

**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)**

Applicant:	Tollefson Properties, LLC
Permit Number:	MTX000243 (pending)
Facility Name:	Mill Creek Meadows Subdivision
Facility Location:	SE ¼ Section 35 T15N R21W Missoula County Latitude; 47.01140, Longitude; -114.210744
Facility Address:	South of Mill Creek Road Frenchtown Montana 59834
Facility Contact:	Michael Smith WGM Group 1111 E. Broadway Missoula, MT 59802 (406) 728-4611
Receiving Water:	Class 1 Ground Water
Number of Outfalls:	One
Outfall/Type:	001 – Conventional Subsurface Drainfield – Domestic in Nature

I. PERMIT STATUS

The following fact sheet outlines the basis for issuing a new MGWPCS wastewater discharge permit to Tollefson Properties LLC for the Mill Creek Meadows Subdivision Waste Water facility south of Frenchtown Montana. 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.

The Mill Creek Meadows Subdivision has been reviewed by the County of Missoula.

A. Application Info

DEQ received an application for a permit at this site on January 16, 2018. The Department reviewed that application and issued a completeness letter to the applicant on January 25, 2018. Letters of deficiency had previously been addressed to the applicant on November 14, 2018 and November 30, 2018. Fees for this project were received with the applicant's original application on October 16, 2017 (10/16/17, \$8,800, check #9385).

II.FACILITY INFORMATION

A. Facility Location

Mill Creek Meadows is a residential subdivision consisting of 39 lots for single family residences. The property is accessed approximately 3/4 mile north on Mill Creek Road from the Frenchtown Frontage Road East of Frenchtown. The subdivision is on a 33.75-acre parcel owned by Tollefson Properties LLC and identified with a Parcel ID #04242835302120000. Outfall 001 for this facility is located on an adjacent 52.29-acre parcel owned by Alfred G. Deschamps and is identified with a Parcel ID #04242835302010000.

B. Facility and Operations

Mill Creek Meadows is planning individual STEP tanks at each residence pumping to a combined collections system. The collection system empties into a surge tank that pumps effluent to the drain field.

Table 1

Collection, Treatment, and Disposal System Summary, Mill Creek Meadows	
Outfall 001 - Domestic Wastewater/Sewerage	
Method of Disposal: Subsurface drainfields infiltrating to ground water.	
Disposal Structure: Subsurface Drainfields (Outfall 001)	
SE 1/4 of Section 35, Township 15North, Range 21West	
Latitude: 47.011400° ; Longitude: -114.210744°	
Contributing Sources of Wastewater:	
Standard Industrial Code(s) (SIC) of contributing sources: Sewerage (4952)	
Average Daily Design Flow (gpd): 9750 (ft ³ /day): 1,303	Daily Maximum Design Flow (gpd): 9750 (ft ³ /day): 1,303
Effluent Sampling Location: EFF-001: Effluent sampling port/dose tank located just prior to the drainfield.	
Flow Monitoring Equipment: FM-001: Monitoring equipment must be a flow-measuring device capable of measurements that are within 10 percent of the actual flow (Permit Part II.B.)	
Flow Monitoring Location: Flow meter and sampling port are planned to be located in the dose tank prior to discharge.	
Treatment: Conventional treatment, discharged to drainfields.	

C. Effluent Monitoring Location

Effluent monitoring location is in the surge tank prior to discharge to drainfield. Sampling requirements are further discussed in Section V.

D. Effluent Characteristics

Pursuant to ARM 17.30.1023, DEQ requires the applicant disclose the quality of the effluent to be discharged such that the potential pollutants are identified, and the proposed discharge can be analyzed with terms and conditions incorporated within the permit to prevent pollution of state water consistent with the Montana Water Quality Act, 75-5-101, et. seq., Montana Code Annotated (MCA). The applicant provided an effluent quality estimate for Outfall 001 as summarized within Appendix I.

E. Geology (PWSID #MT0000856)

The Missoula Valley is part of a structural basin that began to open about 65 million years ago, during the early Tertiary crustal movement that created the Rocky Mountains. Precambrian metasedimentary rocks of the Belt Supergroup, and a few interspersed Paleozoic sedimentary rocks surround the valley, with peaks of 5000 to 7000 feet elevation. This relatively impermeable and deeply eroded landscape was partially filled with Tertiary and Quaternary alluvium, and Glacial Lake Missoula clays and silts. Portions of the Tertiary sediments were scoured from the valley during the repeated draining of Glacial Lake Missoula approximately 12,000 to 15,000 years ago, during the Wisconsin glacial stage, and were replaced with layers of sand, gravel and cobbles, deposited during these catastrophic events and more recent alluvium deposited along the river channel and flood plain. The sediments generally become finer to the southwest of the valley as a result of dissipating energy after sediment-carrying water flowed out of Hellgate Canyon and across the broader Missoula Valley, depositing coarser sediments first and then gradually allowing deposition of finer sediments.

F. Hydrogeologic Characteristics (PWSID #MT0000856)

The Missoula Aquifer is semi-confined in this area. It is composed mainly of unconsolidated Quaternary alluvial fan deposits and discontinuous Glacial Lake Missoula clay and silt. Layers of clay and silt deposited in the lake are interfingered with sand and gravel layers that were deposited between the multiple episodes of draining and refilling the Lake. Tertiary deposits (mostly Renova and Sixmile-Creek Equivalents) flank and underlie the area of Quaternary alluvium, but are generally fine-grained and much less productive than the more recent deposits. Some wells in the outlying areas of the valley are finished in Precambrian bedrock, but these are also much less productive than the main water-bearing alluvium, and derive water mainly from fractures. Depth to the water table ranges from approximately 6 to 70 feet below land surface, depending on distance from rivers and tributary streams. The seasonal fluctuation of the groundwater table ranges from approximately 2 to 13 feet (Woessner, 1988) and depends upon proximity to the recharge source and hydraulic conductivity of the surrounding aquifer sediments. The lateral extent of the Missoula Aquifer varies from about 0.25 miles wide at the mouth of Hellgate Canyon, to 6.25 miles wide between Maclay Flats and the mouth of Grant Creek; the overall length is approximately 20 miles. Groundwater flows generally westward through the Frenchtown High School area. The aquifer has high source water sensitivity because it is semi-confined and comprised of relatively coarse-grained material. The Missoula Valley Aquifer has been designated a "Sole Source Aquifer" by the U.S. EPA.

