

Water Protection Bureau P.O. Box 200901 Helena, MT 59620-0901

# **PERMIT FACT SHEET**

### MONTANA GROUND WATER POLLUTION CONTROL SYSTEM (MGWPCS)

Permittee:	Grass Valley Gardens LLC
Permit Number:	MTX000331
Permit Type:	Domestic Wastewater
Application Type:	New
Facility Name:	Grass Valley Gardens Residential Subdivision
Facility Location:	14N 20W 20SW
	Missoula County
	Latitude: 46.955904° Longitude: -114.162644°
Facility Address:	8700 US Hwy 10, Missoula MT 59808
Facility Contact:	Hunter Morrical – WGM Group
Treatment Type:	Proposed: Advanced, Membrane Bioreactor Facility (MBR)
Receiving Water:	Class I Ground Water
Number of Outfalls:	1
Proposed Outfall, Type:	001, Rapid infiltration cells (RIC)
Effluent Type:	Domestic strength wastewater
Mixing Zone:	Standard
Effluent Limit Type:	WQBEL
Effluent Limits:	Total nitrogen: 11.77 lbs/day
	Total phosphorus: NA
Flow Rate:	Design maximum: 180,000 gpd
	Design average: 120,000 gpd
Effluent sampling:	Monthly sampling for influent and effluent
Ground water sampling:	Quarterly, MW-1 and MW-2
Fact Sheet Date:	February 2025
Prepared By:	M. Peziol

# **1.0 PERMIT INFORMATION**

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

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

#### **1.1 APPLICATION**

DEQ received an application for a new discharge permit on August 15, 2024. Permit fees accompanied the application. DEQ identified deficiencies in the renewal permit application during completeness review and notified the permittee in a letter dated September 17, 2024. The permittee provided supplemental application information on September 23, 2024, October 17, 2024, and November 14, 2024, allowing DEQ to determine the application complete on December 2, 2024.

#### **1.2 PERMIT HISTORY**

No permit history exists as this is a proposed facility.

### **2.0 FACILITY INFORMATION**

#### 2.1 LOCATION

The Grass Valley Gardens Residential Subdivision is located northwest of Missoula, along U.S. Highway 10 West, in the "Wye" area. It is situated in the southern half of Section 20, Township 14 North, Range 20 West, with an approximate address of 8700 U.S. Highway 10 W (**Figure 1**).

The subdivision collection system will serve a population of 1,000 of 436 households, seven commercial lots, and 16 common areas. The subdivision is divided into four sub-phases. Most of the commercial development is planned for Phases 1 and 2. Each phase is estimated to take one year, resulting in the build out being completed in the first five years of construction. All wastewater components will be located on-site (**Figure 2**).

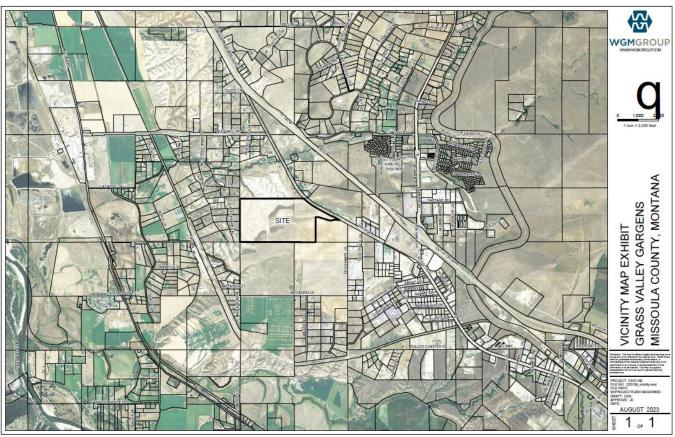


Figure 1. Vicinity Map

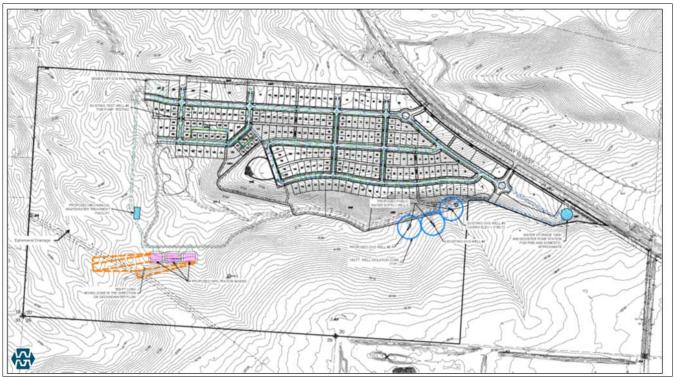


Figure 2. Facility Layout

### **2.2 OPERATIONS**

The Grass Valley Gardens Subdivision is designed to handle up to 180,000 gallons per day (gpd) of domestic wastewater. Wastewater treatment and disposal will be managed through a Membrane Bioreactor (MBR) and a Rapid Infiltration system (RIC). The planned discharge infrastructure includes a lift station that will transport treated effluent to a RIC system located at the southern end of the development. Discharge is located 1,000+ feet upgradient from the adjacent homes and wells to the west (MGWPCS, 2024). System operations are summarized in **Table 1**, see **Figure 2** for a facility layout, a proposed RIC plan is provided as **Figure 3** and a wastewater line diagram as **Figure 4**.

Table 1: Operations	Summary
Collection	
Facility:	Grass Valley Gardens Residential Subdivision
SIC Codes:	1623: Water, Sewer, and Utility Lines and 1522: Residental Construction
Treatment:	Proposed Membrane Bioreactor (MBR)
Location:	46.955904° -114.162644°
Wastewater Samplin	ng/Monitoring
INF-001:	The influent wastewater sample to be collected from a sample port on equalization tank.
EFF-001:	The effluent wastewater sample to be collected from a sample port on dose tank.
FM-001:	The effluent flow meter sample to be collected.
Sampling plan:	The permittee is required to develop and implement a Wastewater Sampling, Analysis, and Reporting Plan
	for their community system (Section 7).
Disposal Operation	
Method:	Proposed subsurface disposal using rapid inflitration cells (RIC)
Location:	Outfall 001
Outfall 001:	46.951529° -114.160508°
	14N 20W 20SW
	Missoula County
Capacity:	Average design flow 120, 000 GPD
	Maximum design flow 180, 000 GPD

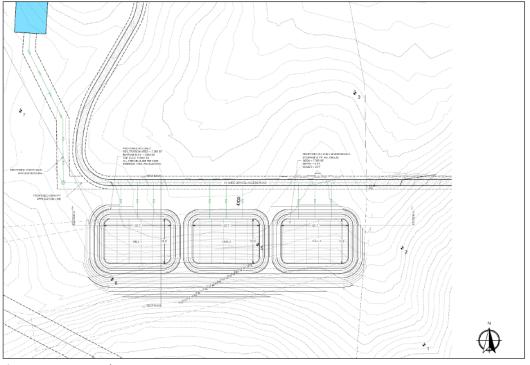


Figure 3. Proposed RIC System Layout

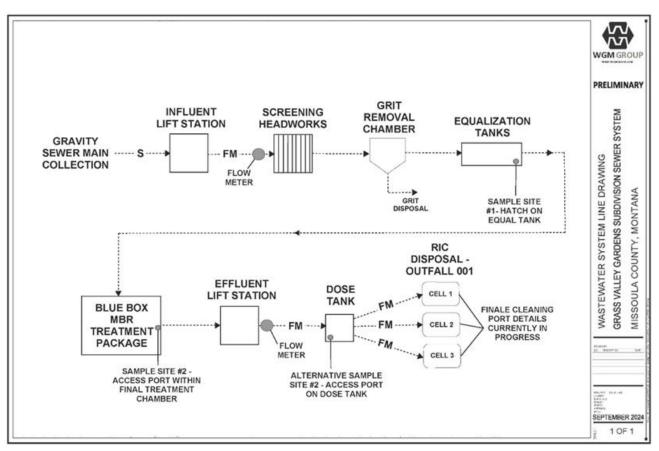


Figure 4. Wastewater Treatment System Line Diagram

#### **2.3 GEOLOGIC CONDITIONS**

WGM conducted thirteen test pits across the site, revealing a soil profile of silty clay, silty clay loam, and loamy sand. Clay layers were typically found beneath the topsoil at depths of 18 inches to six feet, with sandy layers extending from below the clay to depths of 10 to 13 feet. No groundwater was detected, and soil borings indicate relatively transmissive subsurface conditions. The disposal area was chosen based on soil properties, prioritizing areas with better infiltration rates while avoiding poorly draining soils. The central site location was found to have more pervious soils than the perimeter (MGWPCS, 2024).

Test pit locations are shown on Figure 5 and a summary of the wastewater tests is provided in Appendix A.



Figure 5. Test Pit Locations

### 2.4 HYDROGEOLOGIC CONDITIONS

Site specific hydrogeologic data determined ground water flow direction to be S78°W. The nearest potable water wells are located approximately 1,500 feet downgradient of the proposed wastewater infiltration site. The closest surface water feature downgradient is the Clark Fork River, 11,500 ft, with several irrigation ditches, including the Grass Valley French Ditch (0.7 miles away), situated between the disposal site and the river. Based on regional groundwater levels, the ditch is considered a losing feature in this area (MGWPCS, 2024).

The site lies within a semi-confined, shallow to deep basin-fill aquifer, characterized by layers of sand, gravel, and cobbles interspersed with Glacial Lake Missoula clay and silt. The aquifer is recharged primarily by leakage and underflow from O'Keefe Creek, tributaries, and surrounding hills. Classified as an "open" aquifer by the DNRC, it serves over 40,000 homes in the Missoula area and is documented as being productive enough to support the proposed subdivision (MGWPCS, 2024).

Two seperate mounding analyses were conducted by WGM Group, ultizing the Hantush Method to assess the ability of the water to dissipate in the subsurface. It was determined that the mounding potential of the proposed rapid infiltration cells will not interfere with the infiltration capacity of the cells, and will not cause the groundwater to artificially surface.

Hydrogeologic characteristics are summarized below in Table 2.

Table 2: Hydrogeologic Summary					
Shallowest depth to ground water:	61 ft				
Ground water flow direction:	S78°W				
Hydraulic conductivity:	50.20 ft/day				
Hydraulic gradient:	0.0062 ft/ft				

#### **2.5 GROUND WATER MONITORING NETWORK**

Five monitoring wells were established as part of the facility's site-specific hydrogeologic investigation. Well information is provided in **Table 3**. A map of the wells is included above as **Figure 6**. Well lithology and construction reports are provided in **Appendix B**.

