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:	Ridge Run Baseball Facility
Permit Number:	MTX000280
Permit Type:	Domestic Wastewater
Application Type:	New
Facility Name:	Ridge Run Baseball Facility
Facility Location:	NW ¼ NE ¼, Section 12, T29N, R22W Flathead County Latitude: 48.296534° Longitude: -114.338445°
Facility Address:	12 McDermott Lane, Kalispell, MT 59901
Facility Contact:	Chris Kelly, Vice President
Treatment Type:	Level 2
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Outfall / Type:	001 / Pressure dosed subsurface drainfield
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Department Modified 275 foot
Effluent Limit Type:	WQBEL
Effluent Limits:	Total nitrogen: 1.58 lbs/day
Flow Rate:	Design maximum: 8,250 gpd Design average: 7,500 gpd
Effluent sampling:	Quarterly, Outfall 001
Ground water sampling:	Semi-annual, MW-2
Fact Sheet Date:	September 20, 2022
Prepared By:	Michelle Peziol

1.0 PERMIT INFORMATION

The following fact sheet outlines the basis for issuing a new Montana Ground Water Pollution Control System (MGWPCS) wastewater discharge permit to Martin Kelly (Permittee) for the Ridge Run Baseball Facility. The MGWPCS permit application and supplemental materials provide the information that serves as the basis for the development of the effluent limits and the monitoring requirements outlined within this fact sheet. The scope of this permitting action is for the construction, operation, and maintenance of the wastewater treatment and disposal system.

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

1.1 APPLICATION

DEQ received an application for new discharge permit on April 28, 2022. Permit fees accompanied the application on May 10, 2022. DEQ identified deficiencies in the renewal permit application during completeness review and notified the permittee in a letter dated June 1, 2022. The permittee provided supplemental application information on August 9, 2022, allowing DEQ to determine the application complete on August 16, 2022.

2.0 FACILITY INFORMATION

2.1 LOCATION

The Ridge Run Baseball Facility is located in the northern portion of the Flathead Valley (**Figure 1**) on McDermott Lane, about 8 miles north of Kalispell, Montana. All wastewater collections along with the treatment system and disposal are located on-site (**Figure 2**).

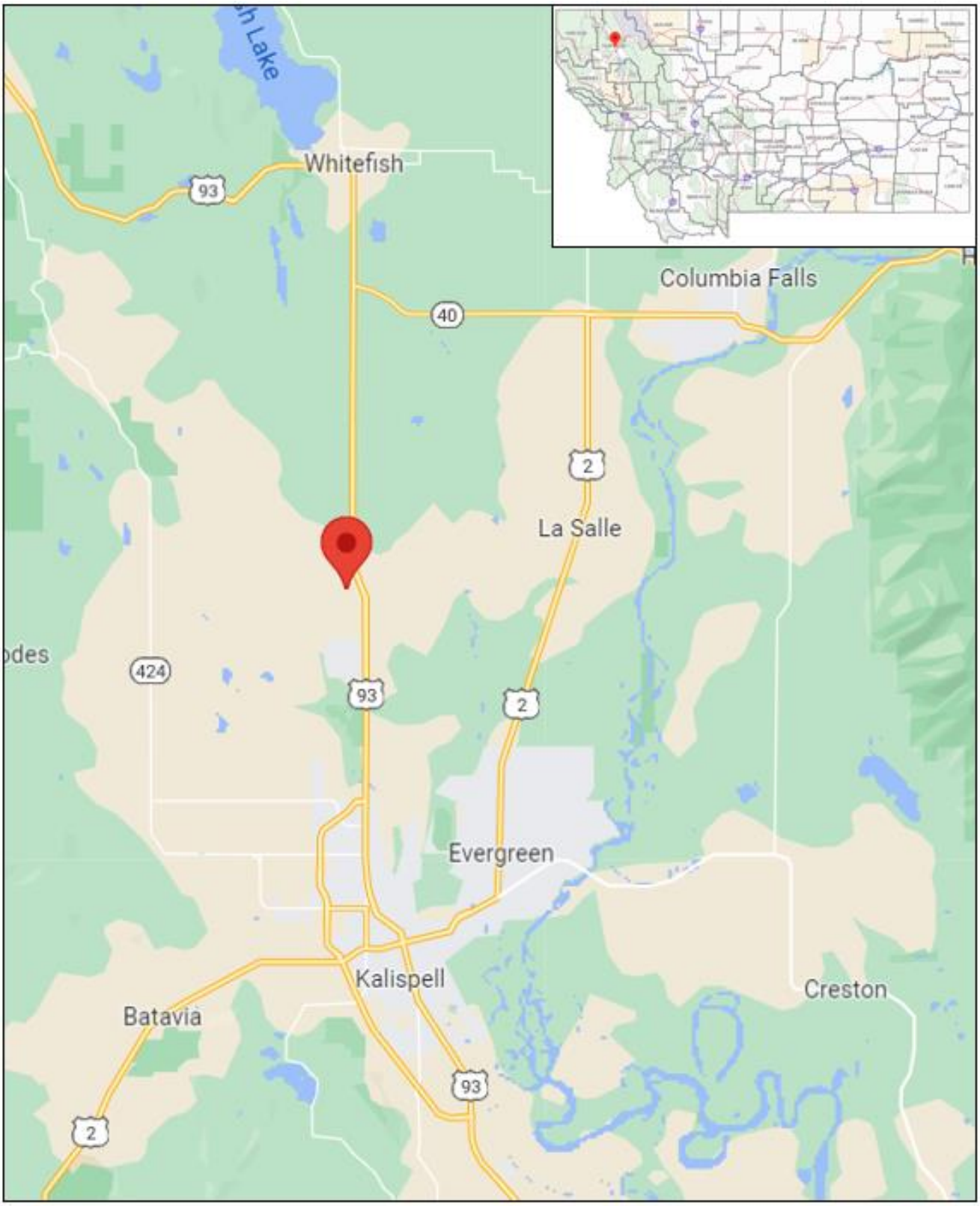


Figure 1. Location of Ridge Run Baseball Facility.