G. Ground Water Monitoring Wells

An existing side gradient ambient monitoring well has been used by the applicant to determine current background water quality. Discharge from Outfall 001 is to Class I state ground water. The applicant will need to locate, monitor and, install, if necessary, a suitable down gradient monitoring well as a condition of this permit. Information regarding permit conditions can be found section VI and VII of this fact sheet. Information regarding the existing monitoring wells has been summarized and listed in Appendix II. See Figure 2 for existing monitoring well locations.

Ground water quality results are summarized in Appendix III.

III.MIXING ZONE

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. DEQ will be authorizing a mixing zone within this permit. The mixing zone rationale is further discussed in Appendix IV.

IV.PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements

at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715. The bases for deriving and establishing effluent limitations are further discussed in Appendix V. Based on the information and analyses presented in Sections III and IV, pursuant to ARM 17.30.1031, DEQ proposes the following numerical effluent limitations:

Table 2: Proposed Final Effluent Limits – Outfall 001		
Parameter	Units	Daily Maximum⁽¹⁾
Nitrogen, Total (as N)	lbs/day	7.3
Footnotes:		
Beneficial Uses: ARM 17.30.1006		
(1) See definition in Part V of permit.		

V.RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and therefore water quality standards. Effluent monitoring and ground water monitoring will be required as a condition of this permit. Monitoring requirements and respective rationale are summarized in Appendix VII.

VI.SPECIAL CONDITIONS

In accordance with ARM 17.30.1031 this section contains the basis for special permit conditions that are necessary to assure compliance with the ground water quality standards and the Montana Water Quality Act. The following special condition(s) will be included in the permit.

- A. Within one year of the effective date of the permit, a minimum of one shallow monitoring well must be installed downgradient of the proposed discharge structure (Outfall 001). This well will be labeled MW-1 and will be located at the end, and centered on the 500-foot standard mixing zone

Monitoring well installation and reporting requirements are contained in Section VII and Appendix VII of this fact sheet.

VII.COMPLIANCE SCHEDULE

A compliance schedule is included to allow a reasonable opportunity for the permittee to attain and maintain compliance with permit requirements. The actions listed in Table 3 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 3

Compliance Schedule					
Authority	Permit Condition	Action	Freq.	Scheduled Completion Date of Action ⁽¹⁾	Scheduled Report Due Date. ⁽²⁾
ARM 17.30.1031	Part I.E.1	Complete a plan for the location and installation of monitoring well MW-1.	Single event	11/28/2018	Due on or before the 28th day of the month following the completion date.
		Develop and implement (or update) a site specific Sampling and Analysis Plan (SAP) for monitoring and sampling the ground water monitoring wells.		11/28/2018	Due on or before the 28th day of the month following the completion date.
		Install required monitoring well. ⁽⁴⁾		6/1/2019	Due on or before the 28th day of the month following initial discharge.
		Provide written report regarding the installation of new monitoring wells. ⁽³⁾		6/1/2019	Due on or before the 28th day of the month following initial discharge.
		Begin ground water monitoring from newly installed monitoring well. ⁽⁴⁾	See Monitoring requirements	Within 30 days of installation.	Due on or before the 28th day of the month following initial discharge.
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.					
(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 final location, drilling methods used, borehole lithologic log, well construction details, elevation of measuring point, and the depth to the top contact of the first ground water bearing zone. This information must be included for each respective monitoring well.					
(5) Sampling parameters required for each respective monitoring well as listed within Table 7.					

VIII.NONSIGNIFICANT DETERMINATION

DEQ has determined that the proposed activity is a new or increased source resulting in a change of existing water quality occurring on or after April 29, 1993 (ARM 17.30.702). The applicable water quality standards for Class I or II ground water and nondegradation provisions are summarized in Appendix V. Discharges in compliance with the limitations of this permit are considered nonsignificant. The permit includes monitoring, reporting and corrective action requirements to establish, confirm, and maintain compliance with the permit limits.

At the request of the Department a cumulative effects analysis was completed for surface water effects at the Clark Fork River as well as at the end of the standard mixing zone. The mixing zone rationale is included in Appendix IV and Appendix V. The applicant calculated cumulative down gradient loads encountered on the way to the Clark Fork River. This additional analysis considered the cumulative down gradient nitrogen loads added by 5

residential wastewater systems. Increases to total nitrogen in surface water greater than 0.001 mg/L are considered significant. The cumulative effects of residential nitrogen discharges from Mill Creek Meadows Subdivision and the five down gradient residences was calculated by the applicant to be below laboratory detection limits (0.0005761 mg/L). This discharge is considered nonsignificant as defined in 17.30.715 and DEQ Circular 7. These calculations are available as part of the public record in the application material submitted by the applicant.

IX. 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 8, 2018**. Comments may be directed to:

DEQWPBPublicComments@mt.gov

or at:

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 were 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 (MTX000243), 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.

