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:	P & S Montana Farms, LLC
Permit Number:	MTX000274
Permit Type:	Domestic wastewater
Application Type:	New
Facility Name:	R bar N Estates Subdivisions
Facility Location:	Tracts 2 & 3 of CS #1410, in NW ¼ of Section 21 and SW ¼ of Section 16, T1S, R5E, Gallatin County Latitude: 45.74166° Longitude: -111.12025°
Facility Contact:	Ronald Pike, Owner
Treatment Type:	Level 2
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Outfall / Type:	001 – IP cell
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Source-Specific
Effluent Limit Type:	WQBEL
Effluent Limits:	Total nitrogen: 3.28 lbs/day
Flow Rate:	Design average: 44,250 gpd
Effluent sampling:	45’ 44” 27.77°, -111’ 7” 12.34°; quarterly
Ground water sampling:	MW-1, MW-2, MW-3; quarterly
Fact Sheet Date:	November 30, 2021
Prepared By:	Melinda Horne

1.0 PERMIT INFORMATION

This fact sheet provides the basis for DEQ's decision to issue a MGWPCS wastewater discharge permit to P&S Montana Farms, LLC for the R Bar N Estates Subdivision wastewater treatment system.

1.1 APPLICATION

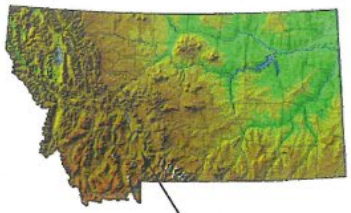
DEQ received an application for renewal of the permit on August 26, 2021. Application fees for new coverage accompanied the application. DEQ reviewed the submittal and issued a completeness letter on September 23, 2021.

2.0 FACILITY INFORMATION

2.1 LOCATION

The R Bar N Estates Subdivision wastewater treatment system is located in the Gallatin Valley between Belgrade and Bozeman (**Figure 1**). It will be built on Tracts 2 & 3 of the Certificate Survey No. 1410, located in the NW ¼ of Section 21 and SW ¼ of Section 16, Township 1 South, Range 5 East, Gallatin County.

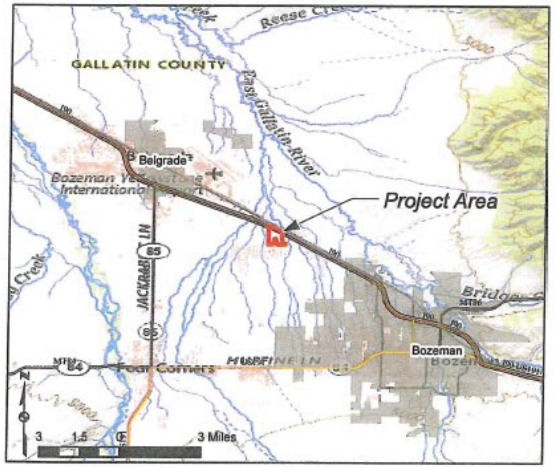
The subdivision will serve a total population of 443, with 177 households (**Figure 2**). The wastewater system will exclusively service the subdivision.



R Bar N Subdivision

Tracts 2 and 3 of COS 1410
SW 1/4 Section 16 and NW 1/4 Section 21, T1S, R5E

Gallatin County, Montana



Project Vicinity

1 inch = 1,500 feet

0 750 1,500 3,000 4,500 6,000 Feet

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Figure 1: Vicinity Map
MTX000274, R Bar N Estates

2.2 OPERATIONS

The treatment system is designed to treat domestic wastewaters that are of residential strength. System operations are summarized below in **Table 1**.

Table 1. Collection, Treatment, and Disposal Summary

Collection	
Contributing sources:	177 residences
Standard industrial code(s) of sources:	4952
Collection method:	Gravity-driven sewer lines
Flow volume:	Average daily design flow: 44,250 gallons per day
Treatment	
Treatment level:	Level II
Treatment technology:	SepticNet system
Treatment location:	45° 44’ 27.77”, - 111° 7’ 12.34”
Disposal	
Method of disposal:	Infiltration to ground water
Disposal structure:	3 100” x 100” infiltration percolation cells
Outfall location:	45° 44’ 27.77”, - 111° 7’ 12.34”

The proposed wastewater system for R Bar N Estates will include gravity sewer services, a lift station, a Level II package wastewater treatment plant, and disposal through infiltration/percolation beds.

Figure 2 is a line drawing of the collection, treatment, and disposal process. **Figure 3** shows the facility plans, including the location of test pits, monitoring wells, and the treatment system.

