

**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: Heller Development LLC

Permit Number: MTX000236

Facility Name: 46 Degrees North Subdivision Wastewater Treatment Facility

Facility Location: T 10N, R3W, N1/2 of NW1/4, Section 17
46.63036N, 112.01209 W
Lewis and Clark County, MT

Facility Address: North Montana Ave, North of Resurrection Cemetery, Helena, MT

Facility Contact: Parker Heller, Heller Development
4200 Fox Den Drive
Helena, MT 59602

Receiving Water: Class 1 Ground Water

Number of Outfalls: One (001) -Domestic

Outfall/Type: SBR to Pressure Dosed Subsurface Drainfield

I. PERMIT STATUS

The following fact sheet outlines the basis for issuing a new MGWPCS wastewater discharge permit to Heller Development LLC for the 46 Degrees North Subdivision Wastewater Facility located near Helena, MT. 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.

A. Application Info

An application for a new permit for the 46 Degrees North Subdivision was submitted to DEQ on March 9th, 2015 after having pre-application meeting in 2014. A fee of \$4,500 was attached to the application. On March 17, 2015, a notice of Deficient Fees was sent to the applicant. An additional \$5000 was requested from the applicant for DEQ to perform a significance determination for the site. On April 9th, 2015, DEQ was contacted by Randi Rognlie of Casne Engineering who was retained by the applicant to submit this application. Randi Rognlie indicated the project had been postponed as discussions with the City of Helena were on-going. An email on April 16th, 2015 indicated discussions were continuing with the City. On November 17, 2015, DEQ advised the applicant that the permit was on hold until the application fees were received. On November 19, 2015, DEQ received the additional \$5,000 fee for conducting a significance determination on the site. On December 4, 2015 a Completeness Letter was sent to the applicant indicating the application had been reviewed and deemed to be complete.

II. FACILITY INFORMATION

A. Facility Location

This facility is located north of Helena, MT approximately 1/2 mile east of North Montana Ave. The subdivision this facility serves is adjacent to Montana Ave.

B. Facility and Operations

This permit is for the waste water treatment facility that serves 88 residences and four commercial hook-ups that will be developed in phases. The commercial hookups are estimated to contribute 3,500 gpd of effluent which is domestic in nature. The design capacity of the system is 25,500 gpd.

Wastewater will be treated by a packaged system to a Sequencing Batch Reactor (SBR) system. The collection system will gravity feed to the treatment plant. Plant components include; One (1) 14,000 gallon distribution/surge tank, four (4) 8,000 gallon SBR tanks, one (1) 6,400 gallon sludge tank, one (1) 12,000 gallon feed tank, one (1) 12,000 gallon dose tank and one mechanical/controls building containing chemical feed equipment. After the

treated effluent leaves the dose tank it will flow through a flow meter and distribution valve into a series of pressure-dosed drainfields which will be constructed as phases of the subdivision develop.

Table: 1

46 Degrees North: Collection, Treatment, and Disposal System Summary	
Outfall 001 - Domestic Wastewater/Sewage	
Method of Disposal: Infiltration to ground water	
Disposal Structure: Subsurface Drainfields (Outfall 001)	
NE, NE, NW, 1/4 of Section 17, T10N, R03W	
Latitude: 46.62808° North; Longitude: 112.01221° West	
Contributing Sources: 88 homes and four commercial hookups developed in two phases, domestic in nature.	
Average Daily Design Flow (gpd): 25,500 (ft ³ /day): 3,409	Daily Maximum Design Flow (gpd): 25,500 (ft ³ /day): 3409
Effluent Sampling Location: EFF-001: Effluent sampling port located after dose tank	
Flow Monitoring Equipment: FM-001: Seametrics IP80 flow meter or equivalent, Insertion Paddlewheel Sensor	
Flow Monitoring Location: Located between dose tank and distribution valve.	
Treatment: NWS SBR	

C. Effluent Monitoring Location

Effluent is sampled at a port at the dose tank prior to leaving the treatment facility. Sampling requirements are further discussed in Section V.

D. Effluent Characteristics

Pursuant to ARM 17.30.1023, DEQ requires the applicant to disclose the quality of the effluent to be discharged such that the potential pollutants can be identified and the proposed discharge can be examined to determine if it will cause pollution of state water, 75-5-605, Montana Code Annotated (MCA). The applicant provided estimated effluent quality data for Outfall 001 as summarized within Appendix I. Estimated effluent characteristics are from a similar system used with MTX000225 which is not yet built out.

