1C, MW-1D, MW-1E, MW-3A, MW-3E commences (or continues) upon the permit effective date.

Monitoring for MW-2A, MW-2B, MW-2C, MW-3B, MW-3C shall commence upon installation (See Compliance Schedule).

Monitoring for MW-4A, MW-4B, MW-4C, MW-4D commences upon authorization of Outfall 004.

A description and status of each monitoring well can be found in Table 3 of the Fact Sheet document.

At no time shall the permittee mark or state "no discharge" on any monitoring well DMR form.

Each monitor well to be individually monitored and sampled for the analyte and measurements respectively listed.

If any monitoring well(s) are abandoned, destroyed or decommissioned, or are no longer able to be sampled due to fluctuations in the ground water table; the permittee shall install a new well to replace the abandoned, destroyed, decommissioned, or non-viable well(s).

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.

Samples must not be collected until after the well casing is properly purged as determined by the DEQ approved Ground Water Monitoring Operational Manual.

Submittal of discharge monitoring report forms (DMRs) will be required, regardless of the operational status of the facility or of each individual monitoring well.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Quarterly Average: The average of all individual daily concentrations (mg/L) analyzed during the quarterly reporting period.

(3) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.

(4) Measuring point (point of reference) for SWL measurements shall be from top of inner casing (or as established by the DEQ approved Ground Water Monitoring Operational Manual) and measured to within 1/100th of one foot.

7.0 SPECIAL CONDITIONS

7.1 MONITORING WELL SURVEY AND SEASONAL GROUND WATER FLOW DIRECTION REPORT

The location and measuring point height of all existing monitoring wells associated with Outfall 002, Outfall 003, and Outfall 004 shall be surveyed by a professional Land Surveyor. The survey will ensure accurate ground water flow directions.

Monthly static water level measurements (at minimum) must be collected to capture the seasonal high and low of the shallow aquifer. This requirement is in addition to the ongoing quarterly monitoring and reporting requirements of **Section 6**.

A ground water monitoring field data form must be used to document each individual monitoring event. The static water level depth shall be measured to 1/100th of a foot using a water meter or transducer. A permanent measuring point shall be established on the casing of each well for precise measurements. Water level measurements shall be measured consecutively among all respective wells on the same calendar day.

Potentiometric surface maps or three-point solution worksheets showing ground water flow direction shall be completed for each monthly monitoring event. Monthly monitoring events shall occur over a minimum of one year.

The report shall include well survey information, monitoring field forms, maps showing monthly flow directions, property boundaries, and the proposed drainfield areas. The spatial global positioning system (GPS) coordinates for each well shall be presented as latitude and longitude in decimal degrees.

The completion and submittal date of the report is listed in **Section 8**. The report shall include all information as listed above. This DEQ reviewed and approved report is a prerequisite for the **Monitoring Well Installation Plan**.

7.2 WATER WELL SURVEY REPORT

The Permittee shall locate and identify all existing water wells located within one thousand (1,000) feet of the proposed drainfields (Outfall 002, 003, and 004) and their respective mixing zone areas. A field investigation and survey are required to provide accurate results. Current ownership and the identification of matching MBMG GWIC water well records must be included.

The report shall include a detailed map showing exact well locations, well identification, property boundaries, and the proposed drainfield areas. GPS coordinates for each well shall be presented as latitude and longitude in decimal degrees.

The completion and submittal date of the report is listed in **Section 8**. The report shall include all information as listed above.

7.3 MONITORING WELL INSTALLATION PLAN

Submit for approval an installation plan for three downgradient monitoring wells for both Outfall 002 and Outfall 003. A reviewed and approved **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report** is a prerequisite to this plan. The report will guide the placement of all new monitoring wells.

Three monitoring wells must be installed at or near the downgradient boundary of each mixing zone. Three wells shall evenly represent the downgradient boundary of the mixing zone and be constructed to represent ground water occurring in the top twenty (20) feet of the shallow aquifer (or as otherwise approved by DEQ).

The three monitoring wells for Outfall 002 will be named MW-2A, MW-2B, and MW-2C. Using existing monitoring wells as substitution may be allowed so long as it meets the placement and construction requirements provided.

The three monitoring wells for Outfall 003 will be named MW-3A, MW-3B, and MW-3C. Using existing monitoring wells as substitution may be allowed so long as it meets the placement and construction requirements provided. The existing MW-4 monitoring well is a potential candidate for MW-3A pending the results of the **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**.

The plan needs to be approved by DEQ prior to installation of the monitoring well(s). All monitoring wells must be secured, maintained, labeled, and monitored for long-term viability. The completion and submittal date of the installation plan is listed in **Section 8**.

The spatial location and measuring point height of all monitoring wells shall be surveyed by a professional Land Surveyor. Spatial GPS coordinates for each well shall be presented as latitude and longitude in decimal degrees.

The installation date for the monitoring wells is provided in **Section 8**. A post construction **Monitoring Well Installation Report** documenting lithology, drilling and construction techniques, well construction information and diagram, and survey information is due two months after installation. All new wells must be reported to the MBMG GWIC program.

Monitoring of the new wells will commence upon installation. DEQ recognizes the challenges faced with well installation efforts in the field. Upon DEQ approval, modification to an approved plan can be made when challenging field conditions occur.

7.4 GROUND WATER MONITORING, ANALYSIS, AND REPORTING OPERATION MANUAL

The permittee shall use Best Management Practices (BMPs) in developing SOPs (Standard Operating Procedures) for sampling, analyzing, and reporting ground water characteristics. The SOP manual must be site-specific and result in monitoring and reporting that is representative of the nature of the shallow ground water bearing zone. The manual must provide for consistent identification, development, monitoring, sampling, calculating, recording, and reporting of the monitoring wells. The manual must provide for guidance on: determining and documenting dry-well occurrences; and determining future well viability. DEQ recommends using the MBMG Open-File Report 746 titled Standard Procedures and

Guidelines for Field Activities (MBMG, 2022) as a reference in developing a site-specific operational manual.

The completion and submittal date of the manual is listed in **Section 8**. The manual must be reviewed and approved by DEQ prior to implementation. The permittee shall maintain a copy of the manual, monitoring well development records, dry well occurrence records, sampling records, and calibration records at the facility at all times. Ground water monitoring requirements are discussed in **Section 6**. All subsequent amended manuals must be reported to DEQ within 30 calendar days.

7.5 MONITORING WELL VIABILITY

The permittee shall monitor and collect representative ground water samples from the receiving ground water aquifer. If any of the wells are abandoned, destroyed, decommissioned, or non-viable; or are no longer able to be monitored due to obstructions or fluctuations in the ground water table; the permittee shall rehabilitate the non-viable well or replace with the installation of a new well.

7.6 MONITORING WELL REPLACEMENT, REHABILITATION, AND ABANDONMENT

If for any reason a monitoring well needs to be replaced, rehabilitated, or abandoned; the permittee shall submit a plan to DEQ for approval prior to the action taking place. The plan must document existing site-specifics and the reasoning behind the proposed action. The plan must detail the specific steps to take place during deconstruction, drilling, workover, and/or construction of the respective wells.

Written permission from DEQ is needed prior to the abandonment of any monitoring well. At minimum, monitoring well abandonment activities must be done in accordance with ARM 36.21.810(2-5). If the monitoring well is located in or around any collection, storage, treatment, disposal, land application, and/or mixing zone workings (or similar) additional actions may be required to prevent preferential subsurface flows, cross contamination, and to mitigate against any unauthorized wastewater releases. All new well installations must have detailed drilling, lithology, geospatial, and well construction information. A follow-up report summarizing all actions and details must be submitted to DEQ within 30 calendar days.