Table 3: Monitoring Well Summary				
GVG#1				
MBMG GWIC #: 326745				
Use: Data collection for on-site deep aquifer characteristics				
Permit Status: Active. Constructed on March 23, 2023				
Location: T14N, R20W, Section 20				
Latitude: 46.95221° Longitude: -114.14864°				
Total depth 418 feet. Static water level 152 feet.				
The well represents the deeper aquifer underlying the facility.				
GVG#2				
MBMG GWIC #: 328213				
Use: Well had perforations set at elevations where the shallowest depth of water was discovered				
for data collection on shallow groundwater characteristics.				
Permit Status: Active. Constructed on September 7, 2023				
Location: T16N, R15W, Section 20				
Latitude: 46.952213° Longitude: -114.16453°				
Total depth 280 feet. Static water level 61 feet.				
The well was utilized to calculate groundwater direction, gradient and hydraulic conductivity.				
GVG#3				
MBMG GWIC #: 330384				
Use: Data collection for on-site deep aquifer characteristics				
Permit Status: Active. Constructed on January 23, 2024				
Location: T14N, R20W, Section 20				
Latitude: 46.953556 Longitude: -114.152306				
Total depth 400 feet. Static water level 106 feet.				
The well represents the deeper aquifer underlying the facility.				
GVG#4				
MBMG GWIC #: 332088				
Use: Data collection for on-site deep aquifer characteristics				
Permit Status: Active. Constructed on July 12, 2024				
Location: T14N, R20W Section 20				
Latitude: 46.953306° Longitude: -114.153111°				
Total depth 340 feet. Static water level 104 feet.				
The well represents the deeper aquifer underlying the facility.				
MW-1				
MBMG GWIC #: 333352				
Use: Well had perforations set at elevations where the shallowest depth of water was discovered				
for data collection on shallow groundwater characteristics.				
Permit Status: Active. Constructed on April 17, 2024				
Location: T14N, R20W, Section 20				
Latitude: N 46° 57' 6' Longitude: W 114° 9' 36'				
Representation: Well is side gradient of the RIC disposal, Outfall 001. The well was utilized to				
calculate groundwater direction, gradient and hydraulic conductivity. Water samples collected				
will be representative of ambient quality of the shallow aquifer specifically for this permit.				

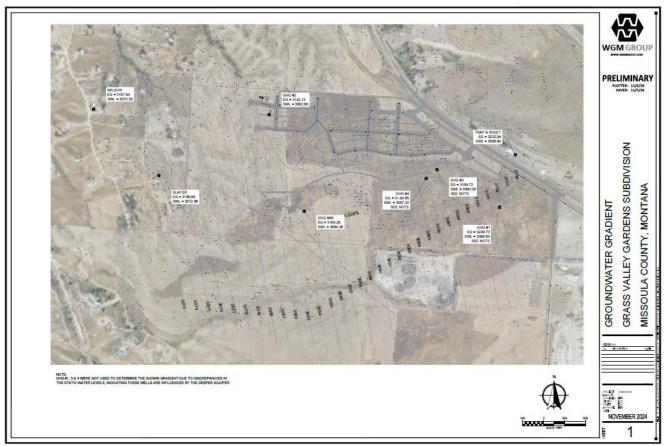


Figure 6. Monitoring Well Map

### **2.6 WATER QUALITY INFORMATION**

The Applicant has proposed an advanced wastewater treatment system that can remove approximately 90% of the raw wastewater nitrogen load. A summary of the estimated influent and effluent characteristics is provided in **Table 4.** 

Table 4: Estimated Influent and Effluent Quality – Outfall 001						
Parameter <sup>(1)</sup>	Units	Influent Limits	Effluent Limits	Source of Data		
Biochemical Oxygen Demand (BOD <sub>5</sub> )	mg/L	350	<10	APP		
TSS	mg/L	350	<10	APP		
Nitrogen, Total Kjeldahl (as N )	mg/L	60	<2.5	APP		
Nitrogen, Total Ammonia (as N)	mg/L	43.0	<1	APP		
Nitrogen, Nitrate + Nitrite (as N)	mg/L		<2.5	APP		
Nitrogen, Total [as N]	mg/L	60	<5	APP		
Oil & Grease	mg/L	<10	<6	APP		
pH Maximum	s.u.		9	APP		
pH Minimum	s.u.		6	APP		
Phosphorus, Total (as P)	mg/L	<2	<2	APP		
Total Dissolved Solids (TDS)	mg/L	29.0	20.0	APP		
Max Wastewater Temperature	°C	25		APP		
Footnotes: APP = MGWPCS Application and supplemental materials from applicant CFU = Colony Forming Unit CFU = colony Forming Unit						

s.u. = standard units

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

Ambient ground water quality characteristics of the shallow aquifer were collected from MW-1 on April 18, 2024, June 12, 2024, and July 9, 2024. A summary of the ground water quality is provided in Table 5.

Table 5: Ground Water Monitoring Results							
Monitor Source <sup>(1)</sup>	Parameter	Units	Reported Minimum Value	Reported Maximum Value	Reported Average Value		
	Chloride (Cl)	mg/L	6	7	6		
	Escherichia coli Bacteria	CFU/100 ml	0	0	0		
	Nitrogen, Nitrate + Nitrite (as N)	mg/L	0.56	3.47	2.38		
MW-1	Nitrogen, Total Kjeldahl (as N )	mg/L	0.00	0.70	0.23		
	рН	s.u.	7.50	8.00	7.73		
	Specific Conductivity (@ 25°C)	μS/cm	286	309	300		
	Total Organic Carbon (TOC)	mg/L	0.50	1.10	0.77		
	Total Dissolved Solids (TDS)	mg/L	161	189	179		
bgs = below g	PCS Application and supplemental materials fro round surface Forming Units	m applicant		<u> </u>			

CFU = Colony Forming Units

ND = Not detected at the Reporting Limit of 0.5 mg/L

s.u. = standard units

(1) Refer to Section 2 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.

Based on the 300 microsiemens per centimeter (µS/cm) specific conductance, the receiving water is Class I ground water.

# **3.0 WATER QUALITY STANDARDS**

Part of DEQ's mission is to protect and sustain the quality of state waters. Water quality standards provide the basis for limitations that protect state waters. These include beneficial use maintenance, specific water quality standards, and the Nondegradation policy. DEQ protects all designated uses of state water by basing effluent limitations on the most restrictive water quality standards intended to protect the most sensitive uses.

#### **3.1 BENEFICIAL USES**

The receiving state water is Class I ground water which is a high-quality water of the state. The current and future beneficial uses of the aquifer will be protected. The beneficial uses and water quality standards are listed below.

Beneficial uses:

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

Water quality standards are established to protect these beneficial uses. Standards are as follows:

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

DEQ protects all designated uses of state water by basing effluent limitations on the most restrictive water quality standards intended to protect the most sensitive uses. The most restrictive standard will be used in formulating limitations (**Section 5**). The corresponding numeric and narrative standards are listed in **Table 6**.

Table 6:         Water Quality Standards						
Parameter <sup>(1)</sup>	Units	Ground Water Human Health Standards	Pollutant Category <sup>(2)</sup>	Nonsignificance Criteria <sup>(3)</sup>		
Bacteria [Escherichia coli]	CFU/100 mL	< 1	-	-		
Nitrogen, Nitrate + Nitrite [as N]	mg/L	10.0	Т	7.5		
Nitrogen, Total (TN) <sup>(4)</sup>	mg/L	10.0	-	7.5		
Phosphorus, Total Inorganic			Н	Surface water breakthrough time greater than 50 years <sup>(5)</sup>		

Footnotes:

(5) Changes in receiving ground water quality are not significant if water quality protection practices approved by the DEQ have been fully implemented and if the listed nonsignificance criteria is met.

CFU = Colony Forming Unit

These standards establish the allowable changes in ground water quality and are the basis for limiting discharges to ground water.

<sup>(1)</sup> The list includes identified parameters of interest.

<sup>(2)</sup> Circular DEQ-7: Carcinogen (C), Harmful (H), and Toxic (T) parameter. Toxic pollutant with a Bioconcentrator (B) factor.

<sup>(3)</sup> Criteria indicates threshold for a significant activity that may lead to degradation.

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

#### **3.2 NONDEGRADATION**

Montana's Nondegradation policy is intended to preserve the existing condition of high-quality state waters. Any water whose existing condition is better than the water quality standards must be maintained in that high quality. Nondegradation policy allows discharges to cause only nonsignificant changes in water quality.

Activities that cause a significant change in water quality require an authorization to degrade. An authorization to degrade is not an authorization to pollute; the water quality standard may not be exceeded outside of a department-authorized mixing zone. This activity is not authorized to degrade. **Figure 7** illustrates the relationship between water quality standards, nondegradation, and nonsignificant changes in water quality.

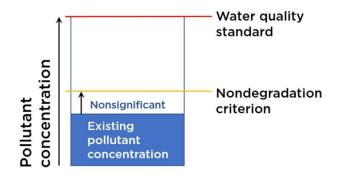


Figure 7. Pollutant Loading Effects on Nondegradation and Nonsignificance

The 2025 Significance Determination Analysis found that the discharge from the proposed facility was not a significant activity (**Appendices C and D**) and is summarized in the following sections.

#### **3.3 SIGNIFICANCE CRITERIA AND DETERMINATION**

Changes of nitrate as nitrogen in ground water are nonsignificant if the discharge will not cause degradation of surface water and the predicted concentration of nitrate as nitrogen at the boundary of the ground water mixing zone does not exceed 7.5 mg/L. Using the nonsignificance criterion of 7.5 mg/L, DEQ will establish effluent limitations and long-term monitoring requirements for compliance at the end of the mixing zone (**Section 5.0**).

In addition to WGM, DEQ also performed a significance determination in predicting nitrate values downgradient of the proposed discharge structure. The new wastewater system design along with on-site ground water characteristics (**Section 2**) and dilution estimates (**Section 4**) were used in these projections.

Due to a high volume of ground water and a decrease in the proposed nitrogen loading discharge; it is predicted that nitrates in the receiving aquifer will be 4.81 mg/L after dilution with the underlying mixing zone. This is less than the nitrate nonsignificance criteria of 7.5 mg/L and is therefore nonsignificant.

For phosphorus, a surface water breakthrough time of greater than 50 years is a nonsignificant change in water quality. The phosphorus criterion requires an analysis to determine a breakthrough time based on the adsorption capacity of the soil. Breakthrough occurs when the subsurface soils lose their capability to adsorb any more phosphorus, and it has a potential to reach surface water. DEQ's phosphorus breakthrough analysis estimates that phosphorus discharged to ground water from Outfall 001 may reach surface water in 197 years. This is assuming a distance to surface water of 11,500 ft, which, as discussed in **Section 2**, is a conservative estimate; the effluent flow path is likely much longer. The predicted phosphorus breakthrough is greater than 50 years, and therefore is not considered to be significant and phosphorus permit limits are not required.

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

### **3.4 CUMULATIVE EFFECTS**

The proposed project is designed to treat the nitrogen in the wastewater to 5mg/L prior to discharge. DEQ performed a projection of nitrate levels at the end of the mixing zone. Upon dilution, nitrate concentration is reduced to 4.81 mg/L which is less than the nitrate nonsignificance criteria of 7.5 mg/L (**Table 7**). This maintains assimilative capacity for potential future development elsewhere while still protecting the aquifer's beneficial uses. This projection does not take nitrate attenuation into account; while the effluent travels in the subsurface, nitrate naturally decays from biogeochemical processes that occur in the aquifer. These projections are conservative because nitrogen attenuation is likely to take place in the vadose, phreatic, and hyporheic zones.