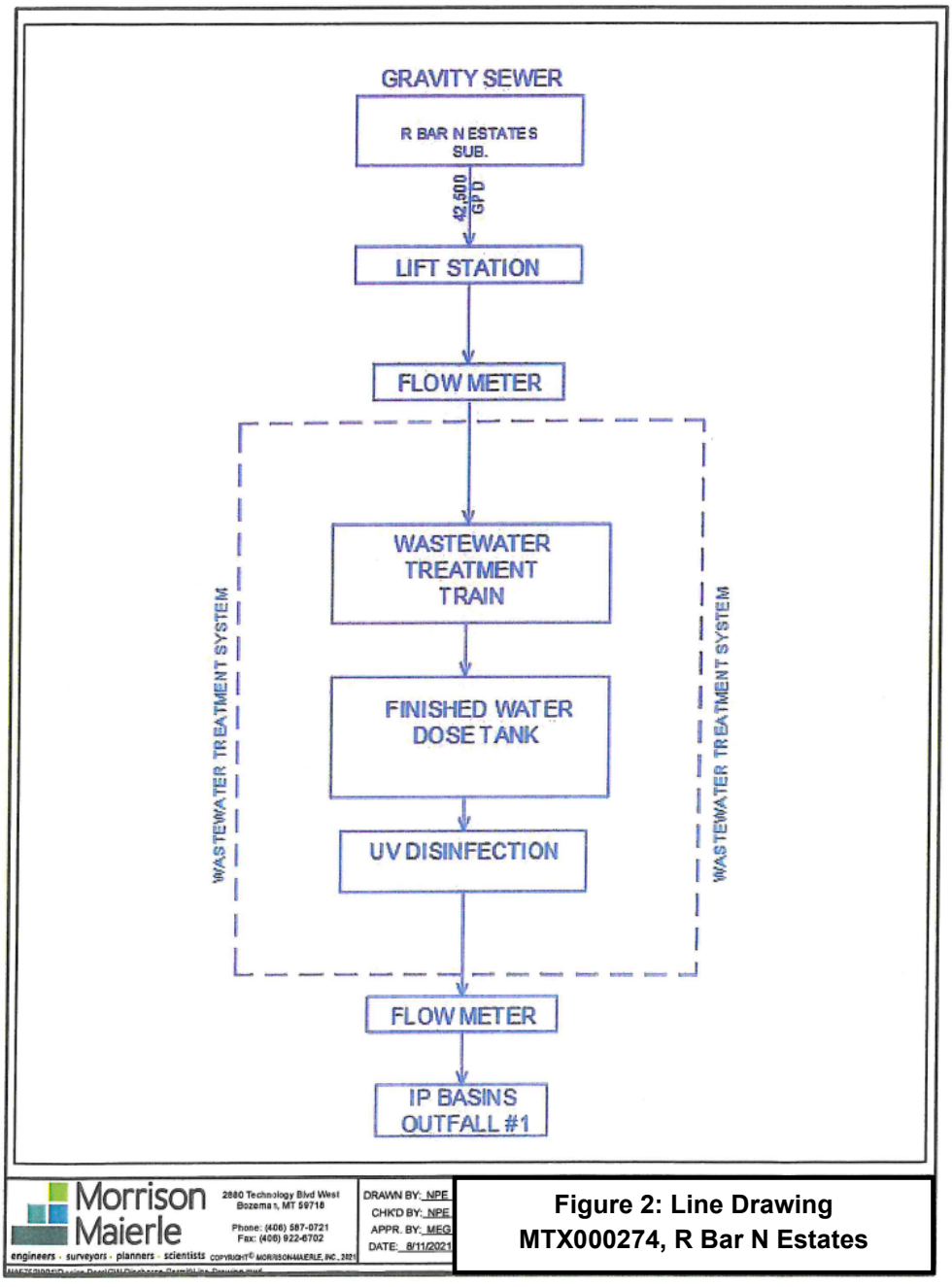

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Figure 2: Line Drawing
MTX000274, R Bar N Estates