7.7 WASTEWATER SAMPLING, ANALYSIS, AND REPORTING OPERATION MANUAL

The permittee shall use Best Management Practices (BMPs) in developing SOPs for sampling, analyzing, and reporting wastewater characteristics for the wastewater system. The manual needs to be site-specific and result in monitoring and reporting that is representative of the nature of the wastewater streams. The manual must address:

- Equipment calibration.
- Preparing and collecting wastewater influent and effluent wastewater samples.
- Analyte and load calculations (**Section 5**).
- Recording and reporting wastewater characteristics.
- Recording and reporting wastewater flows.

The manual will need to identify individual wastewater flow meters for each respective outfall. Provide for clear and concise instructions for accurately calculating loads that are representative of each individual outfall.

The completion and submittal date for the manual is listed in **Section 8.** The manual must be reviewed and approved by DEQ prior to implementation. The permittee shall maintain a copy of the operational manual, sampling, and calibration records at the facility at all times. Wastewater monitoring requirements are discussed in **Section 6**. All subsequent amended manuals must be reported to DEQ within 30 calendar days.

8.0 COMPLIANCE SCHEDULE

The actions listed in **Table 19** must be completed on or before the respective scheduled completion date. A report documenting each respective action must be received by DEQ on or before the scheduled reporting date. Unless otherwise stated, completion of all actions or deliverables must be reported to DEQ in accordance with Part II and Part IV.G of the permit.

Table 19: Compliance Schedule

Action	Frequency	Completion Date of Action	Reporting Due Date
Develop (or update) and implement a **Ground Water Monitoring, Analysis, and Reporting Operation Manual.**	Single event	*Within 90 days of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Develop (or update) and implement a **Wastewater Sampling, Analysis, and Reporting Operation Manual.**	Single event	*Within 90 days of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Complete a **Monitoring Well Survey and Seasonal Ground Water Flow Direction Report**.	Single event	*Within 12 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Complete a **Water Well Survey Report**	Single event	*Within 12 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Complete a **Monitoring Well Installation Plan**. *The Monitoring Well Survey and Seasonal Ground Water Flow Direction Report is a prerequisite.*	Single event	*Within 14 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Complete the installation of the monitoring well(s).	Single event	*Within 24 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Commence monitoring and reporting of the newly installed monitoring well(s).	Single event	*Upon installation. At minimum, within 24 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Complete a **Monitoring Well Installation Report**.	Single event	*Two months after installation. At minimum, within 26 months of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.

9.0 PUBLIC NOTICE

Legal notice information for water quality discharge permits is listed at the following website: http://deq.mt.gov/Public/notices/wqnotices. Public comments on this proposal are invited any time prior to close of business on **September 18, 2025**. Comments may be directed to DEQWPBPublicComments@mt.gov or to

Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620

All comments received or postmarked prior to the close of the public comment period will be considered in the formulation of the final permit. DEQ will respond to all substantive comments pertinent to this permitting action and may issue a final decision within thirty days of the close of the public comment period.

All persons, including the applicant, who believe any condition of the draft permit is inappropriate, or that DEQ's tentative decision to deny an application, terminate a permit, or prepare a draft permit is inappropriate, shall raise all reasonably ascertainable issues and submit all reasonably available arguments supporting their position by the close of the public comment period (including any public hearing). All public comments received for this draft permit will be included in the administrative record and will be available for public viewing during normal business hours.

Copies of the public notice are mailed to the applicant, state and federal agencies, and interested persons who have expressed interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this draft permit. Electronic copies of the public notice, draft permit, fact sheet, and draft environmental assessment are available at the following website: http://deq.mt.gov/Public/notices/wqnotices.

Any person interested in being placed on the mailing list for information regarding this permit may contact the DEQ Water Protection Bureau at (406) 444-5546 or email DEQWPBPublicComments@mt.gov. All inquiries will need to reference the permit number (MTX000164), and include the following information: name, address, and phone number.

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

10.0 REFERENCES

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Subchapter 2 - Water Quality Permit Fees.
Subchapter 5 – Mixing Zones in Surface and Ground Water.
Subchapter 7 – Nondegradation of Water Quality.
Subchapter 10 – Montana Ground Water Pollution Control System.
Subchapter 13 – Montana Pollutant Discharge Elimination System.

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Circular DEQ-2 – Design Standards for Wastewater Facilities.
Circular DEQ-4 – Montana Standards for On-Site Subsurface Sewage Treatment Systems.
Circular DEQ-7 – Montana Numeric Water Quality Standards, Required Reporting Values, and Trigger Values.

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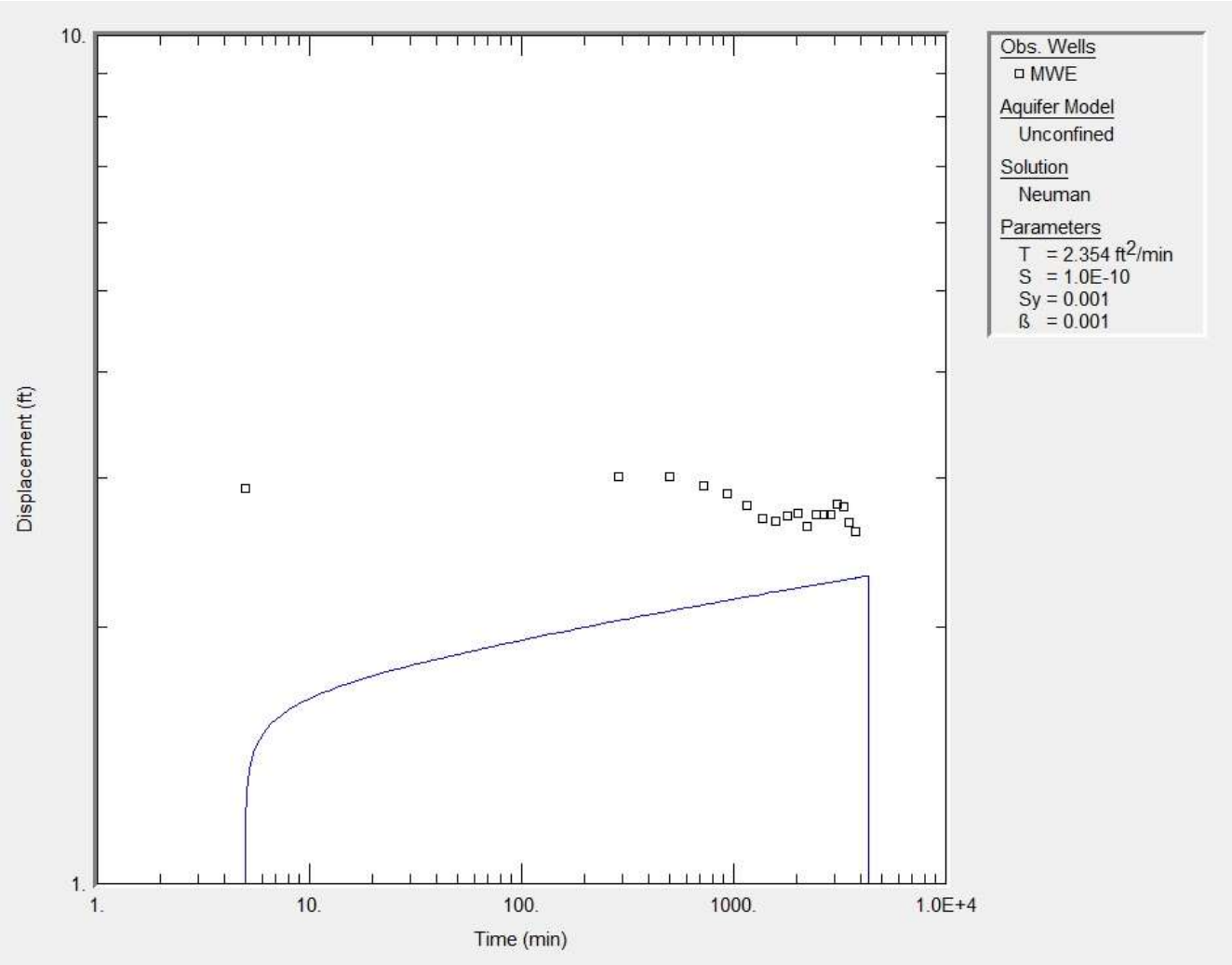
APPENDIX A: AQUIFER PUMP TESTS

