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)

2019 BOZEMAN HOT SPRINGS CAMPGROUND, MTX000126

Permittee:	TRD Inc., PO Box 11425 Bozeman, MT 59719
Permit Number:	MTX000126
Permit Type:	Domestic wastewater
Application Type:	Renewal
Facility Name:	Bozeman Hot Springs Campground
Facility Location:	Gallatin County N ½, SE ¼, Section 14 T2S, R4E Latitude: 45.66069° Longitude: -111.18845°
Facility Address:	81123 Gallatin Road, Bozeman, MT 59718
Facility Contact:	Andy Barnham
Treatment Type:	Conventional Septic
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Outfall / Type:	001 / Subsurface pressure dose drainfield
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Standard
Effluent Limit Type:	DBEL
Effluent Limits:	Total nitrogen: 5.5 lbs/day Total phosphorus: 949 lbs/year
Flow Rate:	Design maximum: 12,250 gpd Design average: 12,250 gpd
Effluent sampling:	Quarterly sampling is at the dose tank prior to discharge.
Ground water sampling:	Quarterly Downgradient monitoring MW1a and MW1b. Upgradient monitoring MW2 location to be determined.
Fact Sheet Date:	March, 2019
Prepared By:	R. Morse

1.0 PERMIT INFORMATION

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 the receiving water quality and permit limitations. This fact sheet provides the basis for DEQ's decision to renew a MGWPCS wastewater discharge permit to TRD Inc. (applicant) for the Bozeman Hot Springs Campground wastewater treatment system.

1.1 APPLICATION

DEQ received an application for renewal of the permit on August 22, 2014. Renewal fees accompanied the application. DEQ reviewed the submittal and issued a completeness letter on October 6, 2014.

1.2 PERMIT HISTORY

In 1971, a combined system which included the Bozeman Hot Springs and the KOA campground was amended to only include the campground. On February 18, 2000 the Bozeman Hot Springs KOA submitted plans and specifications for review and received approval for the current wastewater treatment system (EQ#99-2557). A change of ownership has TRD Inc. as the current applicant and Bozeman Hot Springs Campground as the facility. On August 22, 2014 an application for renewal was received by the Department. A Permit Transfer Notification was received by the Department on August 22, 2014. A notice of completion was issued October 6, 2014. The site was inspected in 2016. Flow metering was identified as a deficiency at that time. The 2002 permit required monthly effluent monitoring and quarterly ground water monitoring.
The majority of the concentrations are reported in units of milligrams per liter (mg/L), which is equivalent to one part per million. The original permit numeric effluent limit was for total inorganic nitrogen (TIN) 54 mg/L or 5.5 lbs/day. The subsequent 2009 permit was written with a limit for total nitrogen (TN) of 54 mg/L and 5.5 lbs/day and 2.6 lbs per day total phosphorus (TP). This facility is subject to Montana 's nondegradation policy (74-5-303, MCA). A nondegradation determination was made for the previous permitting and is relied upon for this renewal.

1.3 CHANGES TO THIS PERMIT

This permit renewal contains additional monitoring parameters and special conditions not included in the previous permit. Please see monitoring **Section 6** and special condition **Section 5** of this fact sheet. The 2009 concentration based effluent limit is changed to a load limit for this renewal, based on the previous DBEL.

2.0 FACILITY INFORMATION

The facility permits a total of 145 overnight campsites, which includes 100 fully-serviced recreational vehicle spaces, 30 primitive tent sites, and 15 rustic cabins. The campground is operational year-around. The Bozeman Hot Springs facility has undergone ownership changes and changes in use. The campground is the only part of the operation served by this permit. Much of the Bozeman Hot Springs operation is served by the Four Corners Water and Sewer District. Part of the special conditions attached to this permit require updated information regarding all infrastructure and wastewater connections currently installed on the property associated with the Bozeman Hot Springs Campground site.

2.1 LOCATION

The Bozeman Hot Springs Campground is located approximately one mile south of the Four Corners intersection, then west off U.S. Highway 191 at Lower Rainbow Road. Four Corners is approximately 8 miles west of Bozeman.

Figure 1. Vicinity Map, Bozeman Hot Springs Campground

Figure 2: Bozeman Hot Springs Campground Property

This campground facility is operated year-round with a transient population using 145 RV and campsites sites with a wide seasonal fluctuations in flow. The adjacent Bozeman Hot Springs facility is not connected to this wastewater system.

Figure 3. Site Map Bozeman Hot Springs Campground

2.2 OPERATIONS

System operations are summarized below in **Table 1**.

Table 1. Collection, Treatment, and Disposal Summary

Collection	
Contributing sources:	145 overnight campsites
Collection method:	Gravity sewer lines to lift stations, to subsurface drainfield
Flow volume:	Average daily design flow: 12,250 gallons per day Maximum daily design flow: 12,250 gallons per day
Flow meters are located in the valve vault prior to discharge to outfall 001 (see Figure 4).	
Treatment	
Treatment level:	Conventional septic
Treatment technology:	Conventional septic tank to dose tank to drainfield
Effluent sampling is done in the at the dose tank prior to discharge (see Figure 4).	
Disposal	
Method of disposal:	Pressure dose drainfield to ground water
Disposal structure:	Subsurface drainfield (Outfall 001)
Outfall location:	Latitude: 45.6615° Longitude: -111.19026°

The Bozeman Hot Springs Campground wastewater system gravity collects wastewater from 145 overnight campsites and RV sites to a central septic tank (primary treatment) and lift station. The lift station doses to the drainfield. The system is designed for 12,500 gallons per day. Maximum recorded daily flow is 8,080 gpd recorded in June of 2018.