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

All major discharge permitting actions, including the current action and any future actions, will include any substantive information derived from public input relating to potential impacts on the human environment and on water quality. All future actions related to this current action will be addressed by DEQ through additional discharge permitting process procedures. Any actions that are outside the prevue of the discharge permit may not be addressed by DEQ until the next permitting action takes place.

To protect beneficial uses, there shall be no increase of a pollutant to a level that renders the waters harmful, detrimental, or injurious. Therefore, no wastewaters may be discharged such that the wastewater either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard.

The allowable discharge will be derived from a mass-balance equation that determines the assimilative capacity of the receiving aquifer **(Section 5)**. This factors into the cumulative impacts of all existing upgradient discharges in the receiving aquifer.

A ground water monitoring network has been established that will provide for long-term monitoring of the aquifer. The ground water data collected will provide continual monitoring of the health of the aquifer including the impacts of any upgradient dischargers. This data is made available to the public for their viewing and will be used by DEQ to update future permit limitations. In addition, any update to limitations, including cumulative effect analyses, will be noticed to the public and will undergo public comment.

Long-term monitoring and reporting, continual analysis and updates of permit conditions, and public notice and comment procedures is a benefit to having a system that is covered under a discharge permit.

# 4.0 MIXING ZONE

A mixing zone is an area of the receiving shallow ground water where the aquifer can assimilate wastewater pollutants. It is a specifically defined area of the receiving aquifer where water quality standards may be exceeded. The availability of dilution is based on the site-specific aquifer characteristics and the drainfield dimensions. The allowable level of dilution is limited by the permit to ensure that water quality standards are met at the end of the mixing zone.

The applicant requested a standard mixing zone for this combined discharge. 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 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 (**Figure 8**). Standard mixing zones extend 15 feet below the top contact of the ground water table. A map of the proposed mixing zone is provided in **Figure 9**.

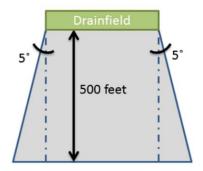


Figure 8: Mixing Zone Schematic

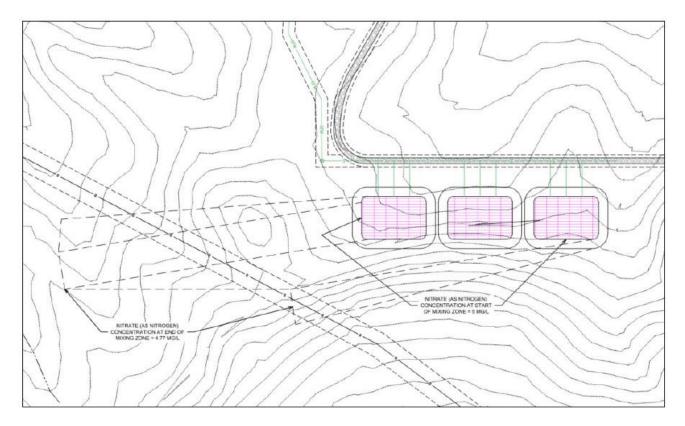


Figure 9. Proposed Mixing Zone

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

Based on the dimensions of the mixing zone, and the hydrogeologic characteristics (**Section 2.5**), the volume of ground water ( $Q_{gw}$ ) available to mix with the wastewater is calculated using Darcy's Equation:  $Q_{gw} = KIA$ 

Where  $Q_{gw}$  = ground water flow volume (ft<sup>3</sup>/day); K = hydraulic conductivity (ft/day); I = hydraulic gradient (ft/ft); and A = cross-sectional area (ft<sup>2</sup>) of flow at the downgradient boundary of the mixing zone.

Modern drainfield systems are designed to minimize the likelihood of the subsurface transport of pathogenic bacteria. Pathogens are a direct existential threat to public and environmental health. In general, DEQ recognizes that replacement of older drainfields with a newly designed one may have environmental benefits.

Table 7: Hydrogeologic and Mixing Zone Information - Outfall 001					
Parameter	Units	Value			
Mixing Zone Type	-	Standard			
Authorized Parameters	-	Total Nitrogen			
Ambient Ground Water Concentrations, Nitrate + Nitrite	mg/L	2.38			
Ground Water Flow Direction	azimuth/bearing	S 78° W			
Length of Mixing Zone	feet	500			
Thickness of Mixing Zone	feet	15			
Outfall Width, Perpendicular to Ground Water Flow Direction	feet	174			
Width of Mixing Zone at Down Gradient Boundary	feet	261.5			
Cross Sectional Area of Mixing Zone (A)	ft <sup>2</sup>	3922.5			
Hydraulic Conductivity (K)	feet/day	50			
Hydraulic Gradient (I)	ft/ft	0.0062			
Volume of Ground Water Available for Mixing ( $Q_{gw}$ )	ft <sup>3</sup> /day	1,221			

# **5.0 LIMITATIONS**

Discharge permits include conditions that ensure compliance with the Montana Water Quality Act and the regulations used to implement it. These conditions include effluent limits as well as any special conditions that DEQ deems necessary to protect the quality of the receiving water.

### **5.1 NITROGEN**

To protect beneficial uses, there shall be no increase of a pollutant to a level that renders the waters harmful, detrimental, or injurious. Therefore, no wastewaters may be discharged such that the wastewater either alone or in combination with other wastes will violate or can reasonably be expected to violate any standard. DEQ will establish an effluent limitation for nitrogen within this permit. The limit will conservatively be based on the projection that the entire nitrogen load in the wastewater stream may ultimately be converted to nitrate.

The allowable discharge will be derived from a mass-balance equation which is a simple steady-state model that determines the assimilative capacity of the receiving aquifer. The equation factors in cumulative impacts of existing upgradient discharges in the receiving aquifer and any available dilution within the mixing zone. The mass-balance equation derived for ground water is as follows:

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

Where  $Q_{gw}$  = ground water available for mixing;  $C_{gw}$  = ambient receiving ground water concentration;  $Q_{eff}$  = design capacity of wastewater system;  $C_{eff}$  = effluent pollutant concentration;  $Q_{comb}$  = combined ground water and effluent volume; and,  $C_{proj}$  = projected pollutant concentration (after available dilution).

The mass-balance equation has been arranged to calculate the maximum amount of nitrogen that can be added to the aquifer without causing or contributing to an exceedance of the water quality standard:

$$C_{limit} = C_{std} + \frac{Q_{gw}}{Q_{eff}} (C_{std} - C_{gw})$$

Where  $C_{limit}$  = concentration-based effluent limit;  $C_{std}$  = water quality standard concentration of 7.5 mg/L;  $Q_{gw}$  = ground water available for mixing of 1,221 ft<sup>3</sup>/d;  $Q_{eff}$  = design capacity of wastewater system of 16,042 ft<sup>3</sup>/d; and,  $C_{gw}$  = ambient receiving ground water concentration of 2.38 mg/L. The resulting  $C_{limit}$  is 11.76 mg/L.

Numeric effluent limits are often expressed as loads which inherently regulates both volume and strength of the discharge. The load limit ensures compliance with the ground water standard at the end of the mixing zone.

$$L_{limit} = C_{limit} Q_{eff} f_{con}$$

Where  $L_{limit}$  = load-based effluent limit (lb/day);  $C_{limit}$  = concentration-based effluent limit (mg/L) of 11.76 mg/L;  $Q_{eff}$  = design capacity of wastewater system of 120,000 gpd; and,  $f_{con}$  = conversion factor of  $8.34 \times 10^{-6}$ . The resulting concentration and load limits are:

C<sub>limit</sub> = 11.76 mg/L L<sub>limit</sub> = **11.77 lbs/day** 

DEQ evaluates and recalculates the limits using updated water quality data as part of every permit renewal cycle. In this way, DEQ protects the receiving water quality by continually assessing impacts to the receiving water.

#### 5.2 PHOSPHORUS

As discussed in **Section 3.3**, the phosphorus breakthrough analysis estimated the phosphorus breakthrough to occur in 197 years. Predicted phosphorus breakthrough within 50 years is considered significant. Therefore, a limit has not been developed.

#### **5.3 FINAL EFFLUENT LIMITS**

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

Table 8: Effluent Limitations – Outfall 001						
Parameter	Units	Monthly Average				
Nitrogen, Total [as N]	lbs/day	11.77				
Monthly load calculation: The monthly average of all individual daily concentrations and the monthly flow total must be used in the load calculations. Calculation rules are provided within the Wastewater Monitoring Tables.						

# **6.0 MONITORING AND REPORTING**

Long-term monitoring and reporting of wastewater and ground water will be established as a condition of the permit. Monitoring of the wastewater characteristics before and after treatment will help ensure operation, maintenance, and compliance with the permit limitations. Wastewater monitoring and reporting requirements are provided in **Table 9**. The permittee must develop and implement a Wastewater Sampling, Analysis, and Reporting Operation Manual. This manual is further discussed in **Section 7**.

Ground water monitoring will provide DEQ with ongoing information on the current and future health of the aquifer. Ground water monitoring and reporting requirements are provided in **Table 10**. The permittee must develop and implement a Ground Water Monitoring, Analysis, and Reporting Operational Manual. This manual is further discussed in **Section 7**.

Reporting must be completed in use of Discharge Monitoring Reports (DMRs). The permittee or operator will file DMRs electronically in use of the online NetDMR program. Information and contacts for this program can be found here: <u>https://deq.mt.gov/water/assistance</u>.

Fable 9: Influent and Effluent Monitoring and Reporting Requirements						
Analyte/Measurement	Monitor Location	Units	Sample Type <sup>(1)</sup>	Minimum Sample Frequency	Reporting Requirements <sup>(1)(2)</sup>	Report Frequency
Biochemical Oxygen Demand, 5 Day (BOD <sub>5</sub> )	EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly
Flow Rate, Influent and Effluent <sup>(3)</sup>	FM-001 FM-002	gal/day	Contin- uous	Contin- uous	Monthly Average <sup>(4)</sup>	Monthly
Nitrogen, Nitrite+Nitrate [as N]	INF-001 EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly
Nitrogen, Total Ammonia [as N]	INF-001 EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly
Nitrogen, Total Kjeldahl (TKN)[as N]	INF-001 EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly
Nitrogen, Total [as N] <sup>(5)</sup>	INF-001 EFF-001	mg/L Ibs/day <sup>(6)</sup>	Calculate Calculate	1/Week* 1/Month	Monthly Average Monthly Average	Monthly Monthly
Phosphorus, Total [as P]	INF-001 EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly
Total Suspended Solids (TSS)	EFF-001	mg/L	Grab	1/Week*	Monthly Average	Monthly

Footnotes:

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

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

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

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

Parameter analytical methods shall be in accordance with the Code of Federal Regulations, 40 CFR Part 136, unless specified above or within a deviation authorized by DEQ.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

(2) Monthly Average: The average of all individual daily concentrations (mg/L) analyzed during the reporting period.