GR Outfall 001



SOLUTION

Pumping Test
Aquifer Model: Unconfined
Solution Method: Neuman

VISUAL ESTIMATION RESULTS

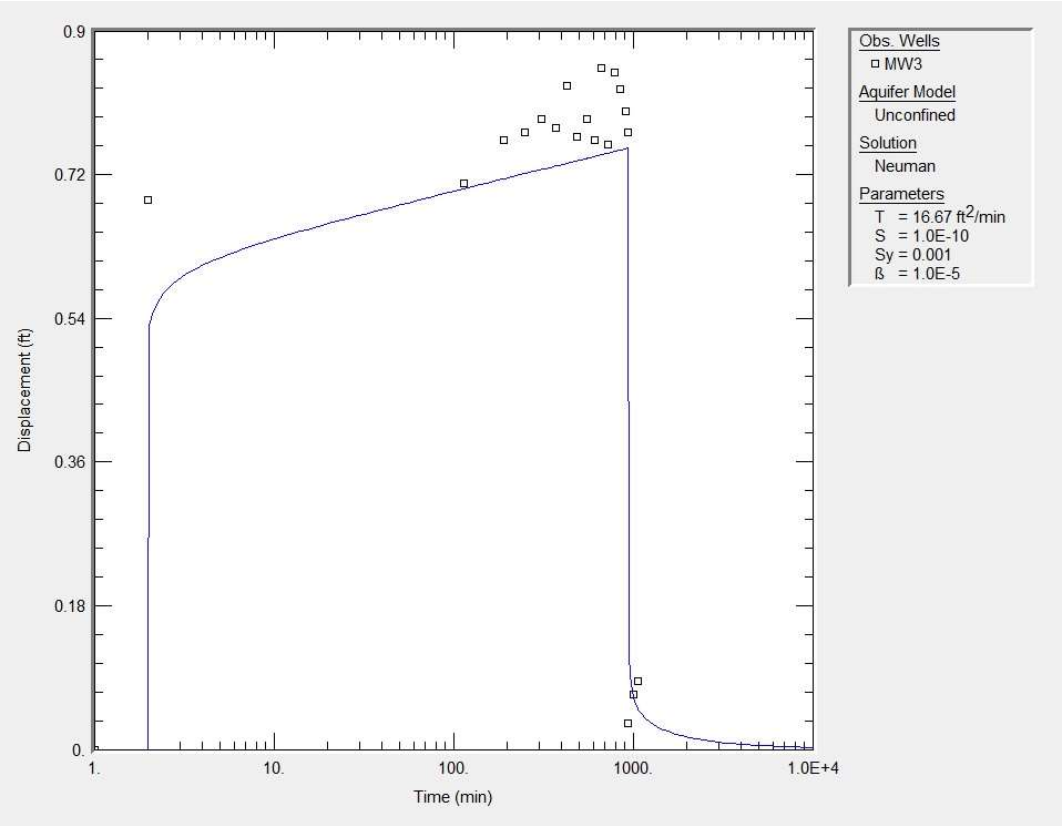
Estimated Parameters

Parameter	Estimate	
T	2.354	ft^2/min
S	1.0E-10	
Sy	0.001	
ß	0.001	

K = T/b = 0.4484 ft/min (0.2278 cm/sec)
Ss = S/b = 1.905E-11 1/ft

Neuman Resulting K = 645.70 ft/day
Previous Modified Cooper-Jacob results K = 617.06 ft/day

GR Outfall 002



SOLUTION

Pumping Test
Aquifer Model: Unconfined
Solution Method: Neuman

VISUAL ESTIMATION RESULTS

Estimated Parameters

Parameter	Estimate	
T	8.913	ft^2/min
S	0.001	
Sy	0.1	
ß	0.1	

K = T/b = 1.361 ft/min (0.6912 cm/sec)
Ss = S/b = 0.0001527 1/ft

Neuman Resulting K = 1,959.84 ft/day
Previous Modified Cooper-Jacob results K = 1,866.20 ft/day

APPENDIX B: MONITORING WELL LOGS

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# **MW-1A**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SE ¼ NW ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____, Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.01 ft. to 11.21 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 11.21 ft. to 21.21 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 7.25 ft. to 21.71 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 7.25 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 8.87 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	1	Topsoil & fill
1	5	Fine silty sand
5	6	Medium sand
6	22	Sandy gravel with intermittent sand seams

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1A, TOC (PVC)=97.338 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# **MW-1B**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SW ¼ NE ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____ , Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 24 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.61 ft. to 9.09 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.09 ft. to 19.09 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 5.25 ft. to 20.5 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 5.25 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 7.62 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	3	Silty loam
3	24	medium to coarse sandy gravel to cobbles

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1B, TOC (PVC)=96.144 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# **MW-1C**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
NE ¼ SE ¼ NW ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____ , Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22.5 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +1.70 ft. to 9.32 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.32 ft. to 19.32 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 6.5 ft. to 21.25 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 6.5 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 8.24 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	0.5	Topsoil
0.5	6.5	Silty very fine sand
6.5	22.5	Sandy gravel

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1C, TOC (PVC)=97.158 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# **MW-1D**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SW ¼ NW ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____, Tract/Blk____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.39 ft. to 9.26 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.26 ft. to 19.26 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 8.5 ft. to 22 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 8.5 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level _____ ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	5	Slightly silty fine sand
5	22	Clean coarse sandy gravel–gravel from medium to cobbles

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/23/09

9. REMARKS: Well MW1D, TOC (PVC)=99.832 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

MW E
APH 001

MONTANA WELL LOG REPORT

Well ID# MW1E

Form No. 603 R2-04

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name Alpine Pacific Utilities, LLC
Mailing address PO Box 474
Somers, MT 59932

2. WELL LOCATION: List ¼ from smallest to largest
____ ¼ ____ ¼ ____ ¼ ____ ¼, Section ____
Township ___ N/S Range ___ E/W County ____
Lot ____ , Tract/Blk ____ Subdivision Name ____
Well Address ____
GPS ☒ Yes ☐ No
Latitude 048°17'03.18" Longitude 114°16'15.12"
Error as reported by GPS locator (± feet) ____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☒ Monitoring Well ☐ Other: ____

4. TYPE OF WORK:
☒ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☐ Other: AUGER

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 10" in. from 0 ft. to 21 ft.
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.

Casing:
Steel: Wall thickness ____ ☐ Threaded ☐ Welded
Dia. 8" in. from +2.5 ft. to ~21.5 ft.
Dia. ____ in. from ____ ft. to ____ ft.

Plastic: Pressure Rating SCH 40 lbs ☒ Threaded ☐ Welded
Dia. 4" in. from +2' ft. to 11 ft.

Perforations/Slotted Pipe:
Type of perforator used FACTORY
Size of perforations/slots ____ in. by ____ in.
____ no. of perforations/slots from ____ ft. to ____ ft.
____ no. of perforations/slots from ____ ft. to ____ ft.

Screens: ☒ Yes ☐ No
Material PLASTIC
Dia. 4" Slot size 0.10 from 11 ft. to 21 ft.
Dia. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel Packed: ☒ Yes ☐ No
Size of gravel 10-20
Gravel placed from 8 ft. to 21 ft.

