ENVIRONMENTAL SUMMARY
PREPARED IN ACCORDANCE WITH SANDERS COUNTY SUBDIVISION REGULATIONS

for

BLUE CREEK SUBDIVISION

On Property Legally Described as: The Southwest One-Quarter of the Northwest One-Quarter (SW1/4 NW1/4) of Section 20 Lying North of Montana Highway 200, Township 27 North, Range 34 West, Principal Meridian Montana, Sanders County, Montana. Containing a total of 25.94 Acres, more or less.

Dated: January 15th, 2023
Revised: July 26, 2024

Prepared For:
Tungsten Holdings, Inc.
809 Mineral Ave.
Libby, MT 59923

Prepared By:
IMEG Corp
1817 South Ave West, Suite A
Missoula, MT 59801

REVISION NOTE: Based on the July 23rd, 2024, Sanders County Commissioner meeting, and public comments provided during this meeting it has been determined that the information submitted in the previous water and sanitation report in regards to available water quantity for the proposed individual wells was not sufficient. During our re-review of the previously provided report and supporting materials we found errors in the reference to the well log GWIC number used in the original report and agree that not enough information was provided for a thorough review of the information. As a result, the Environmental Assessment has been updated to reflect GWIC references and updates to the Water & Sanitation Report as discussed with the county after the conclusion of the July 23rd Public Hearing. Please refer to the "Groundwater Section", herein, that better reflects the updated groundwater materials. We apologize for not providing adequate information in the previous version that was reviewed during the preliminary plat review process. Thank you for the opportunity to correct this and speak on the matter at the next hearing scheduled for July 30th, 2024.

ENVIRONMENTAL ASSESSMENT

Information specified in this Part must be provided in addition to that required in parts I and II of this application form, unless the proposed subdivision qualifies for an exemption under Section IV-A-1.b of the subdivision regulations. Describe the following environmental features, provide responses to each of the following questions and provide reference materials as required.

1. Surface Water

   Locate on a plat overlay or sketch map:

   a. Any natural water systems such as streams, rivers, intermittent streams, lakes or marshes (also indicate the names and sizes of each).

b. Any artificial water systems such as canals, ditches, aqueducts, reservoirs, and irrigation systems (also indicate the names, sizes and present uses of each).
c. Time when water is present (seasonally or all year).
d. Any areas subject to flood hazard, or in delineated 100-year floodplain.
e. Describe any existing or proposed streambank alteration from any proposed construction or modification of lake beds or stream channels. Provide information on location, extent, type and purpose of alteration, and permits applied for.

A National Wetlands Inventory Map and FEMA Floodplain Map are provided in Section B of this application packet. These maps support that there are no streams, rivers, creeks, streams, lakes, ponds, marshes, natural drainages, artificial water systems or wetlands located on the subject property or directly adjacent to the development. Therefore, the Preliminary Plat, surveyed by a PLS licensed in the state of Montana does not show the requirements as provided above.

2. Groundwater

Using available data, provide the following information:

a. The minimum depth to water table and identify dates when depths were determined. What is the location and depth of all aquifers which may be affected by the proposed subdivision? Describe the location of known aquifer recharge areas which may be affected.

A summary report of the GWIC database for the Township, Range, and Section was pulled from the GWIC website and is included within the Water & Sanitation Report, Section D. This summary of area shows that the average well yield is 11- gpm. Further, while reviewing the lithology of the well logs, provided within the Water and Sanitation Report of the area, they provide a pattern of an alluvial aquifer located approximately at a depth of 63-197 feet below ground surface that provides adequate water quantity. This meets the requirement for yield pursuant to DEQ Circular 20. Across Highway 200, is an existing well (GWIC Id: 125985) which is where the sample was taken. The well log from this well shows a 20-gpm yield over a 1-hour period. This is also the well in which water quality samples were collected. Please reference the Water and Sanitation Report (Section I.5. Water Quantity) providing further information on depths to the water table.

b. Describe any steps necessary to avoid depletion or degradation of groundwater recharge areas.

All on-site treatment will be designed in accordance with the State of Montana's non-degradation requirements. If it is determined by DEQ that this well log comparison is not sufficient evidence of adequate water quantity to meet the regulation, then either a test well with an associated pump test will be completed, or cisterns for low producing wells will be proposed per the requirements in ARM 17.36 and DEQ Circular 20. Further, a non-degradation analysis of impacts to groundwater quality from the proposed wastewater treatment systems show there will be no significant changes to water quality. Please reference the Water and Sanitation Report (Section I.2. Description) providing further information pertaining to the steps necessary to avoid depletion or degradation of groundwater recharge areas.

3. Topography, Geology and Soils

a. Provide a map of the topography of the area to be subdivided, and an evaluation of suitability for the proposed land uses. On the map identify any areas with highly erodible soils or slopes in excess of 15% grade. Identify the lots or areas affected. Address conditions such as:

i Shallow bedrock
ii Unstable slopes
iii Unstable or expansive soils
iv Excessive slope

A USGS Topographic Map is provided of the site and adjacent areas. Please see the Slope Analysis, within the Supplemental Data Sheets (Section A), which provides an evaluation of slope categories found on the site. Lots in excess of 15% grade have been shown. Areas containing slopes 25% or greater have been designated as "No Build-Zone" on the face of the Preliminary Plat.

b. Locate on an overlay or sketch map:

i Any known hazards affecting the development which could result in property damage or personal injury due to:

A. Falls, slides or slumps -- soil, rock, mud, snow.
B. Rock outcroppings
C. Seismic activity.
D. High water table

The extent of the property lies within an area that is largely made up of less than 15% slopes and timbered. Please see both the Aerial Map and USGS Topographic Map in Section B supporting this topography. Portions within proposed Lots 1 and 2 and along Blue Creek Road will be designated as "No Build-Zone" due to slopes of 25% or greater as provided on the Preliminary Plat. This is intended to mitigate potentially adverse impacts to future development to avoid unstable or expansive slopes and soils. The applicant does not foresee any geological issues arising from the development of these lots. There are no other known geologic hazards such as slumping, land slide, seismic activity, shallow bedrock etc. on or directly adjacent to the proposed development.

c. Describe measures proposed to prevent or reduce these dangers.

The subject property contains steep slopes along areas of Blue Creek Road and proposed Lots 1 and 2 while the remainder of the subject property consists of slopes that are less than 15%. These areas can be reviewed within the Slope Analysis, within the Supplemental Data Sheets, provided in Section A of this submittal packet. The property has been historically timbered where 25% or greater slopes exist on the site and are proposed to be a "No Build-Zone". This is intended to mitigate potentially adverse impacts to future development to avoid unstable or expansive slopes and soils. Further, stormwater infrastructure and associated easements have been designed to provide suitable drainage and stormwater management for surface water or runoff that may be generated and detained on the subject property.

Development of future home sites is anticipated to occur towards the newly proposed roadway due to the construction of driveways and future utility connections. All other areas, not identified with an "No Build-Zone" are not intended to restrict development. The

subdivision design and development conforms to the general landforms and topography to minimize alteration to the natural landscape.

d. Describe the location and amount of any cut or fill more than three feet in depth. Indicate these cuts or fills on a plat overlay or sketch map. Where cuts or fills are necessary, describe plans to prevent erosion and to promote vegetation such as replacement of topsoil and grading. **The graded areas of the road surface will not result in slopes steeper than 3:1 (horizontal to vertical). The provided cross sections propose a 4:1 side slope off the roadway into the stormwater catch basins. A large portion of the grade changes occur along the southern property line of proposed Lot 2 at approximately 2,321' elevation but does not result in more than 4-feet of cut and fill. This is supported within the Grading, Drainage, and Road Construction Plans (Section D). Silt fences will be installed before excavation takes place and filter fabric will be used to avoid ponding or trenching. Grading and Drainage Engineering Design Report (Section D) offers design aspects and calculations of stormwater facilities to mitigate storm water for each of the lots and proposed access roads. The stormwater retention facilities will be in accordance with MDEQ requirements mitigating pre- and post-development 100-year storm and any potential erosion due to grading during and after construction.**

This project is required to establish a Noxious Weed Management Application and Plan, which has been prepared in accordance with the Sanders County Subdivision Regulations and Montana County Noxious Weed Control Act. The plan details the current conditions of the site, the weed management goals for the subdivision, and it specifies specific weed management techniques (control actions) that will be followed to ensure noxious weeds are actively managed on the property indefinitely. A copy of the Noxious Weed Management Application and Plan has can be reviewed in Section C.

4. Vegetation

a. On a plat overlay or sketch map:

(i) Indicate the distribution of the major vegetation types, such as marsh, grassland, shrub, coniferous forest, deciduous forest, mixed forest.

The provided Montana Natural Heritage Program (MTNHP) summarizes vegetation types that may be located on the project site. Specifically, please see the map on page 6 of Environmental Summary Report in Section E which supports the property is largely coniferous forest based on IMEG site visit and photos. This is further supported by the Environmental Summary Report on page 17 that provides the subject property would classify largely as Rocky Mountain Mesic Montane Mixed Conifer Forest. There are no other major vegetation types as listed in this criterion.

(ii) Identify the location of critical plant communities such as:

A. Stream bank or shoreline vegetation

B. Vegetation on steep, unstable slopes

C. Vegetation on soils highly susceptible to wind or water erosion

D. Type and extent of noxious weeds

An Environmental Summary Report has been provided by Montana Natural Heritage Program (MTNHP) and can be reviewed in Section D of this submittal. No critical plant communities have been identified on the property based upon the data provided.

The established Noxious Weed Management Application and Plan (Section C) provides details of type and extent of noxious weeds that may exist on the site.

b. Describe measures to:

(i) Preserve trees and other natural vegetation (e.g. locating roads and lot boundaries, planning construction to avoid damaging tree cover).

Although portions of this site will be thinned or cleared for infrastructure (roadways, utilities, drainfields, home sites etc.,) it is anticipated each proposed lot will not be cleared or logged completely. The larger rural tracts as proposed will further support the perseveration of trees and natural vegetation where infrastructure is not proposed. The applicant is not aware of any unstable slopes, soils highly susceptible to wind or water erosion. There are no stream banks or shoreline vegetation on the project site.

(ii) Protect critical plant communities (e.g. keeping structural development away from these areas), setting areas aside for open space.

No critical plant communities have been identified on the property.

(iii) Prevent and control grass, brush or forest fires (e.g. green strips, water supply, access.)

The proposed development is located in the WUI, therefore, this application packet includes a Fire Risk Rating Form evaluating the risk of wildfire hazards. This will be reviewed by the subdivision administrator and local fire protection district for adequate fire protection measures. The applicant intends to implement maintenance provisions for any infrastructure such as water supplies, subdivision road signs and roadways. The Fire Risk Rating Form is provided in Section E of the submittal packet.

(iv) Control and prevent growth of noxious weeds

The plant communities can be reviewed within the Noxious Weed Management Application and Plan has can be reviewed in Section C.

5. Wildlife

a. Identify species of fish and wildlife use the area affected by the proposed subdivision.

An Environmental Summary Report has been provided by Montana Natural Heritage Program (MTNHP) and can be reviewed in Section D of this submittal. Each of the species known to occur on this property have been outlined in the Environmental Summary Report (pages 3 and 6-7). This exhibit identifies the wildlife that Montana FWP's database lists as being "known to utilize all or a portion of" the section, township, and range that this project is located within. The wildlife includes Bald Eagle, Fisher, Wolverine, and a variety of plant species anticipated to be in the area. The report highlights the presence of Bald Eagles. The Wildlife Exhibit located in Section B provides the possibility of White-Tail Deer, Mule Deer, and Elk to using this site.