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

(4) Monthly Average Flows: Determine total flows that occurred during the reporting period. Divide total flow by the number of calendar days in the

reporting period to get a unit of daily flow (gal/day).

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

(6) Load Calculation. Determine concentration (mg/L): Use the average of all individual daily concentrations (mg/L) analyzed during the reporting period. Determine totalized flows: Total flow that occurred during the reporting period. Convert to a daily flow average (gal/day): Divide the total monthly flow by the total calendar days (days) of the reporting period. Calculate load (lbs/day): Concentration (mg/L) x Flows (gal/day) x [8.34x10<sup>-6</sup>].

Table 10: Ground Water Monitoring and Reporting Requirements							
Analyte/Measurement	Monitor Location	Units	Sample Type <sup>(1)</sup>	Minimum Sampling	Reporting <sup>(2)</sup> Requirements	Report Frequency	
Chloride [as Cl]	MW-1 MW-2	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly	
Nitrogen, Nitrite+Nitrate [as N]	MW-1 MW-2	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly	
Nitrogen, Total Ammonia [as N]	MW-1 MW-2	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly	
Nitrogen, Total Kjeldahl (TKN)[as N]	MW-1 MW-2	mg/L	Grab	1/Quarter	Quarterly Average	Quarterly	
Nitrogen, Total [as N] <sup>(3)</sup>	MW-1 MW-2	mg/L	Calculate	1/Quarter	Quarterly Average	Quarterly	
Specific Conductivity @ 25°C	MW-1 MW-2	μS/cm	Grab or Instantaneous	1/Quarter	Quarterly Average	Quarterly	
Temperature	MW-1 MW-2	°C	Instantaneous	1/Quarter	Quarterly Average	Quarterly	
Static Water Level (SWL) <sup>(4)</sup>	MW-1 MW-2	ft-bmp	Instantaneous	1/Quarter	Quarterly Average	Quarterly	
Well Depth <sup>(4)</sup>	MW-1 MW-2	ft-bmp	Instantaneous	1/Quarter	Quarterly Average	Quarterly	

Footnotes:

CFU = Colony Forming Units

ft-bmp = feet below measuring point

A description of each monitoring well can be found in Table 3 of the Fact Sheet document.

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

Each monitor well to be individually monitored and sampled for the analyte and measurements respectively listed.

If any monitoring well(s) are abandoned, destroyed or decommissioned, or are no longer able to be sampled due to fluctuations in the ground water table; the permittee shall install a new well to replace the abandoned, destroyed, decommissioned, or non-viable well(s).

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

Samples must not be collected until after the well casing is properly purged as determined by the DEQ approved Ground Water Monitoring Operational Manual.

Submittal of discharge monitoring report forms (DMRs) will be required, regardless of the operational status of the facility or of each individual monitoring well.

(1) See definitions in Part V of the permit unless defined within this table or by a permit condition.

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

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

(4) Measuring point (point of reference) for SWL measurements shall be from top of inner casing or as established by the Operational Manual and measured to within 1/100th of one foot.

# 7.0 SPECIAL CONDITIONS

#### 7.1 MONITORING WELL INSTALLATION PLAN

Submit for approval an installation plan for Monitoring Well MW-2. MW-2 will be built on or near the downgradient boundary of the proposed mixing zone. The well must be constructed to be representative of ground water occurring in the top twenty (20) feet of the shallow aquifer or as otherwise approved.

The plan needs to be approved prior to installation of the monitoring well(s). All monitoring wells must be secured, maintained, labeled, and monitored for long-term viability. In any permit renewal, DEQ will consider concentrations from the previous permit cycle to determine appropriate sampling requirements and necessary modifications to the monitoring plan. The completion and submittal date of the plan is listed in **Section 8**.

The installation date for Monitoring Well MW-2 is also provided in **Section 8**. A post construction report documenting lithology, drilling and construction techniques, well construction information and diagram, surveyed spatial location and measuring point is due two months after installation. All new wells must be reported to the Montana Bureau of Mining and Geology's Ground Water Information Center.

Installation and post construction reports are required for all subsequent well installation and modification actions.

DEQ recognizes the challenges faced with well installation efforts in the field. Upon approval, modification to the plan can be made when challenging field conditions occur.

#### 7.2 WASTEWATER SAMPLING, ANALYSIS, AND REPORTING OPERATION MANUAL

The permittee shall use BMPs in developing SOPs for sampling, analyzing, and reporting wastewater characteristics from the wastewater system. The manual needs to be site-specific and result in monitoring and reporting that is representative of the nature of the wastewater streams. The manual must be used as a guide in:

- Equipment calibration.
- Preparing and collecting wastewater influent (INF-001) and effluent (EFF-001) wastewater samples.
- Analyte calculations (Table 9).
- Recording and reporting wastewater characteristics.
- Recording and reporting wastewater flows.

The completion and submittal date for the manual is listed in **Section 7.** The manual must be reviewed and approved by DEQ prior to implementation. The permittee shall maintain a copy of the operational manual, sampling, and calibration records at the facility at all times. Wastewater monitoring requirements are discussed in **Section 6**. All subsequent amended manuals must be reported to DEQ within 30 calendar days.

#### 7.3 GROUND WATER MONITORING, ANALYSIS, AND REPORTING OPERATIONAL MANUAL

The permittee shall use Best Management Practices (BMPs) in developing SOPs (Standard Operating Procedures) for sampling, analyzing, and reporting ground water characteristics. The SOP manual must be site-specific and result in monitoring and reporting that is representative of the nature of the shallow ground water bearing zone. The manual must provide for consistent identification, development, monitoring, sampling, calculating, recording, and reporting of the monitoring wells. The manual must provide for guidance on determining and documenting dry-well occurrences; and determining future well viability. DEQ recommends using the Montana Bureau of Mines and Geology Open-File Report 746 titled Standard Procedures and Guidelines for Field Activities (MBMG, 2022) as a reference in developing a site-specific operational manual.

The completion and submittal date of the manual is listed in **Section 8**. The manual must be reviewed and approved by DEQ prior to implementation. The permittee shall maintain a copy of the manual, monitoring well development records, dry well occurrence records, sampling records, and calibration records at the facility always. Ground water monitoring requirements are discussed in **Section 6**. All subsequent amended manuals must be reported to DEQ within 30 calendar days.

#### 7.4 MONITORING WELL VIABILITY

The permittee shall monitor and collect representative ground water samples from the receiving ground water aquifer. If any of the wells are abandoned, destroyed, decommissioned, or non-viable; or are no longer able to be

monitored due to obstructions or fluctuations in the ground water table; the permittee shall rehab the non-viable well or replace with the installation of a new well.

#### 7.5 MONITORING WELL REPLACEMENT, REHABILITATION, AND ABANDONMENT

If for any reason a monitoring well needs to be replaced, rehabilitated, or abandoned, the permittee shall submit a plan to DEQ for approval prior to the action taking place. The plan must document existing site-specifics and the reasoning behind the proposed action. The plan must detail the specific steps to take place during deconstruction, drilling, workover, and/or construction of the respective wells.

Written permission from DEQ is needed prior to the abandonment of any monitoring well. At minimum, monitoring well abandonment activities must be done in accordance with ARM 36.21.810(2-5). If the monitoring well is located in or around any collection, storage, treatment, disposal, land application, and/or mixing zone workings (or similar) additional actions may be required to prevent preferential subsurface flows, cross contamination, and to mitigate against any unauthorized wastewater releases. All new well installations must have detailed drilling, lithology, geospatial, and well construction information. A follow-up report summarizing all actions and details must be submitted to DEQ within 30 calendar days.

# **8.0 COMPLIANCE SCHEDULE**

The actions listed in **Table 11** must be completed on or before the respective scheduled completion date. A report documenting each respective action must be received by DEQ on or before the scheduled reporting date. Unless otherwise stated, completion of all actions or deliverables must be reported to DEQ in accordance with Part II and Part IV.G of the permit.

Table 11: Compliance Schedule			
Action	Frequency	Completion Date of Action	Reporting Due Date
Develop and implement a Wastewater Sampling, Analysis, and Reporting Operation Manual.	Single event	Within 180 days of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Develop and implement a Ground Water Monitoring, Analysis, and Reporting Operational Manual.	Single event	Within 180 days of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Complete a Monitoring Well Installation Plan.	Single event	Within 180 days of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Complete the installation of the monitoring well(s).	Single event	Within one (1) year of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Commence monitoring and reporting of the newly installed monitoring well(s).	Single event	Within one (1) year of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.
Complete a Monitoring Well Installation Report.	Single event	Within one (1) year and two (2) months of the effective date of the permit.	Due on or before the 28th day of the month following the completion date.

# **PUBLIC NOTICE**

Legal notice information for water quality discharge permits is listed at the following website: <u>http://deq.mt.gov/Public/notices/wqnotices</u>. Public comments on this proposal are invited any time prior to close of business on **May 21, 2025**. 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: <a href="http://deq.mt.gov/Public/notices/wqnotices">http://deq.mt.gov/Public/notices/wqnotices</a>.

Any person interested in being placed on the mailing list for information regarding this permit may contact the DEQ Water Protection Bureau at (406) 444-5546 or email <u>DEQWPBPublicComments@mt.gov</u>. All inquiries will need to reference the permit number (MTX000331), and include the following information: name, address, and phone number.

During the public comment period provided by the notice, DEQ will accept requests for a public hearing. A request for a public hearing must be in writing and must state the nature of the issue proposed to be raised in the hearing.

## REFERENCES

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.

- Department of Environmental Quality, Administrative Record for permit MTX000331 2024 MGWPCS Application and Supporting Materials
- Montana Bureau of Mines and Geology, Ground-Water Information Center, GWIC state well database, Online at: <u>http://mbmggwic.mtech.edu</u>.

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

WGM Group. 2024. Groundwater Discharge Permit Report: Grass Valley Gardens Subdivision, Missoula County, Montana. WGM Project No. 230109. August 15, 2024.