FIGURE 1a
Vicinity Map

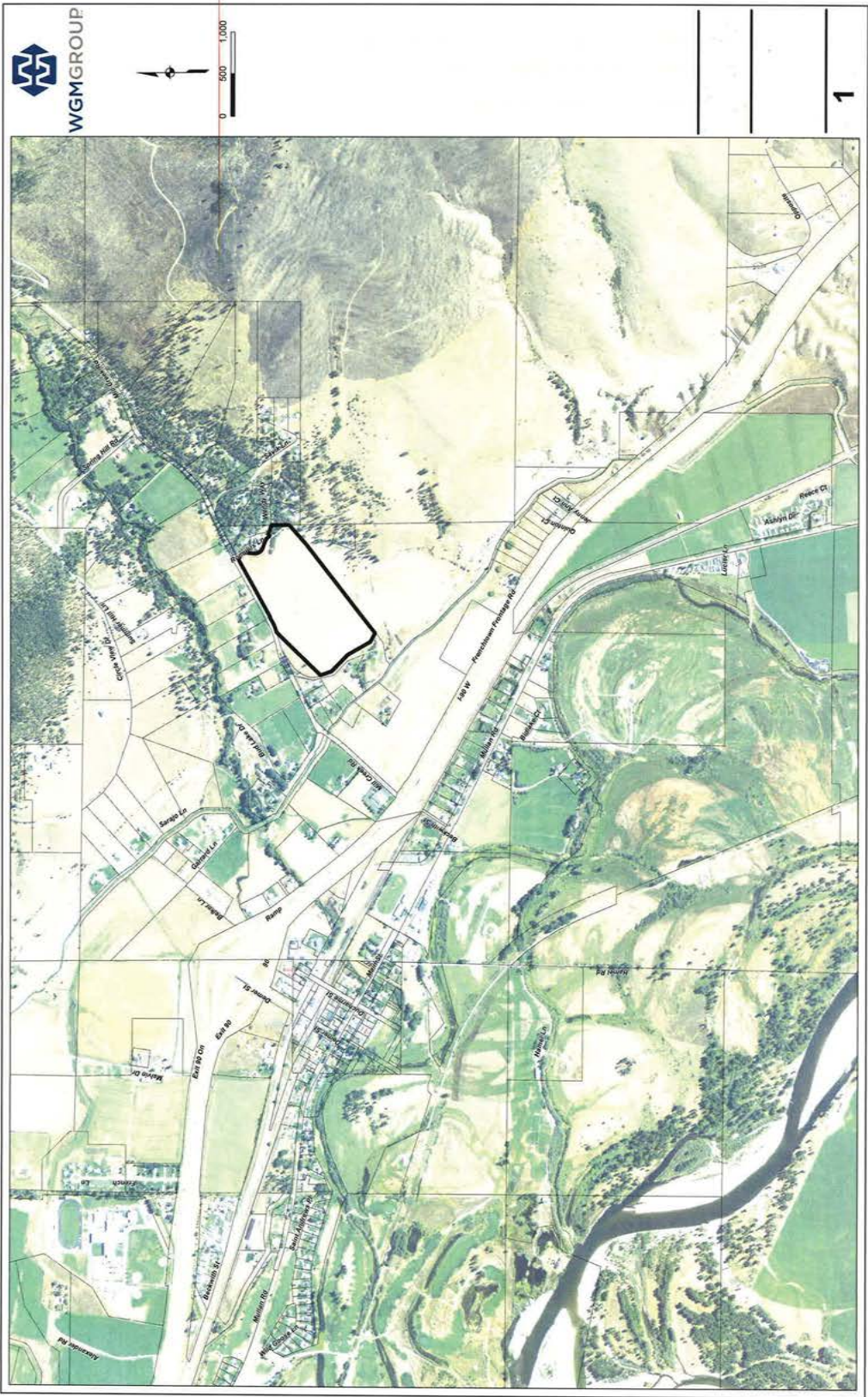


Figure 1b

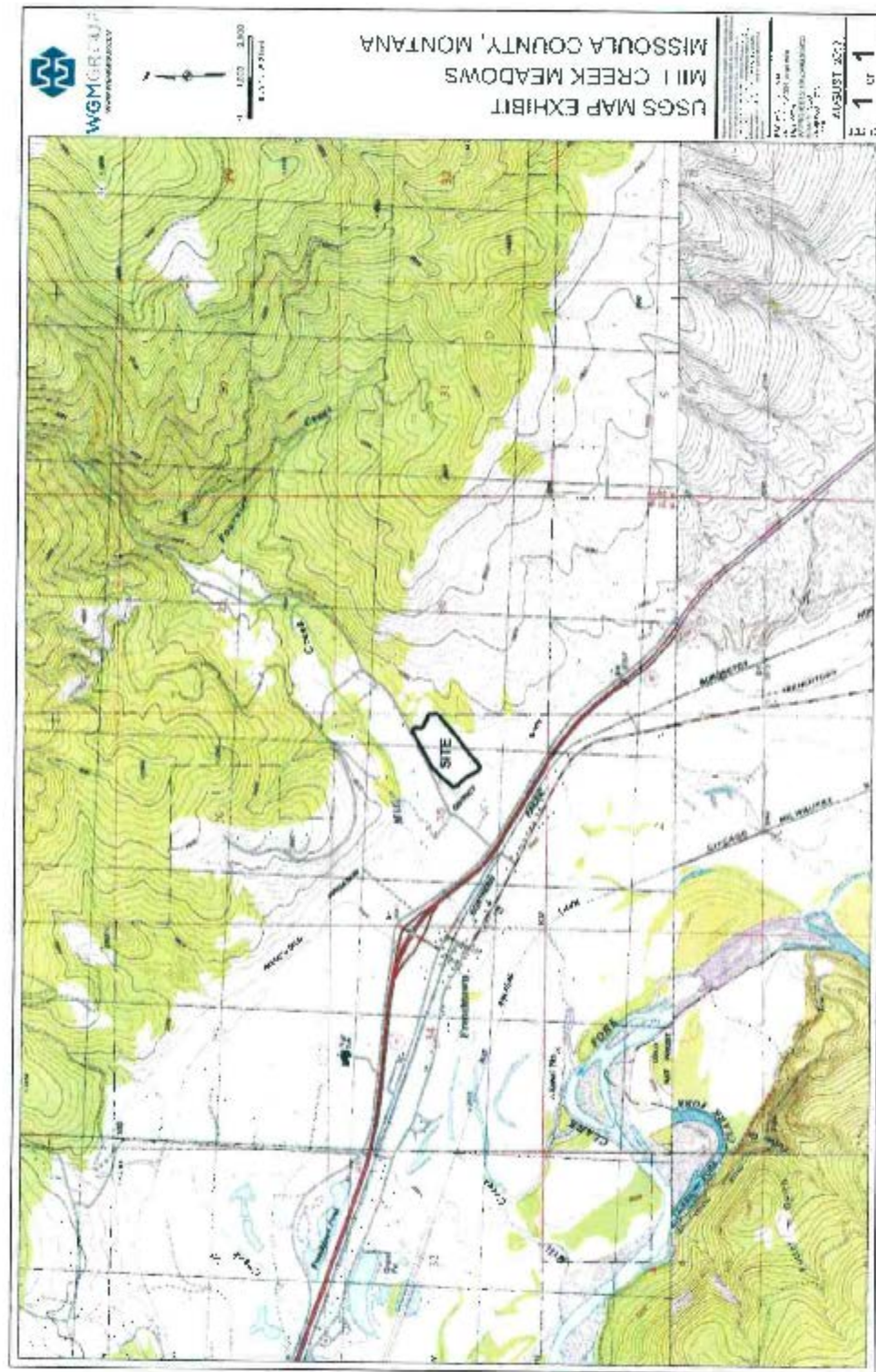