The proposed project mitigates impacts on wildlife and wildlife habitat which is inhabited by birds, small and large mammals within this mixed rural residential and timbered area through

proposing larger tracts of land that will preserve habitat for those species that may visit or pass through the site.

b. On a copy of the preliminary plat or overlay, identify known critical wildlife areas, such as big game winter range, calving areas and migration routes; riparian habitat and waterfowl nesting areas; habitat for rare or endangered species and wetlands.
Please reference the Environmental Summary Report (Section E) which supports the subject site is not known to have critical wildlife areas as provided above. The ranges for Elk, Mule Deer and White-Tailed Deer Distribution Maps can be reviewed within the Wildlife Exhibit in Section B. These maps show the area intersects Winter/General range types for Elk, Mule Deer, and White-tailed Deer. These species occur in the area and show suitable habitats within the distribution maps, however, not all areas will always have animals or sign of animals every year. Not all populations concentrate on specific ranges during the winter season. In areas where no winter distribution is delineated animals depend upon and occur across their General Distribution area during the winter season. The specific areas occupied may expand or contract through time as seasons, population levels and habitat conditions change. There are no other known wildlife migration corridors, waterfowl nesting areas, or wetlands located on the subject property.

c. Describe proposed measures to protect or enhance wildlife habitat or to minimize degradation (e.g. keeping buildings and roads back from shorelines; setting aside wetlands as undeveloped open space).
The proposed project mitigates impacts on wildlife and wildlife habitat which is inhabited by birds, small and large mammals within this mixed rural residential and timbered area as much of the existing vegetation will remain. This development considers the surrounding character of neighboring properties which are generally rural residential developments mixed with larger tracts of vacant land. It should be noted that the intent of the subdivider is to propose cash-in-lieu instead of proposing open space or a parkland dedication. This option will support other desirable locations throughout the county to be improved and provide easier connectivity and public access than the subject parcel.

Sincerely,
IMEG, Corp.

Prepared by:

Tamara Ross

IMEG | Civil Designer / Planning Technician

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WATER & SANITATION REPORT

for

BLUE CREEK SUBDIVISION

On Property Legally Described as: The Southwest One-Quarter of the Northwest One-Quarter (SW1/4NW1/4) of Section 20 Lying North of Montana Highway 200, Township 27 North, Range 34 West, Principal Meridian Montana, Sanders County, Montana. Containing a total of 25.94 Acres, more or less.

Published: August 16, 2023
Revised: July 26, 2024

Prepared For:
Tungsten Holdings
PO Box 1213,
Libby, Montana 59923

Prepared By:
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1817 South Avenue West, Suite A
Missoula, MT 59801

REVISION NOTE: Based on the July 23rd, 2024, Sanders County Commissioner meeting, and public comments provided during this meeting it has been determined that the information submitted in the previous water and sanitation report in regards to available water quantity for the proposed individual wells was not sufficient. During our re-review of the previously provided report and supporting materials we found errors in the reference to the well log GWIC number used in the original report and agree that not enough information was provided for a thorough review of the information. The revisions made to this report and supporting materials is intended to provide information specific to the availability in groundwater quantity from the proposed wells in accordance to 76-3-622(G)(e). We apologize for not providing adequate information in the previous version that was reviewed during the preliminary plat review process. Thank you for the opportunity to correct this and speak on the matter at the next hearing scheduled for July 30th, 2024.

I.1. **Map.** A vicinity map or plan that shows:

a. The location, within 100 feet outside of the exterior property line of the subdivision and on the proposed Lots, of flood plains; surface water features; springs; irrigation ditches;
A vicinity map is included showing the location of the property in relation to the surrounding area. A more detailed and extensive MDEQ Lot Layout Exhibit is attached (Attachment I.3) showing all the required information outlined in section I.1 of the subdivision application and section I.3 of the subdivision application. There are no known springs or irrigation ditches within 100 feet of the property.

b. Existing, previously approved, and, for parcels fewer than 20 acres, proposed water wells and wastewater treatment systems; for parcels less than 20 acres, mixing zones;
Individual wells and individual drainfields along with their mixing zones for the proposed subdivision are all shown on the MDEQ Lot Layout.

c. The representative drainfield site used for the soil profile description; and
The representative drainfield site used for the soil profile descriptions are shown on the

MDEQ Lot Layout. A total of ten (10) soil profiles have been conducted on the site in 2022 by IMEG.

d. The location, within 500 feet outside of the exterior property line of the subdivision, of public water and sewer facilities.
There are no public water or sewer facilities within 500' of the property lines of the subdivision.

I.2. Description. A description of the proposed subdivision's water supply systems, storm water systems, solid waste disposal systems, and wastewater treatment systems, including whether the water supply and wastewater treatment systems are individual, shared, multiple user, or public as those systems are defined in rules published by the Montana Department of Environmental Quality (DEQ).

Water Supply
Lots 1 through 9 of the proposed subdivision will all have proposed individual wells. All proposed wells will supply both domestic and lawn and garden irrigation. Cisterns may be necessary to be connected to the individual wells if it is found during the DEQ review process that there is a chance some of the wells are insufficient in meeting the required water quantity as required in DEQ Circular 20. There are no existing wells in the proposed subdivision.

Wastewater Treatment System
Proposed individual wastewater systems are to serve all nine (9) lots.. All proposed systems have been designed using 4 bedrooms and a design flow of 350 GPD each and will consist of a 1500-gallon septic tank.

For Lot 1 and 2, based on soil profiles excavated near the area of the proposed drainfield and 100% replacement area are Clay Loam and Gravelly Clay Loam, respectively. The system will consist of a minimum of 300 lineal feet of pressurized drainfield for the primary locations and a minimum of 195 lineal feet for the replacement areas.

For Lots 3-8, based on soil profiles excavated near the area of the proposed drainfield and 100% replacement area are Gravelly Sandy Loam and Very Gravelly Sandy Loam. The system will consist of a minimum of 150 lineal feet of pressurized drainfield for the primary locations and a minimum of 195 lineal feet for the replacement areas.

For Lot 9, based on soil profiles excavated near the area of the proposed drainfield and 100% replacement area are Very Gravelly Fine Sandy Loam. The system will consist of a minimum of 180 lineal feet of pressurized drainfield for the primary locations and a minimum of 240 lineal feet for the replacement areas.

Stormwater
Increase in storm drainage runoff will be mitigated per Sanders County Subdivision Regulations and DEQ Circular 8. Proposed swales and retention ponds are designed to capture the increase in storm drainage runoff.

Solid Waste
Heron has a refuse site to control storage, collection, and the disposal of solid waste from this proposed development. Further, if a future lot owner wishes to be served by a private contractor for Solid Waste Disposal it is up to each lot owner to arrange collection.

I.3. Lot Layout. A drawing of the conceptual Lot layout at a scale no smaller than 1 inch equal to 200 feet that shows all information required for a Lot layout document in rules adopted by the Montana Department of Environmental Quality pursuant to 76-4-104, MCA.
A drawing of the MDEQ Lot layout at an acceptable scale of no smaller than 1 inch equal to 200 feet that shows all the information required pursuant to 76-4-104, MCA is included.

I.4. Suitability. Evidence of suitability for new on-site wastewater treatment systems that, at a minimum, include:

a. A soil profile description from a representative drain-field site identified on the vicinity map that complies with standards published by the Montana Department of Environmental Quality;
A total of ten (10) soil profiles have been conducted across the property and primarily demonstrated textures of Clay Loam and Sandy Loam across the site. These soil profile locations are marked on the attached MDEQ Lot Layout Exhibit (Attachment I.3). The soil profile results are attached as Appendix A of this report and demonstrate the site's soil characteristics in further detail. This type of soil has been found to be suitable for new on-site wastewater treatment systems and provide treatment for wastewater effluent.

b. Demonstration that the soil profile contains a minimum of 4 feet of vertical separation distance between the bottom of the permeable surface of the proposed wastewater treatment system and a limiting layer; and
Soil profiles for all but one location show that there is no limiting layer on-site. Soil profiles were dug down to a depth of 120" with no indication showing a potential limiting layer within 4 feet of the proposed drainfield trenches.

c. In cases in which the soil profile or other information indicates that ground water is within 7 feet of the natural ground surface, evidence that the ground water will not exceed the minimum vertical separation distance of 4 feet.
Groundwater monitoring was completed in 2022. The approved groundwater monitoring results are enclosed in Appendix A.

I.5. Water Quantity. For new water supply systems, unless cisterns are proposed, evidence of adequate water availability:

a. obtained from well logs or testing of onsite or nearby wells;
According to ARM 17.36.332, in order to show sufficient quantity, individual wells must provide a sustained yield of at least ten gallons per minute over a one-hour period and six gallons per minute over a two-hour period.
There are no onsite wells. A review of the surrounding well logs that were available on the GWIC website have been included in Appendix B of this report, please refer to the Well Log Vicinity Map herein. Across Highway 200, is an existing well (GWIC Id: 257791). The well log from this well shows a 20-gpm yield over a 1-hour period. This is also the well in which water quality samples were collected.

A total of eight (8) well logs were located per the GWIC website in the vicinity of the property. Five (5) out of the eight (8) well logs meet the requirements for water quantity for individual wells per DEQ Circular 20. While reviewing the lithology of the well logs it shows a pattern of an alluvial aquifer located approximately at a depth of 63-197 feet below ground surface that provides adequate water quantity. The wells that are not meeting the required quantity in DEQ Circular 20 generally appear to be all drilled and finished in a bedrock or shale formation that is hit or miss for water quantity.

The subject property lies at the elevation of Hwy 200 and slopes up towards Fatman Road to the north. The proposed well locations are generally located at the base of this slope and below the apparent ridge to the north. It is our opinion, that the surrounding well logs to the west and south of the site, GWIC Id's 14337, 286136, and 257791, are the most accurate representation of the expected lithology and aquifer conditions for this site. Furthermore, the most recently drilled well (GWIC Id: 330589) is located to the west and is finished in the top 20 feet of the bedrock aquifer and produced a 20-gpm yield over a 1-hour period.

A summary report of the GWIC database for the Township, Range, and Section was pulled from the GWIC website. This summary shows that the average well yield is 11- gpm. This meets the requirement for yield pursuant to DEQ Circular 20.

This matter will be reviewed in more detailed under the purview and requirements to MT DEQ during the Sanitation in Subdivision review process. If it is determined by DEQ that this well log comparison is not sufficient evidence of adequate water quantity to meet the regulation, then either a test well with an associated pump test will be completed, or cisterns for low producing wells will be proposed per the requirements in ARM 17.36 and DEQ Circular 20.

Attached in Appendix B of this report is a well log vicinity map which shows the tracts of land the well logs are associated with, a depiction of which wells meet water quantity requirements, copies of the well logs, and a summary report of the GWIC database which shows the average yield of the wells in this Township, Range, and Section is 11- gpm.

b. obtained from information contained in published hydro-geological reports; or
Section is not applicable as Section (a) above sufficiently provides evidence of an ample quantity of water.

c. as otherwise specified by rules adopted by the Montana Department of Environmental Quality pursuant to 76-4-104, MCA.
Section is not applicable as Section (a) above sufficiently provides evidence of an ample quantity of water.