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

# APPENDIX A – WASTEWATER TEST PIT SUMMARY BY WGM

TEST PIT	DEPTH	TEXTURE SUMMARY OF SOIL	STANDARD APPLICATION
	(FT)	CONDITIONS	RATE (GPD/FT2)
TP-1	11.0	0 – 1.0 Silt Loam	0.4 0.4
IP-1	11.0	1.0– 4.6 Silt Loam	
		4.6 - 11.0 Loamy Sand	0.8
		0 – 0.5 Silt Loam	0.4
TP-2	11.0	0.5 – 3.0 Loamy Sand	0.8
		3.0 – 6.0 Silty Clay Loam	0.3
		6.0 – 11.0 Sand	0.8
70.0		0 – 1.0 Silt Loam	0.4
TP-3	14.0	1.0– 4.5 Silty Clay Loam	0.3
		4.5 – 14.0 Loamy Sand	0.8
TP-4	10.0	0 – 0.75 Silt Loam	0.4
	10.0	0.75 – 10.0 Clay	0.15
TP-5	10.0	0 – 0.75 Silt Loam	0.4
11-5	10.0	0.75 – 10.0 Sand	0.6
		0 – 0.5 Silt Loam	0.4
TP-6	12.0	0.5 – 5.0 Loamy Sand	0.8
16-0	12.0	5.0 – 5.7 Clay	0.15
		5.7 – 12.0 Loamy Sand	0.8
TD 7	40.0	0 – 0.5 Silt Loam	0.4
TP-7	10.0	0.5 – 10.0 Silty Clay	0.15
		0 – 0.66 Silt Loam	0.4
TP-8	13.0	0.66 – 3.0 Sandy Clay Loam	0.4
		3.0 – 13.0 Loamy Sand	0.8
		0 – 0.33 Silt Loam	0.4
TP-9	11.0	0.33 – 11.0 Sandy Loam	0.6
		48"- Sandy Clay Loam	0.4
TP-10	12.0	70"- Sandy Clay Loam	0.4
		Unknown- Sandy Loam	0.6
		0 – 1.0 Silt Loam	0.4
		1.0– 2.75 Silty Clay Loam	0.3
TP-11	12.0	2.75 – 6.5 Sandy Clay Loam	0.4
		6.5 – 12 Sandy Clay Loam	0.4
		0 – 1.0 Silt Loam	0.4
		1.0–2.7 Silty Clay Loam	0.3
TP-12	12.0	2.7 – 6.3 Clay Loam	0.3
		6.3 – 12 Sandy Loam	0.6
		0 – 1.3 Silt Loam	0.0
		1.3 – 2.25 Clay Loam	0.4
TP-13	12.0	2.25 – 7.3 Clay	0.3
IP-13	12.0		
		7.3 – 9 Sandy Clay Loam	0.4
		9 – 12 Sandy Clay Loam	0.4