Figure 2b

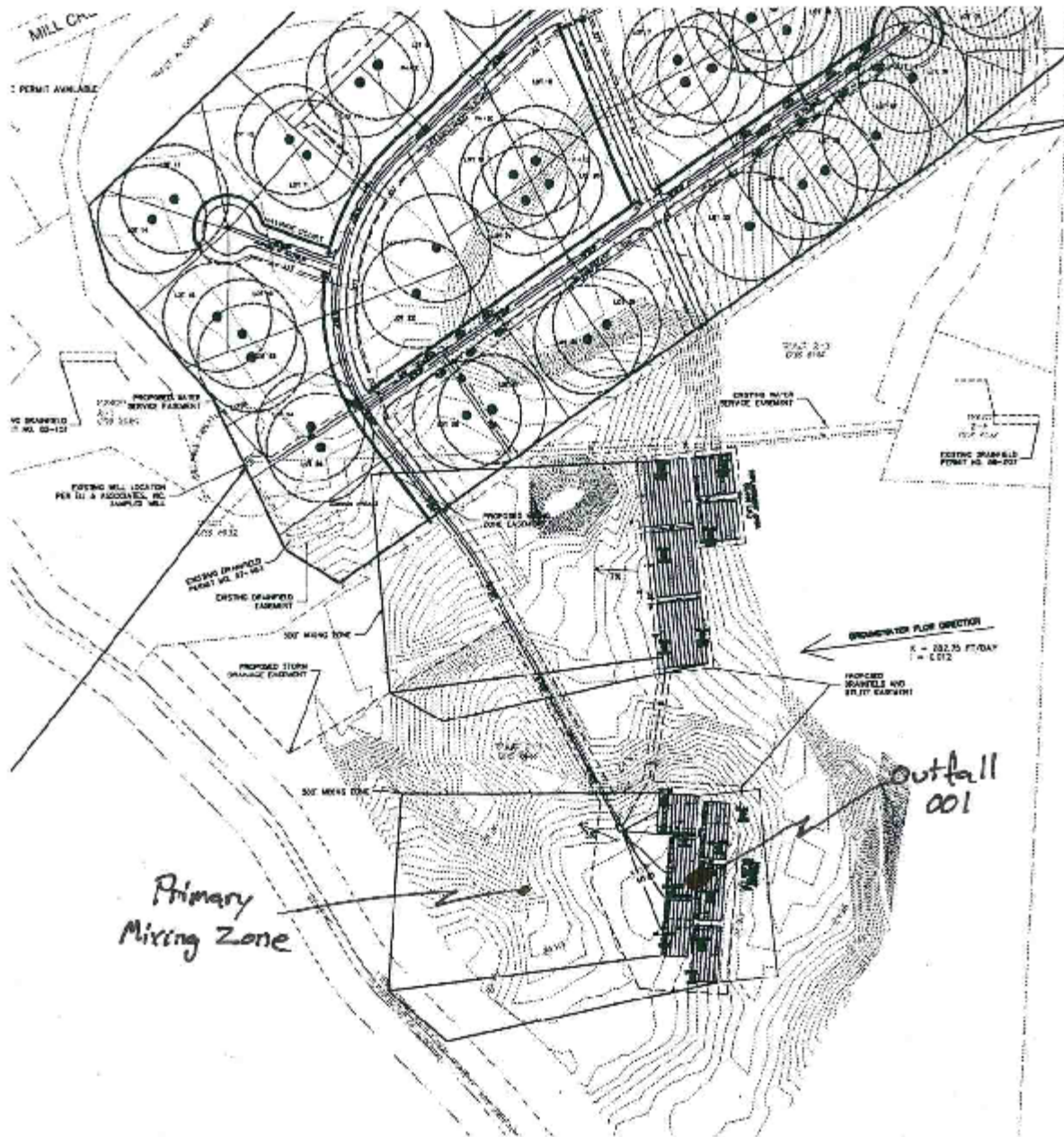
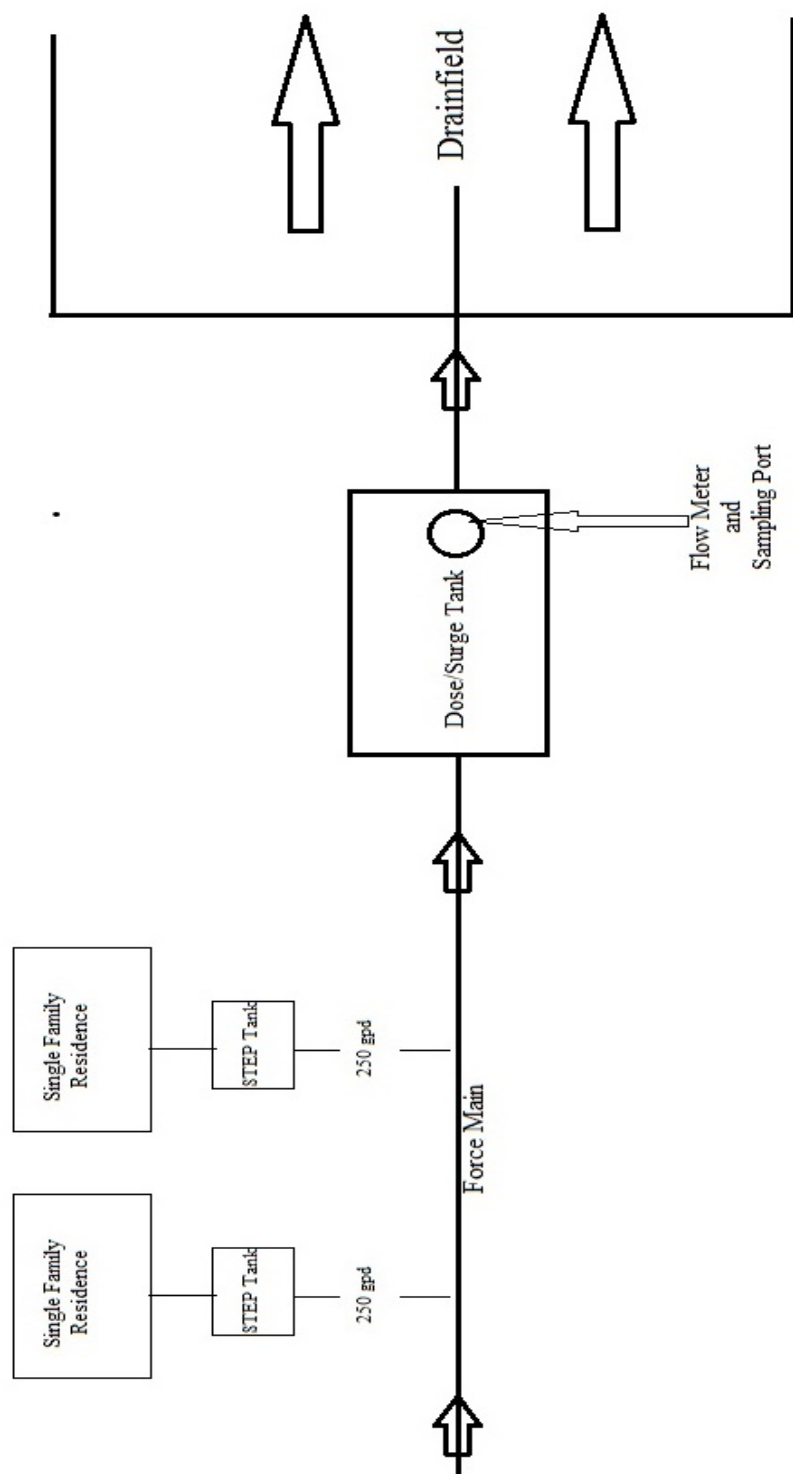