Effluent monitoring is done at the dose tank shown in the **Figure 4** below prior to discharge to drainfield. Monitoring and sampling requirements are further discussed in **Section 6**.

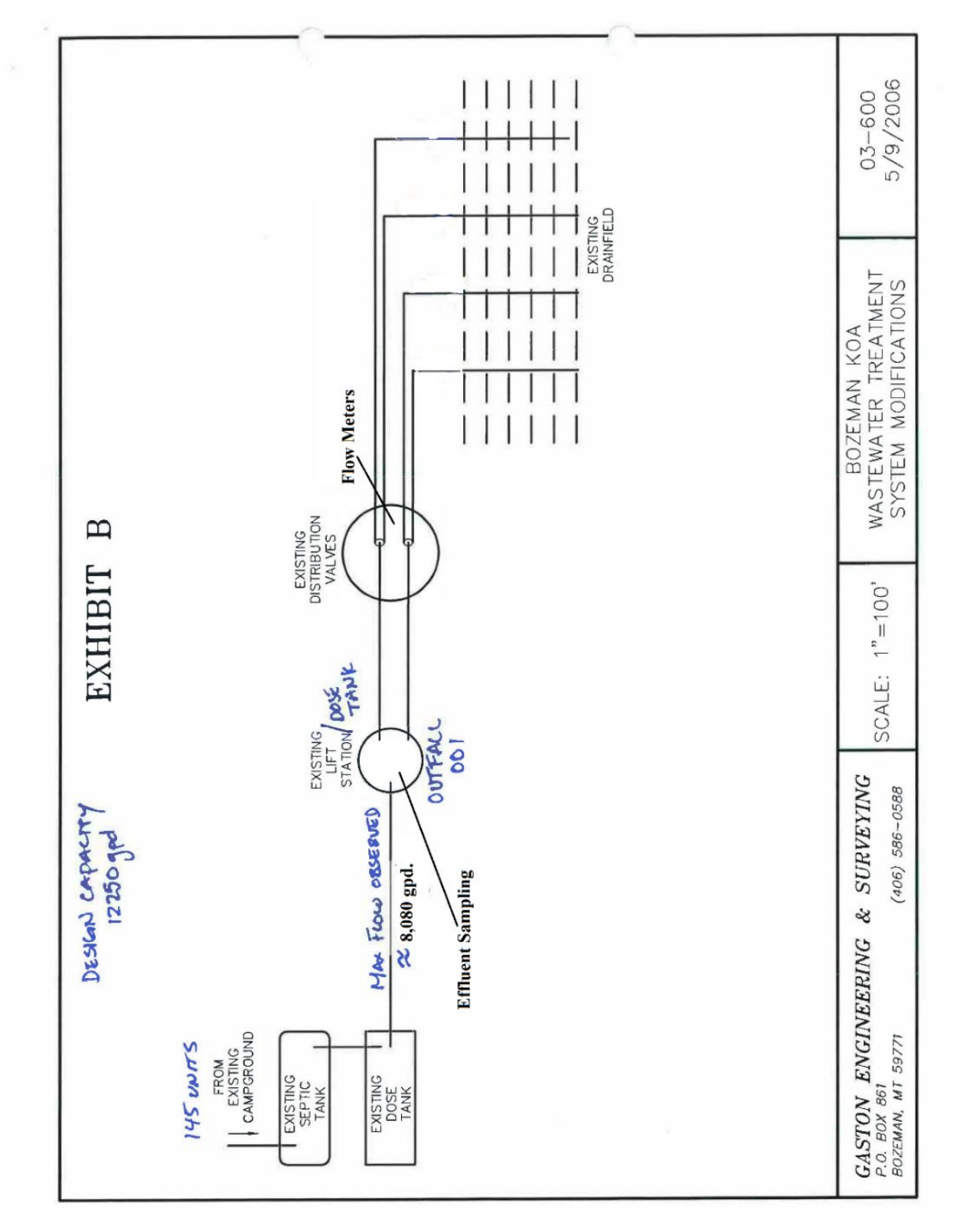


Figure 4. Wastewater Treatment System Line Diagram.

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. During the previous permit cycle, the facility sampled and reported effluent quality criteria to DEQ in the form of discharge monitoring reports (DMRs). These data are summarized in **Table 2**.