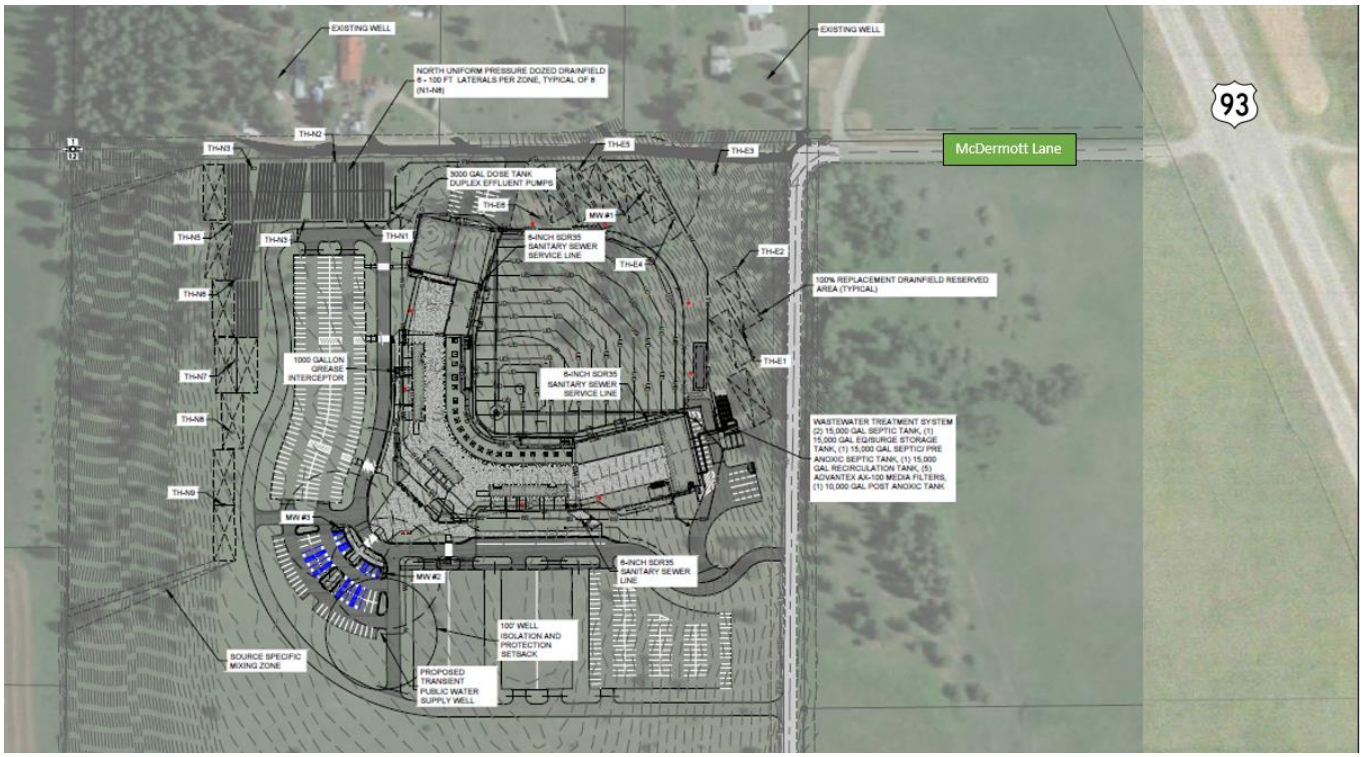


Figure 2. Ridge Run Baseball Facility Wastewater Treatment System.

The Ridge Run Baseball Facility will host minor league baseball games, and other public events including concerts, receptions and business meetings. Outdoor events are anticipated to consist of 48 yearly home baseball games and special events scheduled throughout the year hosted within facility restaurant and concourse buildings.

2.2 GEOLOGY/HYDROGEOLOGY/HYDROLOGY

A summary of the site geology and ground water characteristics are provided in **Table 1**.

Table 1: Geology/Hydrogeology/Hydrology Summary	
Geology	Historical data, geotechnical bore logs and a site evaluation identified cobbly silt loams and similar soils within the proposed absorption areas. An application rate of 0.3 gpd/sf was used to size the drainfield.
Hydrogeology	Measurements taken from three off-site monitoring wells show depth to shallowest ground water to be 148 ft. Hydraulic conductivity was measured at 95.59 ft/day.
Ground Water Flow	Using a three point solution with surface elevations from survey data groundwater flow was estimated to be southwest (S73 59'51.39"W) towards the Stillwater River at a gradient of 0.00215 ft/ft. This site specific direction is supported by the Flathead Valley Potentiometric Surface Map (LaFave, 2004).

Hydrology	The nearest surface water is Stillwell River located 5,500 ft SW from the facility. Montana Natural Heritage Program identifies a PSSA wetland area between facility and Interstate 93, approximately 300 meters NE of Outfall 001.

2.3 OPERATIONS

The Ridge Run Baseball Facility wastewater treatment system has been designed for Level 2 treatment. System operations are summarized below in **Table 2**.

Table 2: Operations Summary

Sources and Treatment
Contributing Sources of Wastewater: Domestic-in-Nature, Residential Strength Standard Industrial Code(s) (SIC) of contributing sources: 7999 Treatment System: Level 2 Recirculating Trickling Filter (proposed Advantex AX-100) Location of System: NW ¼ NE ¼, Section 12, Township 29 South, Range 22 West Latitude: 48.296039° Longitude: -114.341278° Flathead County
Sampling/Monitoring
Wastewater System: INF-001: Influent wastewater sample to be collected from the first in-flow equalization/septic tank. EFF-001: Effluent wastewater sample point located at or after the drainfield dose tank. FM-001: Effluent flow meter located in meter vault after the drainfield dose tank. The permittee is required to develop and implement a Wastewater Sampling, Analysis, and Reporting Plan for their community system (**Section 7**).
Disposal Operation
Outfall 001 - Subsurface Drainfield Method of Disposal: Pressure dosed subsurface infiltration to groundwater. Location: NW ¼ NE ¼, Section 12, Township 29 South, Range 22 West Latitude: 48.29714° Longitude: -114.34137° Design Capacity: Average Daily Flow (gpd): 7,500 Maximum Daily Flow (gpd): 8,250

The Ridge Run Baseball Facility proposed wastewater treatment system's final design consists of two (2) 15,000-gallon concrete tanks for primary treatment, one (1) 15,000-gallon concrete tank for flow equalization, time dosing one (1) 15,000-gallon pre-anoxic tank. Primary treated effluent then blends and recirculates in one (1) 15,000-gallon recirculation tank dosing five AX100 Pods. Effluent is then discharged into one (1) 10,000-gallon tank for post anoxic tank for final denitrification before being pumped to the final discharge tank. The partially treated effluent will then be transported to one (1) proposed 3000-gallon dosing tank. The dosing tank will pump effluent to proposed drainfield. (**Figure 3 – Flow Line Diagram**).