I.6. Water Quality. Evidence of sufficient water quality in accordance with rules adopted by the Montana Department of Environmental Quality pursuant to 76-4-104, MCA.
Water Quality results have been included in Appendix B of this report. This information includes Water sample results and existing well logs.

I.7. Impacts to groundwater quality. Preliminary analysis of potential impacts to ground water quality from new wastewater treatment systems, using as guidance rules adopted by the board of environmental review pursuant to 75-5-301, MCA and 75-5-303, MCA related to standard mixing zones for ground water, source specific mixing zones, and non-significant changes in water quality. The preliminary analysis may be based on currently available information and must consider the effects of overlapping mixing zones from proposed and existing wastewater treatment systems within and directly adjacent to the subdivision. Instead of performing the preliminary analysis, the sub-divider may perform a complete non-degradation analysis in the same manner as is required for an application that is reviewed under Title 76, Chapter 4.
Non-degradation analysis of impacts to groundwater quality from the proposed wastewater treatment systems show there will be no significant changes to water quality. The supporting information is included in Appendix B of this report.

Sincerely,
IMEG. Corp

Reviewed By:

Dan Fultz, R.S.
Senior Civil Designer II

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APPENDIX A

1. Soil Profile Logs
2. Groundwater Monitoring Results

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 1A

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 2	2	Forest Duff	N/A	N/A	N/A	N/A	N/A	
2 - 81	79	Subangular Blocky	10% Gravel	Clay Loam	Tan	Dry	1-2"	
81 - 98	17	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 2

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 1	1	Forest Duff	N/A	N/A	N/A	N/A	N/A	
1 - 22	21	Granular	5% Rock	Loam	Light Brown	Dry	<1"	
22 - 89	67	Subangular Blocky	15-20% Gravel/Cobbles	Gravelly Clay Loam	Tan	Dry	1-2"	
89 - 110	21	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 3

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 4	4	Forest Duff	N/A	N/A	N/A	N/A	N/A	
4 - 28	24	Granular	5% Gravel	Loam	Light Brown	Dry	<1"	
28 - 75	47	Structureless	25-30% Gravel/Cobbles	Gravelly Sandy Loam	Tan	Dry	<1"	
75 - 106	31	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 4

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 2	2	Forest Duff	N/A	N/A	N/A	N/A	N/A	
2 - 37	35	Granular	5% Cobbles	Fine Sandy Loam	Light Brown	Dry	<1"	
37 - 82	45	Structureless	20-25% Gravel	Gravelly Sandy Loam	Tan	Dry	<1"	
82 - 100	18	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 5

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 6	6	Forest Duff	N/A	N/A	N/A	N/A	N/A	
6 - 22	16	Granular	5% Gravel	Fine Sandy Loam	Light Brown	Dry	<1"	
22 - 92	70	Structureless	25-30% Gravel	Gravelly Sandy Loam	Tan	Dry	<1"	Roots extend to 92"
92 - 109	17	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 6

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 5	5	Forest Duff & Log Litter	N/A	N/A	N/A	N/A	N/A	
5 - 26	21	Granular	5% Rock	Fine Sandy Loam	Light Brown	Dry	<1"	
26 81	55	Structureless	25-30% Gravel	Gravelly Sandy Loam	Tan	Dry	<1"	Roots extend to 81"
81 - 110	29	Granular	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 7

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 5	5	Forest Duff & Log Litter	N/A	N/A	N/A	N/A	N/A	
5 - 18	13	Granular	5% Gravel	Loam	Light Brown	Dry	<1"	
18 - 75	57	Structureless	55-60% Gravel	Very Gravelly Sandy Loam	Tan	Dry	<1"	Some Boulders
75 - 110	35	Structureless	30% Gravel	Gravelly Loam	Dark Brown	Moist	<1"	
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 8

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 8	8	Forest Duff & Log Litter	N/A	N/A	N/A	N/A	N/A	
8 - 22	14	Granular	5% Gravel	Loam	Light Brown	Dry	<1"	
22 - 75	53	Structureless	55-60% Gravel	Very Gravelly Sandy Loam	Tan	Dry	<1"	
75 - 116	41	Massive	N/A	Silt Loam	Dark Brown	Somewhat Moist	2"	Extent of Roots; Potential Limiting Layer

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Project Name: Blue Creek Subdivision Feasibility | Project No.: 22003448.00

Client Name: Tungsten Holdings Inc | Lot No.: N/A

Site Evaluator: Dan Fultz | County: Sanders | Date: 10/4/2022

Soil Profile - SP No: SP- 9

Depth (in)	Thick (in)	Structure	Stoniness	Texture	Color	Moisture	Length of Ribbon	Other Comments*
0 - 5	5	Forest Duff	N/A	N/A	N/A	N/A	N/A	
5 - 14	9	Granular	5% Gravel	Loam	Light Brown	Dry	<1"	
14 - 67	53	Structureless	55-60% Gravel	Very Gravelly Fine Sandy Loam	Tan	Dry	<1"	
67 - 102	35	Structureless	Some Boulders/ Clay clumps	Loamy Sand	Dark Brown	Somewhat Moist	<1"	Moist from GW monitor
								No Limiting Layer Observed

* Include information such as roots present, apparent high ground water level, actual water level, bedrock, layer consistency, color variations, or any other information as appropriate.

Site Factors and Setback Distances

Vegetation: Forested | Slope: | Flooding Risk:

Notes: Partly Cobbly | SP Application Rate: gpd/ft2

	Water Supply Wells		Sealed(1)/Other(2) Components		Drainfields Sand Mounds		Notes
Public or Multi-use Wells	-	NA	100	X	100	X	
Other Wells	-	NA	50	X	100	X	
Suction Lines	-	NA	50	X	100	X	
Cisterns	-	NA	25	X	50	X	
Roadcuts/Escarpments	-	NA	10 (3)	X	25	X	
Slopes > 25% (4)	-	NA	10 (3)	X	25	X	
Property Boundaries	10	10	10	X	10	X	
Subsurface Drains	-	NA	10	X	10	X	
Water Lines	-	NA	10	X	10	X	
Drainfields / Sand Mounds	100	100	10	X	-	NA	
Foundation Walls	-	NA	10	X	10	X	
Surface Water, Springs	100	100	50	X	100	X	
Floodplains	10	10	0(1)/100(2)	X	100	X	

(1) Sealed Components include sewer lines, sewer mains, septic tanks, grease traps, dosing tanks, and pumping chambers.
(2) Other components include intermittent and recirculating sand filters, package plants and evapotranspiration systems
(3) Sewer lines and mains may be located in roadways and on steep slopes if they are safeguarded against damage.
(4) Down-gradient of the sealed component, other component, or drainfield/sand mound.

Daniel D. Fultz

From: Shawn Sorenson <ssorenson@co.sanders.mt.us>
Sent: Monday, July 31, 2023 8:29 AM
To: Daniel D. Fultz
Subject: RE: Blue Creek Subdivision - Groundwater Monitoring Results

I agree with your conclusion. This happens frequently in areas with high precip and the pipe sits over-winter.

From: Daniel D. Fultz <Daniel.D.Fultz@imegcorp.com>
Sent: Monday, July 31, 2023 8:13 AM
To: Shawn Sorenson <ssorenson@co.sanders.mt.us>; projects@tungstenholdings.com
Cc: Bradley Fitchett <Brad.Fitchett@elkcreekcontracting.com>
Subject: RE: Blue Creek Subdivision - Groundwater Monitoring Results

Shawn,

I think from Brad and Crawfords' first hand accounts, that the settling around the pipe combined with the snow melt and rain runoff going into this depression, were a contributing factor of seeing water in the hole. With all other holes being dry it seems like this may not be groundwater. Either way, the hole had passing results for a shallow capped system. I think that is how we will proceed unless you feel strongly about this.

Dan Fultz, Registered Sanitarian
IMEG | Civil Designer

1817 South Ave West | Suite A | Missoula, MT 59801

(406) 721-0142 | phone
(406) 532-0246 | single reach
(814) 720-9312 | mobile
(406) 721-5224 | fax
Daniel.D.Fultz@imegcorp.com

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From: Shawn Sorenson <ssorenson@co.sanders.mt.us>
Sent: Friday, July 28, 2023 7:13 AM
To: Daniel D. Fultz <Daniel.D.Fultz@imegcorp.com>; projects@tungstenholdings.com
Cc: Bradley Fitchett <Brad.Fitchett@elkcreekcontracting.com>
Subject: RE: Blue Creek Subdivision - Groundwater Monitoring Results

Hello Dan,
Thank you for the data. The results look acceptable.

Regarding your last sentence, are you saying the rain and snow melt was the cause of settling and the possible groundwater reading, as opposed to actual groundwater?

Thanks,

Shawn

Shawn Sorenson
Sanders County Environmental Health
PO Box 519
Thompson Falls, MT 59873
(406) 827-6909 (w)
(907) 738-4268 (c)

From: Daniel D. Fultz <Daniel.D.Fultz@imegcorp.com>
Sent: Thursday, July 27, 2023 7:28 PM
To: Shawn Sorenson <ssorenson@co.sanders.mt.us>; projects@tungstenholdings.com
Cc: Bradley Fitchett <Brad.Fitchett@elkcreekcontracting.com>
Subject: RE: Blue Creek Subdivision - Groundwater Monitoring Results

Shawn,

Attached are the groundwater monitoring results recorded by Brad Fitchett for the Blue Creek Subdivision site. Also attached is a photo of SP8. This is the only hole that showed any type of water and this photo was taken on the first day of readings. As you can see this hole settled quite a bit with snow melt going directly into the hole. We believe this was the direct result of the groundwater found in this hole.

Please confirm these are acceptable results.

Dan Fultz, Registered Sanitarian
IMEG | Civil Designer

1817 South Ave West | Suite A | Missoula, MT 59801

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Daniel.D.Fultz@imegcorp.com

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From: Shawn Sorenson <ssorenson@co.sanders.mt.us>
Sent: Tuesday, March 7, 2023 7:12 AM
To: projects@tungstenholdings.com
Cc: Daniel D. Fultz <Daniel.D.Fultz@imegcorp.com>
Subject: RE: Blue Creek Subdivision - Groundwater Monitoring

Hello Crawford,
May – June is typical, but varies by location. Our groundwater potential definitely varies by site, and whether potential for ground water is influenced by the Clark Fork River, more local sources, or a combination. We normally try to get monitoring tubes in the ground by April and determine testing frequency by what we are seeing (hopefully not seeing) in the pipe.

For example, we saw an April 16th peek in groundwater in three test holes on Wendell and Lisa Beachy's property up Whitepine Creek last year. Not related to the creek or the river.

Thanks,

Shawn

Shawn Sorenson
Sanders County Environmental Health
PO Box 519
Thompson Falls, MT 59873
(406) 827-6909 (w)
(907) 738-4268 (c)

From: projects@tungstenholdings.com <projects@tungstenholdings.com>
Sent: Friday, March 3, 2023 4:46 PM
To: Shawn Sorenson <ssorenson@co.sanders.mt.us>
Cc: Daniel.D.Fultz@imegcorp.com
Subject: Blue Creek Subdivision - Groundwater Monitoring

Hello Shawn,

I'm following up on our Blue Creek Subdivision project. Last fall when soil profiles were done, it was determined that groundwater monitoring is needed for the property. We want to be sure to record 2 weeks before and after ground water peak, and would like to get those visits on our schedule. To be certain that we are following all procedures completely, could you clarify when ground water peak is?