Table 2. Effluent Quality Data from Outfall 001

Parameter	Units	Reported DMR values			2009 Limit	# of Samples
		Minimum	Maximum	Average		
Flow rate	Gallons/day, daily max.	140	8,080	2,052	12,250	14
	Gallons/day (30 day average)	23	7,250	1,159	–	14
Nitrogen, total Kjeldahl	mg/L 30 day average	4.5	64	26.5	–	14
Nitrate + nitrite total (as N)	mg/L 30 day average	0.00	138	10.74	–	13
Nitrogen, total*	mg/L	4.5	202	37.24	54[1]	Calculated from 30 day averages
Nitrogen total *	pounds/day	.005	13.6	.64	5.5[1]	Calculated from averages
BOD, 5-day, 20 deg. C	mg/L	10	143	61	–	12
Phosphorus, total (as P)	mg/L	0.075	7.0	3.36 mg/L (.34 lbs/day)	2.6 lbs/day[1]	12
TSS	mg/L	2	65	23	–	12

Period of record: December 31, 2011 to December 31, 2018

[1]Limit is Semi -Annual Average

2.4 GEOLOGY

The subsurface drainfields are constructed in alluvial fan deposits that are approximately 200 feet thick and are composed of silt, sand, and gravel from the Gallatin Range to the south. Farther north, the alluvial fan deposits meet with the alluvium from the Gallatin and East Gallatin Rivers. These deposits are approximately 100 feet thick (RAE, 2008). In this area, the Bozeman-Belgrade alluvium consists of cobbles and coarse to fine gravel with minor interbeds of sand.

Less permeable, Tertiary-age deposits underlie the fan and alluvial deposits. These deposits consist of semi-consolidated clay, silt, sand and gravel (RAE application information, 2007).

2.5 HYDROGEOLOGY

The shallow unconfined aquifer in this area is approximately 150 feet thick (Slagle, 1995).

The depth to shallow ground water fluctuates approximately 5 feet, seasonally. High ground water is generally associated with late spring and early to mid-summer. The average static water levels (SWLs) as reported from a GWIC survey of 174 area well logs is 11.5 feet. The two ground water monitoring wells at the end of the standard mixing zone range from 11.6 (MW-1a) to 11.7 feet (MW-1b) from the top of the well casing (TOC), demonstrating that both of these wells are completed in the same unconfined shallow aquifer.

The applicant used data from a 2000 nitrate sensitivity analysis (Gaston, January 2000). The hydraulic conductivity (K) is reported as 405 ft/day. This K value was previously approved for the Bozeman Hot Springs-

BKOA joint wastewater treatment facility in a memo and checklist dated May 13, 1999. Based on the Gaston 2000 study, the hydraulic gradient is 0.094 ft./ft. and the direction of ground water flow is approximately N13°W.

According to the information submitted on the permit application, the nearest downgradient surface water is the Gallatin River, which is 2400 feet from Outfall 001.

Important hydrogeologic characteristics are summarized below in **Table 3**.

Table 3. Hydrogeologic Summary

Average depth to ground water	11 feet
General ground water flow direction	N13°W
Hydraulic conductivity	405 feet per day
Hydraulic gradient	.0094 feet/feet
Nearest downgradient surface water	Gallatin River (2,400 ft.)

2.6 GROUND WATER MONITORING WELLS

There are two downgradient monitoring wells associated with this permit: MW-1a and MW-1b are nested downgradient sampling wells. There is also an existing unapproved upgradient well designated MW-2. These wells are all plotted on **Figure 3**. Monitoring well construction details for MW-1 and MW1-b are provided below in **Table 4**. The two downgradient monitoring wells are located in one approximately 8-inch diameter hole (i.e., nested wells). Fifteen feet of grout separates the deeper well from the shallower well. MW-1a is screened from 10 to 25 feet below the TOC. MW-1b is the deeper of the two wells with screen extending from 40 to 55 feet below the TOC.
MW-2 is an upgradient monitoring well that was recently used for a single ambient sample. DEQ will be approving an upgradient monitoring site as part of the special conditions of this permit. DEQ has used the 2009 ambient analysis for total nitrogen in the calculations associated with this permit cycle (1.5 mg/L TN).

Table 4. Monitoring Well Summary

Downgradient Monitoring Well MW-1a, MW-1b	
MBMG GWIC ID:	No GWIC Number
Location: Latitude:	45.662868° Longitude: -111.190337°
Rationale:	Downgradient Well
Notes:	End of mixing zone, nested well, MW-1a=10-25 feet and MW-1b=40-55 feet
Monitoring Well MW-2 (This well was used for one 2018 ambient sample. The applicant needs to identify and submit a permanent ambient monitoring well for continuing sampling.)	
MBMG GWIC ID:	No GWIC Number
Location: Latitude:	45.659787° Longitude: -111.187296°
Rationale:	Ambient upgradient receiving water quality
Notes:	Approval to be determined (see compliance requirements).

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

- Water sampling results from MW-1 and MW-2 are provided below in **Table 5**. Based on the reported 191 microsiemens per centimeter (µS/cm) specific conductance, the receiving water is Class I ground water.

Table 5. Downgradient- Water Quality Reported From Monitoring Well MW-1a (10-25 feet bgs)

Parameter	Units	Reported DMR values			Reporting Limit	# of Samples
		Minimum	Maximum	Average		
Chloride (as Cl)	mg/L	4	10	5.8	1	27
Escherichia coli bacteria	CFU/100mL	6	6	6	1	1
Nitrogen, total inorganic	mg/L	1.2	3.6	2.36		28
Nitrogen, total nitrate (as N)	mg/L	1.2	3.6	2.36		28
Specific conductivity (@25°C)	µS/cm	316	543	484	1	3

Downgradient- Water Quality Reported From Monitoring Well MW-1b (40-55 feet bgs)

Parameter	Units	Reported DMR values			Reporting Limit	# of Samples
		Minimum	Maximum	Average		
Chloride (as Cl)	mg/L	3	9	4.6	1	27
Nitrogen, total inorganic	mg/L	1.12	3.24*	1.75*		27
Nitrogen, total nitrate (as N)	mg/L	1.2	5.0	1.89		27
Specific conductivity (@25°C)	µS/cm	446	466	454		3

Period of record 12/31/2011 – 12/31/2018 (*9/30/14 sample of 168 mg/L N+N is considered an anomaly and not used for calculations in this report).