A grease tank will be set outside the proposed restaurant to treat fats, oils and grease prior to disposal into the septic system.

Design flows were estimated to 7,500-gallons per day for average flows of and 12,858-gallon per day for maximum flows. A proposed surge/equalization tank will control the release of wastewater within the system to 8,250-gallons per day for maximum daily flows.

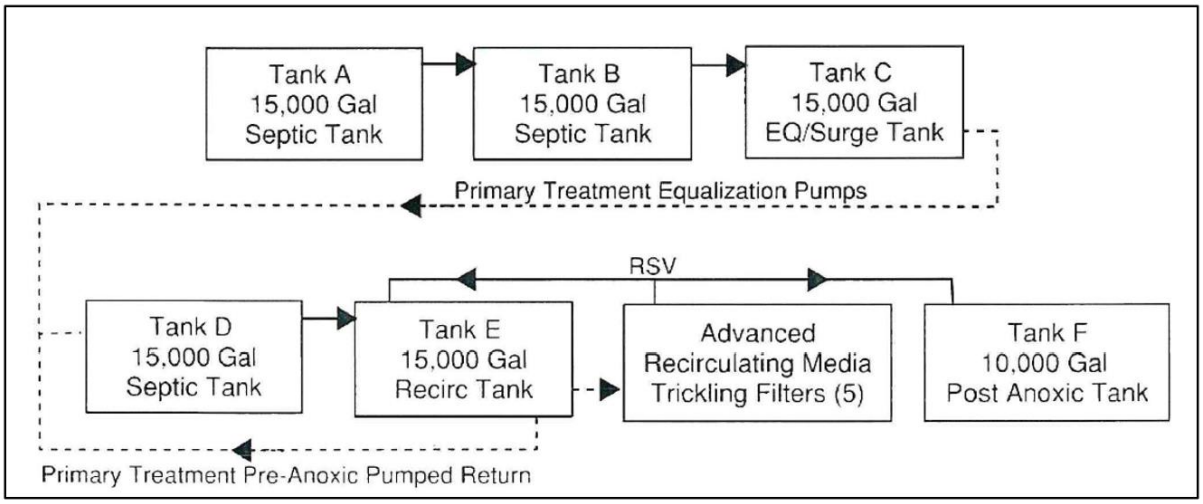


Figure 3. Wastewater Treatment System Line Diagram.

2.4 GROUND WATER MONITORING NETWORK

Three monitoring wells were completed on-site to first water. Proposed well information is provided in **Table 3** and well locations are shown in **Figure 2**. Well lithology and construction diagrams are provided in **Appendix A.**

Table 3: Monitoring Well Summary
Monitoring Well: MW-1
MBMG GWIC #: 323554
Permit Status: Active. Constructed on October 2, 2022
Latitude: 48.2982347 Longitude: -114.3371710
Representation: Upgradient of the outfall.
Monitoring Well: MW-2
MBMG GWIC #: 323555
Permit Status: Active. Constructed on October 4, 2022
Latitude: 48.2963306 Longitude: -114.3390262
Representation: Upgradient of the outfall. Water samples collected are representative of the ambient quality of the aquifer.
Monitoring Well: MW-3
MBMG GWIC #: 323556
Permit Status: Active. Constructed on October 10, 2022
Latitude: 48.298222 Longitude: -114.337203
Representation: Upgradient of the outfall.

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 Facility has proposed a Level 2 Wastewater Treatment System that can remove 78% of the raw wastewater nitrogen load. A summary of the estimated effluent characteristics is provided in **Table 4**.

Table 4: Estimated Effluent and Influent Quality – Outfall 001.

Parameter(1)	Location	Units	Reported Average Value	Reported Maximum Value	Source of Data
Biochemical Oxygen Demand (BOD_5)	EFF-001	mg/L		< 150	APP
Flow rate, Discharge	FM-001	gpd	7500	8250	APP
Nitrogen, Total (as N)	EFF-001	mg/L		< 24	APP
		lbs/day		7	APP
Oil & Grease	INF-001	mg/L		25	
Phosphorus, Total (as P)	EFF-001	mg/L	6.0		7

Footnotes:
APP = Application Form GW-1 and supplemental materials.
CFU = Colony Forming Unit
s.u. = standard units
(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.
(7) Estimates from other Engineering Studies (application Form GW-1 Section M).

Ambient ground water quality characteristics of the underlying aquifer were collected from MW-2. A summary of the ground water quality is provided in **Table 5.** Based on the 493 microsiemens per centimeter (µS/cm) specific conductance, the receiving water is Class I ground water.

Table 5: Ground Water Monitoring Results

Monitor Source(1)	Parameter	Units	Reported Minimum Value	Reported Average Value	Reported Maximum Value	# of Samples	Source of Data
MW-2	Chloride (as Cl)	mg/L	5.00	5.67	7.00	3	APP
	Specific Conductivity (@ 25°C)	µS/cm	478	493	514	3	APP
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	ND	ND	ND	3	APP
	Total Organic Carbon (TOC)	mg/L	0.70	1.10	1.70	3	APP
	pH	s.u.	7.59	7.72	7.81	3	APP

	Total Dissolved Solids (TDS)	mg/L	295	308	321	3	APP
	Nitrogen, Total Kjeldahl (as N)	mg/L	ND	ND	ND	3	APP
	Escherichia coli Bacteria	CFU/100 ml	Absent	Absent	Absent	3	APP

Footnotes:

APP = Application Form GW-1 and supplemental materials.