Packer: ☐ Yes ☒ No
Type ____ Depth(s) ____

Grout: Material used 3/8 HOLE PLUG
Depth from 1 ft. to 8 ft. OR ☒ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☐ Static water level ____ ft. below top of casing or
☐ Closed-in artesian pressure ____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc ____
Yellowstone Controlled Groundwater Area - Water Temperature ____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
____ gpm with drill stem set at ____ ft. for ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
____ gpm with ____ ft. of drawdown after ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test ____ ft.
____ gpm pump rate with ____ ft. of drawdown after ____ hrs pumping
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
____ gpm for ____ hours
Flow controlled by ____

*During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	1	TOP SOIL
1	4	SILT
4	21	SAND & GRAVEL

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 12-1-20

9. REMARKS: ____

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) O'KEEFE
Address ____
Signature Steve Mesh
Date 12-4-20 License no. 380

MBMG ID#

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701


MW1-1
Trimble Creek Rd
TP1
Outfall 002
TP2
TP3
MW2
MW3-3
MW4-2
Birch Grove Rd
Image © 2024 Airbus
615 ft

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# mw / **MW-3E**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name Avec — Alpine Pacific Utilities, LLC
Mailing address — PO Box 474, Somers, MT 59901

2. WELL LOCATION: List ¼ from smallest to largest
_____ ¼ _____ ¼ _____ ¼ _____ ¼, Section _____
Township ___ N/S Range ___ E/W County _____
Lot _____, Tract/Blk ____ Subdivision Name _____
Well Address _____
GPS ☑ Yes ☐ No
Latitude 48.29676°N Longitude 114.27587°W
Error as reported by GPS locator (± feet) 10'
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☐ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 10 in. from 0 ft. to -20 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.
Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.
Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 4 in. from +2 ft. to -8 ft.
Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.
Screens: ☑ Yes ☐ No
Material Plastic Sch 40
Dia. 4 Slot size .020 from -8 ft. to -18 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.
Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 Silica
Gravel placed from -18 ft. to -7 ft.
Packer: ☐ Yes ☐ No
Type _____ Depth(s) _____
Grout: Material used 3/8 bentonite chips
Depth from -7 ft. to 0 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☐ Static water level 9.5 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	-2.5	topSoil
-2.5	5	Sandy gravel Dry
5	10	Sandy gravel / 9-16 wet
10	20	Sandy gravel water

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 5/14/2024

9. REMARKS: _____

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Bridger O'Keefe
Address 2000 four mile Rd. Butte MT
Signature Bridger O'Keefe
Date 5/21/2024 License no. 800

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

MONTANA WELL LOG REPORT

Form No. 603 R2-04

Well ID# mw2 **MW-4D**

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name Alpine Pacific Utilities, LLC
Mailing address PO Box 474
Somers, MT 59901

2. WELL LOCATION: List ¼ from smallest to largest
____ ¼ ____ ¼ ____ ¼ ____ ¼, Section ____
Township ___ N/S Range ___ E/W County ____
Lot ____, Tract/Blk ____ Subdivision Name ____
Well Address ____
GPS ☑ Yes ☐ No
Latitude 48.29144°N Longitude 114.278030W
Error as reported by GPS locator (± feet) 10
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: ____

4. TYPE OF WORK:
☐ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 10 in. from 0 ft. to -20 ft.
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.
Casing:
Steel: Wall thickness ____ ☐ Threaded ☐ Welded
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.
Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 4 in. from +2 ft. to -10 ft.
Perforations/Slotted Pipe:
Type of perforator used ____
Size of perforations/slots ____ in. by ____ in.
____ no. of perforations/slots from ____ ft. to ____ ft.
____ no. of perforations/slots from ____ ft. to ____ ft.
Screens: ☑ Yes ☐ No
Material Plastic Sch-40
Dia. 4 Slot size .020 from -10 ft. to -20 ft.
Dia. ____ Slot size ____ from ____ ft. to ____ ft.
Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 Silica
Gravel placed from ____ ft. to ____ ft.
Packer: ☐ Yes ☐ No
Type ____ Depth(s) ____
Grout: Material used 3/8 bentonite chips
Depth from -10 ft. to 0 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 10 ft. below top of casing **or**
☐ Closed-in artesian pressure ____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc ____
Yellowstone Controlled Groundwater Area - Water Temperature ____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
____ gpm with drill stem set at ____ ft. for ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
____ gpm with ____ ft. of drawdown after ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test ____ ft.
____ gpm pump rate with ____ ft. of drawdown after ____ hrs pumping
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
____ gpm for ____ hours
Flow controlled by ____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	-2.5	topSoil
-2.5	-11.5	gravel little Sand / Hit water At 11'
-11.5	-20	Sandy gravel / Little silt / wet

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: ____

9. REMARKS: ____

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) ____
Address ____
Signature ____
Date ____ License no. ____

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# ____

MONTANA WELL LOG REPORT

Well ID# mw 3 **MW-4A**

Form No. 603 R2-04

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name Apec Alpine Pacific Utilities, LLC
Mailing address PO Box 474
Somers, MT 59901

2. WELL LOCATION: List ¼ from smallest to largest
____ ¼ ____ ¼ ____ ¼ ____ ¼, Section ____
Township ___ N/S Range ___ E/W County ____
Lot ____ , Tract/Blk ___ Subdivision Name ____
Well Address: ____
GPS ☑ Yes ☐ No
Latitude 48.29123°N Longitude 114.27805°W
Error as reported by GPS locator (± feet) 10'
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: ____

4. TYPE OF WORK:
☒ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 6" in. from 0 ft. to -20 ft.
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.

Casing:
Steel: Wall thickness ____ ☐ Threaded ☐ Welded
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 4" in. from +2 ft. to -10 ft.

Perforations/Slotted Pipe:
Type of perforator used ____
Size of perforations/slots ____ in. by ____ in.
____ no. of perforations/slots from ____ ft. to ____ ft.
____ no. of perforations/slots from ____ ft. to ____ ft.

Screens: ☑ Yes ☐ No
Material Plastic Sch 40
Dia. 4 Slot size .020 from -10 ft. to -20 ft.
Dia. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 Silica
Gravel placed from -20 ft. to -9 ft.

Packer: ☐ Yes ☐ No
Type ____ Depth(s) ____

Grout: Material used 3/8 bentonite chips
Depth from -9 ft. to 0 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 10 ft. below top of casing **or**
☐ Closed-in artesian pressure ____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc ____
Yellowstone Controlled Groundwater Area - Water Temperature ____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
____ gpm with drill stem set at ____ ft. for ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
____ gpm with ____ ft. of drawdown after ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test ____ ft.
____ gpm pump rate with ____ ft. of drawdown after ____ hrs pumping
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
____ gpm for ____ hours
Flow controlled by ____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	-2	Topsoil
-2	-10	Sandy gravel / hit water
-10	-20	Sandy gravel / wet

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 5/15/2024

9. REMARKS: ____

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Bridger O'Keefe
Address 2000 four mile rd. Butte MT
Signature Bridger O'Keefe
Date 5/29/2024 License no. 900

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID#

MONTANA WELL LOG REPORT

MW-3A

Form No. 603 R2-04

Well ID# MW4

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name APC Alpine Pacific Utilities, LLC
Mailing address PO Box 474
Somers, MT 59901

2. WELL LOCATION: List ¼ from smallest to largest
____ ¼ ____ ¼ ____ ¼ ____ ¼, Section ____
Township ___ N/S Range ___ E/W County ____
Lot ____ , Tract/Blk ____ Subdivision Name ____
Well Address ____
GPS ☐ Yes ☐ No
Latitude 48.29128°N Longitude 114.27436°W
Error as reported by GPS locator (± feet) 10
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: ____

4. TYPE OF WORK:
☐ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 10 in. from 0 ft. to -18 ft.
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.

Casing:
Steel: Wall thickness ____ ☐ Threaded ☐ Welded
Dia. ____ in. from ____ ft. to ____ ft.
Dia. ____ in. from ____ ft. to ____ ft.