Thanks!

Crawford Dinning
Tungsten Holdings
406-293-3714

22003448.00 Tungsten Holdings Blue Creek
Groundwater Monitoring - IMEG 2023

PASSING
Passsing with 4' = 48"

		Mon. Well #1a			Mon. Well #2		
	Height from EG to Top of Pipe (ft)	20" from Existy Grad to top of pipe			0" from EG to top of Pipe "Flush"		
	Total Pipe (ft)	10.00			10.00		
Initials	Date	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition
BF	4/3/23	No Water	0.00	Snow on Sur.	No Water	0.00	Snow on Sur.
BF	4/12/23	No Water	0.00	Slightly Damp	No Water	0.00	Slightly Damp
BF	4/18/23	No Water	0.00	Rain/Saturated	"	0.00	Rain/Saturated
BF	4/26/23	No Water	0.00	Dry	"	0.00	Dry
BF	5/1/23	No water	0.00	Dry	"	0.00	Dry
BF	5/7/23	"	0.00	Rain/Saturated	"	0.00	Rain/Saturated
BF	5/15/23	"	0.00	Dry	"	0.00	Dry
BF	5/23/23	"	0.00	Dry	"	0.00	Dry
BF	5/29/23	"	0.00	Dry	"	0.00	Dry
BF	6/19/23	No Water	0.00	Dry	No Water	0.00	Dry
			0.00			0.00	

22003448.00 Tungsten Holdings Blue Creek
Groundwater Monitoring - IMEG 2023

PASSING
Passsing with 4' = 48"

		Mon. Well #3			Mon. Well #4		
	Height from EG to Top of Pipe (ft)	11" from EG to top of pipe			11" from EG to top of Pipe		
	Total Pipe (ft)	10.00			10.00		
Initials	Date	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition
BF	4/3/23	No Water	0.00	Snow on Sur.	No Water	0.00	Snow on Sur
BF	4/12/23	No Water	0.00	Slightly Damp	No Water	0.00	Slightly Damp
BF	4/18/23	No Water	0.00	Rain/Saturated	No Water	0.00	Rain/Saturated
BF	4/26/23	No Water	0.00	Dry	No Water	0.00	Dry
BF	5/1/23	No Water	0.00	Dry	No Water	0.00	Dry
BF	5/7/23	"	0.00	Rain/Saturated	"	0.00	Rain/Saturated
BF	5/15/23	"	0.00	Dry	"	0.00	Dry
BF	5/23/23	"	0.00	Dry	"	0.00	Dry
BF	5/29/23	"	0.00	Dry	"	0.00	Dry
BF	6/19/23	No Water	0.00	Dry	No Water	0.00	Dry
			0.00			0.00	

22003448.00 Tungsten Holdings Blue Creek
Groundwater Monitoring - IMEG 2023

PASSING
Passsing with 4' = 48"

		Mon. Well #5			Mon. Well #6		
	Height from EG to Top of Pipe (ft)	13" from Existg Ground to top of pipe.			17" from Existg Ground to top of pipe		
	Total Pipe (ft)	10.00			10.00		
Initials	Date	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition
BF	4/3/23	No Water	0.00	Snow on Sur.	No Water	0.00	Snow on Sur.
BF	4/12/23	No Water	0.00	Slightly Damp	No Water	0.00	Slightly Damp
BF	4/18/23	"	0.00	Rain/Saturated	"	0.00	Rain/Saturated
BF	4/26/23	"	0.00	Dry	"	0.00	Dry
BF	5/1/23	"	0.00	Dry	"	0.00	Dry
BF	5/7/23	"	0.00	Rain/Saturated	"	0.00	Rain/Saturated
BF	5/15/23	"	0.00	Dry	"	0.00	Dry
BF	5/23/23	"	0.00	Dry	"	0.00	Dry
BF	5/29/23	"	0.00	Dry	"	0.00	Dry
BF	6/19/23	No Water	0.00	Dry	No Water	0.00	Dry
			0.00			0.00	

22003448.00 Tungsten Holdings Blue Creek
Groundwater Monitoring - IMEG 2023

PASSING
Passsing with 4' = 48"

		Mon. Well #7			Mon. Well #8		
	Height from EG to Top of Pipe (ft)	6" From Existing Groud to top of Pipe			0" Flush		
	Total Pipe (ft)	10.00			10.00		
Initials	Date	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition
BF	4/3/23	No Water	0.00	Snow on Sur	65" GW to top	0.00	Snow on Sur.
BF	4/12/23	No Water	0.00	Slightly Damp	74" GW to top	0.00	Slightly Damp
BF	4/18/23	"	0.00	Rain/Saturated	81" GW to Top	0.00	Rain/Saturated
BF	4/24/23	"	0.00	Dry	96" GW to Top	0.00	Dry
BF	5/1/23	"	0.00	Dry	109" GW to Top	0.00	Dry
BF	5/7/23	"	0.00	Rain/Saturated	No Water	0.00	Rain/Saturated
BF	5/15/23	"	0.00	Dry	No Water	0.00	Dry
BF	5/23/23	"	0.00	Dry	No Water	0.00	Dry
BF	5/29/23	"	0.00	Dry	"	0.00	Dry
BF	6/19/23	No Water	0.00	Dry	No Water	0.00	Dry
			0.00			0.00	

22003448.00 Tungsten Holdings Blue Creek
Groundwater Monitoring - IMEG 2023

PASSING
Passsing with 4' = 48"

		Mon. Well #9					
	Height from EG to Top of Pipe (ft)	12" EG to Top of Pipe					
	Total Pipe (ft)	10.00			10.00		
Initials	Date	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition	GW to top of pipe (ft)	GW to EG (ft)	Soil Condition
BF	4/3/23	No Water	0.00	Snow on Sur	[redacted]	0.00	[redacted]
BF	4/12/23	No Water	0.00	Slight Damp		0.00	
BF	4/19/23	"	0.00	Rain/Saturated		0.00	
BF	4/26/23	"	0.00	Dry		0.00	
BF	5/1/23	"	0.00	Dry		0.00	
BF	5/7/23	"	0.00	Rain/Saturated		0.00	
BF	5/15/23	"	0.00	Dry		0.00	
BF	5/23/23	"	0.00	Dry		0.00	
BF	5/29/23	"	0.00	Dry		0.00	
BF	6/19/23	No Water	0.00	Dry		0.00	
			0.00			0.00	

APPENDIX B

1. Sampled Well Log
2. Well Log Vicinity Map
3. Well Logs in Vicinity
4. GWIC Summary Report
5. Water Sample Results
6. Well Location Exhibit
7. Non-Degradation Analysis

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps

Site Name: WELCHER ALICIA & CHRISTOPHER
GWIC Id: 257791

Section 1: Well Owner(s)

1) WELCHER, ALICIA AND CHRISTOPHER (MAIL)
15920 VONSASTEN RD.
TRACY CA 95304 [08/31/2010]
2) WELCHER, ALICIA AND CHRISTOPHER (WELL)
150 HWY 200
HERON MT 59844 [08/31/2010]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	

County: SANDERS
Geocode:

Latitude	Longitude	Geomethod	Datum
48.088162	-116.007028	TRS-SEC	NAD83

Ground Surface Altitude: **Ground Surface Method:** **Datum:** **Date:**

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, August 31, 2010

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	25	10
25	160	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
2	160	6	0.25		WELDED	STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
160	160	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	25	BENTONITE	

Section 7: Well Test Data

Total Depth: 160
Static Water Level: 130
Water Temperature:

Air Test *

20 gpm with drill stem set at 155 feet for 1 hours.
Time of recovery 0.08 hours.
Recovery water level 130 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	30	GRAVEL, BOULDERS CLAY
30	135	GRAVEL, DIRT
135	160	GRAVEL, WATER

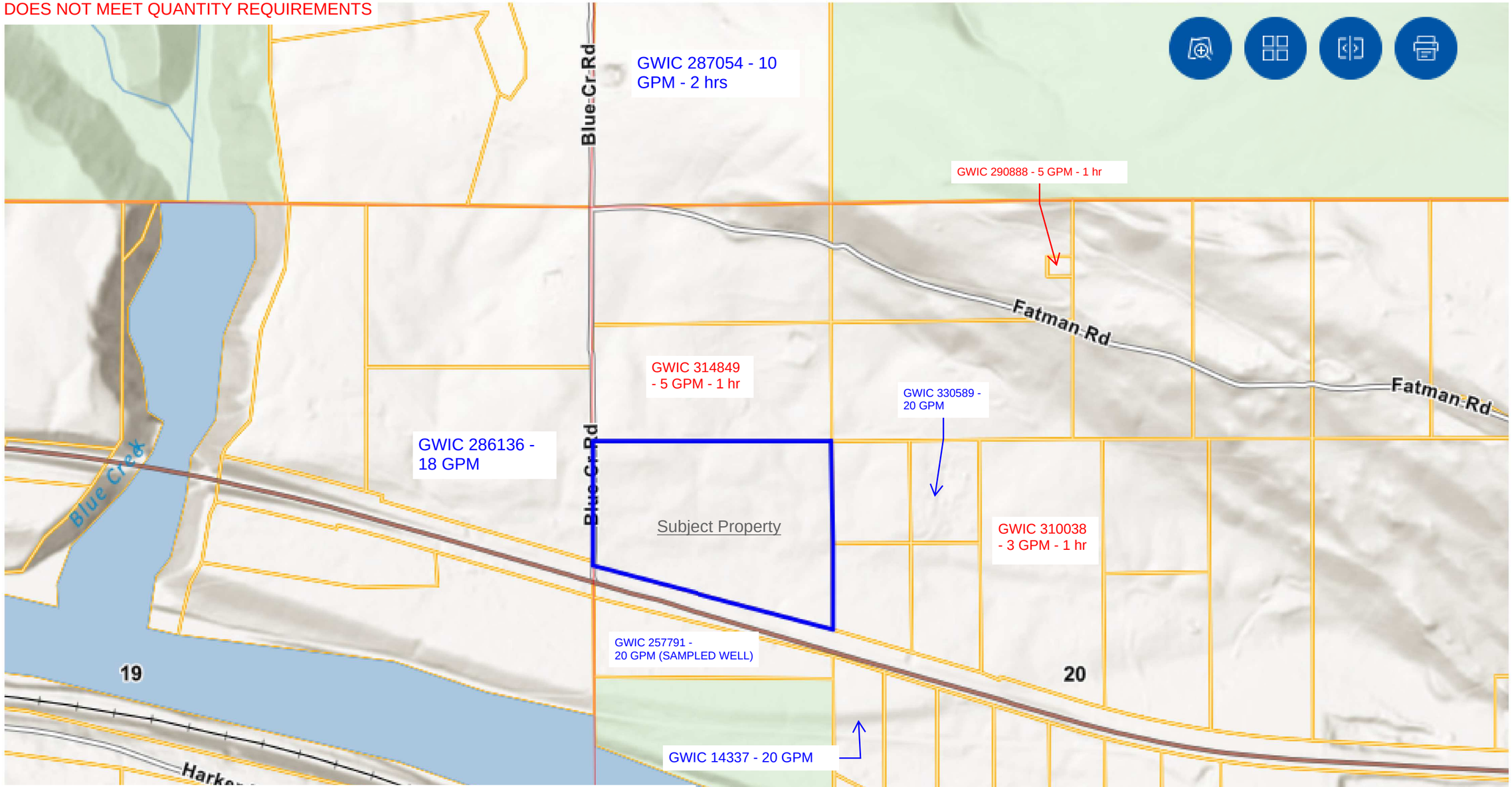
Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: EDWARD A. MINDEN
Company:
License No: WWC-561
Date Completed: 8/31/2010

WELL LOG VICINITY MAP
CREATED 7/25/2024
BY: IMEG - DAN FULTZ, R.S.
MEETS QUANTITY REQUIREMENTS
DOES NOT MEET QUANTITY REQUIREMENTS

35-3819-20-2-01-20-0000
MT HIGHWAY 200 HERON, MT 59844



DEQ Circular 20 - Reference per 2.1.1

a. Minimum Flows
   i. For each individual water system, the applicant must provide evidence of a sustained yield of at least:
      a. Ten (10) gallons per minute over a one-hour period; or
      b. Six (6) gallons per minute over a two-hour period; or
      c. Four (4) gallons per minute over a four-hour period.