Period of Record: 03/18/2022 through 07/12/2022.

bgs = below ground surface

CFU = Colony Forming Units

ND = Not Detected

s.u. = standard units

(1) Refer to Figure 2 of the Fact Sheet for the existing or proposed location of the monitoring wells.

3.0 WATER QUALITY STANDARDS

Part of DEQ's mission is to protect and sustain the quality of state waters. Water quality standards provide the basis for limitations that protect state waters. These include beneficial use maintenance, specific water quality standards, and the 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

With a specific conductivity of 493 µS/cm (**Table 5** above), 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 will be protected. The beneficial uses and water quality standards 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. Standards are as follows:

- Ground water human health;
- Harmful, detrimental, or injurious activity; and,
- Nondegradation provisions.

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.

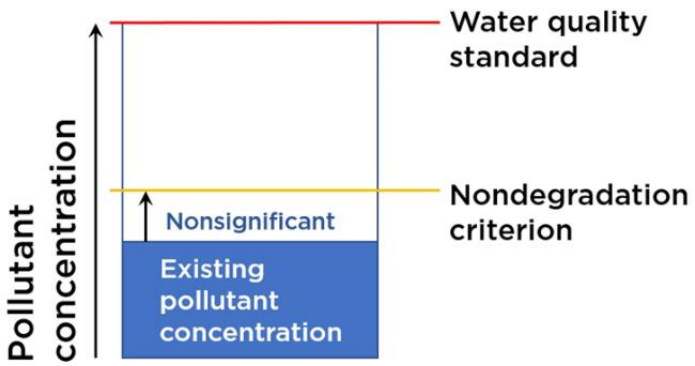
(4) DEQ conservatively assumes all forms of nitrogen will convert to nitrates within the aquifer. DEQ recognizes that other nitrogen forms may be harmful to the beneficial uses therefore will use Total Nitrogen for projecting impacts and in formulation of compliance efforts (limitations).

(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.

Changes in water quality that are deemed significant require an authorization to degrade. An authorization to degrade is not an authorization to pollute; the water quality standard must not be exceeded. An authorization to degrade is not authorized for this activity.



The 2022 Significance Determination Analysis found that the discharge from the proposed facility was not a significant activity and is summarized in the following sections.

3.3 Significance Criteria and Determination

For nitrogen, under Montana statute, total concentrations at or below 7.5 mg/L at the downgradient end of the mixing zone (**Section 4**) is a nonsignificant change in water quality. Using the nonsignificance criterion of 7.5 mg/L, DEQ will establish effluent limits that are protective of beneficial uses at the end of the mixing zone (**Section 5**).

In addition, DEQ also performed a significance determination in predicting nitrate values downgradient of the proposed discharge structure. The new wastewater system design along with on-site ground water characteristics (**Section 2.6**) were used in these projections. Due to a high volume of ground water and a decrease in the proposed nitrogen loading discharge; it is predicted that nitrates in the receiving aquifer will be 7.28 mg/l upon initial dilution with the underlying mixing zone. These projections demonstrate that nitrate in ground water will not result in degradation (**Appendix B and C**). Therefore, water quality changes that result from discharges in compliances with this permit are nonsignificant.

For phosphorus, a surface water breakthrough time of greater than 50 years is a nonsignificant change in water quality. 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 updated phosphorus breakthrough analysis estimates that phosphorus discharged to ground water from Outfall 001 may reach surface water in 563 years (**Appendix D**). The predicted phosphorus breakthrough is greater than 50 years, and therefore is not considered to be significant.

These analyses show that the discharge activity is not significant, and the discharge permit requires that the permittee complies with these established limitations on a long-term basis.

3.4 Cumulative Effects

DEQ considered the direct, secondary, and cumulative environmental impacts of the construction and operation of the facility and found no significant adverse effects on water quality, the human environment, and the physical environment. The DEQ analysis included the cumulative impact from other past and present actions.

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. Any actions that are outside the prevue of the discharge permit may not be addressed by DEQ until the next permitting action takes place.

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. The resulting ambient nitrogen levels were used to determine the assimilative capacity to ensure limitations were achieved that factors in these existing sources.

A ground water monitoring network has been established that will provide for long-term monitoring of the aquifer. The ground water data collected will provide continually monitoring of the health of the aquifer including the impacts of any upgradient dischargers. This data is made available to the public for their viewing and will be 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.

DEQ uses several mixing scenarios to assess a ground water discharge's potential to degrade surface water. These scenarios estimate in-stream nitrate concentrations. These estimates are simple mass-balance calculations based on instantaneous mixing of the nearest surface water. The surface water nitrate concentration, surface water flow, and aquifer characteristics are based upon best available data.

The ground water concentration scenarios are as follows:

- Ground water concentration upon instantaneous dilution.
- Ground water concentration at the end of the mixing zone.
- Undiluted effluent concentration.

Ground water concentrations were estimated using the mixing zone equation (**Section 4**). The scenarios are conservative and do not account for:

- Natural processes that attenuate nitrogen in the aquifer; and,
- Dilution and transport in the hyporheic zone.

The final estimate does not even consider ground water dilution. However, this overly conservative approach can be useful for demonstrating nonsignificance.

By using recent ground water nitrogen concentrations to identify the available assimilative capacity in the receiving aquifer, DEQ accounts for cumulative impacts of multiple nitrogen sources. These projections may be reanalyzed during every permit renewal cycle to incorporate updated site-specific information, which may include new upgradient or downgradient sources of nitrate.