Initial record of work done within the borehole and casing, and describes the amount of water recounter of. This report is compiled electronically from the contents of the Gound Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accompilshed by the films of the report.       Piot this site is lorge on the contents of the contents of the contents of the form is the Clorer Oligital A section 3: Well Section 1: Well Owner's)       Piot this site is Nate Library Digital A Section 2: Location         Section 1: Well Owner(s)       State Valar Level: 152       NOTE: NOT USED FOR SHALLOW AQUIFER ANALYSIS - PERFORATIONS ONLY Water Temperature: PERFORATIONS ONLY Water Section 2: Location         Two ship Range Section Cuarter Sections 1: Not Sections 1: Not Sections 1: Not Sections 2: Location       Total Deght: Also as uniform as acoung of the use of a section of the use of a section 2: Location         Two ship Range Section Cuarter Sections 1: Not Sections 2: Location       Georection Date       Date of the section as a section 3: Progosed Use of Water         Section 3: Proposed Use of Water TEST WELL (1)       Georection Date       Date water on account of the use of a section 3: Proposed Use of Water Sections 3: Well Construction Date         Section 5: Well Completion Date       Section 3: Proposed Use of Water Temperature 3: 2: 2: 3: 7: 7: 7: 6: 1: 4: 1: 1: 2: 2: 3: 7: 7: 7: 6: 1: 1: 3: 1: 4: 1: 4: 1: 1: 2: 2: 3: 7: 7: 1: 1: 1: 1: 3: 1: 4: 1: 1: 1: 2: 1: 1: 3: 1: 4: 1: 1: 1:	GVG #1	N	ONTAN	A WELL L	OG REP	ORT				Other Options		
Site Name: GRUTSCH, GEORGE GWIC id: 326745     Section 7: Well Test Data Total Depth: 418 Static Water Temperature: Well Conner(s)     NOTE: NOT USED FOR SHALLOW AQUIFER ANALYSIS - PERFORATIONS ONLY Water Temperature: Water T	official record of amount of water of the Ground W water rights is th	work done encounter ater Inform	within the d. This ation Ce	report is co nter (GWI	e and cas ompiled e C) databa	ing, and des lectronically use for this s	from the ite. Acqu	ribes the Plot this site in State Library Digital Atl rom the contents e. Acquiring View scanned well log (6/20/2023 8:48:08 A				
GWIC Id: 326745     Total Deph: 418     SNELLOW AQUIFER       Section 1: Well Owner(s)     Total Deph: 418     SNELLOW AQUIFER       1) GRUTSCH, GEORGE (MALL)     Static Water Level: 152     PERFORATIONS ONLY       263 DESCHAMPS LANE     Analysis     PERFORATIONS ONLY       263 DESCHAMPS LANE     Air Test*     IN DEEPER AQUIFER       263 DESCHAMPS LANE     Air Test*     In Test *     IN DEEPER AQUIFER       263 DESCHAMPS LANE     County     Geocode     Time of recovery 0.25, hours.     Recovery water level 152, leet.       NSOULA MT SB03 (3023/2023)     Geocode     *     140 gpm with drill stem set at 330, feet for 6, hours.       18N SOULA MT SB03 (3023/2023)     Geocode     *     140 gpm with drill stem set at 330, feet for 6, hours.       18N SOULA MT SB03 (3023/2023)     Geocode     *     140 gpm with drill stem set at 330, feet for 6, hours.       19N SOULA MT SB03 (3023/2023)     Geocode     *     2       101     Geocode     Datim     160 gpm with drill stem set at 330, feet for 6, hours.       18N SOULA MT SB03 (3023/2023)     Geocode     Noticity Stemas       19SOUL     Geocode     Noticity Stemas       19SOUL     Geocode     Noticity Stemas       141 Habitis     County Grave Stemas     Section 3: Mark MD Stown CLAY, Some GRAVEL       19Soul     Section 3: Weil Construction Detai		ITSCH GE	ORGE				Sectio	n 7 · W	ell Test Data			
Section 1: Well Owner(s)       Static Water Level: 152       ANALYSIS - PERFORATIONS ONLY         1) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Air Test *       IN DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Test *       In DEEPER AQUIFER         2) GRUTSCH, GEORGE (MAIL)       Counter Sections       Time of recovery QLS: hours.         Name of recovery QLS: hours.       Time of recovery QLS: hours.       Time of recovery QLS: hours.         Section 2: Location       Geocode       Datum       Test *       Datum         40: Soula Arrow Grave Counter Sections       Test *       Not Section 3: Recovery water level 152. feet       Datum         40: Goologic Source       Datum       Date Main Arrow Grave Matu			ONGE				00010		en reat Data	NOTE: NOT USED FOR		
2) GRUTSCH, GEORGE (WELL)       140. gpm with drill stam set at 380. feet for 6 hours.         2260 DESCHAMPS LANE       140. gpm with drill stam set at 380. feet for 6 hours.         MISSOULA MT Sexton       County         1 AN       20W       20         Section 2: Location       Fouring the well test the discharge rate shall be as uniform as county         1 AN       20W       20         Section 2: Location       Geocode         1 AN       20W       20         Section 3: County       Geocode         MISSOULA       04-2325-20-20-07-0000         Latitude       Longitude       Geomethol         46.95221255565       -114.148611142       TRS-SEC         Orund Surface Altitude       Ground Surface Method       Datum         46.95221255565       -114.148611142       TRS-SEC         Section 3: Proposed Use of Water       Est Section 3: Well Log         TEST WELL (1)       0       1 [SOIL         Section 5: Well Completion Date       Date         Date well completed: Thursday, March 23, 2023       MOIST ORANOC SUTY GRAVEL WITH SOME SEEPAC         Section 6: Well Construction Details       371       400 (NST ORANOE SUTY GRAVEL WITH WATER, SLTY VERY SAND         Berehole dimensions       61       Well DED       371	1) GRUTSCH, G	EORGE (M				Static Water Level: 152			ANALYSIS - PERFORATIONS ONLY			
1283 DESCHAMPS LANE       140 gpm with dill stem set 380 feet for <u>6</u> hours.         MISSOULA MT 59903 [03/23/2023]       Time of recovery 0.25 hours.         Section 2: Location       Township Range Section Quarter Sections         14N       20W       20         Section 2: Location       Geocode         14N       20W       20         14D       Orand Surface Altitude       Geocode         14D       Datum Date       Section 8: Remarks         Section 3: Proposed Use of Water       Est WeLL (1)         Section 5: Well Completion Date       10       20 MOIST DROWN CLAY TIGHTLY PACKED S         Section 6: Well Construction Datails       223       150       230 TIGHTLY PACKED DRY LAYERS, MOIST BROWN AND         150       223       151       223       150       223       151       230 MOIST DRANDE BROWN CLAY TIGHTLY PACKED							Air Tes	st*		IN DEEPER AQUIFER		
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14N       20W       20       SE/A SE/A       * During the well test the discharge rate shall be as uniform as positive. This rate may or may not be the sustainable yield of the well casing.         MISSOULA       04-2325-20-20-20-20-20-0000       Name       Sustainable yield does not include the reservoir of the well casing.         Addition       Longitude       Geomethod       Datum       Datum       Sustainable yield does not include the reservoir of the well casing.         Addition       Block       Lot       Section 8: Remarks         Addition       Block       Lot       Section 9: Well Log         Section 3: Proposed Use of Water       Tes T WELL (1)       Section 9: Well Log         Section 4: Type of Work       1       10       DBROWN CLAY, SOME GRAVEL         Drilling Method: ROTARY       10       20       MOIST BROWN CLAY, SOME GRAVEL         Status: NEW WELL       20       150       223       TIG HTLY PACKED DRY LAVERS, MOIST BROWN AND CAY TIGHTLY PACKED S         Section 5: Well Construction Details       Sando AND ORAVEL WITH WATER, SILTY VERY SAND       371       400       GRAY CLAY LAVERS         Section 1: Wall       Pressure       Joint       Type       371       400       GRAVEL OND CRAVEL WITH WATER, SILTY VERY SAND         Section 1: Wall       Pressure       Joint       Type       371			Sectio	n (	Quarter S	ections	i anipi	ig nat				
Section 3: Proposed Use of Water     From To     Description       TEST WELL (1)     9     1     Solu       Section 4: Type of Work     0     1     Solu       Drilling Method: ROTARY     10     20     MOIST BROWN CLAY TIGHTLY PACKED S       Section 5: Well Completion Date     10     20     MOIST BROWN CLAY TIGHTLY PACKED S       Section 5: Well Completion Date     20     150     HARD GRAY AND BROWN CLAY TIGHTLY PACKED S       Section 5: Well Construction Data     20     150     HARD GRAVEL WITH SOME SEEPAL       Section 6: Well Construction Details     223     TIGHTLY PACKED DRY LAYERS, MOIST BROWN AND       Borehole dimensions     223     371     SAND AND GRAVEL WITH WATER, SILTY VERY SAND       From To     Diameter     Joint     Type       2418     Well DED     Steel     20       Completion (Perf/Screen)     Well DED     Steel     20       From To     Diameter Openings     Description     20     TIGHTLY PACKED FINE GRAYEL WITH WATER, SILTY VERY SAND       223     371     SAND AND GRAVEL WITH WATER, SILTY VERY SAND     20       Casing     Well DED     Steel     20       From To     Diameter Openings     Description     20       224     1864     WELDED     Steel       227     1	14N         20W         20         SE%         SE%           County         Geocode           MISSOULA         04-2325-20-2-02-07-0000           Latitude         Longitude         Geomethod         Datum           46.95221255565         -114.148641142         TRS-SEC         NAD83							possible. This rate may or may not be the sustainable yield of the well. Sustainable yield does not include the reservoir of the well casing.				
Section 3: Proposed Use of Water     Unassigned       EST WELL (1)     0     1     Solution       Section 4: Type of Work     0     1     Solution       Dilling Methods: ROTARY     0     1     Solution       Section 5: Well Completion Date     1     0     20     150       Section 5: Well Completion Date     20     150     RARD GRAY AND BROWN CLAY TIGHTLY PACKED S       Section 5: Well Completion Date     20     150     RARD GRAY AND BROWN CLAY       Section 6: Well Construction Details     301     150     223     371       Sorehole dimensions     6     223     371     SAND AND GRAVEL WITH WATER, SILTY VERY SAND       Section 6: Well Construction Details     223     371     SAND AND GRAVEL WITH WATER, SILTY VERY SAND       Sorehole dimensions     6     223     371     SAND AND GRAVEL WITH WATER, SILTY VERY SAND       Saing     400     420     CIGLORED ROCK AND GRAVEL COAL SEAMS     24       Sompletion (Perf/Screen)     400     420     CIGLORED ROCK AND GRAVEL COAL SEAMS       Size of To Diameter Openings Openings Description     1     1     10     10       Size of To Diameter Openings Openings Description     1     1     1     10       Size of To Diameter Openings Openings Description     1     1     1<	Addition		Blo	ck	I	Lot	Sectio	n 9: W	ell Log			
Section 3: Proposed Ose of Water         TEST WELL (1)         Section 4: Type of Work         Dnilling Method: ROTARY         Status: NEW WELL         Section 5: Well Completion Date         Date well completed: Thursday, March 23, 2023         Section 6: Well Construction Details         Borehole dimensions         From To Diameter         From To Diameter         0 data 6         Casing         From To Diameter         -2       118         Completion (Perf/S creen)         -2       1198 Section (Perf/S creen)         From To Diameter Openings Openings Description         227 371 6       864         Annular Space (Stall/Grout/Packer)         From To Description       Cont.         From To Description       Fort.         From To Description       Fort.												
0       1       Solit         Section 4: Type of Work       0       1       Solit         Drilling Method: ROTARY       1       10       BROWN CLAY, SOME GRAVEL         Status: NEW WELL       10       20       MOIST BROWN CLAY         Section 5: Well Completion Date       20       150       HARD GRAY AND BROWN CLAY         Date well completed: Thursday, March 23, 2023       MOIST ORANGE SILTY GRAVEL WITH SOME SEEPAC         Section 6: Well Construction Details       GRAY CLAY LAYERS, MOIST BROWN AND GRAVEL WITH WATER, SILTY VERY SAND         Borehole dimensions       223       371       SAND, AND GRAVEL WITH WATER, SILTY VERY SAND         From To       Diameter       1       400       GRAY SAND, GREEN AND PURPLE GRAVEL WITH         0 418       6       223       371       400       GRAY SAND, GRAVEL COAL SEAMS         From To       Diameter       Molst Oracker State       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI         Casing		osed Use o	of Water					-	Description			
Section 4: Type of Work       1       10       BROWN CLAY, SOME GRAVEL         Drilling Method: ROTARY       10       20       MOIST BROWN CLAY         Status: NEW WELL       20       150       AAND, GRAVEL AND COBBLE LAYERS         Section 5: Well Completion Date       MOIST ORANGE SILTY GRAVEL WITH SOME SEEPAG         Date well completed: Thursday, March 23, 2023       MOIST ORANGE SILTY GRAVEL WITH SOME SEEPAG         Section 6: Well Construction Details       MOIST ORANGE SILTY GRAVEL WITH SOME SEEPAG         Borehole dimensions       Section 6: Well Construction Details         Borehole dimensions       SAND CLAY BOUND LAYERS         From To       Diameter         22       110         223       371         A00       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER, SILTY VERY SAND AND CLAY BOUND LAYERS         Casing       TightTy PACKED FINE GRAY SAND AND MULTI         Casing       WellDED         From To       Diameter         To       Diameter         To       Size of         Size of       Size of	IEST WELL(1)											
Status: NEW WELL       10       20       150       20       150       20       150       SanD, GRAY AND BROWN CLAY TIGHTLY PACKED S         Section 5: Well Completion Date       20       150       SanD, GRAYEL AND COBBLE LAYERS         Date well completed: Thursday, March 23, 2023       MOIST ORANGE SILTY GRAVEL WITH SOME SEEPAD         Section 6: Well Construction Details       223       371       SanD AND GRAY LAYERS, MOIST BROWN AND GRAY LAYERS, MOIST BROWN AND CLAY BOUND LAYERS         Section 6: Well Construction Details       223       371       SanD AND GRAYEL WITH WATER, SILTY VERY SAND AND CLAY BOUND LAYERS         Section 7       Diameter	Section 4: Type	of Work					1	10	BROWN CLAY, S	SOME GRAVEL		
Section 5: Well Completion Date       20       150       150       150       SAND, GRAVEL AND COBBE LAYERS         Section 6: Well Construction Details       371       371       371       223       371       SAND AND GRAVEL WITH WATER, SILTY VERY SAND AND GRAVEL WITH WATER, SILTY VERY SAND AND CLAY BOUND LAYERS         Sorehole dimensions       5       371       400       GRAY DUP LAYERS         From To       Diameter       371       400       GRAY BOUND LAYERS         371       400       GRAY BOUND LAYERS       371       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI         Colored Trinchick Parket Streen       371       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI         Completion (Perf/Screen)       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI         227       371       6       864       11/4X 1/4       HOLTE PERFORATOR SLOTS         Xunular Space (Seal/Grout/Packer)       Cont.       Fed?       Driller Certification         All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards.							10	20	MOIST BROWN	CLAY		
Date well completed: Thursday, March 23, 2023       150       223       TIGHTLY PACKED DRY LAYERS, MOIST BROWN AND GRAY CLAY LAYERS, MOIST BROWN AND GRAY CLAY LAYERS         Sorehole dimensions       5       5       5       371       5       5       5       371       400       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER, SLITY VERY SAND AND CLAY BOUND LAYERS         Sorehole dimensions       5       6       371       400       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER CEMENTED LAYERS         Sorehole dimensions       6       371       400       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER CEMENTED LAYERS         Sorehole dimensions       From To       Diameter       110       120       110       120         Casing       400       420       CLAY BOUND LAYERS       371       400       420       COLORED ROCK AND GRAVEL COAL SEAMS         Completion (Pert/Screen)       110       WELDED STEEL       400       420       110							20	150				
Borehole dimensions       223       3/1       AND CLAY BOUND LAYERS         From To       Diameter       0       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER CEMENTED LAYERS         Casing       400       400       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER CEMENTED LAYERS         Casing       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI COLORED ROCK AND GRAVEL COAL SEAMS         From To       Diameter       Wall       Pressure Rating       Joint       Type         -2       418       6       WELDED STEEL       Colored Rock And GraveL Coal SEAMS         Completion (Pert/Screen)       WELDED       STEEL       Contemport         From To       Diameter Openings Openings       Description       Cont.         227       371 6       864       1 1/4X 1/4 HOLTE PERFORATOR SLOTS       Driller Certification         Annular Space (Seal/Grout/Packer)       Cont.       Fed?       All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to				3, 2023			150	223	TIGHTLY PACKE	D DRY LAYERS, MOIST BROWN AND		
From       To       Diameter       0       GRAY SAND, GREEN AND PURPLE GRAVEL WITH WATER CEMENTED LAYERS         Casing       400       400       400       420       TIGHTLY PACKED FINE GRAY SAND AND MULTI COLORED ROCK AND GRAVEL COAL SEAMS         From       To       Diameter       Thickness       Rating       Joint       Type         22       418       6       WELDED       STEEL       Colored ROCK AND GRAVEL COAL SEAMS         Completion (Perf/Screen)       WELDED       STEEL       Colored ROCK AND GRAVEL COAL SEAMS         From       To       Diameter       Openings       Description         227       371       6       864       1 1/4X 1/4 HOLTE PERFORATOR SLOTS         Annular Space (Seal/Grout/Packer)       Cont.       Fed?       Driller Certification         All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well con			on Deta	ils			223	371				
Casing       400       420       IIGHTLY PACKED FINE GRAY SAND AND MULTI         From       To       Diameter       Thickness       Rating       Joint       Type         2       418       6       WELDED       STEEL       COLORED ROCK AND GRAVEL COAL SEAMS         Completion (Pert/Screen)       WELDED       STEEL       IIGHTLY PACKED FINE GRAY SAND AND MULTI         From       To       Diameter       Openings       Openings       Description         227       371       6       864       1 1/4 X 1/4 HOLTE PERFORATOR SLOTS       Driller Certification         All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the       All work performed and reported in this report is true to the	rom To Diame	ter					371	400				
From       To       Diameter       Thickness       Rating       Joint       Type         2       418       6       WELDED       STEEL         Completion (Perf/Screen)       # of       Size of       STEEL         From To       Diameter       Openings       Openings       Description         227       371       6       864       1 1/4 X 1/4 HOLTE PERFORATOR SLOTS         Annular Space (Seal/Grout/Packer)       From       Fo       Description         From To       Description       Cont.       Fred?         All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards.				0			400	420				
2     418     6     WELDED     STEEL       Completion (Perf/Screen)     # of     Size of     Size of       From To     Diameter Openings     Openings     Description       227     371     6     864     1       1/4 X 1/4     HOLTE PERFORATOR SLOTS     Driller Certification       Annular Space (Seal/Grout/Packer)     Cont.     Form To       From To     Description     Fed?       All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards.	From To Dian				Joint	Type						
From     To     Diameter     Øpenings     Øpenings       227     371     6     864     1 1/4 X 1/4       HOLTE PERFORATOR SLOTS     Image: Contemportant of the state of the st							i⊢—					
From       To       Diameter       Openings       Description         227       371       6       864       1       1/4 X 1/4       HOLTE PERFORATOR SLOTS         Annular Space (Seal/Grout/Packer)       Driller Certification       All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards. This report is true to the Montana well construction standards.	Completion (Perf	Screen)					<u> </u>	<u> </u>				
Annular Space (Seal/Grout/Packer)  From To Description  Fed?  All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the	From To Diamet				otion							
From To Description Fed? Description Fed? All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the	227 371 6	864	1 1/4 X	1/4 HOLTE	PERFOR	ATOR SLOTS	] <u> </u>	-				
From To Description Fed? All work performed and reported in this well log is in compliance the Montana well construction standards. This report is true to the	Annular Space (S	eal/Grout/Pa	acker)				Driller	Certifi	cation			
			CESEAL				All wor the Mo	k perfo ntana	rmed and repor well construction			
best of my knowledge.  Name: DANIELLE NORCROSS Company: CAMP WELL DRILLING AND PUMP SERVICE License No: WWC-795								Na Compa	me:DANIELLE N any:CAMP WELL			