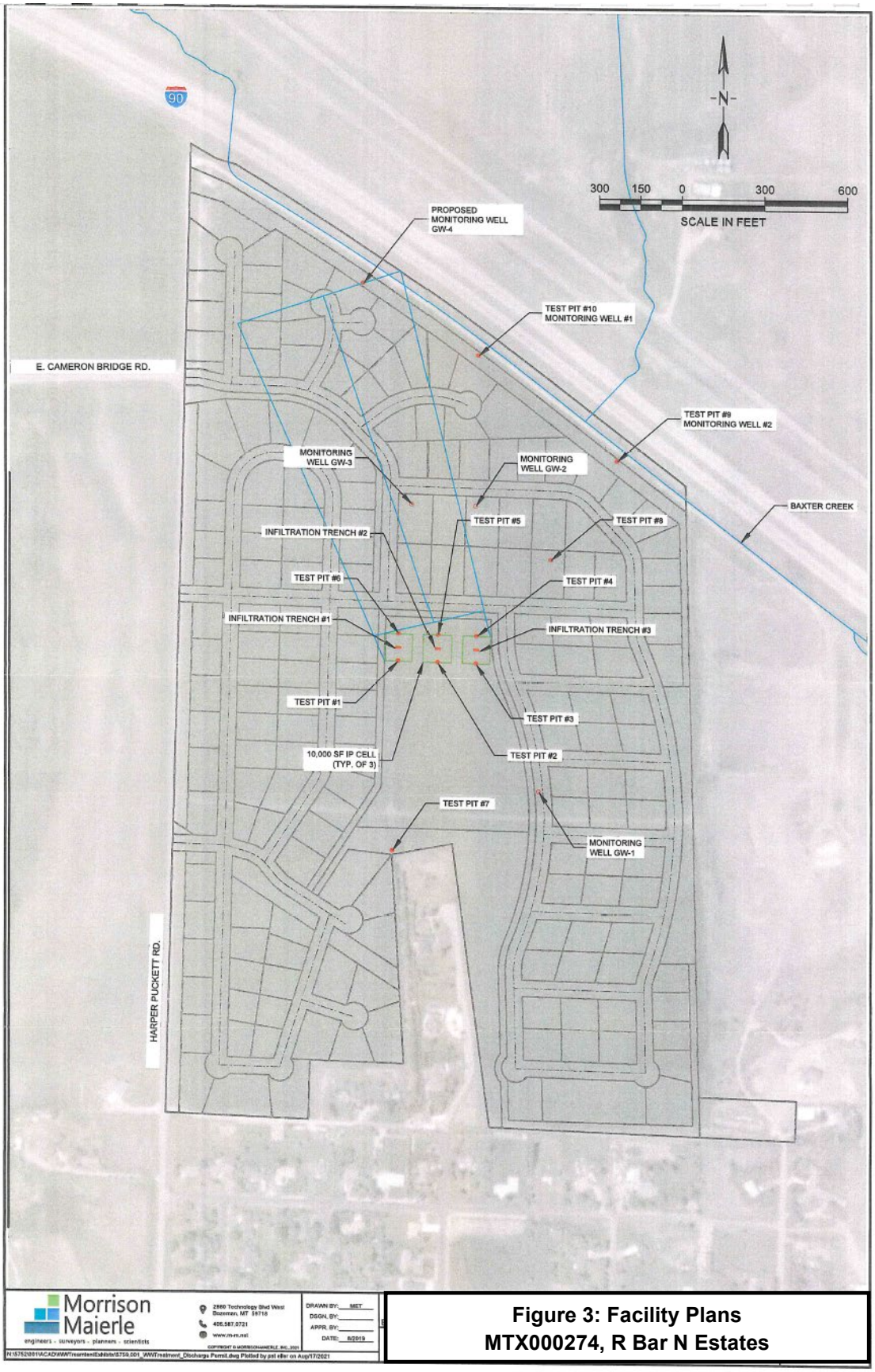


Figure 3: Facility Plans
MTX000274, R Bar N Estates

2.3 EFFLUENT CHARACTERISTICS

DEQ requires a permit applicant to disclose the quality of the effluent so that DEQ may evaluate the potential for pollution of state water. The applicant provided the following design criteria that the selected Level II treatment package will meet (**Table 2**). The facility plans to choose a SepticNet system, which treats wastewater to a Total Nitrogen concentration of 7.5 mg/L. In this permit, however, DEQ evaluates the proposed discharge with the applicant's conservative Total Nitrogen estimate of 15 mg/L.

Table 2. Treatment Design Criteria

Average daily flow	44,250 gpd
Effluent total nitrogen	15 mg/L
BOD	10-15 mg/L
TSS	10-15 mg/L

2.4 GEOLOGY

The facility is located in the Gallatin Valley, which is a part of the Three Forks structural basin. The Three Forks basin is filled with Tertiary alluvial deposits that are tilted eastward in the late Tertiary/early Quaternary. Atop the Tertiary units in the valley are Quaternary alluvial and fluvial deposits (Hackett, 1960).

Within the permit boundaries are two geologic units: Quaternary alluvial fan (Qaf) and coarse-grained Tertiary sediment or sedimentary rock (Tsuc). Qaf is Holocene to Pleistocene in age, and comprised of gravel, sand, silt, and clay. The clasts are matrix supported, and the unit may be up to 200 ft thick. Tsuc is Miocene and Pliocene in age, and in the Bozeman area is comprised of conglomerate, sandstone, siltstone, and volcanic ash beds (MBMG 469, 2002).

The monitoring well logs reported predominate grain sizes of gravels, cobbles, and sand.

2.5 HYDROGEOLOGY

The Gallatin Valley aquifer is unconfined and located in Quaternary and Tertiary alluvium. The Quaternary units generally have high transmissivity, whereas the Tertiary strata has lower. The aquifer is recharged by irrigation water, and spring runoff. Calcium and bicarbonate are the principal dissolved constituents in groundwater located in Quaternary deposits, and sodium is the primary constituent in Tertiary strata. Hackett (1960) found the depth to water throughout the Gallatin Valley to be less than 10 feet.