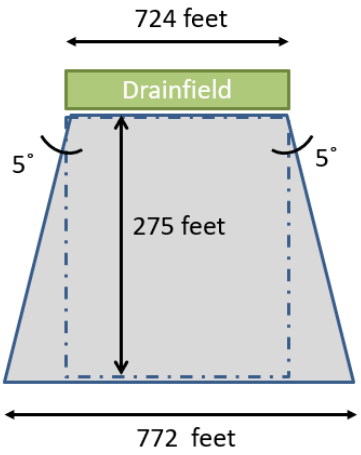
At the time of drafting, numeric surface water standards were no longer in effect due to recent legislation. In order to preserve the analyses moving forward, DEQ will be conservative and temporarily use the former aquatic standard listed in 2019's Circular DEQ-7.

The calculations underlying these projections are discussed and provided in full in **Appendix B, C and D.** These projections demonstrate that nitrate in ground water will not result in degradation of the nearest surface water. It also determined that the measurable impacts to surface water is not measurable. Therefore, water quality changes that result from this discharge activity are not significant so long as permit compliance is maintained.

4.0 MIXING ZONE

A mixing zone is an area of the receiving shallow ground water where the aquifer can 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.

This permit authorizes a department-modified mixing zone for total nitrogen discharge from Outfall 001. The modified mixing zone extends 275 feet downgradient from the source. The upgradient boundary is equal to the width of the source (measured perpendicular to the of ground water flow direction). The mixing zone widens in the downgradient direction by 5° on either side. The width of the downgradient boundary is calculated by adding the increased width for each side (the tangent of 5° (0.0875) times the mixing zone length) to the width of the upgradient boundary. Standard mixing zones extend 15 feet below the ground water table. A map of the proposed mixing zone is provided in **Figure 2**.



Information below provides details on how DEQ calculates the available dilution of the receiving aquifer. A summary is provided in **Table 7.**

The cross-sectional area (A) is the area of the ground water flux boundary at the maximum width of the mixing zone. Based on the dimensions of the mixing zone, and the hydrogeologic characteristics (**Section 2**), the volume of ground water ($\mathbf{Q_{GW}}$) available to mix with the wastewater is calculated using Darcy's Equation:

$$\mathbf{Q_{gw} = K\ I\ A}$$

Where:

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

Modern drainfield systems are designed to minimize the likelihood of the subsurface transport of pathogenic bacteria. Pathogens are a direct existential threat to public and environmental health.

Table 7: Hydrogeologic and Mixing Zone Information - Outfall 001

Parameter	Units	Value
Mixing Zone Type	-	Modified
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	<0.01
Ground Water Flow Direction	azimuth/bearing	S73°59' 51.39"W
Length of Mixing Zone	feet	275
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	724
Width of Mixing Zone at Down Gradient Boundary	feet	772
Cross Sectional Area of Mixing Zone (**A**)	ft^2	11,580
Hydraulic Conductivity (**K**)	feet/day	95.59
Hydraulic Gradient (**I**)	ft/ft	0.0022
Volume of Ground Water Available for Mixing ($\mathbf{Q_{gw}}$)	ft^3/day	2,436

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. The specific limitations provided by this permit are discussed below.

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:

$$\mathbf{Q_{gw}\,C_{gw} + Q_{eff}\,C_{eff} = Q_{comb}\,C_{proj}}$$

Where:

- $\mathbf{Q_{gw}}$ = ground water available for mixing
- $\mathbf{C_{gw}}$ = ambient receiving ground water concentration
- $\mathbf{Q_{eff}}$ = design capacity of wastewater system
- $\mathbf{C_{eff}}$ = effluent pollutant concentration
- $\mathbf{Q_{comb}}$ = combined ground water and effluent ($Q_{comb} = Q_{gw} + Q_{eff}$)
- $\mathbf{C_{proj}}$ = 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.

$$\mathbf{C_{lmt} = C_{std} + D(C_{std} - C_{gw})}$$

Where:

- $\mathbf{C_{lmt}}$ = effluent limitation concentration
- $\mathbf{C_{std}}$ = water quality standard concentration
- $\mathbf{C_{gw}}$ = ambient receiving ground water concentration
- **D** = dilution ratio (Q_{gw} / Q_{eff})

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.

$$\mathbf{L_{lmt} = (CON)(C_{eff})(DC_{eff})}$$

Where:

- $\mathbf{L_{lmt}}$ = effluent limitation-load
- $\mathbf{C_{eff}}$ = allowable effluent concentration
- $\mathbf{DC_{eff}}$ = design capacity of wastewater treatment system (gpd)
- **CON** = conversion factor [$8.34(10^{-6})$]

The calculated effluent limitation for nitrogen is:

1.58 lbs/day

C_{lmt} = 25.28 mg/L

Average Design Capacity = 7,500 gpd

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 3.3**, the phosphorus breakthrough analysis estimated the phosphorus breakthrough to occur in 563 years. Predicted phosphorus breakthrough within 50 years is considered significant. Therefore, a limit has not been developed. Typically, this does not require a permit limitation. However, 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.

Total Phosphorus Adsorption by Soils: 149,488 lbs
50 Year Breakthrough
266 lbs/year

The effluent limitations for this permit are summarized in **Table 8.**

Table 8: Effluent Limitations – Outfall 001

Parameter	Units	Quarterly Average	Annual Average
Nitrogen, Total [as N]	lbs/day	1.58	-

Quarterly load calculation: The quarterly average of all individual daily concentrations and the quarterly flow total must be used in the load calculations. Calculation rules are provided within the Wastewater Monitoring Tables.

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 **Table 9**. 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 10**. 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 in use of the online NetDMR program. Information and contacts for this program can be found here: https://deq.mt.gov/water/assistance.