Plastic: Pressure Rating Sch40 lbs. ☑ Threaded ☐ Welded
Dia. 4 in. from +1 ft. to -18 ft.

Perforations/Slotted Pipe:
Type of perforator used ____
Size of perforations/slots ____ in. by ____ in.
____ no. of perforations/slots from ____ ft. to ____ ft.
____ no. of perforations/slots from ____ ft. to ____ ft.

Screens: ☑ Yes ☐ No
Material Plastic Sch40
Dia. 4 Slot size .020 from -8 ft. to -18 ft.
Dia. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 Sand
Gravel placed from -18 ft. to -7 ft.

Packer: ☐ Yes ☐ No
Type ____ Depth(s) ____

Grout: Material used 3/8 bentonite
Depth from -7 ft. to 0 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☐ Static water level ____ ft. below top of casing **or**
☐ Closed-in artesian pressure ____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc ____
Yellowstone Controlled Groundwater Area - Water Temperature ____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
____ gpm with drill stem set at ____ ft. for ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
____ gpm with ____ ft. of drawdown after ____ hours
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test ____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery ____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
____ gpm for ____ hours
Flow controlled by ____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	-2.5	Topsoil / gravel
-2.5	-9	Silt/clay ~~water~~ wet around 9
-9	-20	Sandy gravel / water

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 5/13/2024

9. REMARKS: ____

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Bridger O'Keefe
Address 2000 Four mile Rd Butte MT
Signature Bridger O'Keefe
Date 5/29/2024 License no. 800

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID#

RLK HYDRO INC.

Hydrology, Engineering & Environmental Consulting

September 15, 2009

Pat Potts
Montana Department of Environmental Quality
Water Protection Bureau
PO Box 200901
Helena, MT 59620-0901

RE: First Interstate Bank—Glacier Ranch Subdivision
MTX000164

Dear Pat:

Please find enclosed well logs for the four monitoring wells completed at the Glacier Ranch Subdivision as required by Permit #MTX000164. O'Keefe Drilling installed the wells under my supervision and completed them (other than development and sampling) on July 22 and 23, 2009.

RLK Hydro staff developed the wells by pumping on August 11 (MW1B) and August 12, 2009 (MW1A, C, & D). Each well was pumped between approximately 1.25 gpm and 3.75 gpm while frequently monitoring the conductivity, pH, and temperature of the discharge water. The parameters were monitored until they had stabilized to the standards outlined in Part III of the Ground Water Monitoring SOP dated April 17, 2009. Development was also directed at removing any sediment that had settled in the sump (approximately five inches) below the bottom of the well screen. Total pumping time varied from one hour-nineteen minutes to two hours-fourteen minutes. Static water level was monitored after pumping was stopped until two consecutive measurements taken several minutes apart were the same. It is unknown how much drawdown occurred during pumping; however, the wells recovered to static water level within 5 minutes of stopping the pump. At that point, a water sample was collected with a new clean bailer. The analysis results are enclosed.

Based on field measurements and laboratory results, it appears that curing grout was still influencing MW1D at the sampling time. Based on these results, MW1D was redeveloped on September 14, 2009 and sampled again. The second set of laboratory results for MW1D will be submitted as soon as available.

The monitoring wells were surveyed. Elevations for the top of the PVC casing (at the indicated measuring point) and the top of the concrete surface seal apron were obtained based on the local datum used throughout the site development. The top of the apron next to the protective casing

PO Box 1579 or 484 N Main St
Kalispell, MT 59903-1579
Phone: 406-752-2025 Fax: 406-257-4125 Email: info@rlkhydro.com

is approximately five inches (0.42 feet) above the ground surface prior to well installation. It is expected that the ground surface will be slightly modified as the individual areas of the subdivision are built out. The following table shows the surveyed elevations.

Well Name	Top of Casing Elevation (ft)	Top of Surface Seal Elevation (ft)
MW1A	97.338	95.754
MW1B	96.144	93.954
MW1C	97.158	95.876
MW1D	99.832	97.862

The top of casing elevation is also shown in the remarks section of the individual well logs.

The quarterly self-monitoring reports will continue to be submitted to the Water Protection Bureau with "no discharge" noted until the treatment system is brought online. Copies of the well logs are also being submitted to the Montana Bureau of Mines & Geology.

Please do not hesitate to call me with any questions regarding this submittal.

Sincerely,

Greg Davis, PE
Director of Engineering

Cc: file
Scott Mizner, First Interstate Bank
Enclosure(s):
Well Logs
Laboratory Results

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# _____

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SE ¼ NW ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____ , Tract/Blk____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.01 ft. to 11.21 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 11.21 ft. to 21.21 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 7.25 ft. to 21.71 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 7.25 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 8.87 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level _____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	1	Topsoil & fill
1	5	Fine silty sand
5	6	Medium sand
6	22	Sandy gravel with intermittent sand seams

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1A, TOC (PVC)=97.338 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# _____

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SW ¼ NE ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____ , Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 24 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.61 ft. to 9.09 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.09 ft. to 19.09 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 5.25 ft. to 20.5 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 5.25 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 7.62 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	3	Silty loam
3	24	medium to coarse sandy gravel to cobbles

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1B, TOC (PVC)=96.144 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# _____

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
NE ¼ SE ¼ NW ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____ , Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22.5 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +1.70 ft. to 9.32 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.32 ft. to 19.32 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 6.5 ft. to 21.25 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 6.5 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level 8.24 ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
___ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	0.5	Topsoil
0.5	6.5	Silty very fine sand
6.5	22.5	Sandy gravel

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/22/09

9. REMARKS: Well MW1C, TOC (PVC)=97.158 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

Form No. 603 R2-04

MONTANA WELL LOG REPORT

Well ID# _____

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. **This form is to be completed by the driller and filed with Mt. Bureau of Mines & Geology within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report.**

Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena).

For fields that are not applicable, enter NA. Optional fields have a grayed background. Record additional information in the REMARKS section.

1. WELL OWNER:
Name First Interstate Bank
Mailing address PO Box 7130, Kalispell, MT 59904-0130

2. WELL LOCATION: List ¼ from smallest to largest
SW ¼ NW ¼ NE ¼ NE ¼, Section 16
Township 29 N/S Range 21 E/W County Flathead
Lot _____, Tract/Blk ____ Subdivision Name Glacier Ranch
Well Address _____
GPS ☐ Yes ☑ No
Latitude _____ Longitude _____
Error as reported by GPS locator (± feet) _____
Horizontal datum ☐ NAD27 ☐ WGS84

3. PROPOSED USE: ☐ Domestic ☐ Stock ☐ Irrigation
☐ Public water supply ☑ Monitoring Well ☐ Other: _____

4. TYPE OF WORK:
☑ New well ☐ Deepen existing well ☐ Abandon existing well
Method: ☐ Cable ☐ Rotary ☑ Other: Auger

5. WELL CONSTRUCTION DETAILS:
Borehole:
Dia. 8.25 in. from 0 ft. to 22 ft.
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Casing:
Steel: Wall thickness _____ ☐ Threaded ☐ Welded
Dia. _____ in. from _____ ft. to _____ ft.
Dia. _____ in. from _____ ft. to _____ ft.

Plastic: Pressure Rating Sch 40 lbs. ☑ Threaded ☐ Welded
Dia. 2 in. from +2.39 ft. to 9.26 ft.

Perforations/Slotted Pipe:
Type of perforator used _____
Size of perforations/slots _____ in. by _____ in.
_____ no. of perforations/slots from _____ ft. to _____ ft.
_____ no. of perforations/slots from _____ ft. to _____ ft.

Screens: ☑ Yes ☐ No
Material Sch 40 PVC
Dia. 2 Slot size 20-slot from 9.26 ft. to 19.26 ft.
Dia. _____ Slot size _____ from _____ ft. to _____ ft.