Upgradient Water Quality Reported by Applicant (11/28/18) MW-2

Parameter	Units	Value	Number of Samples
Chloride (as Cl)	mg/L	6	1
Organic Carbon	mg/L	0.9	1
TDS	mg/L	97	1
Specific conductivity (@25°C)	µS/cm	191	1
pH		8.1	1
Sulfate	mg/L	ND	1
Total Nitrogen (2009)*	mg/L	1.5	3

* For ambient nitrogen DEQ has used the 2009 reported TN= 1.5 mg/L.

3.0 WATER QUALITY STANDARDS AND NONDEGRADATION

Ground water is a water of the state. The State of Montana uses several water quality measures to protect, sustain, and improve the quality of state waters. These water quality limitations provide the basis for effluent limits that DEQ applies to discharge permits (**Section 5**). 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 BENEFICIAL USES

With a specific conductivity of 191 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

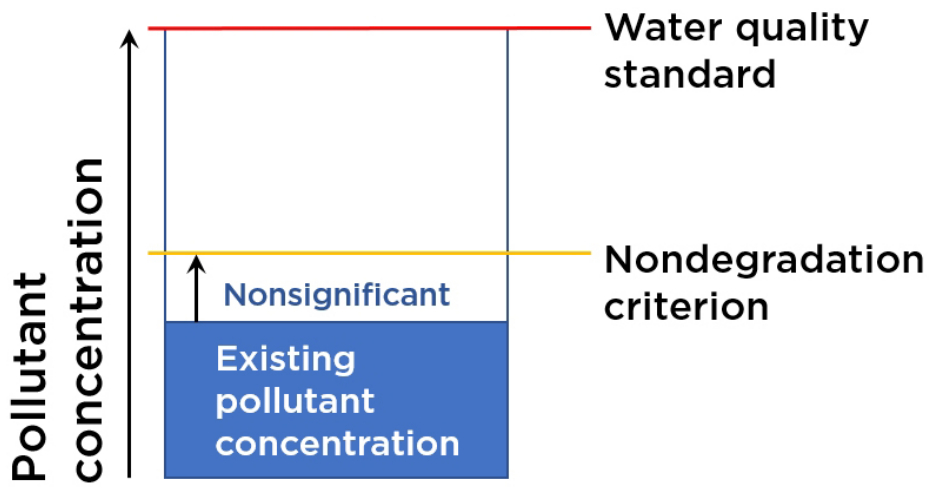
DEQ protects all the assigned beneficial uses by protecting the most sensitive. Drinking water is the most sensitive use of this receiving water.

3.2 Water Quality Standards

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 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 states that certain types of common activities cause nonsignificant changes in water quality, and also provides criteria for determining whether changes in water quality are significant.



Nonsignificant changes do not require further nondegradation review. Therefore, DEQ must determine whether the proposed discharge will result in significant changes in water quality.

3.4 Nonsignificance

When developing the initial permit (MTX000126, 2000), DEQ determined that discharges in compliance with this permit result in nonsignificant changes in water quality. This discharge has not increased since this determination, and therefore DEQ did not perform a new significance determination for this permit renewal. DEQ determined that the discharge continues to meet ground water nonsignificance/nondegradation criteria (described below) at the end of the mixing zone (**Section 4**). DEQ used these criteria and updated ground water quality data to establish effluent limits (discussed below in **Section 5**).

3.4.1 Ground Water Nonsignificance Criteria

For this discharge to ground water, the following nonsignificance criteria are relevant:

Nitrogen

Under Montana statute, ground water total nitrogen at or below 5.0 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. Using the nonsignificance criterion of 5.0 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**.

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.

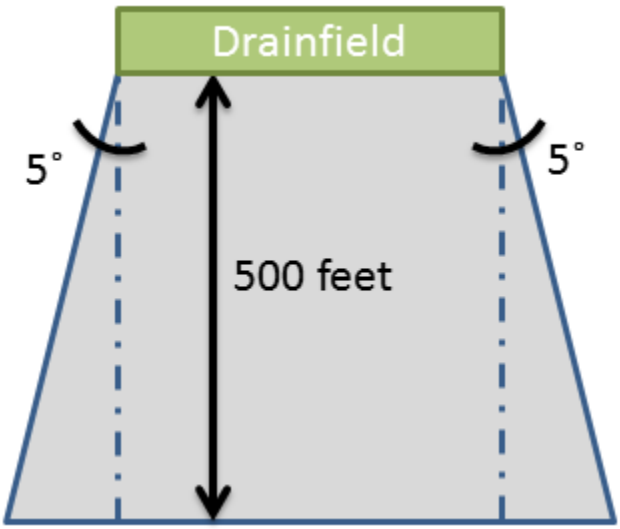
A phosphorus breakthrough analysis conducted by DEQ in 2000 (DEQ, MTX000126, 2000) estimated the phosphorus breakthrough to occur in 98 (*i.e.* >50) years. Phosphorus breakthrough time of greater than 50 years is considered nonsignificant. The 2000 permit established an effluent limit in order to maintain the 50-year breakthrough. This 2000 effluent limitation is maintained within this proposed permit renewal.