Important hydrogeologic characteristics are summarized below in **Table 3**. This data was the result of modeling completed by WET (2021).

Table 3. Hydrogeologic Summary

Average depth to ground water	50 ft [(1)]
General ground water flow direction	N 20° W [(2)]
Hydraulic conductivity	300 ft/day [(2)]
Hydraulic gradient	0.01 ft/ft [(2)]
Nearest downgradient surface water	Baxter Creek [(3)], 1000 ft

[(1)] Averaged from static water level measurements taken by the permittee.
[(2)] Modeling results from WET (2021).
[(3)] Baxter Creek is perched above groundwater table, as are Hyalite and McDonald Creeks (Hackett, 1960).

2.6 GROUND WATER MONITORING WELLS

There are 3 monitoring wells associated with this permit: MW-1, MW-2, and MW-3. These wells are plotted on **Figure 2**. Monitoring well construction details are provided below in **Table 4**. Driller's logs for each monitoring well are attached as **Appendix A**. The permittee plans to add an additional monitoring well at the downgradient point of the mixing zone.

Table 4. Monitoring Well Summary

Monitoring Well MW-1	
MBMG GWIC ID:	315467
Location- latitude/longitude:	45.7399° Longitude: -111.11865°
Location- narrative:	Just east from center of property
Rationale:	Ambient receiving water quality
Depth; screened interval:	Total depth: 65 ft; screen interval: 45-65 ft
Notes:	Upgradient well
Monitoring Well MW-2	
MBMG GWIC ID:	315466
Location- latitude/longitude:	45.742794° Longitude: -111.1196°
Location- narrative:	Northern center of property
Rationale:	Effluent monitoring location
Depth; screened interval:	Total depth: 59 ft; screen interval: 39-59 ft
Notes:	Not in estimated effluent path
Monitoring Well MW-3	
MBMG GWIC ID:	315469
Location- latitude/longitude:	45.7428° Longitude: -111.12052°
Location- narrative:	Northwestern part of property
Rationale:	Effluent monitoring location
Depth; screened interval:	Total depth: 59 ft; screen interval: 39-59 ft
Notes:	Downgradient well in estimated effluent path

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.

2.7 GROUND WATER QUALITY CHARACTERISTICS

Sampling results from MW-1, MW-2, and MW-3 are provided below in **Table 5**. Based the average conductivity provided of 634 µS/cm, the receiving water is Class I ground water. This data was collected by the permittee and analyzed by a laboratory.

Table 5: Existing Groundwater data

Test	Units	Minimum	Maximum	Average	No. of Samples (1)
Specific Conductivity	µS/cm	590	649	634	8
Total Dissolved Solids	mg/L	351	413	379	9
pH	s.u.	7.4	7.7	7.6	9
Chloride	mg/L	16	17.5	17.5	9
E. coli	No./100ml	ND	ND	ND	9

Total Kjeldahl Nitrogen	mg/L	ND	ND	ND	9
Nitrate + Nitrite, as N	mg/L	3.59	5.33	4.45	9
Total Organic Carbon	mg/L	0.9	1.1	1.0	9
Total Nitrogen	mg/L	3.6	5.3	4.45	9
[(1)] Samples were taken from monitoring wells GW-1, GW-2, and GW-3 on 2/3/2021, 4/29/2021, and 7/13/2021.					

Table 6 presents the average ambient ground water concentrations in comparison to a Proposed Level II treatment system.

Table 6: Summary of Estimated and Self-Reported Monitoring Results

Analyte/Measurement	**units**	**Proposed System**	**Water Quality Standards**	**Ambient Ground Water**
		Level 2 treatment with properly designed and cited drainfield	DEQ Circular-7	Average results from MW-1, MW-2, and MW-3
		average		**average**
Escherichia coli Bacteria	CFU/100ml	not likely	<1	ND
Chloride [as Cl]	mg/L	5		18
Nitrogen, Ammonia [as N]	mg/L	2		*
Nitrogen, Kjeldahl, total [as N]	mg/L	3		ND
Nitrogen, Nitrite + Nitrate [as N]	mg/L	21[(2)]	10	4.45
Nitrogen, Total [as N]	mg/L	24[(2)]		ND
Nitrogen, Total [as N]	lbs/day	8.81[(4)]		*
Oil & Grease	mg/L	<1		*
pH	s.u.	6 to 9		7.6
Phosphorus, Total [as P]	mg/L	8		*
Specific Conductivity [SC] @ 25°C	µS/cm	305		634
Solids, total dissolved (TDS)	mg/L	200		379

Footnotes:
CFU = Colony Forming Units
s.u.: standard units
*Analyte was not required to be sampled in the application process, or not applicable.
(1) Ammonia and organic nitrogen are the primary nitrogen components in untreated and minimally treated wastewater streams.
(2) Prior to dilution within an authorized mixing zone.
(4) Calculated using average daily design flow.