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (7/9/2008 4:32:32 PM)

Site Name: ROYLANCE BILL
GWIC Id: 143307

Section 1: Well Owner(s)

1) ROYLANCE, BILL (MAIL)
267 MILLCREEK RD
SHERIDAN MT 59749 [05/31/1994]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	NE¼ SW¼

County
SANDERS

Geocode

Latitude	Longitude	Geomethod	Datum
48.086325	-116.009786	TRS-SEC	NAD83

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition	Block	Lot
ELK TERRACE		1

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: CABLE
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, May 31, 1994

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	100	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	100	6				STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
100	100	6	1	6	OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	100	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 100
Static Water Level: 72
Water Temperature:

Pump Test *

Depth pump set for test _ feet.
20 gpm pump rate with _ feet of drawdown after 5 hours of pumping.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level 72 feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source
Unassigned

From	To	Description
0	1	TOPSOIL
1	63	BOULDER GRAVEL CLAY
63	100	GRAVEL

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: ROBERT L. VETTER
Company: RL VETTER CONTRACTING
License No: WWC-549
Date Completed: 5/31/1994

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View water quality for this site

Site Name: COMPTON, CHRIS
GWIC Id: 286136

Section 1: Well Owner(s)

1) COMPTON, CHRIS (MAIL)
127 HWY 200
HERON MONTANA 59844 [08/12/2015]
2) COMPTON, CHRIS (WELL)
127 MT HWY 200
HERON MONTANA 59844 [08/12/2015]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	19	NW¼ NE¼ SE¼ NE¼

County
SANDERS

Geocode

Latitude	Longitude	Geomethod	Datum
48.091052	-116.020002	DIGITALMAP	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
2361.52	LIDAR	NAVD88	8/4/2023

Measuring Point Altitude	MP Method	Datum	Date Applies
2362.77	LIDAR	NAVD88	11/1/2021 2:37:00 PM

Addition **Block** **Lot**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Wednesday, August 12, 2015

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	197	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	197	6	0.25		WELDED	A53B STEEL

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
197	197	6			OPEN BOTTOM

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	18	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 197
Static Water Level: 158
Water Temperature:

Air Test *

18 gpm with drill stem set at 195 feet for 2 hours.
Time of recovery 0.08 hours.
Recovery water level 158 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source
112DRFT - GLACIAL DRIFT

From	To	Description
0	30	DIRT, CLAY, GRAVEL
30	160	DRY GRAVEL, COBBLE
160	197	GRAVEL, SAND, WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: SCOTT HITTLE
Company: UNIVERSAL DRILLING
License No: WWC-645
Date Completed: 8/12/2015

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View scanned well log (5/12/2016 9:41:50 AM)

Site Name: WILLIAMS, CLARK
GWIC Id: 287054

Section 1: Well Owner(s)

1) WILLIAMS, CLARK (MAIL)
56 BLUE CREEK RD.
HERON MT 59844 [03/15/2016]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	NW¼ NW¼ NW¼ NW¼

County
SANDERS

Geocode

Latitude	Longitude	Geomethod	Datum
48.09504886945	-116.017369803	TRS-SEC	NAD83

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method:
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: N/A

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	0	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
0	0	6	0.25			STEEL

There are no completion records assigned to this well.

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth:
Static Water Level: 78
Water Temperature:

Pump Test *

Depth pump set for test 180 feet.
10 gpm pump rate with 58 feet of drawdown after 2 hours of pumping.
Time of recovery 0.25 hours.
Recovery water level 78 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

ORIGINAL DRILLER NOT KNOWN. THIS LOG IS FROM A CERTIFICATION DONE 3/15/2016.

Section 9: Well Log

Geologic Source

Unassigned

Lithology Data

There are no lithologic details assigned to this well.

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: PHILIP LEWIS
Company: LEWIS DRILLING
License No: WWC-453
Date Completed:

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps

Site Name: HAYDEN, CHARLES
GWIC Id: 290888

Section 1: Well Owner(s)

1) HAYDEN, CHARLES (WELL)
27 HILLSIDE LANE
HERON MT 59844 [04/26/2016]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	SW¼ SW¼

County

SANDERS

Geocode

Latitude	Longitude	Geomethod	Datum
48.094444	-116.006944	NAV-GPS	NAD27

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, April 26, 2016

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	400	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	40	6	0.25		WELDED	A53A STEEL
20	400	4		200.0	GLUED	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
380	400	4	20	1/8	SAW SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	25	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 400
Static Water Level: 40
Water Temperature:

Air Test *

5 gpm with drill stem set at 400 feet for 1 hours.
Time of recovery 3 hours.
Recovery water level 40 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	20	SOFT SHALE
20	40	MEDIUM SHALE
40	200	SHALE WITH CRACKS 3GPM
200	400	SHALE WITH CRACKS 5GPM

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: SCOTT HITTLE
Company: UNIVERSAL DRILLING
License No: WWC-645
Date Completed: 4/26/2016

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps
View hydrograph for this site
View field visits for this site
View scanned well log (10/15/2020 3:07:36 PM)

Site Name: BURGESS, ANDREW
GWIC Id: 310038

Section 1: Well Owner(s)

1) BURGESS, ANDREW (MAIL)
201 MT HWY 200
HERON MT 59844 [04/04/2020]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	NE¼ SE¼ SE¼ NW¼

County: SANDERS
Geocode:

Latitude	Longitude	Geomethod	Datum
48.089402	-116.007398	DIGITALMAP	WGS84

Ground Surface Altitude	Ground Surface Method	Datum	Date
2316.89	LIDAR	NAVD88	8/4/2023

Measuring Point Altitude	MP Method	Datum	Date Applies
2318.89	LIDAR	NAVD88	10/5/2021 5:00:00 PM

Addition: **Block:** **Lot:**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: DEEPENED

Section 5: Well Completion Date

Date well completed: Saturday, April 4, 2020

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
222	425	5.5

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-5	420	4		200.0		PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
400	420	4	30	1/4"X4"	SAW SLOTS

Annular Space (Seal/Grout/Packer)

There are no annular space records assigned to this well.

Section 7: Well Test Data

Total Depth: 420
Static Water Level: 128
Water Temperature:

Air Test *

3 gpm with drill stem set at 415 feet for 1 hours.
Time of recovery _ hours.
Recovery water level _ feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source

400BELT - BELT SUPERGROUP

From	To	Description
222	420	GRAY SHALE

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: THOMAS RICHARDSON
Company: H2O WELL SERVICE INC
License No: WWC-580
Date Completed: 4/4/2020

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Go to GWIC website
Plot this site in State Library Digital Atlas
Plot this site in Google Maps

Site Name: RATZLAFF, KALVIN AND SHELBY
GWIC Id: 314849

Section 1: Well Owner(s)

1) RATZLAFF, KALVIN AND SHELBY (MAIL)
16 BLUE CREEK RD
HERON MT 59844 [08/17/2020]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	SW¼ SW¼

County

LINCOLN

Latitude	Longitude	Geomethod	Datum
48.093056	-116.013333	NAV-GPS	NAD27

Ground Surface Altitude **Ground Surface Method** **Datum** **Date**

Addition **Block** **Lot**

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Monday, August 17, 2020

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	400	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	140	6.3	0.25		WELDED	A53A STEEL
120	400	4		200.0	BELL	PVC-SCHED 40

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
380	400	4	20	1/8	SAW SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	25	BE	Y

Section 7: Well Test Data

Total Depth: 400
Static Water Level: 100
Water Temperature: 7.22 °C

Air Test *

5 gpm with drill stem set at 400 feet for 1 hours.
Time of recovery 1 hours.
Recovery water level 100 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source

Unassigned

From	To	Description
0	130	CLAY WITH SOME GRAVEL
130	140	SOFT SHALE
140	400	SHALE WITH CRACKS 5GPM

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: SCOTT HITTLE
Company: UNIVERSAL DRILLING
License No: WWC-645
Date Completed: 8/17/2020

MONTANA WELL LOG REPORT

This well log reports the activities of a licensed Montana well driller, serves as the official record of work done within the borehole and casing, and describes the amount of water encountered. This report is compiled electronically from the contents of the Ground Water Information Center (GWIC) database for this site. Acquiring water rights is the well owner's responsibility and is NOT accomplished by the filing of this report.

Other Options

Return to menu
Plot this site in State Library Digital Atlas
Plot this site in Google Maps

Site Name: DOWNING, MEASHA
GWIC Id: 330589

Section 1: Well Owner(s)

1) DOWNING, MEASHA (MAIL)
PO BOX 623
CLARK FORK IDAHO 83811 [04/04/2023]
2) DOWNING, MEASHA (WELL)
14 ELK HEIGHTS LANE
HERON MT 59844 [04/04/2023]

Section 2: Location

Township	Range	Section	Quarter Sections
27N	34W	20	

County: SANDERS
Geocode:

Latitude	Longitude	Geomethod	Datum
48.090278	-116.01	NAV-GPS	NAD27

Ground Surface Altitude: **Ground Surface Method**: **Datum**: **Date**:

Addition: **Block**: **Lot**:

Section 3: Proposed Use of Water

DOMESTIC (1)

Section 4: Type of Work

Drilling Method: ROTARY
Status: NEW WELL

Section 5: Well Completion Date

Date well completed: Tuesday, April 4, 2023

Section 6: Well Construction Details

Borehole dimensions

From	To	Diameter
0	140	6

Casing

From	To	Diameter	Wall Thickness	Pressure Rating	Joint	Type
-2	120	6.6	0.25	200.0	WELDED	A53A STEEL
100	140	4		200.0	GLUED	PVC

Completion (Perf/Screen)

From	To	Diameter	# of Openings	Size of Openings	Description
120	140	4	20	6"X1/8"	SAW SLOTS

Annular Space (Seal/Grout/Packer)

From	To	Description	Cont. Fed?
0	25	BENTONITE	Y

Section 7: Well Test Data

Total Depth: 140
Static Water Level: 90
Water Temperature:

Air Test *

20 gpm with drill stem set at 140 feet for 1 hours.
Time of recovery 0.17 hours.
Recovery water level 90 feet.
Pumping water level _ feet.

** During the well test the discharge rate shall be as uniform as 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 8: Remarks

Section 9: Well Log

Geologic Source
Unassigned

From	To	Description
0	60	GRAVEL, COBBLE
60	110	GRAVEL, SILT, COBBLE
110	120	WET, GRAVEL
120	140	BEDROCK, FRACTURES WITH WATER

Driller Certification

All work performed and reported in this well log is in compliance with the Montana well construction standards. This report is true to the best of my knowledge.