Gravel Packed: ☑ Yes ☐ No
Size of gravel 10-20 under 20-40 silica sand
Gravel placed from 8.5 ft. to 22 ft.

Packer: ☐ Yes ☑ No
Type _____ Depth(s) _____

Grout: Material used Neat cement with powdered bentonite plus a concrete surface seal
Depth from +0.42 ft. to 8.5 ft. OR ☐ Continuous feed

6. WELL TEST DATA:
A well test is required for all wells. (*See details on well log report cover.*)
☑ Static water level _____ ft. below top of casing **or**
☐ Closed-in artesian pressure _____ psi.
How was test flow measured:
bucket/stopwatch, weir, flume, flowmeter, etc _____
Yellowstone Controlled Groundwater Area - Water Temperature _____ °F
☐ AQUIFER TEST DATA FORM ATTACHED

Test - 1 hour minimum
Drawdown is the amount water level is lowered below static level.
All depth measurements shall be from the top of the well casing.
Time of recovery is hours/minutes since pumping stopped.

Air test*
_____ gpm with drill stem set at _____ ft. for _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Bailer test*
_____ gpm with _____ ft. of drawdown after _____ hours
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Pump test*
Depth pump set for test _____ ft.
____ gpm pump rate with ____ ft. of drawdown after ___ hrs pumping
Time of recovery _____ hrs/min. Recovery water level ____ ft.

OR Flowing Artesian*
_____ gpm for _____ hours
Flow controlled by _____

**During the well test the discharge rate shall be as uniform as possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the resevoir of the well casing.*

7. WELL LOG:

Depth, Feet From	Depth, Feet To	Material: color/rock and type/descriptor (example: blue/shale/hard, or brown/gravel/water, or brown/sand/heaving)
0	5	Slightly silty fine sand
5	22	Clean coarse sandy gravel–gravel from medium to cobbles

☐ ADDITIONAL SHEETS ATTACHED

8. DATE WELL COMPLETED: 7/23/09

9. REMARKS: Well MW1D, TOC (PVC)=99.832 feet

10. DRILLER/CONTRACTOR'S 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, firm, or corporation (print) Steve Malkovich, O'Keefe Drilling
Address PO Box 3810, Butte, MT 59701
Signature _____
Date _____ License no. 360

Montana Bureau of Mines & Geology
The University of Montana
1300 West Park Street
Butte, MT 59701

MBMG ID# _____

ANALYTICAL REPORT

Montana Environmental Laboratory LLC
1170 N. Meridian Rd., P.O. Box 8900, Kalispell, MT 59904-1900
Phone: 406-755-2131 Fax: 406-257-5359 www.melab.us

RLK Hydro, Inc.
P.O. Box 1579
Kalispell, MT 59901

PWS ID:
Project: Glacier Ranch - MW

Client Sample ID: Glacier Ranch - MW1A
Matrix: ENVIRO WATER
Collected: 08/12/2009 13:23
Lab ID: 0907311-01
Received: 08/13/2009 9:06

Analyses	Result	Units	RL	MCL	Method	Prepared	Analyzed	Analyst
Chloride	**6.3**	mg/L	0.1		E300		08/17/2009 13:39	LCK
Coliform, Escherichia	**<1**	mpn/100ml	1		SM9223B	08/13/2009 15:00	08/14/2009 9:45	LKN
Conductivity	**441**	umhos/cm	0.1		SM2510B		08/14/2009 12:16	BLW
Nitrate	**1.52**	mg/L	0.01		E353.2		08/14/2009 14:10	BLW
Nitrate + Nitrite, Total	**1.52**	mg/L	0.01		E353.2		08/14/2009 14:10	BLW
Nitrogen, Total	**1.93**	mg/L	0.22		Calculation		08/18/2009 8:44	BLW
pH	**7.60**	pH	0.1		E150.1	08/13/2009	08/14/2009 12:24	BLW
Total Kjeldahl Nitrogen (TKN)	**0.41**	mg/L	0.22		E351.2		08/17/2009 16:30	BLW
Total Suspended Solids (TSS)	**41**	mg/L	1		SM2540D		08/17/2009 13:49	BLW

MCL = Maximum Contaminant Limit **ND = Not Detected**
RL = Reporting Limit **NR = Not Regulated**

MEL REVIEW: JMC

ANALYTICAL REPORT

Montana Environmental Laboratory LLC
1170 N. Meridian Rd., P.O. Box 8900, Kalispell, MT 59904-1900
Phone: 406-755-2131 Fax: 406-257-5359 www.melab.us

RLK Hydro, Inc.
P.O. Box 1579
Kalispell, MT 59901

PWS ID:
Project: Glacier Ranch - MW

Client Sample ID: Glacier Ranch - MW1C
Matrix: ENVIRO WATER
Collected: 08/12/2009 15:34
Lab ID: 0907311-02
Received: 08/13/2009 9:06

Analyses	Result	Units	RL	MCL	Method	Prepared	Analyzed	Analyst
Chloride	**6.2**	mg/L	0.1		E300		08/17/2009 13:39	LCK
Coliform, Escherichia	**<1**	mpn/100ml	1		SM9223B	08/13/2009 15:00	08/14/2009 9:45	LKN
Conductivity	**463**	umhos/cm	0.1		SM2510B		08/14/2009 12:16	BLW
Nitrate	**1.48**	mg/L	0.01		E353.2		08/14/2009 14:10	BLW
Nitrate + Nitrite, Total	**1.48**	mg/L	0.01		E353.2		08/14/2009 14:10	BLW
Nitrogen, Total	**1.48**	mg/L	0.22		Calculation		08/18/2009 8:45	BLW
pH	**7.62**	pH	0.1		E150.1	08/13/2009	08/14/2009 12:24	BLW
Total Kjeldahl Nitrogen (TKN)	**ND**	mg/L	0.22		E351.2		08/17/2009 16:30	BLW
Total Suspended Solids (TSS)	**43**	mg/L	1		SM2540D		08/17/2009 13:49	BLW

MCL = Maximum Contaminant Limit **ND = Not Detected**
RL = Reporting Limit **NR = Not Regulated**

MEL REVIEW: JMC

ANALYTICAL REPORT

Montana Environmental Laboratory LLC
1170 N. Meridian Rd., P.O. Box 8900, Kalispell, MT 59904-1900
Phone: 406-755-2131 Fax: 406-257-5359 www.melab.us