2.8 SURFACE WATER HYDROLOGY

The closest hydrologically connected state water is 13,000 ft downgradient according to the groundwater elevations measured by Hackett et al. (1960) and modeled by WET (2021). The creeks downgradient of the facility – Hyalite, McDonald, and Baxter Creeks – are perched above the water table. The simulated groundwater head from WET (2021) places the water levels of these creeks 20-50 ft above the water table, demonstrating that they are hydrologically disconnected.

3.0 WATER QUALITY STANDARDS AND NONDEGRADATION

Part of DEQ's mission is to protect, sustain, and improve the quality of state waters. Water quality standards provide the basis for effluent limits that DEQ applies to discharge permits (**Section 5**). These standards include three components: designated uses, water quality criteria, and nondegradation policy. DEQ protects all designated uses of state water by basing effluent limits on the most restrictive water quality limitations, intended to protect the most sensitive uses.

3.1 DESIGNATED USES

With a specific conductivity of 634 µS/cm (**Table 5** above), the receiving water is Class I ground water and therefore a high-quality water of the State. Class I ground waters must be maintained suitable for the following uses with little or no treatment:

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

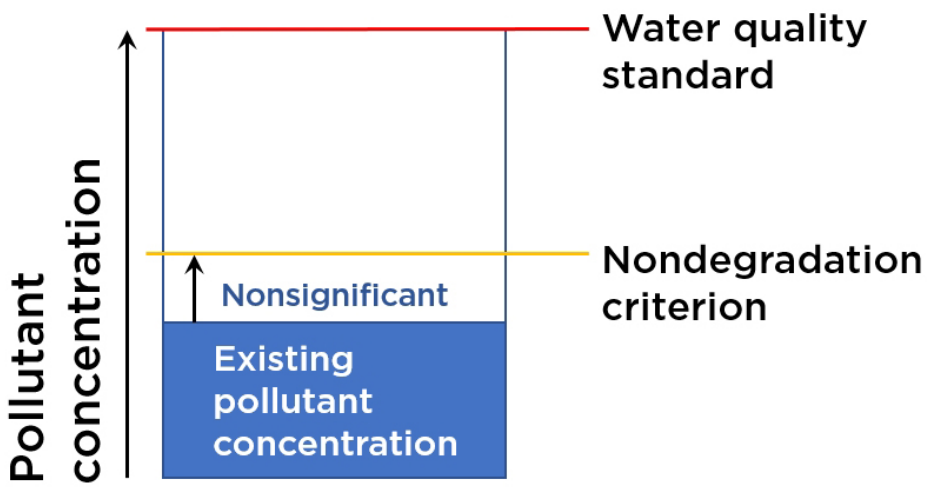
DEQ protects all the assigned beneficial uses by protecting the most sensitive. Drinking water is the most sensitive use of this receiving water.

3.2 WATER QUALITY CRITERIA

Montana has water quality standards for both surface water and ground water. The numeric criteria for each are different because they must support different uses. DEQ writes permits to protect the most sensitive, thereby protecting all uses. DEQ's ground water standard for nitrate is 10.0 mg/L, as is the standard for Nitrate + Nitrite (as Nitrogen). Class I ground water must be maintained suitable for use as a drinking water supply with little or no treatment, and therefore must meet the corresponding human health standard of 10.0 mg/L total nitrogen. These water quality standards may not be exceeded outside a designated mixing zone (**Section 4**).

3.3 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.



DEQ must determine whether the proposed discharge will result in significant changes in water quality.

3.4 NONSIGNIFICANCE

The proposed activity is a new source resulting in a change of existing water quality. DEQ must determine whether these water quality changes are significant. Some nonsignificant activities are specified in the Administrative Rules of Montana; other activities are evaluated for significance according to a process provided in the Rules. DEQ evaluated the significance of this discharge using the criteria and methods described below.

3.4.1 Ground Water Nonsignificance Criteria

Ground water discharges meeting the following criteria are nonsignificant, so long as they do not cause degradation of surface waters (see **Section 3.4.2**).

Nitrogen

Under Montana statute, ground water nitrate at or below 7.5 mg/L at the downgradient end of the mixing zone (see **Section 4**) is a nonsignificant change in water quality, so long as the discharge does not cause degradation of surface water. Evaluation of the effects to surface water are discussed below in **Section 3.4.2**. Using the nonsignificance criterion of 7.5 mg/L, DEQ established effluent limits that cause the discharge to comply with ground water nonsignificance/nondegradation criteria at the end of the mixing zone. This is discussed in detail in **Section 5.1**. The calculations underlying these projections are discussed and provided in full in **Appendix B**. These projections demonstrate that nitrate in ground water will not result in degradation. Therefore, water quality changes that result from discharges in compliance with this permit are nonsignificant.

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.

Phosphorus

A total phosphorus 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. Breakthrough occurs when the subsurface soils lose their capability to adsorb any more phosphorus, and it reaches surface water.