FIGURE 3
Line Diagram



Ambient Sampling 2017

ATTACHMENT K-2: WELL LOG - SAMPLED WELL

[illegible]

APPENDIX I - ESTIMATED EFFLUENT QUALITY

Table 1

Estimated Effluent Quality – Outfall 001. Estimates are from Manley Meadows Subdivision MTX000153.							
Parameter⁽¹⁾	Location	Units	Reported Minimum Value	Reported Average Value	Reported Maximum⁽²⁾ Value	# of Samples	Source of Data
Biochemical Oxygen Demand (BOD ₅)	EFF-001	mg/L	80	113	190	16	DMR
Chloride (as Cl)	EFF-001	mg/L	413	552	780	16	DMR
Flow rate, Discharge	FM-001	gpd	1,744	2,241	3,917	16	DMR
Nitrogen, Nitrate + Nitrite (as N)	EFF-001	mg/L	0.010	0.018	0.05	16	DMR
Nitrogen, Total Kjeldahl (as N)	EFF-001	mg/L	46.800	61.870	78.400	16	DMR
Nitrogen, Total (as N)	EFF-001	mg/L	46.800	61.800	78.400	16	DMR
		lbs/day	0.790	1.149	1.740	16	DMR
Phosphorus, Total (as P)	EFF-001	mg/L	5.7	6.9	7.9	16	DMR
		lbs/day	0.09	0.13	0.19	16	DMR
Total Suspended Solids (TSS)	EFF-001	mg/L	17	32	58	16	DMR
Footnotes:							
DMR = Self Reported Discharge Monitoring Reports							
EFF-001: Effluent sample site located at end of discharge pipe.....							
FM-001 = Effluent flow meter located.....							
Period of Record: 07/2013 through 07/2017.							
(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.							
(2) Maximum value recorded of all quarterly reported Daily Maximum Values.							

APPENDIX II – MONITORING WELL SUMMARY

Table 2

Monitoring Well Summary:
Monitoring Well: Ambient Side Gradient
MBMG GWIC #: 246316
Lithologic Log ID:
Status: Constructed on June 11, 2008
Location: Approx. 1/4 mile east of the intersection of Frenchtown Frontage Rd and Mill Creek Rd.
Latitude: 47.01342° Longitude: -114.21412°
Representation: Ambient quality of the shallow receiving ground water, sidegradient of Outfall 001.

APPENDIX III - GROUND WATER QUALITY MONITORING RESULTS

Table 3

Ground Water Monitoring Results, GWIC #246316, Sidegradient Monitoring Well								
Monitor Source ⁽¹⁾	Representation	Parameter	Units	Reported Minimum Value	Reported Average Value	Reported Maximum ⁽²⁾ Value	# of Samples	Source of Data
GWIC ID#246316	Ambient Ground Water Quality Ground water, 1,200-feet west (sidegradient) from Outfall 001, 138 feet deep							
		Chloride (as Cl)	mg/L	1.00	1.30	2.00	3	APP
		<i>Escherichia coli</i> Bacteria	CFU/100 ml	ND	ND	ND	3	APP
		Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.03	0.33	0.36	3	APP
		Nitrogen, Total Kjeldahl (as N)	mg/L	ND	ND	ND	3	APP
		Organic Carbon	mg/L	ND	0.02	0.06	3	APP
		pH	s.u.	8.00	8.00	8.10	3	APP
		Specific Conductivity (@ 25°C)	µS/cm	278.00	280.30	285.00	3	APP
		Total Dissolved Solids (TDS)	mg/L	152.00	156.30	160.00	3	APP
Footnotes:								
APP = Application Form GW-1 and supplemental materials.								
CFU = Colony Forming Units								
ND = Not Detected								
Period of Record: 09/29/2017 through 01/03/2018.								
s.u. = standard units								
(1) Refer to Section II of the Fact Sheet for the existing or proposed location of the monitoring wells.								
(2) Maximum value recorded of all monthly or quarterly reported values.								

APPENDIX IV – MIXING ZONE RATIONALE

The applicant has requested a Standard Mixing Zone.

The Montana Water Quality Act (75-5-103, Montana Code Annotated (MCA)) states that a mixing zone is an area of the receiving water, established in a permit, where the water quality standards may be exceeded. Mixing zones are subject to the conditions imposed by DEQ and consistent with the rules adopted by the Board of Environmental Review (Board).

DEQ determines whether a mixing zone is appropriate pursuant to the requirements and procedures of ARM 17.30.501 et seq. DEQ must conduct a water quality assessment in accordance with ARM 17.30.506 to determine if and what type of mixing zone may be authorized. A person applying to DEQ for a mixing zone must indicate the type of mixing zone requested and supply information of sufficient detail for DEQ to make a determination regarding the authorization of the mixing zone (ARM 17.30.515).