E. Geology

The 46 Degrees North Subdivision Wastewater Treatment Facility is located in the valley north of Helena, which is an intermountane basin surrounded by slightly rugged mountainous terrain consisting of folded and faulted pre-Tertiary (lower middle Proterozoic rocks of the Belt Supergroup) bedrock on the west, north and east. The valley fill is composed of a thick section of Tertiary sediments (up to 6,000 feet), that range from fine-grained Tertiary lacustrine ash and volcanics with localized lenses of gravel, to interbedded silt and clay lenses of sand and gravel. Unconformably overlying these deposits is a thinner section of locally derived fine-to-coarse-grained Tertiary sediments that grade into the Quaternary alluvium. The Quaternary alluvium ranges from 300 feet thick in the southern portion of the Helena valley to 100 feet thick or less to the north into the North Hills area (MBMG, 2006). The Quaternary alluvium consists of sandy pebble to

cobble gravel with sand lenses and minor silt lenses. The term “shale gravel” is often used to describe the Quaternary section where sand and gravel clasts of mostly red siltites and argillites from which they are weathered occur (MBMG, 2006).

F. Hydrogeologic Characteristics

Three aquifers have been identified as part of the Helena Valley ground water flow system. They are the bedrock aquifer, the aquifer in the Tertiary sediments, and the Quaternary alluvial aquifer. However, “a ground water flow continuum exists across rock units within the ground water flow system” (MBMG, 2006). Particularly within the Quaternary alluvium, the upper 100 feet of the valley-fill material is best described as, “a sequence of complexly stratified lenses of cobbles, gravel, and sand” with 30 to 70 percent of the section composed of intercalated silt and clay. “Lateral discontinuity of the many fine-grained layers allows hydraulic interconnection of the coarse-grained water-yielding zones, which therefore function as one complex aquifer system” (USGS-Briar, 1992). The subsurface drainfield for 46 Degrees North Subdivision will be constructed in the near-surface portion of the Quaternary valley-fill material.

Application material supplied for this permit indicates shallow ground water is greater than 8 feet deep (based on test pit logging), well logs indicate bedrock is greater than 150 feet deep and the ground water flow direction is N26°E. Hydraulic gradient was derived using the three-point method from several combinations of static water level locations. It is shown as .00795 ft/ft . Hydraulic conductivity is 298 feet per day as calculated by the applicant using a Razak/Huntley model, on-site drawdown pump test. Static Water level reported for MW-1, based on the monitoring well log (GWIC #277346), is 35 feet, and will be used as the shallow ground water level.

A summary table is provided within Appendix IV.

G. Ground Water Monitoring Wells

GWIC well # 277346 was used for upgradient monitoring. Down gradient monitoring was not available for this new application. Information regarding this monitoring well has been summarized and listed in Appendix II and Figure 2a.

H.

Ground Water Quality Characteristics

Discharge from this facility will be to Category I ground water. 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 not be authorizing a mixing zone within this permit. The mixing zone rationale is further discussed in Appendix IV.

IV.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. The bases for deriving and establishing effluent limitations and conditions 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 numerical effluent limitations for the following parameter:

A. Nitrogen

Application materials indicate that nitrogen parameters will be present in the proposed wastewater stream (Appendix I). The applicant has proposed a SBR treatment system that provides an advanced method for nitrogen treatment. A similar designed treatment system (MGWPCS program) has reported average total nitrogen concentrations on average of four mg/L which is lower than ground water quality standards (Appendix V). In comparison, systems using conventional treatment (e.g. septic tank) may discharge total nitrogen concentrations of approximately 40 to 100 mg/L (USEPA, 2002).

Table 2:
 Effluent limitations

46 Degrees North: Proposed Final Effluent Limits – Outfall 001			
Parameter	Units	Daily Maximum⁽¹⁾	Rationale
Nitrogen, Total (as N)	mg/L	7.5	Nondegradation Nonsignificance Criteria: ARM 17.30.715(1)(d)(iii) Beneficial uses: ARM 17.30.1006(1)(b)(ii)
Footnotes:			
(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 requirements will be required as a condition of this permit. Monitoring requirements and respective rationale is summarized in Appendix VII.

VI.SPECIAL CONDITIONS

Special conditions have not been established within this permit. Monitoring requirements are included in Section I-D of the permit as special conditions.