The surface waters within a mile of the facility are perched, meaning they are separated from the underlying ground water by 23-33 feet of unsaturated sediments and do not receive input from underlying ground water. The permittee estimates that the nearest surface water hydrologically connected to the receiving ground water is the East Gallatin River, located 13,000 ft or nearly 2.5 miles away. Based on this, the DEQ phosphorus breakthrough analysis estimates that phosphorus discharged to ground water from Outfall 001 may reach surface water in 184 years (**Appendix B**). This breakthrough is nonsignificant; therefore, no phosphorus effluent limits are required.

3.4.2 Surface Water Nondegradation

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.

In addition to the nonsignificance calculations discussed above, Water and Environmental Technologies prepared a groundwater flow and transport simulation for evaluating nitrate fate and transport at R Bar N Estates Subdivision (**Appendix C**). This study is based upon a hydrogeologic investigation of this portion of the Gallatin Valley. As summarized above, the nearest surface water bodies (Baxter, McDonald, and Hyalite creeks are perched, with 23-33 feet of unsaturated sediment between the creek beds and the underlying ground water. The fate and transport study convincingly demonstrates that nitrate in ground water will not result in degradation of the nearest surface water.

4.0 MIXING ZONE

DEQ authorizes a source-specific mixing zone for total nitrogen discharged from Outfall 001. A mixing zone is a specifically defined area of the receiving water where water quality standards may be exceeded. DEQ evaluates the suitability according to criteria established in the Administrative Rules of Montana. The mixing zone is then defined in the permit. The applicant requested a source-specific mixing zone for this discharge (**Appendix D**).

A source-specific mixing zone is allowable when the applicant demonstrates to the Department that the mixing zone will not impair any beneficial uses. The applicant must provide information addressing the quality of the effluent and receiving water, and the dimensions of the proposed mixing zone.

DEQ grants R Bar N Estates Subdivision a source-specific mixing zone for total nitrogen at Outfall 001. The dimensions of the mixing zone are 1250 ft long, 15 ft deep, 410 ft wide upgradient, and 630 wide downgradient.

The volume of ground water (Q_{GW}) available to mix with the effluent is calculated using Darcy's Equation: $Q_{GW} = KIA$

Where:

Q_{GW} = ground water flow volume (feet^3/day)
K = hydraulic conductivity (feet/day)
I = hydraulic gradient (feet/feet)

A = cross-sectional area (feet^2) at the downgradient boundary of the mixing zone.

Table 7 summarizes the variables used in Darcy's equation and the resulting volume of ground water available to mix at Outfall 001. These values are drawn from the permit application.

Table 7. Source-Specific Mixing Zone for Total Nitrogen Discharged from Outfall 001

Parameter	Value	Units
Receiving water nitrogen concentration	4.5	mg/L
Ground water flow direction	N20W	Bearing
Length of mixing zone	1250	ft
Thickness/depth of mixing zone	15	ft
Upgradient width of mixing zone	410	ft
Downgradient width of mixing zone	629	ft
Cross-sectional area of mixing zone (A)	9431	ft^2
Hydraulic conductivity (K)	270	ft/day
Hydraulic gradient (I)	0.007	ft/ft
Volume of ground water available for mixing (Q_{GW})	17825	ft^3/day

In order to determine whether a mixing zone is allowable, DEQ calculates a predicted concentration at the downgradient end of the mixing zone. This mixing calculation follows the following procedure:

- Volume of ground water times the concentration of the parameter = existing load;
- Volume of discharge times the concentration of the parameter = waste load; and
- (Existing load + waste load) / total volume = predicted concentration.

Because the predicted concentration must satisfy the most stringent nonsignificance criterion (**Section 3**), DEQ can calculate water quality based effluent limits (WQBELs) by rearranging the equation and solving for the effluent concentration (**Section 5**).

5.0 PERMIT CONDITIONS

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.

Montana's numeric water quality standards are published in Circular DEQ-7. Water quality criteria applicable to this permit are summarized below in **Table 8**. The permit establishes effluent limits that will meet water quality standards and nondegradation criteria, thereby protecting beneficial uses and existing high quality waters. The most restrictive criteria in **Table 8** provide the basis for the effluent limits.

Table 8. Applicable Ground Water Quality Criteria

Parameter	Human Health Standard	Beneficial Use Support	Nondegradation Criteria
Nitrate plus nitrite (as Nitrogen[N])	10 mg/L	-	-
Total Nitrogen	-	10 mg/L	**7.5 mg/L**
Total Phosphorus	-	-	**>50 year breakthrough**

This discharge permit includes numeric WQBELs that restrict the strength and volume of the discharge. The ground water nonsignificance criteria (**Section 3.4.1**) provide the basis for the limits. DEQ calculates WQBELs by rearranging the mixing zone equation (**Section 4**) and solving for the effluent concentration that satisfies the water quality criteria. 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 cumulative impacts to the receiving water.