In making its mixing zone determination, DEQ will consider the potential cumulative effects of additional existing discharges in the area (ARM 17.30.506(2)(f)). In addition, DEQ will analyze the assimilative capacity of the aquifer that is available for the proposed discharge. The derived effluent limitation (Section IV) will maintain the beneficial uses of all downgradient ground water.

A mixing zone may be denied if it will threaten or impair existing uses (Section IV) in accordance with ARM 17.30.505. In making this determination DEQ will consider whether current available data can accurately predict ground water or pollutant movement, or whether there is sufficient unpredictability that might result in adverse impacts due to a particular concentration of a parameter within the mixing zone [ARM 17.30.506; and 517].

A mixing zone may be granted for individual parameters in a discharge (ARM 17.30.505). The concentration of pollutants at the downgradient boundary of the mixing zone must be estimated in accordance with ARM 17.30.517 to determine if the discharge qualifies for a ground water mixing zone. After an assessment of this information, DEQ has determined it is appropriate to authorize a mixing zone for the parameters listed within Table 4 below as the potential impact to beneficial uses is expected to be minimal (Section IV).

The applicant submitted information which justifies the authorization of a standard 500-foot mixing zone. Pursuant to ARM 17.30.502 a "Mixing Zone" is defined as a limited area of a portion of an aquifer where initial dilution of a discharge takes place, where water quality changes may occur, and where certain water quality standards may be exceeded. DEQ will authorize the mixing zone based on the hydrogeologic and mixing zone information presented in this fact sheet. ARM 17.30.517 states that a specific depth and width are necessary to determine the aquifer cross-section area (A) for a mixing zone. The width of the outfall structures perpendicular to ground water flow direction are reported within the table below. ARM 17.30.517 states that the depth of a ground water mixing zone extends from the top of the water table beneath the source down to 15 feet below the water table.

The cross-sectional area (A) is the area of the ground water flux boundary at the terminus of the mixing zone (ARM 17.30.517). The down gradient boundary mixing zone width is the width of the source (drainfield width perpendicular to ground water flow direction), plus the distance determined by the tangent of 5° (0.0875) times the length of the mixing zone times two (2) (ARM 17.30.517). The calculated widths and respective cross section areas (A) are listed in the below table.

Based on the dimensions of the standard mixing zones, and the hydrogeologic characteristics (Section II), the volume of ground water (QGW) available to mix with the effluent is calculated using Darcy's Equation (ARM 17.30.517):

$$QGW = KIA$$

Where:

QGW = ground water flow volume (ft³/day)
K = hydraulic conductivity (ft/day)
I = hydraulic gradient (ft/ft)
A = cross-sectional area (ft²) of flow at the downgradient boundary of the mixing zone.

The hydraulic conductivity (K) and the hydraulic gradient (I) were calculated by the applicant using local well data and Montana Bureau of Mines and the Geology Ground Water Map of the vicinity.

Table 4 displays the respective mixing zone parameters used in the above equation. The table also lists the resulting volume of ground water available to mix at Outfall 001.

Based on the description of the mixing zone, and analysis presented in Section IV, DEQ has determined pursuant to ARM 17.30.505 that a standard mixing zone is applicable for Outfall 001 and will be authorized in this permit for the parameters listed in the table below.

$$QGW = 282 \text{ ft/day} \times 0.012 \text{ ft/ft} \times 7012.5 \text{ ft}^2 = \mathbf{23,730 \text{ ft}^3/\text{day}}$$

Table 4

Mixing Zone Information - Outfall 001		
Parameter	Units	Value
Mixing Zone Type	-	Standard
Authorized Parameters	-	Total Nitrogen
Ambient Ground Water Concentrations, TN	mg/L	0.33
Ground Water Flow Direction	azimuth/bearing	S84°W
Length of Mixing Zone	feet	500
Thickness of Mixing Zone	feet	15
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	380
Width of Mixing Zone at Down Gradient Boundary	feet	467.5
Cross Sectional Area of Mixing Zone (A)	ft ²	7012.5
Hydraulic Conductivity (K)	feet/day	282
Hydraulic Gradient (I)	ft/ft	0.012
Volume of Ground Water Available for Mixing (Q _{gw})	ft ³ /day	23,730

APPENDIX V – RATIONALE FOR PROPOSED DISCHARGE LIMITATIONS AND CONDITIONS

DEQ has a statutory duty to develop effluent limits and issue permits consistent with the Montana Water Quality Act, §75-5-101, MCA et seq. and rules adopted under that Act. Section IV presents the basis for discharge limitations in accordance with the requirements at ARM 17.30.1006, ARM 17.30.1031 and ARM 17.30.715.

A. Water Use Classification & Applicable Water Quality Standards

The receiving water for Outfall 001 is Class 1 ground water and high-quality waters of the state (75-5-103, MCA). The quality of Class 1 ground water must be maintained so that these waters are suitable for the following beneficial uses with little or no treatment (ARM 17.30.1006):

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

Persons may not cause a violation of the following specific water quality standards in Class 1 ground water, pursuant to ARM 17.30.1006, except within a DEQ approved mixing zone as provided in ARM 17.30.1005:

- The human health standards for ground water listed in Circular DEQ-7;
- For concentrations of parameters for which human health standards are not listed in DEQ-7, no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class I water. DEQ may use any pertinent credible information to determine these levels; and,
- No increase of a parameter that causes a violation of the nondegradation provisions of 75-5-303, MCA.

The nondegradation rules (ARM 17.30.701, et seq.) implement Montana's nondegradation policy, which applies to any activity of man resulting in a new or increased source which may cause degradation of state waters (ARM 17.30.705). In accordance with ARM 17.30.706, DEQ is required to determine whether a new or increased source may cause degradation or whether it is nonsignificant according to ARM 17.30.715.

DEQ performed a significance determination for the proposed activity as part of permit development (DEQ, 2014). The determination established that the proposed discharge is a new or increased source (ARM 17.30.702) because it is an activity resulting in a change of existing water quality occurring on or after April 29, 1993. The proposed activity will result in discharges that if maintained in compliance with the nondegradation-nonsignificance criteria established within this permit, will not constitute a significant activity.

The applicable ground water standards pursuant to ARM 17.30.1006 and the nondegradation-nonsignificance criteria at ARM 17.30.715 for the identified parameters are summarized in the table below and will be used as the basis for developing effluent limitations in the permit.