Table 9: Influent and Effluent Monitoring and Reporting Requirements

Analyte/Measurement	Monitor Location	Units	Sample Type[1]	Minimum Sample Frequency	Reporting Requirements[1][2]
Flow Rate, Effluent[3]	FM-001	gal/day	Continuous	Continuous	Quarterly Average[4]
	FM-001	gal/quarter	Continuous	Continuous	Quarterly Total
Oils and Grease [HEM]	INF-001 EFF-001	mg/L	Grab	1/Quarter	Quarterly Average
Nitrogen, Nitrite+Nitrate [as N]	INF-001 EFF-001	mg/L	Grab	1/Quarter	Quarterly Average
Nitrogen, Total Ammonia [as N]	INF-001 EFF-001	mg/L	Grab	1/Quarter	Quarterly Average
Nitrogen, Total Kjeldahl (TKN)[as N]	INF-001 EFF-001	mg/L	Grab	1/Quarter	Quarterly Average
Nitrogen, Total [as N][5]	INF-001 EFF-001	mg/L	Calculate	1/Quarter	Quarterly Average
		lbs/day[6]	Calculate	1/Quarter	Quarterly Average
Phosphorus, Total [as P]	INF-001 EFF-001	mg/L	Grab	1/Quarter	Quarterly Average

Footnotes:

EFF-001: Description provided in Table 2 of the Fact Sheet document.

INF-001: Description provided in Table 2 of the Fact Sheet document.

FM-001: Description provided in Table 2 of the Fact Sheet document.

If no discharge occurs throughout 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) Quarterly Average: The average of all individual daily concentrations (mg/L) analyzed during the quarterly reporting period.

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

(4) Quarterly Average Flows: Determine total flows (gal/quarter) that occurred during the quarterly reporting period. Divide total flow by the number of calendar days in the Quarterly 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) Quarterly Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the quarterly reporting period. Determine totalized quarterly flows (gal/quarter): Total flow that occurred during the quarterly reporting period. Convert to a daily flow average (gal/day): Divide the total quarterly flow (gal/quarter) by the total calendar days (days) of the quarterly reporting period. Calculate quarterly load (lbs/day): Concentration (mg/L) x Flows (gal/day) x $[8.34 \times 10^{-6}]$.

Table 10: Ground Water Monitoring and Reporting Requirements

Analyte/Measurement	Monitor Location	Units	Sample Type(1)	Minimum Sampling Frequency	Reporting(2) Requirements
Chloride [as Cl]	MW-2	mg/L	Grab	2/Year	Semi-Annual
Nitrogen, Nitrite+Nitrate [as N]	MW-2	mg/L	Grab	2/Year	Semi-Annual
Nitrogen, Total Ammonia [as N]	MW-2	mg/L	Grab	2/Year	Semi-Annual
Nitrogen, Total Kjeldahl (TKN)[as N]	MW-2	mg/L	Grab	2/Year	Semi-Annual
Nitrogen, Total [as N](3)	MW-2	mg/L	Calculate	2/Year	Semi-Annual
Specific Conductivity @ 25°C	MW-2	µS/cm	Grab or Instantaneous	2/Year	Semi-Annual
Temperature	MW-2	°C	Instantaneous	2/Year	Semi-Annual
Static Water Level (SWL)(4)	MW-2	ft-bmp	Instantaneous	2/Year	Semi-Annual
Well Depth(4)	MW-2	ft-bmp	Instantaneous	2/Year	Semi-Annual

Footnotes:
CFU = Colony Forming Units
ft-bmp = feet below measuring point

A description 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) Semi-Annual Average: The average of all individual daily concentrations (mg/L) analyzed during the semi-annual 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 Operational Manual and measured to within 1/100th of one foot.

7.0 SPECIAL CONDITIONS

7.1 GROUND WATER MONITORING, ANALYSIS, AND REPORTING OPERATIONAL 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 Montana Bureau of Mines and Geology 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.

7.2 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 rehab the non-viable well or replace with the installation of a new well.

7.3 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.

7.4 WASTEWATER SAMPLING, ANALYSIS, AND REPORTING OPERATION MANUAL

The permittee shall use BMPs in developing SOPs for sampling, analyzing, and reporting wastewater characteristics from 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 be used as a guide in:

- Equipment calibration.
- Preparing and collecting wastewater influent (INF-001) and effluent (EFF-001) wastewater samples.
- Analyte calculations (**Table 6**).

- Recording and reporting wastewater characteristics.
- Recording and reporting wastewater flows.

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 11** 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 11: Compliance Schedule

Action	Frequency	Completion Date of Action	Reporting Due Date
Develop and implement a **Ground Water Monitoring, Analysis, and Reporting Operational Manual.**	Single event	*Within 180 days of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.
Develop and implement a **Wastewater Sampling, Analysis, and Reporting Operation Manual.**	Single event	*Within 180 days of the effective date of the permit.*	Due on or before the 28th day of the month following the completion date.

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 **December 16, 2022**. 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 (MTX000280), 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.

REFERENCES

40 CFR § 136. Guidelines Establishing Test Procedures for the Analysis of Pollutants. 2011.

Administrative Rules of Montana, Title 17, Chapter 30, Water Quality:
• 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.

Department of Environmental Quality, Water Quality Circulars:
• 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.

Bauder, J.W., et. al. 1993. Physiographic and land use characteristics associated with nitrate nitrogen in Montana ground water: Journal of Environmental Quality, v. 22, 99. 255-262.

LaFave, J. (2004). *Potentiometric surface map of the southern part of the Flathead Lake area, Lake, Missoula, Sanders Counties, Montana*. Butte, MT: Montana Bureau of Mines and Geology, Butte, MT, United States.

LaFave, J. I., Smith, L. N., & Patton, T. W. (2004). Ground-Water Resources of the Flathead Lake Area: Flathead. *Lake, Missoula, and Sanders Counties, Montana, Part A–Descriptive Overview and Water-Quality Data: Montana Ground-Water Assessment Atlas*, *2*.

Montana Bureau of Mines and Geology, Standard Procedures and Guidelines for Field Activities, Open-File Report 746, p.96. http://www.mbmg.mtech.edu/mbmgcat/catmain.asp

Montana Natural Heritage Program, Wetland and Riparian Map Viewer, https://mtnhp.org/mapviewer/?t=8

U.S. Environmental Protection Agency, Effluent Limitation Guidelines, http://water.epa.gov/scitech/wastetech/guide/, 2013.

U.S. Environmental Protection Agency, Guidance Manual for Developing Best Management Practices, http://www.epa.gov/npdes/pubs/owm0274.pdf, 1993.

U.S. Environmental Protection Agency, NPDES Permit Writers' Manual, 833-K-10-001, September 2010.