Ground water discharges meeting these criteria are nonsignificant, so long as they do not cause degradation of surface waters.

4.0 MIXING ZONE

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 standard mixing zone for this discharge, consistent with previous permit cycles.

A standard mixing zone extends 500 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.



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 6 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 previous fact sheet, recent investigation, and the permit application.

Table 6. Mixing Zone for Total Nitrogen Discharged from Outfall 001

Parameter	Units	Value
Receiving water nitrogen concentration	1.5	mg/L
Ground water flow direction	N13E	Bearing
Length of mixing zone	500	Feet
Depth of mixing zone	15	Feet
Upgradient width of mixing zone	377.5	Feet
Downgradient width of mixing zone	465.5	Feet
Cross-sectional area of mixing zone (A)	6,975	Square feet
Hydraulic conductivity (K)	405	Feet per day
Hydraulic gradient (I)	0.0094	Feet per feet
Volume of ground water available for mixing (Q_{GW})	26,554	Cubic feet per 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 7**. 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 7** provide the basis for the effluent limits.

Table 7. 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	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.

DEQ calculated the effluent limits using the same method as for the previous permit. DEQ uses updated ambient ground water quality data to re-evaluate the receiving water quality and the assimilative capacity for dilution.

5.1 TOTAL NITROGEN EFFLUENT LIMIT

The nonsignificance criterion of 5.0 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 5.0 mg/L at the end of the mixing zone, given the available dilution. Available dilution is determined by ground water quality sampling of the receiving water. Ambient total nitrogen reported in 2009 was 1.5 mg/L (**Section 2**). DEQ calculates an effluent limit that protects receiving water quality and beneficial uses according to the following equation:

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

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 6**, the result for C_{lmt} is 61.8 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 12,250 gallons per day containing 61.8 mg/L total nitrogen is equivalent to 6.44 pounds per day.

The allowable discharge concentration is derived from the mass balance water quality equation [ARM 17.30.517(1)(d)], which considers dilution and the background concentration of the receiving water (EPA, 2000), pursuant to a standard 500-foot ground water mixing zone [ARM 17.30.518(5)].

The allowable discharge concentration beneath the subsurface drainfields (Outfall 001) is:

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

C_2 = 61.8 mg/L

C_1 = average ground water (receiving) concentration, is 1.5 mg/L
C_2 = allowable discharge concentration (TN) beneath the infiltration galleries in mg/L
C_3 = ground water concentration limit for pollutant (from DEQ Circular 7 or other appropriate water quality standard) at the end of the mixing zone is 5.0 mg/L, instantaneous (no single sample shall exceed)
Q_1 = ground water volume is 26,554 ft^3 / day
Q_2 = maximum flow of discharge (average daily design flow of system is 1,636 ft^3/day)

The volume of ground water that will mix with the discharge (Q_1) is estimated using Darcy's equation: $Q_1 = K\ I\ A$. The calculated ground water flow volume for the mixing zone (Q_1) is 26,554 ft^3/day; assuming an aquifer hydraulic conductivity (K) of 405 ft/day and a hydraulic gradient (I) of 0.0094 ft/ft, and a cross sectional area (A) of flow [using the constant of 15 feet to a limiting layer of 15 feet and a cross sectional area with tangent angles of 390 feet] at the downgradient boundary of the standard 500-foot mixing zone of 6975 ft^2.

The average daily design flow of the wastewater disposal system is 12,250 gpd, or 1,637.70 ft^3/day. The nitrate (as N) concentration must not exceed 5.0 mg/L at the end of the ground water mixing zone. The average concentration of nitrate-nitrogen in the receiving ground water is 1.5 mg/l (C_1). It is assumed that the entire TN load in the effluent converts to nitrate (as N) and enters the ground water.

The calculated effluent concentration of TN must not exceed 61.8 mg/L at the average daily design flow in order to maintain a concentration that is less than the state water quality standard of 5.0 mg/L for nitrate (as N) in the ground water at the mixing zone boundary. The WQBEL will be expressed as a load (lbs/day) based on the average design flow of the system (12,250 gpd) and the calculated maximum concentration as follows:

Load limit (lbs/day) per outfall = effluent flow rate (gpd) x daily maximum concentration (mg/L) ***x*** *(8.34 x* 10^{-6}*)*
Load limit (lbs/day) per outfall= (12,250 gpd) **x** (61.8 mg/L) **x** (8.34 x 10^{-6})
Load limit (lbs/day) per outfall= 6.44 lbs/day

DEQ compares the calculated water quality based effluent limit (WQBEL) which is 6.4 lbs/day and the appropriate definition based effluent limit (DBEL) which is 5.5 lbs/day and assigns the most conservative of the two limits to the permit renewal. The proposed total nitrogen limit for this facility is a load limit of 5.5 lbs per day TN.

The final limits are summarized in Section 5,Table 8.