VII.COMPLIANCE SCHEDULE

A compliance schedule has not been established within this permit.

VIII.NONSIGNIFICANT DETERMINATION

DEQ has determined (DEQ, 2016) that the discharge constitutes a new source and is subject to the Montana Nondegradation Policy (75-5-303, MCA; ARM 17.30.702). The applicable water quality standards for Class I or II ground water and nondegradation-nonsignificance criteria 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.

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 10, 2016. 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 (MTX000236), 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.

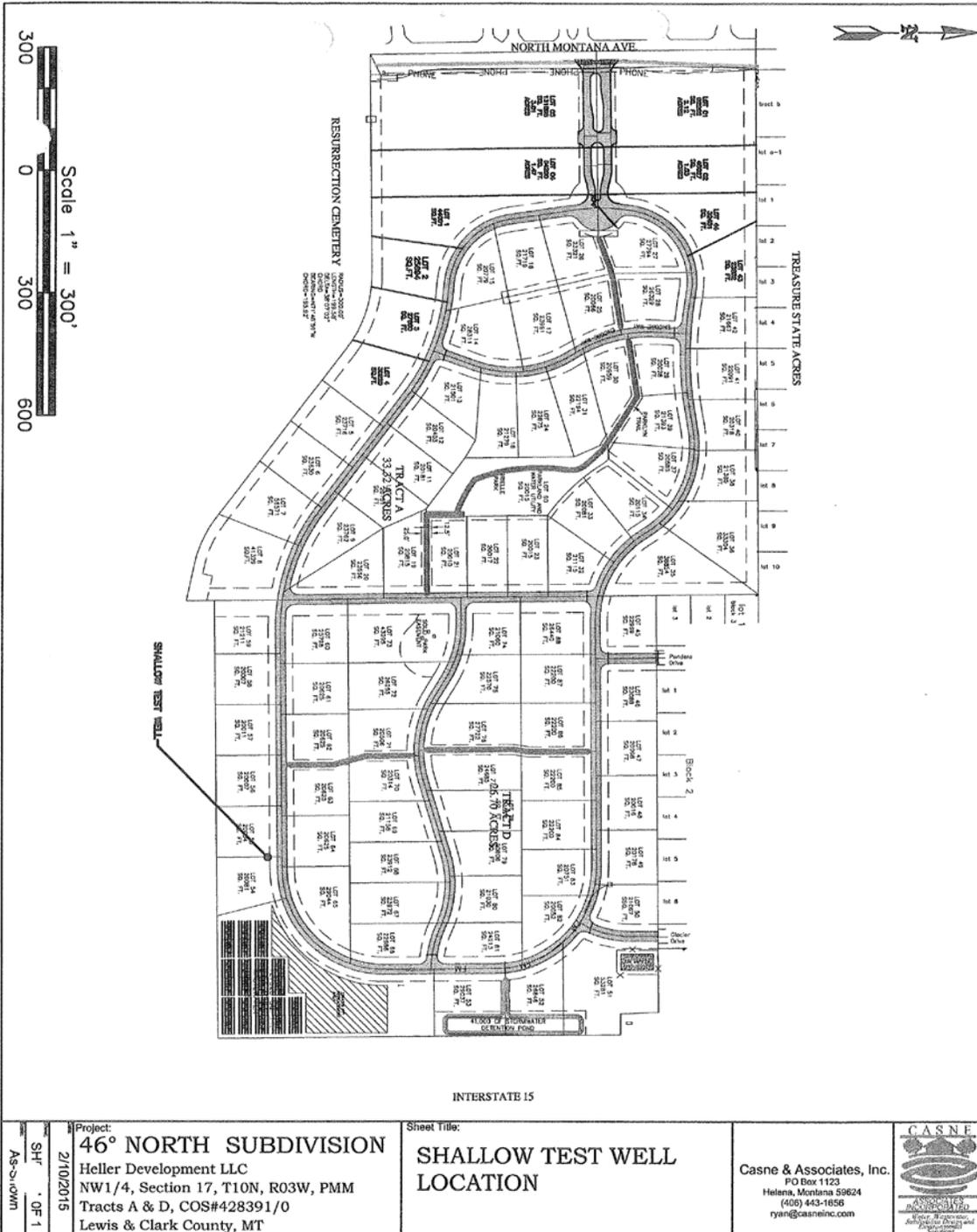
FIGURE 1
Vicinity Map



FIGURE 2a
Site Map



Figure 2b
 Site Map



Project:
46° NORTH SUBDIVISION
 Heller Development LLC
 NW1/4, Section 17, T10N, R03W, PMM
 Tracts A & D, COS#428391/0
 Lewis & Clark County, MT