U.S. Environmental Protection Agency, Nitrification, 625/R-00/008, Office of Ground Water and Office of Water. 2002a.

U.S. Environmental Protection Agency, *Onsite Wastewater Treatment Systems Manual*, 625/R-00/008, Office of Research and Development and Office of Water. 2002b.

APPENDIX A – MONITORING WELL LOGS: MW-1

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report was completed online by the driller. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: MK REALITY C/O CHRIS KELLEY
GWIC Id: 323554

Section 1: Well Owner(s)
1) **MK REALITY C/O CHRIS KELLEY** (MAIL)
12 MC DERMOTT LN
KALISPELL MT 59901

Section 2: Location

Township	Range	Section	Quarter Sections
29N	22W	12	NW¼ NE¼

County	Geocode
FLATHEAD	

Latitude	Longitude	Geomethod	Datum
48.296533	-114.339383	NAV-GPS	WGS84

Addition	Block	Lot

Section 3: Proposed Use of Water
OTHER (1)

Section 4: Type of Work
Drilling Method: DUAL ROTARTY

Section 5: Well Completion Date
Date well completed: Saturday, October 2, 2021

Section 6: Well Construction Details
Meta Data Fields

1. Was borehole completed as a well? YES
2. Was well abandoned?

Borehole dimensions

From	To	Diameter
0	300	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	300	6.6	0.250		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
280	290	6	4 ROWS	1/8 X 1	HOLTE PERFORATOR SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	300	GRANULAR BENTONITE	Y

Section 7: Well Test Data

Total Depth: 300
Static Water Level: 182
Water Temperature:

Air Test *

15 gpm with drill stem set at 280 feet for 2 hours.
Time of recovery _ hours.
Recovery water level _ feet.

** 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 reservoir of the well casing.*

Section 8: Remarks
WELL 1

Section 9: Well Log

From	To	Description
0	40	BROWN CLAY AND GRAVEL
40	70	CLAY GRAVEL BOULDERS
70	280	CLAY GRAVEL
280	300	BROWN SAND AND GRAVEL SOME WATER

Driller Certification is Missing

This well log is considered to be in DRAFT form. It has not been certified and is not an official copy.

APPENDIX A – MONITORING WELL LOGS: MW-2

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report was completed online by the driller. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: MK REALITY C/O CHRIS KELLEY
GWIC Id: 323555

Section 1: Well Owner(s)
1) **MK REALITY C/O CHRIS KELLEY** (MAIL)
12 MC DERMOTT LN
KALISPELL MT 59901

Section 2: Location

Township	Range	Section	Quarter Sections
29N	22W	12	NW¼ NE¼

County	Geocode
FLATHEAD	

Latitude	Longitude	Geomethod	Datum
48.296333	-114.339069	NAV-GPS	WGS84

Addition	Block	Lot

Section 3: Proposed Use of Water
OTHER (1)

Section 4: Type of Work
Drilling Method: DUAL ROTARTY

Section 5: Well Completion Date
Date well completed: Monday, October 4, 2021

Section 6: Well Construction Details
Meta Data Fields

1. Was borehole completed as a well? YES
2. Was well abandoned?

Borehole dimensions

From	To	Diameter
0	300	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	300	6.6	0.250		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
280	290	6	4 ROWS	1/8 X 1	HOLTE PERFORATOR SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	300	GRANULAR BENTONITE	Y

Section 7: Well Test Data

Total Depth: 300
Static Water Level: 180
Water Temperature:

Air Test *

10 gpm with drill stem set at 280 feet for 2 hours.
Time of recovery _ hours.
Recovery water level _ feet.

** 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 reservoir of the well casing.*

Section 8: Remarks
WELL #2

Section 9: Well Log

From	To	Description
0	40	CLAY AND GRAVEL
40	70	CLAY GRAVELS AND BOULDERS
70	280	BROWN CLAY AND GRAVEL
280	300	BROWN SAND GRAVEL SOME WATER

Driller Certification is Missing

This well log is considered to be in DRAFT form. It has not been certified and is not an official copy.

APPENDIX A – MONITORING WELL LOGS: MW-3

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report was completed online by the driller. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Site Name: MK REALITY C/O CHRIS KELLEY
GWIC Id: 323556

Section 1: Well Owner(s)
1) **MK REALITY C/O CHRIS KELLEY** (MAIL)
12 MK DERMOTT LN
KALISPELL MT 59901

Section 2: Location

Township	Range	Section	Quarter Sections
29N	22W	12	NW¼ NE¼

County	Geocode
FLATHEAD	

Latitude	Longitude	Geomethod	Datum
48.298222	-114.337203	NAV-GPS	WGS84

Addition	Block	Lot

Section 3: Proposed Use of Water
OTHER (1)

Section 4: Type of Work
Drilling Method: DUAL ROTARTY

Section 5: Well Completion Date
Date well completed: Sunday, October 10, 2021

Section 6: Well Construction Details
Meta Data Fields

1. Was borehole completed as a well? YES
2. Was well abandoned?

Borehole dimensions

From	To	Diameter
0	300	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	300	6.6	0.250		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
280	290	6	4 ROWS	1/8 X 1	HOLTE PERFORATOR SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	300	GRANULAR BENTONITE	Y

Section 7: Well Test Data

Total Depth: 300
Static Water Level: 180
Water Temperature:

Air Test *

15 gpm with drill stem set at 280 feet for 2 hours.
Time of recovery _ hours.
Recovery water level _ feet.

** 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 reservoir of the well casing.*

Section 8: Remarks
WELL #3

Section 9: Well Log

From	To	Description
0	85	BROWN CLAY GRAVEL AND BOULDERS
85	190	BROWN CLAY AND GRAVEL
190	280	BROWN CEMENTED CLAY AND GRAVEL
280	300	BROWN CEMENTED SAND AND GRAVEL WITH WATER

Driller Certification is Missing

This well log is considered to be in DRAFT form. It has not been certified and is not an official copy.