5.2 TOTAL PHOSPHORUS EFFLUENT LIMIT

DEQ previously determined (2000) that phosphorous discharged to ground water would reach the surface water Gallatin River in 98 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. The phosphorous effluent limit is 2.6 pounds per day (949 lbs/yr).

Based on the information and analyses presented above, DEQ proposes the following numerical effluent limitations in **Table 8** below.

5.3 FINAL EFFLUENT LIMITS

TABLE 8. EFFLUENT LIMITS

Proposed Final Effluent Limits – Outfall 001			
Parameter	**Units**	**Daily maximum(1)**	**Annual maximum**
Flow	gpd	12,250	
Total nitrogen	lbs/day	5.5	
Phosphorus, total (as P)	lbs/year		949
Footnotes:			
Beneficial Uses: ARM 17.30.1006			
(1) See definition in Part V of permit.			

5.4 SPECIAL CONDITIONS

The following special conditions will be included in the permit.

1. Upon issuance of this permit, the applicant shall begin sampling and reporting for all parameters required in this permit and listed in **Section 6.1** of this fact sheet. Parameters and monitoring schedules have changed since the last permit cycle. Sample collection, preservation and analysis shall be in compliance with ARM 19.30.1007.

2. Within 180 days of the issuance of this permit, the applicant will provide to DEQ for approval, the location and details of the well to be used as the DEQ approved upgradient monitoring well.

3. Within 12 months of the issuance of this permit, the applicant will provide to DEQ for approval, a site plan for the Bozeman Hot Springs campground accurately showing the location of all current structures

on the site. The site plan must identify all installed and proposed infrastructure included in MGWPCS permit. The site plan will identify and locate all installed wastewater and water infrastructure on the site associated with all existing structures not connected to MTX000126. The site plan should identify and locate all existing and planned water and wastewater infrastructure on the site that serve any existing facilities within the site not included in the scope of MGWPCS permit MTX000126. Site plan should include the fate of all wastewater leaving the site.

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 5**). 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 lift station/dose tank prior to splitting valves 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 applicant indicated in a 6/25/18 email that the owners of the facility have installed four new ModMag M-Series M5000 flow meters. Flow meters are located in the valve vault after the lift station prior to discharge to the subsurface drainfields.

Effluent monitoring and reporting requirements are summarized in **Table 9** below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 9.

Effluent Monitoring and Reporting Requirements – Outfall 001						
Analyte/Measurement	**Monitor Location**	**Units**	**Sample Type[1]**	**Minimum Sample Frequency**	**Reporting Requirements[1][2]**	**Report Freq**
Count of Daily Samples Collected During Reporting Period	EFF-001				Count	Monthly
Flow Rate, Effluent[3]	FM-001	gpd	Contin-uous	Contin-uous	Daily Maximum Monthly Average	Monthly
Nitrogen, Nitrite+Nitrate (as N)	EFF-001	mg/L	Composite	Monthly	Daily Maximum Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)(as N)	EFF-001	mg/L	Composite	Monthly	Daily Maximum Monthly Average	Monthly
Nitrogen, Total (as N)[4]	EFF-001	mg/L	Calculate	Monthly	Daily Maximum Monthly Average	Monthly
		lbs/day[5]	Calculate	Monthly	Daily Maximum[6] Monthly Average[7]	Monthly
Phosphorus, Total (as P)	EFF-001	mg/L	Composite	Monthly	Monthly Average	Monthly
		lbs/day[5]	Calculate	Monthly	Monthly Average[7]	Monthly
		lbs/year[8]	Calculate	1/Year	Annual Maximum[9]	Annually[9]

Footnotes:

EFF-001: Sampling is from the dose tank just prior to discharge to drainfield.

FM-001: Located in the distribution valve vault prior to release into the drainfield.

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

Grab sample will represent concentration for a 24 hour period.

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

(1) See definitions in Part V of the permit.

(2) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report

(3) Requires recording device or totalizing meter, must be capable of recording daily effluent volume.

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

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

(6) Daily Maximum Load calculation: lbs/day = the maximum of all calculated individual daily average loads (lbs/day) recorded during the reporting period.

(7) Monthly Average Load calculation: lbs/day = the average of all calculated individual daily average loads (lbs/day) recorded during the reporting period.

(8) Annual Load calculation: lbs/year = (mg/L) x flow (gpd) x [8.34 x 10-6] x 365 (days/year).

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

6.2 GROUND WATER MONITORING

As a special condition, 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 and MW-2. 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 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