Sheet Title:
**SHALLOW TEST WELL
 LOCATION**

Casne & Associates, Inc.
 P.O. Box 1123
 Helena, Montana 59624
 (406) 443-1656
 ryan@casneinc.com

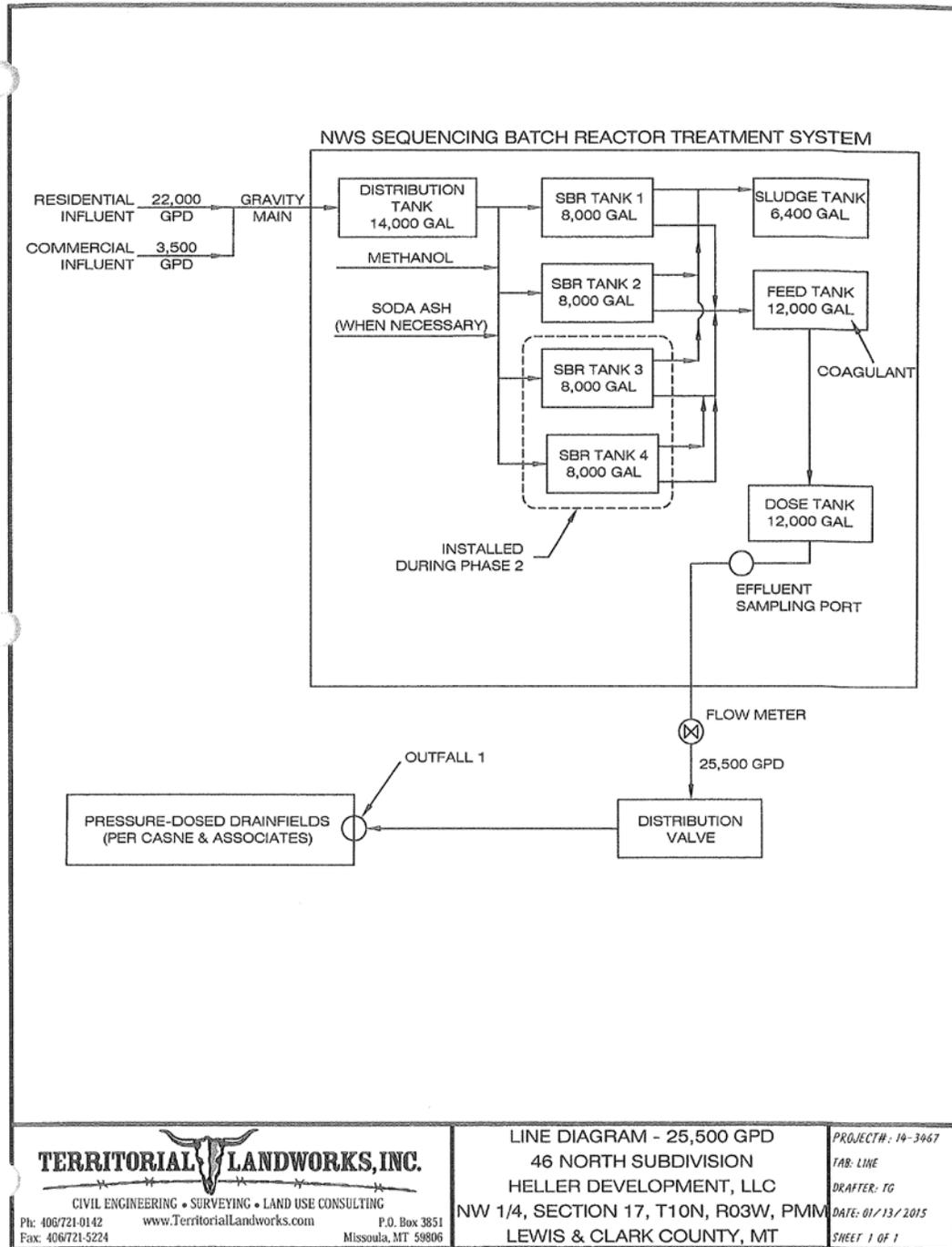


As-shown
 SHF
 2/10/2015
 OF 1

Figure 2e
Downgradient Well Locations



FIGURE 3
 Line Diagram



PL OF DATE: 3/20/15 8:59 AM TANK LOCATION: 1-11 ATTEND: PR 03/24/15 PLS. (PETER) 2 - 1011 FOR DEVELOPMENT 1117 46 NORTH SUBDIVISION WWW.TERRITORIAL-LANDWORKS.COM SYSTEM FLOW DIAGRAM 25,500 GPD (TANK)