APPENDIX B – SIGNIFICANCE DETERMINATION AND REASONABLE POTENTIAL ANALYSES

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

Projected Downgradient Nitrates in Ground Water

SITE NAME: Ridge Run Baseball Facility
COUNTY: Flathead
Permit #: MTX000280
NOTES: Projected nitrates in receiving ground water downgradient from discharge structure.
Projected to be lower than the most restrictive surface water significance criteria and trigger value (see notes).

	(K)	(I)	(D)	(L)	(Ng)	(Y)	(#l)	(Ql)	(Ne)	(P)	(V)	(W)	(Am)	(As)	(Qg)	(Qr)	(Qe)	Nt
Distance from Discharge Structure	Hydr. cond. (ft/day)	Hydr. grad. (ft/ft)	Mix zone thick (feet)	Down grad. distance (feet)	Back-ground nitrate (mg/l)	Drain-field width (feet)	# of single family homes	Effluent per source (ft3/day)	Effluent TN conc. (mg/l)	Annual precip. (in/yr)	Percent precip. recharge	Down-grad. width (feet)	Mix zone area (ft^2)	Mix. zone surface area (ft^2)	Ground water flow (ft3/day)	Recharge flow (ft3/day)	Effluent flow (ft3/day)	Projected nitrate (N) (mg/l)
Outfall 001																		
	95.59	0.002200	15	275	0.00	724	1	1103	24.0	16.0	0.2	772	11582	212334	2380	155.00	1103	**7.28**

REV. 10/2015

NOTES:

Circular DEQ 7: Ground Water Human Health Standard = 10 mg/L
Circular DEQ 7: Trigger Value in determining significant activities = 5 mg/L
ARM 17.30.715: Significance Criteria for determining nonsignificant changes in surface water = 7.5 mg/L

BY: Michelle Peziol
DATE: 08/01/22

Hydr. cond. =	*K*	Hydraulic Conductivity
Hydr. grad. =	*I*	Hydraulic Gradient
Mix zone thick =	*D*	Thickness of Mixing Zone (Standard mixing zone is typically 15ft)
Down grad. distance =	*L*	Mixing Zone Length, or if less, the distance to the nearest downgradient source.
Drainfield width =	*Y*	Width of Drainfield Perpendicular to Ground Water Flow
Background nitrate =	*Ng*	Background Nitrate (as Nitrogen) Concentration
Nitrate in precip. =	*Nr*	Nitrate (as Nitrogen) Concentration in Precipitation (usually constant at 1.0 mg/L)
Effluent Nitrate conc. =	*Ne*	Total Nitrogen concentration in treated effluent
# single family homes =	*#l*	Number of Single Family Homes on the Drainfield (leave as 1 if effluent volume in next column is adjusted to equal total effluent from drainfield)
Effluent per drain. =	*Ql*	Quantity of Effluent from drainfield
Annual precip. =	*P*	Annual local Precipitation
Percent precip recharge =	*V*	Percent of Precipitation Recharging Ground Water (usually constant at 0.2)
Down grad. width =	*W*	Width of Mixing Zone Perpendicular to Ground Water Flow = (0.175)(L) + (Y)
Mix zone area =	*Am*	Cross Sectional Area of Aquifer Mixing Zone = (D)(W)
Mix zone surface area =	*As*	Surface Area of Mixing Zone = (L)(W)
Ground water flow =	*Qg*	Ground Water Flow Rate = (K)(I)(Am)
Recharge flow =	*Qr*	Recharge Flow Rate = (As)(P/12/365)(V) 0
Effluent flow =	*Qe*	Effluent Flow Rate = (#l)(Ql)
Resulting nitrate (N) =	*Nt*	Nitrate (as Nitrogen) Concentration at End of Mixing Zone = ((Ng)(Qg) + (Nr)(Qr) + (Ne)(Qe)) / ((Qg) + (Qr) + (Qe)) (or nitrate concentration to use as background nitrate for next downgradient drainfield when determining cumulative effects)

APPENDIX C – SIGNIFICANCE DETERMINATION AND REASONABLE POTENTIAL ANALYSES

MASS BALANCE EQUATION

ALLOWABLE DISCHARGE CONCENTRATION DETERMINATION

$$C_2 = \frac{C_3(Q_1 + Q_2) - C_1 Q_1}{Q_2}$$

C1	Ambient ground water (background) concentration (mg/L)	0.01
C2	**Allowable discharge concentration (mg/L)**	**25.28**
C3	Ground water concentration limit for pollutant (from Circular WQB-7) at the end of the mixing zone.	7.50
Q1	Ground water flow volume (ft^3 / day)	2380
Q2	Average flow of discharge (design capacity of system in ft^3 / day)	1003

The volume of ground water that will mix with the discharge (Q_s) is estimated using Darcy's equation:

Q1=K I A

Q1	**Ground water flow volume (ft^3 / day)**	**2380**
K	hydraulic conductivity (ft/day)	95.59
I	hydraulic gradient (ft/ft)	0.0022
A	cross-sectional area (ft^2) of flow at the down-gradient boundary of mixing zone.	11582

Outfall 001 - Ridge Run Baseball MTX000280- September 01, 2022

APPENDIX D – SIGNIFICANCE DETERMINATION AND REASONABLE POTENTIAL ANALYSES

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Ridge Run Baseball Facility
COUNTY: Flathead
Permit #: MTX000280
NOTES: Variables used are based on conservative measurements
Design Capacity = 8,250 gpd

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	772	ft
L	Length of Primary Drainfield's Long Axis	275	ft
W	Width of Primary Drainfield's Short Axis	724	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	6	ft
D	Distance from Drainfield to Surface Water	5140	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils,	1.0	ft
Ne	1.0 ft for fine soils)**		
Sw	Soil Weight (usually constant)	100	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200	ppm
#l	Number of proposed wastewater treatment systems	1	
CONSTANTS			
Pl	Phosphorous Load per proposed wastewater treatment system	266	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (Pl)(#l)	266	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	119460000	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	627979500	lbs
P1	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	149488	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	563	years

BY: Michelle Peziol
DATE: 08/01/2022

NOTES: ** 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.*

REV. 04/2000