Downgradient Ground Water Monitoring and Reporting Requirements (MW-1a, MW-1b)						
Analyte/Measurement	**Monitor Location[1]**	**Units**	**Sample Type[2]**	**Minimum Sampling Frequency**	**Reporting[2][3][4] Requirements**	**Reporting Frequency**
Chloride (as Cl)	MW-1a MW-1b	mg/L	Grab	Monthly	Monthly Average	Monthly
Escherichia coli Bacteria	MW-1a MW-1b	CFU/100ml	Grab	Monthly	Daily Maximum Monthly Average[5]	Monthly
Nitrogen, nitrate + nitrite (as N)	MW-1a MW-1b	mg/L	Grab	Monthly	Daily Maximum Monthly Average	Monthly
Nitrogen, total kjeldahl (TKN)(as N)	MW-1a MW-1b	mg/L	Grab	Monthly	Daily Maximum Monthly Average	Monthly
Specific conductivity @ 25°C	MW-1a MW-1b	µS/cm	Grab	Monthly	Monthly Average	Monthly
Static water level (SWL)[6]	MW-1a MW-1b	ft-bmp	Instant-aneous	Monthly	Monthly Average	Monthly
Upgradient Ground Water Monitoring and Reporting Requirements (DEQ approved upgradient monitoring well)						
Analyte/Measurement	**Monitor Location***	**Units**	**Sample Type[2]**	**Minimum Sampling Frequency**	**Reporting[2][3][4] Requirements**	**Reporting Frequency**
Chloride (as Cl)	*	mg/L	Grab	Quarterly	Quarterly Average	Quarterly
Total organic carbon	*	mg/L	Grab	Quarterly	Quarterly Average	Quarterly
Total dissolved solids	*	mg/L	Grab	Quarterly	Quarterly Average	Quarterly
pH	*	s.u.	Grab	Quarterly	Monthly Average	Quarterly
Escherichia coli Bacteria	*	CFU/100ml	Grab	Quarterly	Daily Maximum Quarterly Average[5]	Quarterly
Nitrogen, nitrate + nitrite (as N)	*	mg/L	Grab	Quarterly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, total kjeldahl (TKN)(as N)	*	mg/L	Grab	Quarterly	Daily Maximum Quarterly Average	Quarterly
Specific conductivity @ 25°C	*	µS/cm	Grab	Quarterly	Quarterly Average	Quarterly
Static water level (SWL)[6]	*	ft-bmp	Instant-aneous	Quarterly	Quarterly Average	Quarterly

Footnotes:

CFU = Colony Forming Units

ft-bmp = feet below measuring point

* Sampling location is the DEQ approved monitoring well as described in the special conditions of this fact sheet and the permit.

s.u. = standard units

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

Each monitor well to be individually sampled and analyzed for each respective parameter listed above.

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.

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) Refer to Section 2 of the Fact Sheet for the existing location of the monitoring wells.

(2) See definitions in Part V of the permit.

(3) Submittal of DMRs will be required, regardless of the installation status of each individual monitoring well.

(4) Daily Maximum: Report highest measured daily value for the reporting period on Discharge Monitoring Report (DMR).

(5) The geometric mean must be reported if more than one sample is taken during a reporting period.

(6) Measuring point (point of reference) for SWL measurements shall be from top of casing and measured to within 1/100th of one foot.

COMPLIANCE SCHEDULE

The actions listed in **Table 11** 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 11 – Compliance Schedule

Compliance Schedule for Bozeman Hot Springs MGWPCS #MTX000126			
Action	**Frequency**	**Scheduled Completion Date of Action**(1)	**Scheduled Report Due Date.**(2)
Develop and submit to DEQ a site plan acurately representing all current water and wastewater infrastructure on the site. Site plan will include the Bozeman Hot Springs Campground water and wastewater systems as well as any other systems on the site. The plan will include all current existing structures acurately located, and will include a description of wastewater management for all facilities and structures on the site.	Single event (3)	Within 12 months of the effective date on the permit.	Due on or before the 28th day of the month following the completion date.
Begin new monitoring program including the sampling of all required parameters and at the locations as required in the permit renewal.	Continuing event (5)	Beginning at the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Provide for DEQ approval, the location and description of an upgradeint monitoring well. Provide three consecutive quarters of upgradinet monitoring data once the location is approved.	Single event (4)(5)(6)	Within 180 days of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.

Footnotes:

(1) The actions must be completed on or before the scheduled completion dates.

(2) Reports must be received by DEQ on or before the scheduled report due dates. The reports must include all information as required for each applicable action as listed in Section 5.3.

(3) The completed plan (action), in place of a written report, must be received by the DEQ on or before the scheduled "report" due date.

(4) The written report documenting monitoring well installation must include: drilling methods used; borehole lithologic logs; diagram of well construction details; measuring point details; surveyed base location of all monitoring wells; surveyed measuring point elevation of all monitoring wells; depth to the top contact of the first saturated ground water bearing zone; well development records; depth to static water level (post development). This information must be included for each respective monitoring well.

(5) Sampling parameters required for each respective monitoring well as listed within Table 10 and Table 5 of Fact Sheet.

(6) Three separate consecutive quarterly sampling events required from this monitoring well once approved by DEQ and installed.

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 **May 20, 2019**. 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.