5.1 TOTAL NITROGEN EFFLUENT LIMIT

The nonsignificance criterion of 7.5 mg/L is the most restrictive of the water quality criteria applicable to this permit; therefore it is the water quality target for this effluent limit. DEQ established the final WQBEL for this discharge by back-calculating the effluent concentration that results in 7.5 mg/L at the end of the mixing zone, given the available dilution. Available dilution is determined by recent ground water quality sampling of the receiving water. Ambient total nitrogen averaged 4.45 mg/L (**Section 2**). DEQ calculates an effluent limit that protects receiving water quality and beneficial uses according to the following equation:

$$\underline{\text{Equation 1:}}\ C_{lmt} = C_{std} + D(C_{std} - C_{gw})$$

Where:

C_{lmt} = effluent limitation concentration
C_{std} = limiting water quality criterion
C_{gw} = ambient receiving ground water concentration
D = dilution ratio (Q_{gw} / Q_{eff})
Q_{gw} =ground water flux at the end of the mixing zone
Q_{eff} = average maximum daily discharge

Using the values provided above in **Table 7**, the result for C_{lmt} is 16.69 mg/L. This is the final WQBEL expressed as a concentration. Load limits are more appropriate for discharges to ground water since the long-term loading is the greater concern in absence of aquatic life considerations. Additionally, load limits inherently control both the strength and volume of the discharge. A discharge of 44,250 gallons per day containing 16.69 mg/L total nitrogen is equivalent to 6.16 pounds per day. The limit calculations are provided in detail in **Appendix E**.

5.2 TOTAL PHOSPHORUS EFFLUENT LIMIT

DEQ determined that phosphorous discharged to ground water would reach surface water 2.5 miles away in 183 years. A phosphorous breakthrough time of less than 50 years is considered significant. As discussed above, the total phosphorous effluent limit will stay the same as the last permit cycle.

Based on the information and analyses presented above, DEQ proposes the following numerical effluent limitations in **Table 9** below.

5.3 FINAL EFFLUENT LIMITS

Table 9 contains the final effluent limits for R Bar N Estates Subdivision.

Table 9: Effluent Limitations – Outfall 001

Parameter	Units	Quarterly Average

Nitrogen, Total [as N]	lbs/day	6.16
Quarterly load calculation: The quarterly average of all individual daily concentrations and quarterly total flows must be used in the load calculations. Calculation rules are provided within the Wastewater Monitoring Tables.		

6.0 MONITORING AND REPORTING REQUIREMENTS

DEQ requires effluent and ground water monitoring to assure compliance with the effluent limitations and therefore water quality standards. Effluent monitoring and ground water monitoring is required as a condition of this permit. All monitoring and sampling required by this permit must be representative; therefore the permit identifies specific monitoring locations. Monitoring requirements and rationale are summarized below.

6.1 EFFLUENT MONITORING

This permit includes numeric effluent limitations with specific magnitudes and durations to ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (see **Section 3**). Accordingly, the permittee is required to monitor and report at a specified frequency in order to demonstrate compliance with these limitations.

Effluent samples and discharge flow measurements must be representative of the nature and volume of the effluent. The effluent sample location (EFF-001) is located at the drainfield dose pump chamber as shown in **Figure 3**. The permittee is required to install, maintain and report flow measurements using a flow-measuring device capable of measurements that are within 10 percent of the actual flow. The flow measuring device must be installed and in operating condition prior to discharge.

Effluent monitoring and reporting requirements are summarized in **Table 10** below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 10: Influent and Effluent Monitoring and Reporting Requirements – Centralized Community Treatment System (CTS-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/Quarter	Quarterly Average	Quarterly
Flow Rate, Effluent[(3)]	FM-001	gal/day	Contin-uous	Contin-uous	Quarterly Average[(4)]	Quarterly
	FM-001	gal/quarter	Contin-uous	Contin-uous	Quarterly Total	Quarterly
Oils and Grease [HEM]	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Nitrite+Nitrate [as N]	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total Ammonia [as N]	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly

Nitrogen, Total Kjeldahl (TKN)[as N]	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total [as N](5)	EFF-001	mg/L	Calculate	1/Quarter	Quarterly Average	Quarterly
		%	Calculate	1/Quarter	Percent Removal(6)	Quarterly
		lbs/day(7)	Calculate	1/Quarter	Quarterly Average(8)	Quarterly
Phosphorus, Total [as P]	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Total Suspended Solids (TSS)	EFF-001	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly

Footnotes:

EFF-001: Description provided in Table 1 of the Fact Sheet document.

FM-001: 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) Quarterly Average: The average of all individual daily concentrations (mg/L) analyzed during the quarterly reporting period.

(3) Requires recording device or totalizing meter, must be capable of recording daily and quarterly 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) Calculated as {[(Influent TN - Effluent TN)/Influent TN]*100} using the corresponding quarterly average values for the reporting period.

(7) Load calculation: lbs/day = concentration (mg/L) x flow (gal/day) x [8.34 x 10^{-6}].