Name: SCOTT HITTLE
Company: UNIVERSAL DRILLING
License No: WWC-645
Date Completed: 4/4/2023

GWIC Summary Report

Ground Water Information Center | **MBMG Data Center**
Montana Bureau of Mines and Geology
Montana Technological University
1300 West Park Street - Natural Resources Building Room 329
Butte Montana 59701-8997
Ph: (406) 496-4336 Fx: (406) 496-4343

GWIC Data > Well Construction Data > Township: 27N Range: 34W Sec: 20

The following data were returned from the GWIC databases for the area you requested. For a more detailed description of the data view the GWIC Metadata report. If you notice data entry errors or have questions please let us know by sending us an Email at **GWIC@mtech.edu**. If you wish to view a one page report for a particular site, click the hyperlinked **Gwic Id** for that well. Scroll to the right of your screen to view all the data. All data displayed on the screen may not show up when printed.

Retrieval Statistics*

Field	Max	Min	Avg
Total Depth (ft)	420.00	100.00	277.36
Static Water Level (ft)	278.00	40.00	111.18
Yield (gpm)	20.00	2.00	11.00

* These statistics do not take any geographic, topographic, or geologic factors into consideration. Negative swl values are reported for water levels that are above land surface.

Did you know about...

Other GWIC data

GWIC has 2 field visit(s) for this request area.
GWIC has 2 water level(s) for this request area.

Thanks, Just take me back to the menu.

Other MBMG data

MBMG has 423 publications available for LINCOLN county.
MBMG has 429 publications available for SANDERS county.
MBMG has 9 abandoned mine record(s) for this request area.

Gwic Id	PDF	DNRC WR	Site Name	Twn	Rng	Sec	Q Sec	Ver?	Type	Td	Swl	Pwl	Rwl	Yield	Test	Date	Use
330589			DOWNING, MEASHA	27N	34W	20		No	WELL	140.00	90.00		90.00	20.00	AIR	4/4/2023	DOMESTIC
257791			WELCHER ALICIA & CHRISTOPHER	27N	34W	20		No	WELL	160.00	130.00		130.00	20.00	AIR	8/31/2010	DOMESTIC
287054			WILLIAMS, CLARK	27N	34W	20	BBBB	No	WELL		78.00		78.00	10.00	PUMP		DOMESTIC
310038			BURGESS, ANDREW	27N	34W	20	BDDA	Yes	WELL	420.00	128.00			3.00	AIR	4/4/2020	DOMESTIC
143307			ROYLANCE BILL	27N	34W	20	CA	No	WELL	100.00	72.00	72.00		20.00	PUMP	5/31/1994	DOMESTIC
290888			HAYDEN, CHARLES	27N	34W	20	CC	No	WELL	400.00	40.00		40.00	5.00	AIR	4/26/2016	DOMESTIC
314849			RATZLAFF, KALVIN AND SHELBY	27N	34W	20	CC	No	WELL	400.00	100.00		100.00	5.00	AIR	8/17/2020	DOMESTIC
256585			LINZMAIER, PETER	27N	34W	20	DA	No	WELL	320.00				2.00	AIR	6/9/2010	DOMESTIC
143308			IDA INC	27N	34W	20	DAAD	Yes	WELL	405.00	90.00	390.00		7.00	AIR	6/20/1994	DOMESTIC

152909	BUSH JACK	27N	34W	20	DB	No	WELL	184.00	95.00		10.00	AIR	11/14/1995	DOMESTIC
143309	LANCE, BILL ROY	27N	34W	20	DB	No	WELL	300.00	278.00	278.00	20.00	BAILER	5/25/1994	DOMESTIC
160646	WIERENGA DAVID	27N	34W	20	DB	No	WELL	222.00	122.00		10.00	AIR	4/23/1996	DOMESTIC

End of Report.
12 record(s) listed.

Items of Note:

[1]This report is restricted to site types of **WELL, BOREHOLE, SPRING, COAL BED METHANE WELL, PETWELL, PIEZOMETER**.

[2]A single well record (a distinct GWIC Id) may be represented by more than one line in this report if more than one performance test was conducted on the well at the time of drilling.

Explanation of Columns:
GWIC Id = Key field for the GWIC database. Links to one page reports.
PDF = Are scanned documents available through the Document Manager?

- = Yes, click on the icon to download the PDF file.
- = No, well was submitted electronically. No paper record exists.
- = No, record does have a known well log but it is not scanned yet.
- = No, record may or may not have a document to scan. Metadata is unclear.
- = No, record was created from a source other than a well log. No paper record exists.

DNRC WR = Water right number assigned to this site by Department of Natural Resources and Conservation.
Site Name = Current owner name assigned to GWIC record.
Location = Location of site in Montana township, range, section, and quarter-section coordinates.
Ver? = Has this location been verified by field staff?
Type = Type of site assigned to GWIC record.
Td = **T**otal **d**epth of well in feet below ground.
Swl = **S**tatic **w**ater **l**evel in feet above/below ground - Negative values are reported for water levels that are above land surface.
Pwl = **P**umping **w**ater **l**evel in feet below ground.
Rwl = **R**ecovery **w**ater **l**evel in feet below ground.
Yield = Yield in gallons per minute.
Test = Type of performance test reported.
Date = Completion date of well/borehole.
Use = Reported use of water.

Disclaimer:
The preceding materials represent the contents of the GWIC databases at the Montana Bureau of Mines and Geology at the time and date of the retrieval. The information is considered unpublished and is subject to correction and review on a daily basis. The Bureau warrants the accurate transmission of the data to the original end user at the time and date of the retrieval [7/25/2024 8:44:37 PM]. Retransmission of the data to other users is discouraged and the Bureau claims no responsibility if the material is retransmitted. There may be wells in the request area that are not recorded at the Information Center.

ANALYTICAL REPORT

Montana Environmental Laboratory LLC
1170 N. Meridian Rd., P.O. Box 8900, Kalispell, MT 59904-1900
Phone: 406-755-2131 Fax: 406-257-5359 www.melab.us

IMEG - Missoula
IMEG - Missoula
1817 South Ave West, Ste A
Missoula, MT 59801

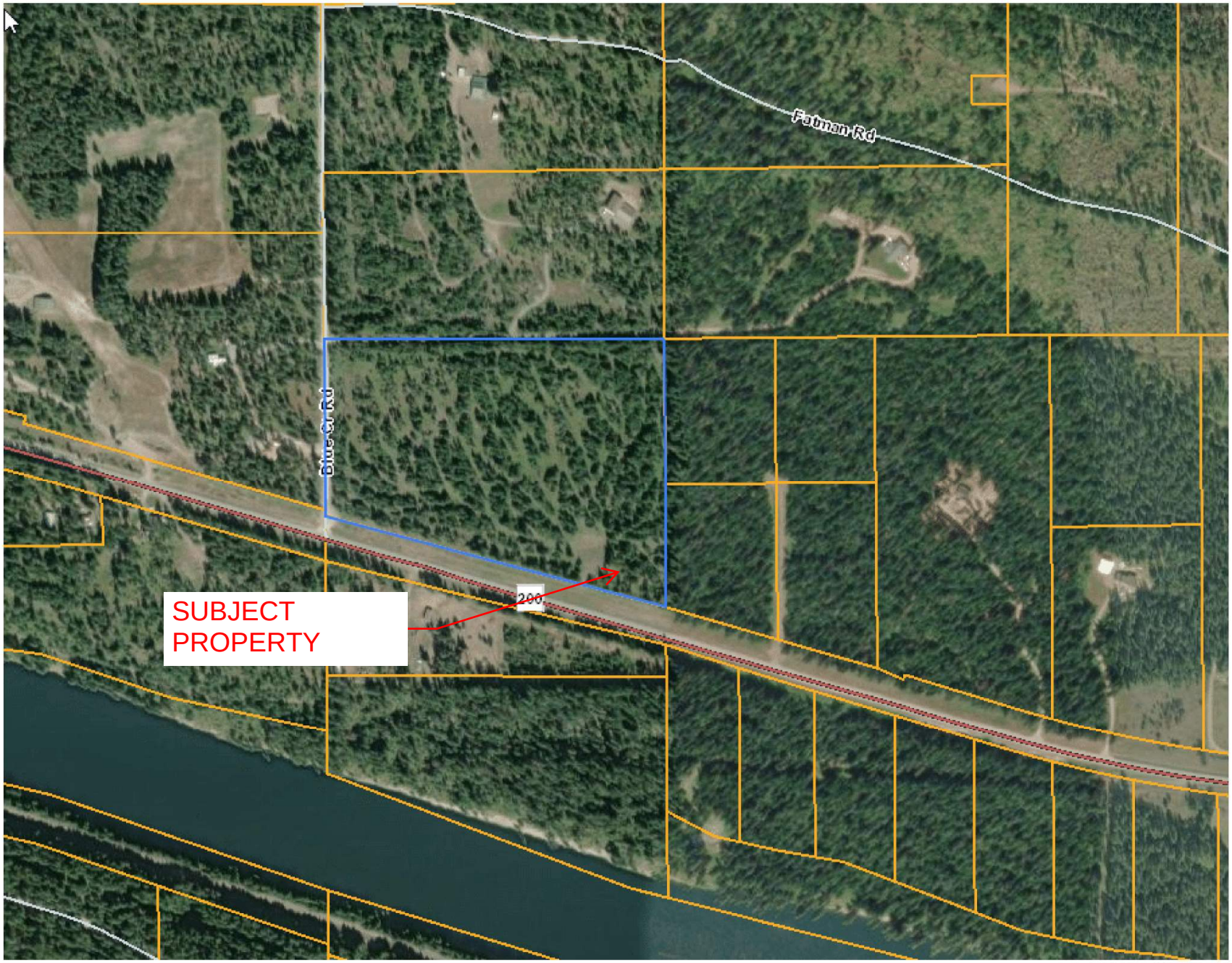
PWS ID:
Project: E of Blue Cr Rd & S of MT 200

Client Sample ID: Yard Hydrant **Lab ID:** 2307806-01
Matrix: DRINKING WATER **Collected:** 07/28/2023 7:30 **Received:** 08/04/2023 9:00