RLK Hydro, Inc.
P.O. Box 1579
Kalispell, MT 59901

PWS ID:
Project: Glacier Ranch - MW

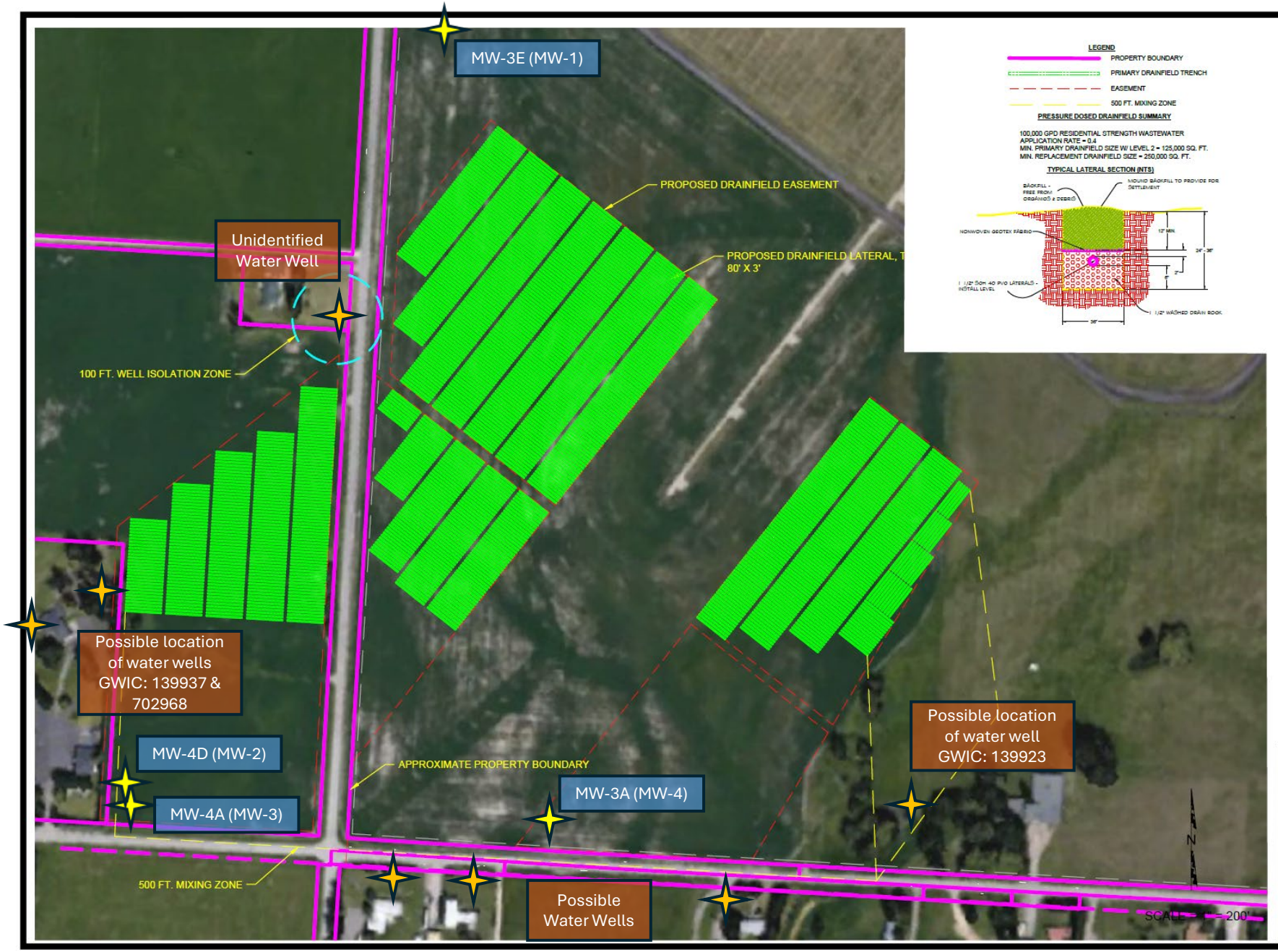
Client Sample ID: Glacier Ranch - MW1D
Matrix: ENVIRO WATER
Collected: 08/12/2009 17:34
Lab ID: 0907311-03
Received: 08/13/2009 9:06

Analyses	Result	Units	RL	MCL	Method	Prepared	Analyzed	Analyst
Coliform, Escherichia	**<1**	mpn/100ml	1		SM9223B	08/13/2009 15:00	08/14/2009 9:45	LKN
Conductivity	**223**	umhos/cm	0.1		SM2510B		08/14/2009 12:16	BLW
Nitrate + Nitrite, Total	**1.64**	mg/L	0.01		E353.2		08/14/2009 14:10	BLW
pH	**9.11**	pH	0.1		E150.1	08/13/2009	08/14/2009 12:24	BLW
Total Suspended Solids (TSS)	**191**	mg/L	1		SM2540D		08/17/2009 13:49	BLW

MCL = Maximum Contaminant Limit
RL = Reporting Limit
ND = Not Detected
NR = Not Regulated

MEL REVIEW: JMC

APPENDIX C: WATER WELL MAP AND DATA



PROJECT: OUTFALL 002, GR WWTS
LOCATED IN: SECTION 4, T29N, R21W, PMM, FLATHEAD COUNTY, MONTANA
FOR: ALPINE PACIFIC UTILITIES

APEC Engineering
somers, montana
www.apec-mt.com
406.393.2127

PRELIMINARY PRIMARY DRAINFIELD LAYOUT

PROJECT NO.		
DESIGN	TML	02/10/2023
CADD	TML	02/10/2023
CHECK		
REVIEW		

REVIEW SET - NOT FOR CONSTRUCTION

SHEET #1 OF 2

APPENDIX D: PHOSPHORUS BREAKTHROUGH ANALYSES

Phosphorus Breakthrough Analysis – Primary Drainfield

The "phosphorus breakthrough time to surface water" is calculated by performing the "phosphorus breakthrough analysis" (as referenced in Appendix M of the Montana Department of Environmental Quality *"How to Perform a Nondegradation Analysis for Subsurface Wastewater Treatment Systems"* March 2005). Refer to Figure 3 for the stream course, drainfield location, groundwater flow direction, drainfield dimensions, and distance from the drainfield to surface water. The wastewater treatment system will use aluminum sulfate precipitation followed by settling and tertiary filtration to remove phosphorus from the waste stream. This system is designed to treat a maximum wastewater flow of 52,000 gpd and the MT DEQ granted phosphorous limit is 2.5 mg/l. The phosphorous loading rate in lbs/day using a flow rate of 52,000 gpd at a concentration of 2.5 mg/l is 396 lbs/yr.

The variables for this project site are as follows:

1. **Length of Primary Drainfield perpendicular to groundwater flow, Lg.** This length, in relation to the groundwater flow, is 877 feet (Figure 3).
2. **Length of the Primary Drainfield's Long Axis, L.** This measurement is 812 feet (Figure 3).
3. **Width of the Primary Drainfield's Short Axis, W.** This measurement is 558 feet (Figure 3).
4. **Depth of limiting layer from the bottom of the Drainfield's laterals, B.** This depth is from the bottom of the drainfield trench to ground water equaling 4 feet.
5. **Distance from Drainfield to the surface water, D.** This is the shortest distance parallel to ground water flow where groundwater would intersect the stream and is 256 feet (Figure 3).
6. **Phosphorus mixing depth in groundwater, T.** The soils in this area are coarse textured and this number is 0.5 feet.
7. **Soil Weight, Sw.** This number is the constant 100 lbs per cubic feet.
8. **Phosphorus adsorption capacity of soil, Pa.** This number is the constant 200 ppm.
9. **Number of single-family homes on the drainfield, #I.** As stated before, this project will have a centralized wastewater treatment system from which all of the effluent will drain from, so this number will be 1.

The constants used for this project site are as follows:

1. **Phosphorus load per single family home, Pl.** As stated above, this project will have a centralized wastewater treatment system from which all of the effluent will drain at a rate of 52,000 gallons per day and having an effluent total inorganic phosphorus discharge concentration of 2.5 mg/l PO_4-P. The 2.5 mg/l PO_4-P concentration is very conservative, as actual treated effluent values

may be as low as 1.5 mg/l or less. Using a 2.5-mg/l PO_4-P concentration, the phosphorus load for this project will be 396 lbs per year.

2. **Conversion factor for ppm to percentage.** This number is the constant 1.00E+06 (unitless).

The equations used for this project site are as follows:

1. **Total Phosphorus Load, Pt.**
   Pt = (Pl)(#I)
2. **Soil Weight under Drainfield, W1.**
   W1 = (L)(W)(B)(Sw)
3. **Soil weight from Drainfield to surface water, W2.**
   W2 = [(Lg)(D) + (0.0875)(D)(D)](T)(Sw)
4. **Total Phosphorus adsorption by soils, P.**
   P = (W1 + W2)[(Pa) / (X)]
5. **Solution for Breakthrough Time to Surface Water, BT.**
   BT = P / Pt

The entire "phosphorus breakthrough analysis" is presented in spreadsheet form in Appendix 4 with all variables and calculated results for the equations above. The "breakthrough time to surface water" is 97 years. Since this time is greater than the phosphorus 50-year breakthrough criteria, additional analysis of phosphorus impacts to the surface water is not required.