Date Completed: 3/23/2023

		MONTAN	WELL LOG F	EPORT				Other Options
		tivities of a l	icensed Monta	na well driller,				Go to GWIC website
encountered. T Information Ce	This report is enter (GWIC)	compiled el database fo	e and casing, a lectronically fro or this site. Acq mplished by th	m the content uiring water rig	s of the ( ghts is th	Groun	d Water	Plot this site in State Library Digital Atlas Plot this site in Google Maps
Site Name: CU GWIC Id: 3282		OBERT AN	D LINDA		Section	n 7: W	ell Test	Data
					Total D			
Section 1: Wel 1) CUMMINGS 2029 US HWY	, ROBERT A	ND LINDA (	MAIL)		Static Water Level: 61 Water Temperature:			
MISSOULA MT 2) CUMMINGS	59808 [09/0 , ROBERT A		WELL)		Air Tes			
2029 US HWY MISSOULA MT		7/2023]			Time of	recov	ery <u>0.15</u>	n set at <u>280</u> feet for <u>2</u> hours. 5 hours. 61_feet.
Section 2: Loc	ation						er level	
Township	Range	Section	Quarter	Sections				
14N	20W	20	SW%		* Durin	g the v	vell test t	the discharge rate shall be as uniform as
MISSOULA	County		Geoco	de				y or may not be the sustainable yield of the
Latitude	Longit	ude	Geomethod	Datum	well. Su casing.	istaina	able yield	I does not include the reservoir of the well
46.952213	-114.16	3453	TRS-SEC	NAD83				
Ground Surfa	ce Altitude	Ground S	urface Method	Datum Date	Section	n 8: R	emarks	
Addition		Block		Lot			ell Log	
					Geolog		urce	
Section 3: Pro	posed Use o	of Water			Unassi From	-	Dentit	8
DOMESTIC (1)					-rom 0		Descript SOIL	uon
Section 4: Typ	e of Work				2		BROWN	CLAY
Drilling Method: F					61			CLAY, GRAVEL
Status: NEW WE	LL				91			, CLAY W/WATER
Continue Co Mar	Completio	Data			164	179	GRAVEL	, SAND W/WATER
Section 5: Wel Date well comple			2023		179	191	GRAVEL	, YELLOW CLAY
Date weil comple	teu. mursuay,	September	, 2025		191	227		LAY, GRAVEL W/WATER
Section 6: Wel	I Constructi	ion Details			227	241		, SAND W/WATER
Borehole dimen					241	280	GRAY C	LAY
From To Diam					$\vdash$		<u> </u>	
0 280	6				$\vdash$		<u> </u>	
Casing	Wall	Pressure		г	$\vdash$			
From To Diam	eter Thicknes		Joint Type		$\square$			
0 280 6	0.25		WELDED STEE	1				
Completion (Per	f/Screen)			_	Driller	Certif	ication	
From To Dian	# of neter Openin	Size of gs Opening	s Description		the Mo	ntana	well cons	d reported in this well log is in compliance wit struction standards. This report is true to the
91 99 6		1" X 1/4	SAW SLOTS	]	best of		owledge	
119 125 6		1" X 1/4"	SAW SLOTS	]				DLEY MCKAY
130 138 6		1" X 1/4	SAW SLOTS				-	TERN MONTANA DRILLING COMPANY
Annular Space (		acker)					No: WW(	
From To Descri	Cont. ption Fed?				Date C	omple	ted: 9/7/2	023
0 0 BENT								
	and a large							

					M	ONTANA WE	LL LOG	REPO	RT
lescrit	bes ti	he amount	of water en	ncountered.		vas completed			record of work done within the borehole and casing, and lier. Acquiring water rights is the well owner's
Site N	lame	and the second second second second	and the second	HOLDING	station in the second se		Sectio	n 7: W	/ell Test Data
Section 1: Well Owner(s) 1) TEST WELL, GRASS VALLEY GARDENS 8 (MAIL)								epth: 4	100
								- C.	Level: 106
								Tempe	rature:
		AT NOR A MT 598	THERN LP	SUITE 1			Air Tes	st "	
Sectio	on 2	: Locatio	n						th drill stem set at <u>320</u> feet for <u>8</u> hours.
Tor	wnst	nip R	ange S	Section	Quarter	Sections			rery _ hours.
	14N	Cour	20W	20	NE% S	W% SE%	Recov	ery wa	ter level _ feet.
AISSO	DULA	4	<i>.</i>				* Durin	a the v	well test the discharge rate shall be as uniform as
La	stitue	de	Longitud	e G	eomethod	Datum			s rate may or may not be the sustainable yield of the
		53556	-114.1	52306 NAV-	GPS	WGS84			able yield does not include the reservoir of the well
Additi	on			Block		Lot	casing		
							Sectio	n 8: R	emarks
EST			ed Use of	Water			GRASS	VALL	EY GARDENS
-				2			Sectio	n 9: W	lell Log
		: Type of		4			From	То	Description
Junua	) Mier	INDU. DUA	ROTART	r			0	Э	BROWN CLAY
Sectio	on 5	Well Co	mpletion	Date			3	15	BROWN CLAY AND GRAVEL
				anuary 23, 2	2024		15	60	GRAVEL
							60	70	CEMENTED GRAVELS
Section 6: Well Construction Details							00		CEMENTED GRAVELS
Sactio	on 6	: Well Co	nstruction	n Details			70		TAN SAND AND GRAVELS
		: Well Co Fields	nstruction	n Details				110	
Neta (	Data	Fields					70	110 135	TAN SAND AND GRAVEL WITH CLAY
Meta I	Data s bor	Fields	oleted as a				70 110	110 135 140 142	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER
<b>Vieta (</b> 1. Was 2. Was	Data s bon s wel	Fields ehole com I abandoni	oleted as a ad?				70 110 135	110 135 140 142	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL
Meta I 1. Was 2. Was Boreh	Data s bon s well	Fields ehole com I abandon dimension	oleted as a ad?				70 110 135 140	110 135 140 142 150	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER
Vieta I 1. Was 2. Was Boreh From	Data s bor s well ole c To	Fields ehole com I abandon timension Diameter	oleted as a ad? s				70 110 135 140 142 150 160	110 135 140 142 150 160	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER
Meta I Was 2. Was Boreh From 0	ole c To 25	Fields ehole com I abandon dimension Diameter 12.8	oleted as a ed? s				70 110 135 140 142 150 160 175	110 135 140 142 150 160 175 183	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER
Vieta I Vas 2. Was Boreh From 0 25	ole o 70 25 400	Fields ehole com I abandon dimension Diameter 12.8	oleted as a ed? s				70 110 135 140 142 150 160 175 183	110 135 140 142 150 160 175 183 188	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER GRAY CLAY
Meta I 1. Was 2. Was Boren From 0	ole o 70 25 400	Fields ehole com I abandon dimension Diameter 12.8	oleted as a ed? s	well? YES			70 110 135 140 142 150 160 175 183 188	110 135 140 142 150 160 175 183 188 200	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER GRAY CLAY GRAVEL SOME SAND AND WATER
Veta I . Was 2. Was Boreh From 0 25 Casino	ole c To 25 400	Fields ehole com l abandoni dimension Diameter 12.8 8	oleted as a ed? s	well? YES	-	Type	70 110 135 140 142 150 160 175 183 188 200	110 135 140 142 150 160 175 183 188 200 210	TAN SAND AND GRAVEL WITH CLAY BROWIN CLAY BROWIN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER GRAY CLAY GRAVEL SOME SAND AND WATER GRAVEL
Veta I Was Was Boreh From 0 25 Casino	ole c To To	Fields ehole com l abandoni dimension Diameter 12.8 8	oleted as a ed? s Wall	well? YES	Joint	Type	70 110 135 140 142 150 160 175 183 188 200	110 135 140 142 150 160 175 183 188 200 210	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER GRAY CLAY GRAVEL SOME SAND AND WATER
Vieta I Was 2. Was Boreh From 0 25 Casino From -2	ole o 70 25 400 70 400	Fields ehole com l abandoni dimension Diameter 12.8 8 0 Diameter 8.6	voleted as a ed? s Wall Thicknes 0.250	well? YES	Joint	Type A53B STEEL	70 110 135 140 142 150 160 175 183 188 200 Driller	110 135 140 142 150 160 175 183 188 200 210 Certif	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER CRAY CLAY GRAVEL SOME SAND AND WATER GRAVEL GRAVEL GRAVEL GRAVEL SAND SOME SAND AND WATER GRAVEL CALSONE SAND AND WATER GRAVEL
Vieta I Was Was Boreh From 0 25 Casino From 2	ole o 70 25 400 70 400	Fields ehole com l abandoni dimension Diameter 12.8 8 Diameter	voleted as a ed? s Wall Thicknes 0.250	well? YES	Joint		70 110 135 140 142 150 160 175 183 188 200 Driller This w	110 135 140 142 150 160 175 183 188 200 210 Certif	TAN SAND AND GRAVEL WITH CLAY BROWN CLAY BROWN CLAY AND GRAVEL SAND SOME WATER SAND GRAVEL AND WATER BROW CLAY SANDY GRAVEL SAND GRAVEL AND WATER LARGE SAND GRAVEL AND WATER GRAY CLAY GRAVEL SOME SAND AND WATER GRAVEL ication is Missing is considered to be in DRAFT form. It has not
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iescrib	es ti	he amoun	t of water e	ncountered		vas completed			record of work done within the borehole and casing and lier. Acquiring water rights is the well owner's		
Site Na	amo	: 8" SCF	REENED	RASS VA	LLEY GARE	DENS WELL	Sectio	n 7: W	ell Test Data		
0.000	Id:	332088	1	NELL	GVG	;#4	Total Depth: 340 Static Water Level: 104				
Section 1: Well Owner(s)									rature:		
) 8" S 2829 (	SCR	EENED	GRASS V		RDENS WE	LL 2 (MAIL)	Air Te:				
									ill stem set at _ feet for 20 hours.		
Sectio	n 2	: Locatio	n						rery _ hours		
Tow	vnsh	nip R	tange 3	Section	Quarter	Sections	Recov	ery wa	ter level _ feet.		
1	14N		20W	20	NE% S	W% SE%	Pump	Test *			
		Cour	nty		Geoc	ode	i ang	1001			
MISSO							Depth	pump	set for test 285 feet.		
0.000	titue		Longitud		Seomethod	Datum			mp rate with 117 feet of drawdown after 72 hours		
		53306	-114.1	53111 NAV-	GPS	WGS84	of pum	ping.			
Additio	nc			Block		Lot			very <u>1.6</u> hours.		
							Recov	ery wa	ter level <u>104</u> feet.		
PUBLIC Sectio	on 4	ATER SU					possib	le. Thi: ustaini	well test the discharge rate shall be as uniform as s rate may or may not be the sustainable yield of th able yield does not include the reservoir of the well		
		. 101-11 01-									
Sectio	n 5	: wen uc	mpletion	Date			Sectio	n 8: R	emarks		
			mpletion Friday, July				Sectio	n 8: R	emarks		
Date w	ell c	ompleted;	Friday, July	y 12, 2024					emarks /ell Log		
Date w Sectio	ell c on 6	ompleted: : Well Co	동안 이 같은 것은 것이 같은 것이다.	y 12, 2024				n 9: W			
Date w Sectio	ell c on 6	ompleted;	Friday, July	y 12, 2024			Sectio	n 9: V To	fell Log		
Date w Sectio Aeta D	on 6 Data	ompleted : Well Co Fields	Friday, Jul	y 12, 2024			Sectio From	n 9: M To 15	Tell Log Description		
Date w Sectio Meta D	on 6 Data	ompleted : Well Co Fields	Friday, July	y 12, 2024 n Details			Sectio From	n 9: W To 15 63	Tell Log Description CEMENTED CLAYEY GRAVEL		
Date w Sectio Meta D Was	on 6 Data bore weil	ompleted: : Well Co Fields ehole com Labandon	Friday, July onstruction pleted as a ed?	y 12, 2024 n Details			Sectio From 0 15	n 9: W To 15 63 90	Tell Log Description CEMENTED CLAYEY GRAVEL CEMENTED GRAVEL		
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Form No. 603 R2-99