APPENDIX I - ESTIMATED EFFLUENT QUALITY

**Effluent Characteristics (Timberworks)
 Table: 3**

46 Degrees North: Estimated⁽³⁾ Effluent Quality – Outfall 001. (Eff. Characteristics from MTX000225, Timberworks)						
Parameter⁽¹⁾	Location	Units	Reported Average Value	Reported Maximum⁽²⁾ Value	# of Samples	Source of Data⁽³⁾
Biochemical Oxygen Demand (BOD ₅)	EFF-001	mg/L	6.3	12.0	6	MTX000225 ⁽³⁾
Chloride (as Cl)	EFF-001	mg/L	65.8	80.0	6	
<i>Escherichia Coliform</i> Bacteria	EFF-001	CFU/100ml	4.0	120.0	1	
Nitrogen, Nitrate + Nitrite (as N)	EFF-001	mg/L	6.1	15.9	6	
Nitrogen, Total Ammonia (as N)	EFF-001	mg/L	0.3	2.5	1	
Nitrogen, Total Kjeldahl (as N)	EFF-001	mg/L	5.5	7.3	6	
pH (Maximum)	EFF-001	s.u.	NR	9.2	NR	
pH (Minimum)	EFF-001	s.u.	NR	7.2	NR	
Phosphorus, Total (as P)	EFF-001	mg/L	4.5	7.8	6	
		lbs/day	NR	NR	NR	
Specific Conductivity	EFF-001	µS/cm	863.3	1010.0	6	
Total Dissolved Solids (TDS)	EFF-001	mg/L	497.5	597.0	6	
Total Suspended Solids (TSS)	EFF-001	mg/L	10.0	10.0	6	

Footnotes:

CFU = Colony Forming Unit

NR= Not Reported

EFF-001: Effluent sample site located at end of discharge pipe.....

Period of Record:11/2013 through 04/2014.

s.u. = standard units

(1) Conventional and nonconventional pollutants only, table does not include all possible toxics.

(2) Maximum value recorded of all quarterly reported Daily Maximum Values.

(3) Data is from a similar SBR system with similar effluent source. Data included in application Form GW-1 , Section M. This data is supplied by applicant and obtained from Territorial Landworks. It represents actual sampling data for the Timberworks Subdivision, MTX000225.

APPENDIX II MONITORING WELL SUMMARY

Table: 4

46 Degrees North: Monitoring Well Summary
Monitoring Well: MW-1
MBMGWIC #: 277346
Lithologic Log ID: Quaternary alluvium, sand and fine gravels.
Status: Constructed on April 7, 2014
Location: Upgradient
Latitude: 46.62786° North Longitude: 112.01317° West
Representation: Upgradient ambient water quality, shallow receiving ground water. SWL=35 ft.

Monitoring well MW-1 is located upgradient and slightly cross-gradient from the drainfield location. It was drilled in 2014 to a depth of 60 feet. Air testing on the well indicated a flow of 17 gallons per minute. The well casing is screened from 37 to 57 feet. The well log shows static water level at 35 feet below ground surface. Monitoring well MW-1 is cataloged with Montana Ground Water Information Center as well #277346.

**APPENDIX III –
 GROUND WATER QUALITY MONITORING RESULTS**

Table: 5
 Ground Water Monitoring

MW-1 Ground Water Monitoring Results, 46 degrees North						
Monitor Source⁽¹⁾	Representation	Parameter	Units	Reported Average Value	# of Samples	Source of Data
MW-1	Shallow Ground Water	Chloride (as Cl)	mg/L	6.5	2	APP
		<i>Escherichia coli</i> Bacteria	CFU/100 ml	1.00	2	APP
		Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.16	3	APP
		Nitrogen, Total Kjeldahl (as N)	mg/L	4.30	3	APP
		pH	s.u.	7.9	2	APP
		Specific Conductivity (@ 25°C)	µS/cm	481.5	2	APP
		Total Dissolved Solids (TDS)	mg/L	285	2	APP

Footnotes:

APP = Application Form GW-2 and supplemental materials.