(8) 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.

6.2 GROUND WATER MONITORING

This permit requires ground water monitoring to provide long term ambient and downgradient characterization of the aquifer. Ground water monitoring will be required at monitoring wells MW-1, MW-2, and MW-3. Data collected via ground water monitoring will be used for mixing zone evaluation and aquifer characterization in future permit renewals. Ground water monitoring and reporting requirements are summarized in the table below. Sampling and reporting requirements shall commence upon the effective date of the permit.

Ground water monitoring and reporting requirements are summarized in **Table 11** below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 11: 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-1 MW-2 MW-3	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Escherichia coli Bacteria	MW-1 MW-2 MW-3	CFU/100ml	Grab	1/Quarter	Quarterly Average(3)	Quarterly

Nitrogen, Nitrite+Nitrate [as N]	MW-1 MW-2 MW-3	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total Ammonia [as N]	MW-1 MW-2 MW-3	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN)[as N]	MW-1 MW-2 MW-3	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Total [as N](5)	MW-1 MW-2 MW-3	mg/L	Calculate	1/Quarter	Quarterly Average	Quarterly
pH	MW-1 MW-2 MW-3	s.u.	Grab or Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW-1 MW-2 MW-3	µS/cm	Grab or Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Temperature	MW-1 MW-2 MW-3	°C	Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Static Water Level (SWL)(4)	MW-1 MW-2 MW-3	ft-bmp	Instant-aneous	1/Quarter	Quarterly Average	Quarterly
Well Depth	MW-1 MW-2 MW-3	ft-bmp	Instant-aneous	1/Quarter	Quarterly Average	Quarterly

Footnotes:
CFU = Colony Forming Units
ft-bmp = feet below measuring point
s.u. = standard units
A description of each monitoring well can be found in Table 1 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).
Monitoring for the wells listed above shall commence upon the permit effective date.
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) The geometric mean must be reported if more than one sample is taken during a reporting period.
(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

The following special condition(s) will be included in the permit.

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.

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 Special Conditions – Monitoring Well Viability

The permittee shall monitor and collect representative ground water samples from the shallow water bearing zones. If any of the monitoring 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 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 8**).
- 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 12** below 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. Completion of all actions or deliverables must be reported to DEQ in accordance with Part II.D and Part IV.G of the permit.

Table 12: 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.

9.0 PUBLIC NOTICE

Legal notice information for water quality discharge permits are 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 February 10, 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 (MTX000274), 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.

APPENDIX A – MONITORING WELL LOGS

APPENDIX B – NONSIGNIFICANCE PROJECTIONS

APPENDIX C – WET (2021) NITRATE STUDY

APPENDIX D – SOURCE-SPECIFIC MIXING ZONE REQUEST

APPENDIX E – EFFLUENT LIMIT CALCULATIONS

The system consists of a ScepticNet system (Level II method for nitrogen treatment).

To protect beneficial uses [ARM 17.30.1006(1)(b)(ii)], there shall be no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses. Therefore, no wastes may be discharged such that the waste either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. DEQ establishes the effluent limitations for nitrogen based on the projection that the entire nitrogen load in the wastewater stream may ultimately be converted to nitrate (USEPA, 2002a).

The allowable discharge concentrations are derived from a mass-balance equation (ARM 17.30.517) which is a simple steady-state model, used to determine concentration after accounting for other sources of pollution in the receiving water and any dilution as provided by a mixing zone. The mass-balance equation (Equation 1) derived for ground water is as follows:

Equation 1:

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

Where:

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

The mass-balance equation has been arranged to calculate effluent limits so that the discharge does not cause or contribute to an exceedance of the most restrictive water quality standard. This equation can be applied to any effluent and receiving water where the applicable dilution ratio is known. This equation will only be used for nitrogen which has been authorized mixing (Section 4).

Equation 2:

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

Where:
C_{lmt} = effluent limitation concentration
C_{std} = water quality standard concentration = 7.5 mg/L
C_{gw} = ambient receiving ground water concentration = 4.45 mg/L
D = dilution ratio (Q_{gw} / Q_{eff}) = 17860 / 5915

$$C_{lmt} = 7.5 + (17825/5915)(7.5 - 4.45) = \mathbf{16.69\ mg/L}$$

A mass-balance approach is used to calculate the effluent quality of the discharge that meets the most restrictive water quality standard at the end of the mixing zone. Numeric effluent limitations are expressed as loads since this type of limitation inherently regulates both volume and strength of the effluent as prescribed by 75-5-402(3), MCA. Load limits ensure compliance with the ground water standards at the end of the mixing zone. Based on the proposed design capacity, the respective load effluent limitation is:

6.16 lb/day
[(8.34*10-6)* 16.69 mg/L*44250 gpd]
as based on the following equation:

Equation 3:

$$L_{lmt} = CON * C_{eff} * DC_{eff}$$

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

The final effluent limits are summarized in **Table 9** for Outfall 001.