GVG MW

#### MONTANA WELL LOG REPORT

Well ID # 24-021

This log reports the activities of a licensed Montana well driller and serves as the official record of work done within the borehole and casing and describes the amount of water encountered. This form is to be completed by the driller and filed with DNRC within 60 days of completion of the work. Acquiring Water Rights is the well owner's responsibility and is not accomplished by the filing of this report. Well log information is stored in the Groundwater Information Center at the Montana Bureau of Mines and Geology (Butte) and water right information is stored in the Water Rights Bureau records (Helena). For Risks that are not applicable, enter NA. *Optional fields are in italics*. Record additional information in the REMARKS section.

1.	WELL OWNER: Name Robert & Linda Cummings / Grass Valley Holdings	Tes		r minimum own is the amount water level is lowered below static level.
	Mailing address 9500 Hwy 10 W			th measurements shall be from the top of the well casing.
	Missoula, MT 59808			of recovery is hours/minutes since pumping stopped.
2.	WELL LOCATION: List ½ from smallest to largest		Air te:	
	¼¼¼ SW ¼, Section20		. 1/2	gpm with drill stem set at 113 ft. for 2 hours
	Township _14 N Range _20 W County _Missoula		Time o	of recovery _45 min_ hrs/min. Recovery water level _99 ft.
	Lot#_2 COS 3917 Subdivision Name	OR	Bailer t	est*
	GPS X Yes No			gpm with ft. of drawdown after hours
	Well Address9029 Highway 10 West U. Missoula MT 59808		Time o	of recovery hrs/min. Recovery water level ft.
	Latitude N 46° 57° 6" Longitude W 114° 9' 36"			
	Error as reported by GPS locator ( + feet) Elav 3186"	OR	Pump t	
	Horizontal datum X NAD27 🛛 WGS84			pump set for test ft.
-				gpm pump rate within, of drawdown afterhrs pumping
3.	PROPOSED USE: Domestic Distock Imigation		Time o	of recovery min. Recovery water level ft.
	Public water supply X Other: Ground Source Supply Sample /Monitor		Florida.	- Autoriout
4.	TYPE OF WORK:	OK	Flowing	g Artesian*
4.	New Well X Deepen existing well Abandon existing well	l I	Floor	gpm for hours
	Method: Cable X Rotary COther			controlled by
	Method: Li Cable X Rotary Li Other			er resc one inscharge rate small to as uniform as possible. This rate may or may stalinable yield of the well. Sustalinable yield does not include the reservoir of the
5.	WELL CONSTRUCTION DETAILS:		casina.	sources you or the wear. Suscentione you does not include any reserver of the
э.	Borehole:		WELL	106
	Dia6 in. from GL ft. to138 ft.	Depth.		Material:
	Dia in. from ft. to ft.	L Coppe	1.001	Color/rock and type/descriptor (example: blue/shale/hard, or brown
	Dia in. from ft. to ft.			gravel/water; or brown/sand/heaving)
	Casing:	Fram		
	Steel: Wall thickness  Threaded X Welded	0	1	Sol
	Dia. 6 in. from +2 ft. to 138 ft.	1	4	Sand, Gravel & Clay
	Dia in. from ft. to ft.	4	17	Sand, Gravel & Cobbles
		17	56	Coarse Brown Sand & Gravel
	Plastic: Pressure Rating lbs. Threaded X Click- Certalock	56	76	Tan Clay
	Dia in. from ft. to ft.	76	80	Dark Brown Clay
		80	108	Coarse Sand
	Perforations/Slotted Pipe:	108	138	Sand & Gravel w/Water
	Type of perforator used			
	Size of perforations/slots <u>1-1/4</u> in. by <u>1/4</u> in.			
	no. of perforations/slots from ft. to ft.			
	no. of perforations/slots from ft. to ft.			
	Screens: Yes X No			
	Material			
	DiaSlot sizefromft. toft. DiaSlot size fromft. toft.			
	Gravel Packed:  Ves X No			
	Size of gravel			
	Gravel placed from ft. toft.			
	Packer: Yes X No		-	
	Type Depth(s)			, · · · · · · · · · · · · · · · · · · ·
	Grout: Material used Bentonite Surface Seal			
	Depth fromGLft. to _50ft. OR X Continuous feed			DNAL SHEETS ATTACHED
				WELL COMPLETED: _April 17, 2024
6.	WELL TEST DATA:			IRKS:
	A well test is required for all wells. (See dataits on well tog report cover.)	-		OCODE: 04-2325-20-2-02-09-0000
	Static water level _99'			
	ft, below top of casing or	10.	DRILL	ER/CONTRACTIOR'S CERTIFICATION:
	Closed-in artesian pressure psi.	AI	work per	formed and reported in this well log is in compliance with the
	How was test flow measured;	Mo	ntana w	all construction standards. This report is true to the best of my
	bucket/stopwatch, weir, flume, flowmeter, etc	kno	wledge.	
	owstone groundwater closure area only - Water Temperature °F	Na	ne, firm,	or corporation (print) Camp Well, Drilling & Pump Service
Ε	AQUIFER TEST DATA FORM ATTACHED	A de	increase in the second	10266 Machania Lato Minamia Mt E0208
		Sig	nature .	Hura Min
		Dat	e: _/	Arci 17, 2024 License no. 795
			<u>ب</u>	MBMG ID #

Montana DNRC P.O. BOX 201601 HELENA, MT 59620-1601 444-6610

# APPENDIX C – SIGNIFICANCE DETERMINATION AND REASONABLE POTENTIAL ANALYSES

### MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ) Montana Ground Water Pollution Control System

Ground Water Dilution Projection (GWDP) - Nondegradation Significance Analysis

These projections estimate the parameter concentrations in the aquifer downgradient of the subsurface discharge. After dilution with ground water, the projected concentration is compared to the respective significance criteria in determining nonsignificant changes in water quality (ARM 17.30.715).

Site Name:	Grass Valley Gardens Residential Subdivision									
Location:	Missoula Cou	Aissoula County								
Permit #:	MTX000331									
Notes:	Design Capa	Design Capacity = 120,000 gpd; Design flow 16,042 ft³/d								
	These calcula	tions a	re for the following parameter of interest: Nitrate							
	These calcula	tions u	se the most restrictive ground water standard.							
	These calcula	tions d	o not credit potential losses due to chemical transformation.							
	These calcula	tions d	o not credit potential losses due to attenuation.							
			Projected Concentration Calculation							
			Cr = (Qd)(Cd) + (Qs)(Cs)							
			Qd + Qs							
		TI	ne Activity is Not Significant if Cr < Significance Criteria							
			pjection at the End of the Mixing Zone.							
Qd =			Design capacity - effluent flow rate							
Cd =	5.0	mg/L	Concentration - effluent (treated wastewater)							
	500		Length of ground water dilution zone Thickness of dilution zone							
	15	ft								
	174	ft	Outfall width, perpendicular to ground water flow direction							
	262	ft	Projected width of downgradient dilution zone							
	3923	ft²	Cross sectional area of dilution zone (A)							
	50	ft/d	Hydraulic conductivity (K)							
	0.00620	ft/ft	Hydraulic gradient (I)							
Qs(Qgw) =	1221	ft³/d	Ground water volume (Qgw)							
Cs =	2.38	mg/L	Ambient nitrate concentration in ground water							
Cr =	4.81	mg/L	Projected concentration - end of the mixing zone							
Sign. Criteria =	7.5	mg/L	Nonsignificance Criteria, ARM 17.30.715							
Sign. Activity?	<7.5	mg/L	The activity is not significant							

# APPENDIX D – SIGNIFICANCE DETERMINATION AND REASONABLE POTENTIAL ANALYSES

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY (DEQ)								
	PHOSPHOROUS BREAKTHROUGH ANALYSIS							
	<u></u>							
SITE NAME:	Grass Valley Gardens Residential Subdivision							
COUNTY:	Missoula							
Permit #:	MTX000331							
NOTES:	Variables used are based on conservative measurements Design Capacity = 120,000 gpd; Design flow 16,042 ft <sup>3</sup> /d							
	Design Capacity = 120,000 gpd, Design low 16,042 lt/d							
VARIABLES	DESCRIPTION							
	DESCRIPTION	<u>VALUE</u> 174						
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow							
L	Length of Primary Drainfield's Long Axis	387						
W	Width of Primary Drainfield's Short Axis	71						
В	Depth to Limiting Layer from Bottom of Drainfield Laterals*	15						
D	Distance from Drainfield to Surface Water	11500						
T Ne	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils, 1.0 ft for fine soils)**	0.5	ft					
Sw	Soil Weight (usually constant)		lb/ft3					
Ра	Phosphorous Adsorption Capacity of Soil (usually constant)		ppm					
#I	Design Flow Rate	120000	gpd					
		700	lle e 6 m					
PI X	Phosphorous Load per proposed wastewater treatment system	1.0E+06	lbs/yr					
^	Conversion Factor for ppm to percentage (constant)	1.0E+00						
EQUATIONS								
Pt	Total Phosphorous Load = (PI)(#I)		lbs/yr					
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	40925250						
W2	Soil Weight from Drainfield to Surface Water	678643750	lbs					
	= [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)							
P1	Total Phosphorous Adsorption by Soils = $(W1 + W2)[(Pa)/(X)]$	143914	lbs					
SOLUTION								
ВТ	Breakthrough Time to Surface Water = P / Pt	197	years					