CFU = Colony Forming Units

Period of Record: 04/14/2014 through 07/22/2014.

s.u. = standard units

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

APPENDIX IV – MIXING ZONE RATIONALE

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).

A mixing zone is not authorized by DEQ in this permit for the proposed discharge site. The applicant requested a standard mixing zone in the permit application submittal (DEQ, 2014). In determining whether a mixing zone is applicable for a proposed discharge, DEQ notes the following site specific conditions based on the information provided:

- Reported high ambient organic nitrate levels (2015 application).
- Interception of domestic water well zones of influence (ARM 17.30.506 and 508).
- Potential downgradient impacts on beneficial uses (ARM 17.30.506).

DEQ has determined that based on site specific conditions listed above and DEQ’s consideration and assessment of the following:

- General considerations in designation of a mixing zone (ARM 17.30.505);
- Water quality assessment (ARM 17.30.506); and,
- Specific restriction for ground water mixing zones (ARM 17.30.508);

DEQ will not be establishing a mixing zone for the proposed discharge in this permit.

Table: 6

46 Degrees North, Gound Water Information Table - Outfall 001		
Parameter	Units	Value
No mixing zone has been authorized		
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	0.16
Ground Water Flow Direction	azimuth/bearing	N26°E
Hydraulic Conductivity (K)	feet/day	233.6
Hydraulic Gradient (I)	ft/ft	0.008
Volume of Ground Water Available for Mixing (Q_{gw})	ft ³ /day	13,273

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 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 (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, 2016). 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. Discharges in compliance with the nondegradation-nonsignificance criteria established within this permit, constitute nonsignificant degradation.

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: 7
 Water Quality Standards

46 Degrees North: Applicable Ground Water Quality Standards.					
Parameter⁽¹⁾	Units	17.30.1006(1)(b)(i) Human Health Standards - Ground Water	17.30.1006(1)(b)(ii) Beneficial Uses - Ground Water	Pollutant Category⁽²⁾	17.30.715 Nondegradation - Nonsignificance Criteria⁽³⁾
Nitrogen, Total (TN)	mg/L		10.0		7.5
Phosphorus, Total Inorganic				H	Surface water breakthrough time greater than 50 years ⁽⁴⁾
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) Includes known pollutants and parameters of concern only.					
(2) Circular DEQ-7 (2012): Carcinogen (C), Harmful (H), and Toxic (T) parameter. Toxic pollutant with a Bioconcentrator (B) factor.					
(3) Discharges in compliance with the nondegradation significance criteria constitute nonsignificant degradation.					
(4) 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 pollutants and parameters of interest (POI's) for the proposed discharge based on the following:

- Reported effluent characteristic estimates (Section II.D.),
- Water quality standards (Appendix V.),
- Water use classification of the receiving ground water (Appendix V), and ,
- United States Environmental Protection Agency (USEPA) reference documents (Appendix VIII).

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

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. DEQ will establish the effluent limitations for nitrogen based on the projection that the entire nitrogen load in the wastewater stream will ultimately be converted to nitrate (USEPA, 2002a).

To protect beneficial uses (ARM 17.30.1006(1)(b)), and with no available dilution (Appendix IV), the most restrictive of the ground water human health standards and nondegradation nonsignificant criteria (listed above) will be used as the effluent limitation. The effluent limitation for nitrogen is displayed within Section IV.

b. Phosphorus

The nondegradation-nonsignificance criteria set forth in ARM 17.30.715 state that the phosphorus concentration must be removed for a period of 50 years prior to discharge to any surface water. Phosphorus in wastewater is removed mainly through soil sorption processes, which vary based on soil composition. The 50-year breakthrough nondegradation criterion is based on the amount of soil available to adsorb the load of phosphorus from the wastewater source between the discharge points and the closest downgradient surface water.

A phosphorus breakthrough analysis (Appendix VI) was conducted by DEQ for the proposed Outfall 001 using site-specific data (DEQ, 2015). In providing a conservative analysis, DEQ used the following factors:

- The limiting layer depth is based on the ground water table which occurs at approximately 27 ft-bgs.
- Best professional estimates indicate that ground water is flowing N26°E.
- Based on the above description, and only for this analysis as required by rule, DEQ assumes 2,400 feet as the closest potential surface water body (ground water stock pond), based on the estimated ground water flow direction.
- Conservative projections indicate that this proposed project will not discharge phosphorus to surface water.
- The analysis determines the amount of soil needed for the existing downgradient domestic source to meet its own conservative 50 year breakthrough (Appendix VI).