Table 5

Applicable Ground Water Quality Standards.			
Parameter⁽¹⁾	Units	17.30.1006(1)(b)(ii) Beneficial Uses - Ground Water	17.30.715 Nondegradation - Nonsignificance Criteria⁽²⁾⁽³⁾
Nitrogen, Total (TN)	mg/L	10.0	5.0
Footnotes:			
These standards establish the maximum allowable changes in ground water quality and are the basis for limiting discharges to ground water, ARM 17.30.1005(1); Circular DEQ-7 (2012), Footnote 16; and ARM 17.30.715(1)(d).			
(1) The list only includes identified parameters of interest.			
(2) Discharges in compliance with the nondegradation significance criteria constitute nonsignificant degradation.			
(3) 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.			

B. Pollutants and Parameters of Interest (POI)

DEQ has identified POI's for the proposed discharge based on the following:

- Reported effluent characteristics (Section II.D),
- Water quality standards (Appendix V),
- Water use classification of the receiving ground water (Appendix V).

Each individual POI is further discussed below.

C. Development of Effluent Limits

ARM 17.30.1006 and 17.30.715 set forth the basis for developing effluent limitations that will protect water quality. The ground water quality standards establish the maximum allowable changes to ground water quality; are the basis for limiting discharges to ground water; and may only be exceeded within a mixing zone authorized by DEQ.

1) Water Quality Based Effluent Limitations

a. Nitrogen

Application materials state that nitrogen is present in the wastewater stream (Section II.D.). 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 will establish 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 will be derived from a mass-balance equation (ARM 17.30.517) which is a simple steady-state model, used to determine the POI concentration after accounting for other sources of pollution in the receiving water and any dilution as provided by a mixing zone. The equation factors in cumulative impacts of existing upgradient discharges and will limit the discharger to the assimilative capacity currently available in the receiving aquifer. 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 for mixing (Section III).

Equation 2:

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

Where:

C_{eff}	=	effluent pollutant concentration
C_{std}	=	water quality standard concentration
C_{gw}	=	ambient receiving ground water concentration
D	=	dilution ratio (Q_{gw}/Q_{eff})

Solving for the effluent concentration

$$\mathbf{C_{eff} = 90.04mg/L}$$

$$\mathbf{C_{eff} = 5 + 18.21 (5.0 - 0.33) = 90.04}$$

Where:
 C_{eff} = effluent concentration
 C_{std} = 5.0 mg/L TN
 C_{gw} = 0.33 mg/L
 $D = 23,730 \text{ ft}^3/\text{day} / 1,303 \text{ ft}^3/\text{day} = 18.2$

i. Outfall 001

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 design capacity, the respective load effluent limitation is:

Load Limit = 7.32 lbs/day

$$\text{Load lbs/day} = C_{eff} \times \text{Discharge gpd} \times \text{Conversion factor}$$

$$[(8.34 \times 10^{-6}) \times 90.04 \text{ mg/L} \times 9,750 \text{ gpd}]$$

as based on the following equation:

<p>Equation 3:</p> $L_{\text{lim}} = C_{\text{CON}} \times C_{\text{eff}} \times DC_{\text{eff}}$ <p>Where:</p> L_{lim} = effluent limitation-load C_{eff} = allowable effluent concentration DC_{eff} = design capacity of wastewater treatment system (gpd) C_{CON} = conversion factor $[8.34 \times 10^{-6}]$

Based on the information and analyses presented in Sections III and IV and pursuant to 75-5-402, MCA and ARM 17.30.1031, DEQ proposes to establish numerical effluent limitations.

The numeric effluent limitations are expressed as loads whenever possible since this type of limitation inherently regulates both the volume and the strength of the effluent as prescribed at 75-5-402(3), MCA. Load limits also ensure compliance with the ground water standards at the end of the mixing zone. The proposed final effluent limits are computed above, and are listed in Section IV.

D. Final Effluent Limitations

Based on the information and analyses presented in Sections III and IV and pursuant to 75-5-402, MCA and ARM 17.30.1031, DEQ proposes to establish numerical effluent limitations.

The numeric effluent limitations are expressed as loads whenever possible since this type of limitation inherently regulates both the volume and the strength of the effluent as prescribed at 75-5-402(3), MCA. Load limits also ensure compliance with the ground water standards at the end of the mixing zone. The proposed final effluent limits are listed in Section IV.

APPENDIX VII – RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

ARM 17.30.1031 requires that all issued MGWPCS permits contain monitoring requirements that assure compliance with the developed numeric effluent limitations and the water quality standards. Effluent monitoring and ground water monitoring requirements will be required and made conditions of this permit.

A. Effluent Monitoring - Compliance

Final numeric effluent limitations are developed for this permit with specific magnitudes and durations based on site-specific conditions that ensure the discharge will not cause or contribute to an exceedance of an applicable water quality standard (see Sections III and IV). Accordingly, the permittee will be required to monitor and report monitoring results at a specified frequency in order to demonstrate compliance with the applicable effluent limitations. Effluent monitoring and reporting requirements are summarized in Table 6. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

B. Effluent Monitoring - Sampling Location

Samples shall be representative of the nature of the monitored discharge (Permit Part II.A.). As discussed in Section II.C, the effluent sample location has been established at the (EFF-001) located in the dose tank prior to discharge to drainfield (Figure 3).

C. Discharge Monitoring

Flow measurements shall be representative of the volume of the monitored discharge (Permit Part II.A.). The applicant will be 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 (Permit Part II.B.). The flow measuring device (FM-001) is located in the dose tank prior to discharge to drainfield (Figure 3). The flow measuring device must be installed and in operating condition prior to discharge. Flow monitoring and reporting requirements are summarized in the table below and in the permit.

Table 6

Effluent Monitoring and Reporting Requirements – Outfall 001						
Analyte/Measurement	Monitor Location	Units	Sample Type ⁽¹⁾	Minimum Sample Frequency	Reporting Requirements ⁽¹⁾⁽²⁾	Report Freq
Flow Rate, Effluent ⁽³⁾	FM-001	gpd	Continuous	Continuous	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Nitrite+Nitrate (as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Ammonia (as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN)(as N)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total (as N) ⁽⁴⁾	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
		lbs/day ⁽⁵⁾	Grab	Monthly	Daily Maximum ⁽⁶⁾ Quarterly Average ⁽⁷⁾	Quarterly

Footnotes:

EFF-001: located at effluent collection tank just prior to release of wastewater into the disposal pond.