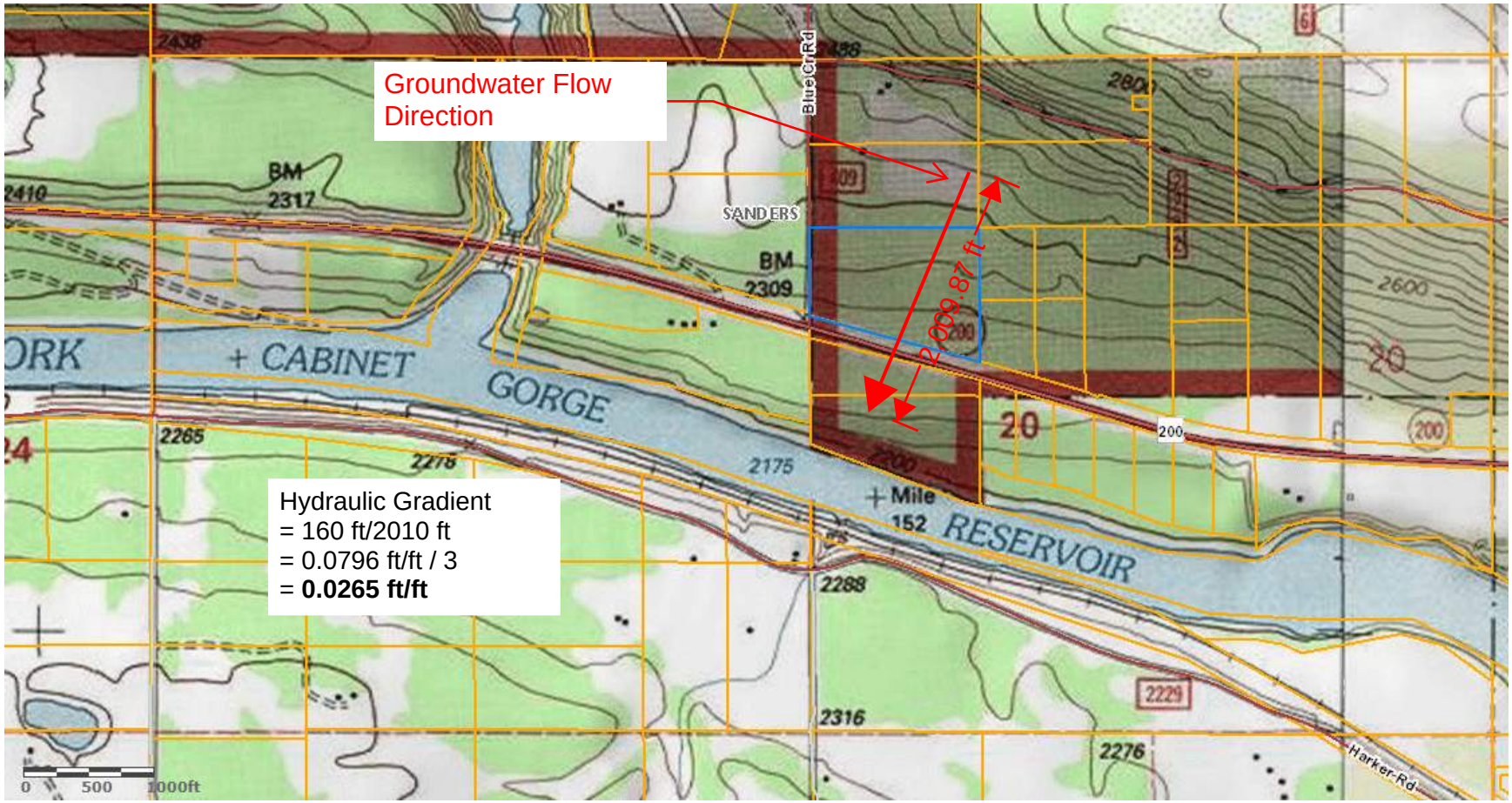
Analyses	Result	Units	RL	MCL	Method	Prepared	Analyzed	Analyst
Conductivity	**223**	umho/cm	0.1		SM2510B		08/04/2023 14:24	BLW
Nitrate + Nitrite, Total	**ND**	mg/L	0.01	10	E353.2		08/08/2023 10:20	BLW

MCL = Maximum Contaminant Limit ND = Not Detected
RL = Reporting Limit

MEL REVIEW:


Fabman Rd
Blue Cr Rd
206
SUBJECT
PROPERTY

Hydraulic Gradient Map



Items in yellow are calculated for you

Using Modified Cooper-Jacob equation (Unconfined)

Well #	GWIC ID	Pump Rate gpm	Pump Level	Static Level	Length of perfs-enter 10 for open hole	Specific Capacity	Transmissivity	Hyd Conductivity (K)
1						#DIV/0!	#DIV/0!	#DIV/0!
2						#DIV/0!	#DIV/0!	#DIV/0!
3						#DIV/0!	#DIV/0!	#DIV/0!
4						#DIV/0!	#DIV/0!	#DIV/0!
5						#DIV/0!	#DIV/0!	#DIV/0!
							Average K	**#DIV/0!**

Using Modified Cooper-Jacob equation (Confined)

Well #	GWIC ID	Pump Rate gpm	Pump Level	Static Level	Length of perfs-enter 10 for open hole	Specific Capacity	Transmissivity	Hyd Conductivity (K)
1						#DIV/0!	#DIV/0!	#DIV/0!
2						#DIV/0!	#DIV/0!	#DIV/0!
3						#DIV/0!	#DIV/0!	#DIV/0!
4						#DIV/0!	#DIV/0!	#DIV/0!
5						#DIV/0!	#DIV/0!	#DIV/0!
							Average K	**#DIV/0!**

Using Razack and Huntley equation (Fetter 1994)

Well #	GWIC ID	Pump Rate gpm	Pump Level	Static Level	Length of perfs-enter 10 for open hole	Specific Capacity	Transmissivity	Hyd Conductivity (K)
1	257971	20	155	130	10	0.80	981.70	98.17
2	168748	7	155	78	10	0.09	228.65	22.87
3	286136	18	195	158	10	0.49	703.47	70.35
4						#DIV/0!	#DIV/0!	#DIV/0!
5						#DIV/0!	#DIV/0!	#DIV/0!
							Average K	**63.79**

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

NITRATE SENSITIVITY ANALYSIS

SITE NAME: Tungsten Blue Creek Subdivision
COUNTY: Sanders County
LOT #:
NOTES: Drainfields are sized for a 4-bedroom home
Condcutivity and Gradient derived from regional topographic slope.

VARIABLES	DESCRIPTION	VALUE	UNITS
K	Hydraulic Conductivity	63.79	ft/day
I	Hydraulic Gradient	0.0265	ft/ft
D	Mixing Zone Thickness (usually constant)	15.0	ft
L	Mixing Zone Length (see ARM 17.30.517(1)(d)(viii)	100	ft
Y	Width of Drainfield Perpendicular to Ground Water Flow	60	ft
Ng	Background Nitrate (as Nitrogen) Concentration	0.01	mg/L
Nr	Nitrate (as Nitrogen) Concentration in Precipitation (usually constant)	1.0	mg/L
Ne	Nitrate (as Nitrogen) Concentration in Effluent	50.00	mg/L
#I	Number of Single Family Homes on the Drainfield	1.0	
Ql	Quantity of Effluent per Single Family Home	26.70	ft3/day
P	Precipitation	34.2	in/year
V	Percent of Precipitation Recharging Ground Water (usually constant)	0.20	
EQUATIONS			
W	Width of Mixing Zone Perpendicular to Ground Water Flow = (0.175)(L)+(Y)	77.50	ft
Am	Cross Sectional Area of Aquifer Mixing Zone = (D)(W)	1162.50	ft2
As	Surface Area of Mixing Zone = (L)(W)	7750.00	ft2
Qg	Ground Water Flow Rate = (K)(I)(Am)	1965.13	ft3/day
Qr	Recharge Flow Rate = (As)(P/12/365)(V)	12.11	ft3/day
Qe	Effluent Flow Rate = (#I)(Ql)	26.70	ft3/day
SOLUTION			
Nt	**Nitrate (as Nitrogen) Concentration at End of Mixing Zone =((Ng)(Qg)+(Nr)(Qr)+(Ne)(Qe)) / ((Qg)+(Qr)+(Qe))**	**0.68**	**mg/L**

BY: Adam Krick
DATE: November 21, 2023

REV. 03/2005

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

NITRATE SENSITIVITY ANALYSIS

SITE NAME: Tungsten Blue Creek Subdivision
COUNTY: Sanders County
NOTES: Drainfields are sized for a 3-bedroom home

BY:
DATE: 11/21/23

Nitrate at end of mixing zone(s) with no cumulative effects

Variable	(K)	(I)	(D)	(L)	(Y)	(Ng)	(Nr)	(Ne)	(#I)	(QI)	(P)	(V)	(W)	(Am)	(As)	(Qg)	(Qr)	(Qe)	Nt
LOT #	Hydr. cond. (ft/day)	Hydr. grad. (ft/ft)	Mix zone thick (feet)	Down grad. distance (feet)	Drain-field width (feet)	Back-ground nitrate (mg/l)	Nitrate in precip (mg/l)	Effluent Nitrate conc. (mg/l)	# of single family homes	Effluent per drain. (ft3/day)	Annual precip. (in/yr)	Percent precip. recharge	Down-grad. width (feet)	Mix zone area (ft^2)	Mix. zone surface area (ft^2)	Ground water flow (ft3/day)	Recharge flow (ft3/day)	Effluent flow (ft3/day)	Resulting nitrate (N) (mg/l)
1	140.90	0.020	15.0	100	28	0.01	1.0	50.0	1.0	26.70	14.2	0.2	45.50	682.50	4550.00	1923.29	2.95	26.70	**0.69**
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	

Nitrate at end of mixing zones with cumulative effects

LOT #	(K)	(I)	(D)	(L)	(Y)	(Ng)	(Nr)	(Ne)	(#I)	(QI)	(P)	(V)	(W)	(Am)	(As)	(Qg)	(Qr)	(Qe)	Nt
1	140.90	0.020	15.0	35	28.0	0.01	1.0	50.0	1.0	26.70	14.2	0.2	34.13	511.88	1194.38	1442.46	0.77	26.70	**0.92**
2	140.90	0.020	15.0	100	20.0	0.92	1.0	50.0	1.0	26.70	12.0	0.2	37.50	562.50	3750.00	1585.13	2.05	26.70	**1.73**
3	25.00	0.010	15.0	100	100.0	1.73	1.0	50.0	1.0	26.70	12.0	0.2	117.50	1762.50	11750.00	440.63	6.44	26.70	**4.44**
						4.44							0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	
													0.00	0.00	0.00	0.00	0.00	0.00	

REV. 03/20005

NOTES:

= fill in values in these cells

= these cells are calculated for you

Hydr. cond. =	*K*	Hydraulic Conductivity
Hydr. grad. =	*I*	Hydraulic Gradient
Mix zone thick =	*D*	Thickness of Mixing Zone up to a Maximum of 15 feet (usually constant at 15 feet)
Down grad. distance =	*L*	Mixing Zone Length (see ARM 17.30.517(1)(d)(viii), or this may also be the distance to end of last mixing zone when calculating cumulative effects.
Drainfield width =	*Y*	Width of Drainfield Perpendicular to Ground Water Flow
Background nitrate =	*Ng*	Background Nitrate (as Nitrogen) Concentration
Nitrate in precip. =	*Nr*	Nitrate (as Nitrogen) Concentration in Precipitation (usually constant at 1.0 mg/L)
Effluent Nitrate conc. =	*Ne*	Nitrate (as Nitrogen) Concentration in Effluent (50 for conventional; 24 for level II; 30 for level 1a; 40 for level 1b)
# single family homes =	*#l*	Number of Single Family Homes on the Drainfield (leave as 1 if effluent volume in next column is adjusted to equal total effluent from drainfield)
Effluent per drain. =	*Ql*	Quantity of Effluent from drainfield (average rate varies depending on number of bedrooms)
Annual precip. =	*P*	Annual local Precipitation
Percent precip recharge =	*V*	Percent of Precipitation Recharging Ground Water (usually constant at 0.2)
Down grad. width =	*W*	Width of Mixing Zone Perpendicular to Ground Water Flow = (0.175)(L) + (Y)
Mix zone area =	*Am*	Cross Sectional Area of Aquifer Mixing Zone = (D)(W)
Mix zone surface area =	*As*	Surface Area of Mixing Zone = (L)(W)
Ground water flow =	*Qg*	Ground Water Flow Rate = (K)(I)(Am)
Recharge flow =	*Qr*	Recharge Flow Rate = (As)(P/12/365)(V)
Effluent flow =	*Qe*	Effluent Flow Rate = (#l)(Ql)
Resulting nitrate (N) =	*Nt*	Nitrate (as Nitrogen) Concentration at End of Mixing Zone = ((Ng)(Qg) + (Nr)(Qr) + (Ne)(Qe)) / ((Qg) + (Qr) + (Qe)) (or nitrate concentration to use as background nitrate for next downgradient drainfield when determining cumulative effects)

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

PHOSPHOROUS BREAKTHROUGH ANALYSIS

SITE NAME: Tungsten Blue Creek Subdivision
COUNTY: Sanders County
LOT #: 0
NOTES: Drainfields are sized for a 3-bedroom home
No surface water is located within 500' so 500' is used.