Using these conservative estimates, this phosphorus breakthrough analysis indicates that phosphorus discharged to ground water would not reach surface water from Outfall 001 in a significant amount of time. At the proposed discharge load, the phosphorus breakthrough is expected to occur in 57.6 years. A phosphorus breakthrough that would occur within 50 years would be considered significant (ARM 17.30.715). Because there will be no

phosphorus breakthrough within 50 years, a limit for phosphorus will not be included within the proposed permit.

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 the following numerical effluent limitations. The proposed final limitations are the most stringent applicable limitations for each individual parameter as developed in the previous sections. Effluent limits based on water quality standards are expressed as a daily maximum concentration. 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 as 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 the table below. 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 effluent port (EFF-001) located after the dose tank (see Figure 3).

C. Discharge Monitoring

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 after the dose tank and before the distribution valve (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.

Table: 9
Effluent Monitoring

46 Degrees North: Effluent Monitoring and Reporting Requirements – Outfall 001						
Parameter/Method	Monitor Location	Units	Sample Type⁽¹⁾	Minimum Sample Frequency	Reporting Requirements⁽¹⁾⁽²⁾⁽³⁾⁽⁴⁾	Report Freq
Flow Rate, Effluent ⁽⁵⁾	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)	EFF-001	mg/L	Grab	Monthly	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total (as N) ⁽⁶⁾	EFF-001	mg/L	Calculate	Monthly	Daily Maximum Quarterly Average	Quarterly
		lbs/day ⁽⁷⁾	Calculate	Monthly	Daily Maximum ⁽⁸⁾ Quarterly Average ⁽⁹⁾	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 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) Daily Minimum: Report lowest measured daily value for the reporting period on Discharge Monitoring Report
 (4) The geometric mean must be reported if multiple samples are taken during a reporting period.
 (5) Requires recording device or totalizing meter, must record daily effluent volume.
 (6) Total Nitrogen is the sum of Nitrate + Nitrite and Total Kjeldahl Nitrogen.
 (7) Load calculation: lbs/day = (mg/L) x flow (gpd) x [8.34 x 10⁻⁶].
 (8) Daily Maximum Load calculation: lbs/day = the maximum of all calculated individual daily average loads (lbs/day)
 (9) Quarterly Average Load calculation: lbs/day = the average of all calculated individual daily average loads (lbs/day)

D. Ground Water Quality Monitoring

Ground water monitoring will be required at monitoring well MW-1. Ground water monitoring will be used for 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 the table below. All analytical methods must be in accordance with the Code of Federal Regulations, 40 CFR Part 136 for each monitored parameter. The existing ground water monitoring well MW-1 shall be maintained and monitored during the term of the upcoming permit cycle. Sampling and reporting requirements shall commence upon the effective date of the permit.

Ground water reporting requirements for MW-1 are discussed in Section V.

Table: 10
 Monitoring and Reporting Requirements

46 Degrees North: Ground Water Monitoring and Reporting Requirements						
Parameter/Method	Monitor Location⁽¹⁾	Units	Sample Type⁽²⁾	Minimum Sampling Frequency	Reporting⁽²⁾⁽³⁾⁽⁴⁾⁽⁵⁾ Requirements	Reporting Frequency
Chloride (as Cl)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Nitrate + Nitrite (as N)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Nitrogen, Total Kjeldahl (TKN)	MW-1	mg/L	Grab	1/Quarter	Daily Maximum Quarterly Average	Quarterly
pH	MW-1	s.u.	Grab or Instantaneous	1/Quarter	Quarterly Average	Quarterly
Specific Conductivity @ 25°C	MW-1	µS/cm	Grab or Instantaneous	1/Quarter	Daily Maximum Quarterly Average	Quarterly
Static Water Level (SWL) ⁽⁶⁾	MW-1	ft-bmp	Instantaneous	1/Quarter	Quarterly Average	Quarterly
Footnotes:						
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.						
If any monitoring well is abandoned, destroyed or decommissioned, or is no longer able to be sampled due to fluctuations in the groundwater table: the permittee shall install a new well to replace the abandoned, destroyed, decommissioned, or non-viable well.						
Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above.						
(1) Refer to Section V. of the Fact Sheet for the 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. 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".						
(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.						

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.

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.

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