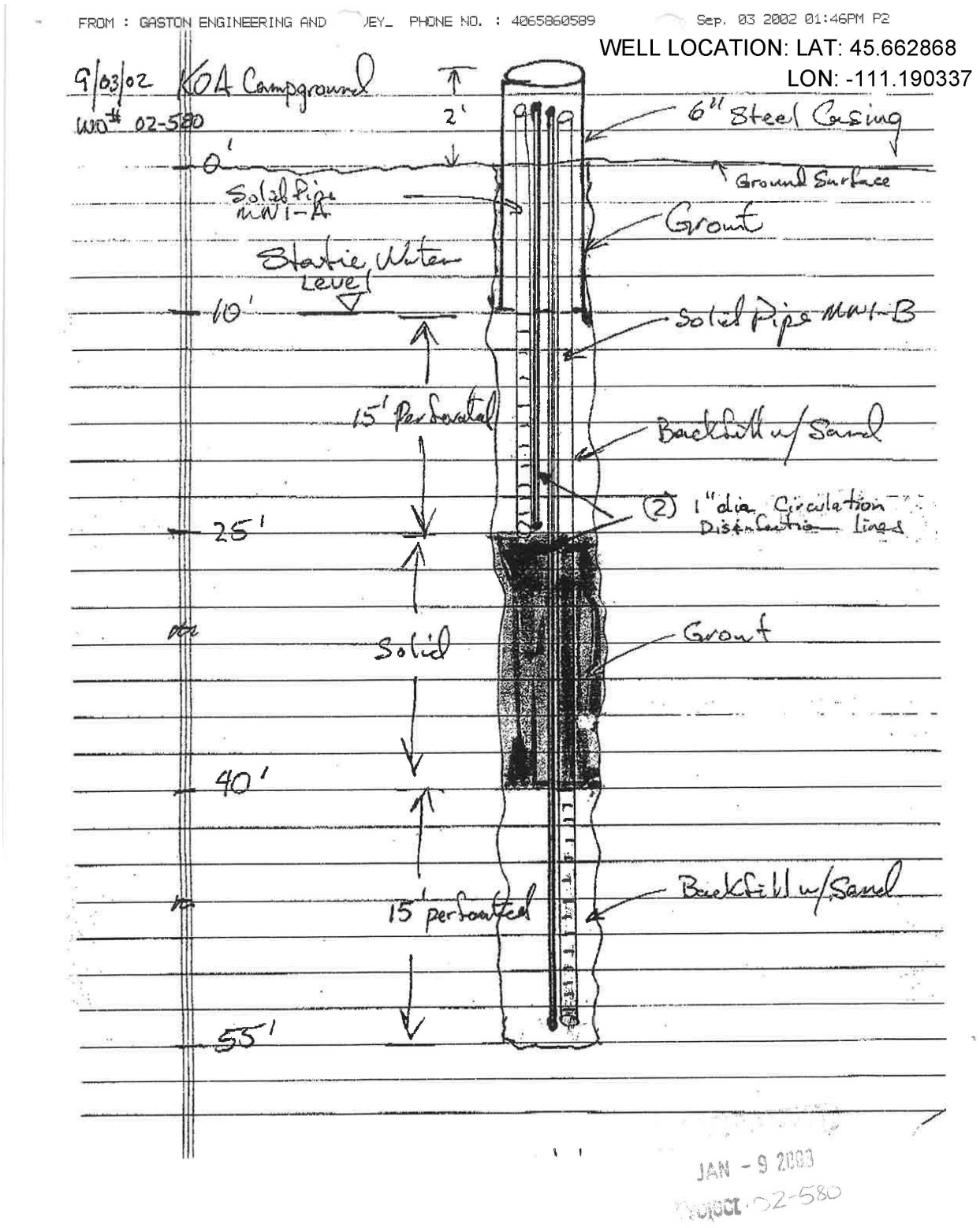
Copies of the public notice are mailed to the applicant,
state and federal agencies, and interested persons who have expressed interest in being notified of permit actions. A copy of the distribution list is available in the administrative record for this draft permit. Electronic copies of the public 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) 444-3080 or email DEQWPBPublicComments@mt.gov. All inquiries will need to reference the permit number (MTX000126), 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 SUMMARY

Downgradient Monitoring Well MW-1


FROM : GASTON ENGINEERING AND VEY_ PHONE NO. : 4065860589 Sep. 03 2002 01:46PM P2
WELL LOCATION: LAT: 45.662868
LON: -111.190337
9/03/02 KOA Campground
WO# 02-580
2'
0'
6" Steel Casing
Ground Surface
Solid Pipe MW1-A
Grout
Static Water Level
10'
Solid Pipe MW1-B
15' Perforated
Backfill w/ Sand
(2) 1" dia. Circulation Disinfectant lines
25'
Solid
Grout
40'
15' perforated
Backfill w/Sand
55'
JAN - 9 2003
Project 02-580

APPENDIX B – NONSIGNIFICANCE PROJECTIONS

Nitrogen significance criteria:

MASS BALANCE EQUATION

ALLOWABLE DISCHARGE CONCENTRATION DETERMINATION

Bozeman Hot Springs KOA MTX000126

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

C1	Ambient ground water (background) concentration (mg/L)	1.5
C2	**Allowable discharge concentration (mg/L)**	**61.81**
C3	Ground water concentration limit for pollutant (from Circular WQB-7) at the end of the mixing zone.	5.00
Q1	Ground water volume (ft^3 / day)	26554
Q2	Maximum flow of discharge (design capacity of system in ft^3 / day)	1636

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)**	**26554**
K	hydraulic conductivity (ft/day)	405
I	hydraulic gradient (ft/ft)	0.0094
A	cross-sectional area (ft^2) of flow at the down-gradient boundary of a standard 500-foot mixing zone.	6975

Outfall 001 -Bozeman Hot Springs Campground MTX000126 February 2019

Figure 4. WQBEL Calculation Sheet

Phosphorus significance criteria:

A phosphorus breakthrough analysis was done for this site in association with the original permit application. This renewal uses that analysis which identified projected phosphorus breakthrough to surface water to be 98 years. Anything greater than 50 years for a breakthrough is considered to be a nonsignificant impact on the beneficial use of surface water.