FM-001: located between wastewater sumps and prior to release into the collection tank.

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 (DMR) form.

(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 $[8.34 \times 10^{-6}]$.

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

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

D. Ground Water Quality Monitoring

As a special condition (ARM 17.30.1031), down gradient ground water monitoring will be established in this permit. Ground water monitoring will be required at monitoring well MW-1. Ground water monitoring will be used for mixing zone determination, aquifer characterization, and in collection of data that is required for future permit renewal (Part III.A., Duty to Reapply). Ground water monitoring and reporting requirements are summarized in Table 7. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter. Sampling and reporting requirements shall commence upon the effective date of the permit.

Ground water installation and reporting requirements for MW-1 are discussed in Section VI and installation is discussed in Appendix VIII. The commencement date for monitoring well sampling and reporting is listed in Section VII.

Ground water monitoring and reporting requirements are summarized in Table 7. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter.

Table 7

Analyte/Measurement	Monitor Location⁽¹⁾⁽²⁾	Units	Sample Type⁽³⁾	Minimum Sampling Frequency	Reporting⁽³⁾⁽⁴⁾⁽⁵⁾ Requirements	Reporting Frequency
Chloride (as Cl)	MW-1	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly
Nitrogen, Nitrate + Nitrite (as N)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Ammonia (as N)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN)(as N)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW-1	µS/cm	Grab or Instantaneous	1/Quarter	Quarterly Average	Quarterly
Static Water Level (SWL) ⁽⁷⁾	MW-1	ft-bmp	Grab or Instantaneous	1/Quarter	Quarterly Average	Quarterly
Temperature	MW-1	°C	Grab or Instantaneous	1/Quarter	Quarterly Average	Quarterly

Footnotes:

CFU = Colony Forming Units

ft-bmp = feet below measuring point

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).

Monitoring for the proposed monitoring wells MW-1 and MW-2 shall commence upon installation (Section VI.B.)

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 VI. and Section VII. of the Fact Sheet for the existing or proposed location of the monitoring wells.

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

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

(4) Submittal of DMRs will be required, regardless of the installation status of each individual monitoring well. If the monitoring well(s) is not installed for an individual monitoring period, the following shall be stated upon each applicable DMR: “monitoring well has not been installed”.

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

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

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

APPENDIX VIII – MONITORING WELL INSTALLATION REQUIREMENTS

Monitoring well MW-1 will be installed so that all collected samples will be representative of the shallow portion of the water bearing zone (mixing zone). The monitoring well must be constructed so that the perforated casing and filter pack is only representative of ground water occurring from the top contact of the seasonal high ground water down to twenty feet below the top contact of the seasonal high ground water. This may be approximately 44 to 64 ft-bgs (feet below ground surface) as estimated from on-site application information submitted to DEQ (DEQ, 2017). The monitoring well must be secured, maintained, labeled, and monitored for long-term viability.

A monitoring well installation plan must be received by DEQ due within 180 days of the effective date of this permit (see Table 3, section VII). The plan must address all installation requirements as described within this fact sheet. The respective completion and reporting dates are listed in Table 3, Section VII.

Upon completion, a monitoring well installation report must be received by DEQ due on or before the 28th day of the month following the completion date. The report must include final location, drilling methods used, borehole lithologic log, well construction details, well identification, elevation of measuring points, and the depth to the top contact of the first ground water bearing zone. The respective completion and reporting dates are listed in Section VII.

The commencement date for monitoring well sampling and reporting is listed in Section VII.

APPENDIX VIII - REFERENCES CITED

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.

Crowley et al., 2017. Montana Bureau of Mines and Geology (MBMG), Principal Aquifers of Montana, MBMG Hydrogeologic Map 11.

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.

Department of Environmental Quality. 2010. [CB1] Administrative Record of Montana Ground Water Pollution Control System (MGWPCS) permit application and supplemental materials, Facility Mill Creek Meadows, MTX000243.

Fetter, C.W., Applied Hydrogeology, 1994.

Freeze, R., and Cherry, J., Groundwater, 1979.

Kendy, E. and R.E. Tresch. 1996. Geographic, Geologic, and Hydrologic Summaries of Intermontane Basins of the Northern Rocky Mountains, Montana. USGS Water-Resources Investigations Report: 96-4025.

Montana Bureau of Mines and Geology, Ground-Water Information Center, Retrieved November, 2014, from the GWIC database, <http://mbmggwic.mtech.edu>.

Montana Bureau of Mines and Geology (MBMG), Ground Water Assessment Program (GWAP) information on aquifer water quality. Referenced on January, 20XX:
http://www.mbmgs.mtech.edu/gwip/gwip_currentProjects.asp

Montana Bureau of Mines and Geology (MBMG), Ground Water Investigation Program (GWIP) studies of domestic wastewater injections and their impacts on ground water and surface water. Referenced on January, 20XX:
http://www.mbmgs.mtech.edu/gwip/gwip_currentProjects.asp

Montana Code Annotated, Title 75, Chapter 5, *Montana Water Quality Act*, 2011.

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.

U.S. Environmental Protection Agency, 1991. *Technical Support Document for Water Quality-Based Toxics Control* (TSD). EPA-505/2-90-001. U.S. Environmental Protection Agency, Office of Water, Washington, DC. <www.epa.gov/npdes/pubs/owm0264.pdf>.

U.S. Geological Survey, Basic Ground Water Hydrology, <http://pubs.usgs.gov/wsp/2220/report.pdf>, 2016.

U.S. Geological Survey, Groundwater Basics, <http://water.usgs.gov/ogw/basics.html>, 2016.

Woessner, W., Troy, T., Ball, P. and D.C. DeBorde. 1998. Virus Transport in the Capture Zone of a Well Penetrating a High Hydraulic Conductivity Aquifer Containing a Preferential Zone. In Proc. Source Water Protection Int., Dallas, TX. 28–30 Apr. 1998. National Water Research Inst., Fountain Valley, CA.

Vuke et al., Montana Bureau of Mines and Geology, Geologic Map of Montana, Geologic Map 62, 2007.

World Health Organization, Guidelines for Drinking-Water Quality (Chlorination disinfection, viruses and pathogen mitigation). 1996.

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