Phosphorus Breakthrough Analysis
Rlk Hydro, Inc. *By:* *RWN* *Date:* *08/29/06*

Site Name	Glacier Ranch Subdivision
County	Flathead
Lot#	Subdivision
Notes	

Variables	Description	Value	Units	Comments
Lg	**Length of Primary Drainfield perpen. to groundwater flow**	877	ft.	
L	**Length of Primary Drainfield's Long axis**	812	ft.	
W	**Width of Primary Drainfield's short axis**	558	ft.	
B	**Depth to limiting layer from bot. of drainfields laterals***	4.0	ft.	
D	**Distance from drainfield to surface water**	256	ft.	
T	**Phosphorus mixing depth in groundwater (0.5 ft. for coarse soils, 1.0 ft. for fine soils)****	0.5	ft.	
Sw	Soil Weight (usually constant)	100	lbs./ft.^{3}	
Pa	Phosphorus adsorption capacity of soil (usually constant)	200	ppm	
#I	Number of single family homes on the drainfield	1	home (h)	
Constants				
PI	Phosphorus load per single family home (constant)	396	lbs/yr.	2.5 ppm treated effluent at 52,000 gpd
X	Conversion factor for ppm to percentage (constant)	1.00E+06	unitless	
Equations				
Pt	Total Phosphorus Load = (PI)(#I)	396	lbs.-h/yr.	2.5 ppm treated effluent at 52,000 gpd
W1	Soil Weight under drainfield = (L)(W)(B)(Sw)	1.81E+08	lbs.	
W2	soil weight from drainfield to surface water [(Lg)(D) + (0.0875)(D)(D)](T)(Sw)	11512320	lbs.	
P	Total Phosphorus adsorption by soils = (W1 + W2)[(Pa)/(X)]	3.86E+04	lbs.	
Solution				
BT	Breakthrough Time to Surface Water = P/Pt	97	years	

RLK HYDRO INC.

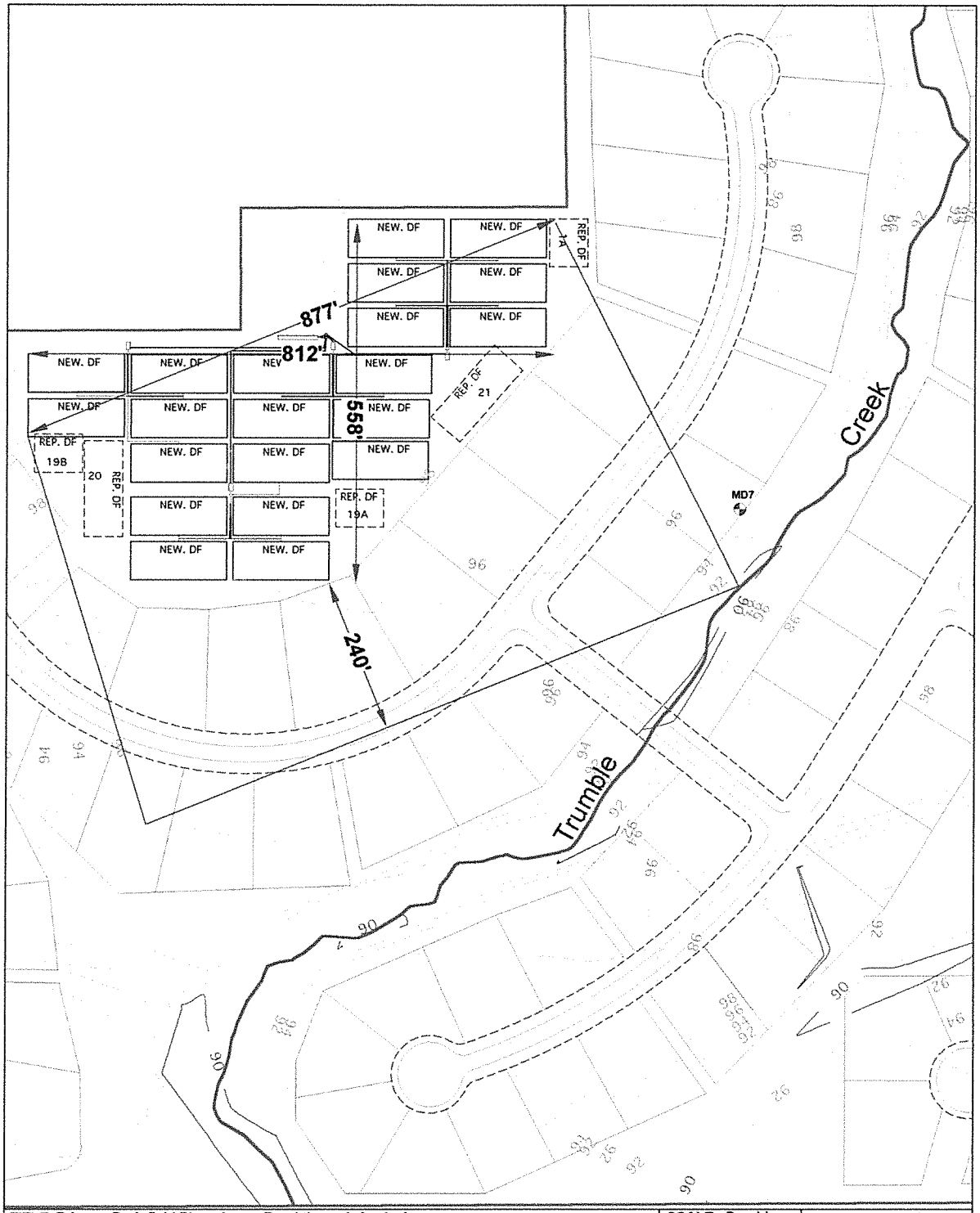


Figure 3. Phosphorous Breakthrough Time Analysis Dimensions

RLK HYDRO INC.

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Glacier Ranch
COUNTY: Flathead
Permit #: MTX000164 - Outfall 002
NOTES: Design Capacity = 22,000 gpd = 2,941 ft³/day
A **Seasonal Ground Water Flow Direction Study** is needed to analyze the potential overlap with Outfall 003 (see **Cumulative Impact Study**) which may impact adsorption availability.

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	615	ft
L	Length of Primary Drainfield's Long Axis	*	ft
W	Width of Primary Drainfield's Short Axis	*	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	6.00	ft
D	Distance from Drainfield to Surface Water	557	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5	ft
Ne			
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#I	Number of proposed wastewater treatment systems	1	
CONSTANTS			
PI	Phosphorous Load per proposed wastewater treatment system	167	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (PI)(#I)	167	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	93120000	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	18485089	lbs
P1	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	22321	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	133	years

BY: C. Boe
DATE: April 15, 2025

NOTES: ** Area of approved drainfield estimated to be 338,400ft²*
Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.

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MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Glacier Ranch
COUNTY: Flathead
Permit #: MTX000164 - Outfall 003
NOTES: Design Capacity = 45,600 gpd = 6,096 ft³/day
A **Seasonal Ground Water Flow Direction Study** is needed to analyze the potential overlap with Outfall 003 (see **Cumulative Impact Study**) which may impact adsorption availability.

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	775	ft
L	Length of Primary Drainfield's Long Axis	*	ft
W	Width of Primary Drainfield's Short Axis	*	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	6.00	ft
D	Distance from Drainfield to Surface Water	1750	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5	ft
Ne			
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#I	Number of proposed wastewater treatment systems	1	
CONSTANTS			
Pl	Phosphorous Load per proposed wastewater treatment system	347	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (Pl)(#I)	347	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	203040000	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	81210938	lbs
P1	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	56850	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	164	years

BY: C. Boe
DATE: April 15, 2025

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