VARIABLES	DESCRIPTION	VALUE	UNITS
Lg	Length of Primary Drainfield as Measured Perpendicular to Ground Water Flow	100.0	ft
L	Length of Primary Drainfield's Long Axis	100.0	ft
W	Width of Primary Drainfield's Short Axis	52.0	ft
B	Depth to Limiting Layer from Bottom of Drainfield Laterals*	4.0	ft
D	Distance from Drainfield to Surface Water	500.0	ft
T	Phosphorous Mixing Depth in Ground Water (0.5 ft for coarse soils,	1.0	ft
Ne	1.0 ft for fine soils)**		
Sw	Soil Weight (usually constant)	100.0	lb/ft3
Pa	Phosphorous Adsorption Capacity of Soil (usually constant)	200.0	ppm
#l	Number of Single Family Homes on the Drainfield	1.0	
CONSTANTS			
Pl	Phosphorous Load per Single Family Home (constant)	6.44	lbs/yr
X	Conversion Factor for ppm to percentage (constant)	1.0E+06	
EQUATIONS			
Pt	Total Phosphorous Load = (Pl)(#l)	6.44	lbs/yr
W1	Soil Weight under Drainfield = (L)(W)(B)(Sw)	2080000.0	lbs
W2	Soil Weight from Drainfield to Surface Water = [(Lg)(D) + (0.0875)(D)(D)] (T)(Sw)	7187500.0	lbs
P	Total Phosphorous Adsorption by Soils = (W1 + W2)[(Pa)/(X)]	1853.5	lbs
SOLUTION			
BT	**Breakthrough Time to Surface Water = P / Pt**	287.8	years

BY: Adam Krick
DATE: November 21, 2023

*****Must be shallow capped system so 4' to GW used to be conservative*****

NOTES: ** Depth to limiting layer is typically based on depth to water in a test pit or bottom of a dry test pit minus two feet to account for burial depth of standard drainfield laterals.*
*** Material type is usually based on test pit. A soil that can be described as loam (e.g. gravelly loam, sandy loam, etc.) or finer according to the USDA soil texture classification system is considered a "fine" soil.*

REV. 12/2004

Appendix Q

TRIGGER VALUE CALCULATION FOR ADJACENT TO SURFACE WATER DILUTION ANALYSIS

"An analysis of the effect of the proposed drainfield system on the quality of any adjacent surface water is required by ARM 17.36.312 and 17.30.715(1c). The increase in the nutrient concentration in the surface water cannot exceed the trigger value (T.V. of 0.01 mg/L nitrate and 0.001 mg/L phosphorous as set forth in Circular DEQ 7."

DILUTION EQUATION: $\frac{(QD)(CD) + (QL)(CL)}{QD + QL} < T.V. = \text{non-significant}$

Note: Effluent flow rate (QD) must be multiplied by the number of drainfields in the subdivision.

NITRATE CALCULATION:

	9.00		Number of drainfields in subdivision
QD =	26.70	ft^3/d	Effluent flow rate from drainfield in cubic feet per day (commonly 200 gpd or 26.7 ft^3/d for a 2 - 5 bedroom home)
CD =	50.00	mg/L	Nitrate concentration in mg/L (50 mg/L nitrate-N for standard drainfield, 24 mg/L for Level 2 wastewater treatment system)
QL =	3260.00	ft^3/s	Flow rate in ft^3/s into (or out of) surface water determined by stream gauge (usually the 14-day, 5-year low flow or 14Q5)
CL =	0.00	mg/L	Nitrate concentration (in mg/L) in surface water; can typically assume zero since increase, not total, is important

0.0000427 mg/L = final result, must be < 0.01 mg/L to be considered nonsignificant nitrate increase

PHOSPHOROUS CALCULATION:

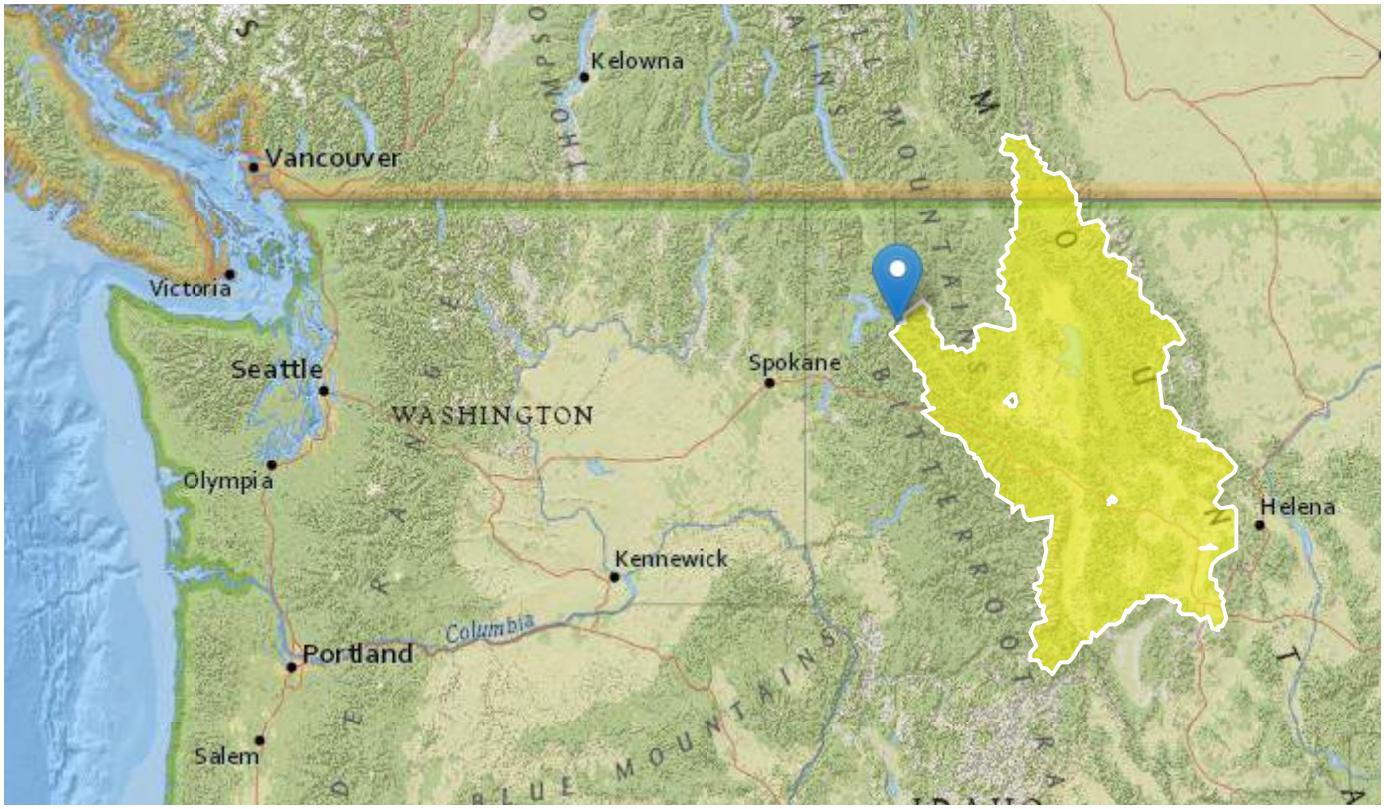
	9		Number of drainfields in subdivision
QD =	26.7	ft^3/d	Effluent flow rate from drainfield in cubic feet per day, (commonly 200 gpd or 26.7 ft^3/d for a 2 - 5 bedroom home)
CD =	10.6	mg/L	Phosphorous concentration in mg/L (commonly 10.6 mg/L) in effluent
QL =	3260.00	ft^3/s	Flow rate in ft^3/s into (or out of) surface water determined by stream gauge (usually the 14-day, 5-year low flow or 14Q5)
CL =	0	mg/L	Phosphorous concentration (in mg/L) in surface water; can typically assume zero since increase, not total, is important

0.0000090 mg/L = final result, must be < 0.001 mg/L to be considered nonsignificant for phosphorous increase

****Flow Rate based on StreamStats 14Q5, see attached**

StreamStats Report

Region ID: MT
Workspace ID: MT20220714201625121000
Clicked Point (Latitude, Longitude): 48.08803, -116.02678
Time: 2022-07-14 14:16:53 -0600



Collapse All

Basin Characteristics

Parameter Code	Parameter Description	Value	Unit
CONTDA	Area that contributes flow to a point on a stream	21991.8	square miles
PRECIP	Mean Annual Precipitation	32.34	inches
SLOP50_30M	Percent area with slopes greater than 50 percent from 30-meter DEM.	20.7	percent

Low-Flow Statistics

Low-Flow Statistics Parameters [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	21991.8	square miles	6.4	2520
SLOP50_30M	Slopes_gt_50pct_from_30m_DEM	20.7	percent	1.87	67.5

Low-Flow Statistics Parameters [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	21991.8	square miles	7.74	1560
SLOP50_30M	Slopes_gt_50pct_from_30m_DEM	20.7	percent	0.06	66

Low-Flow Statistics Disclaimers [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

Statistic	Value	Unit
7 Day 10 Year Low Flow	2580	ft^3/s

Low-Flow Statistics Disclaimers [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Low-Flow Statistics Flow Report [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

Statistic	Value	Unit
7 Day 10 Year Low Flow	2420	ft^3/s

Low-Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
7 Day 10 Year Low Flow	2550	ft^3/s

Low-Flow Statistics Citations

McCarthy, P.M., Sando, Roy, Sando, S.K., and Dutton, D.M.,2016, Methods for estimating streamflow characteristics at ungaged sites in western Montana based on data through water year 2009: U.S. Geological Survey Scientific Investigations Report 2015–5019–G, 19 p. (https://doi.org/10.3133/sir20155019)

Seasonal Flow Statistics

Seasonal Flow Statistics Parameters [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	21991.8	square miles	6.4	2520
SLOP50_30M	Slopes_gt_50pct_from_30m_DEM	20.7	percent	1.87	67.5

Seasonal Flow Statistics Parameters [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

Parameter Code	Parameter Name	Value	Units	Min Limit	Max Limit
CONTDA	Contributing Drainage Area	21991.8	square miles	7.74	1560
PRECIP	Mean Annual Precipitation	32.34	inches	20.7	83.2

Seasonal Flow Statistics Disclaimers [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Seasonal Flow Statistics Flow Report [81.7 Percent (18000 square miles) W Region LowFlow GLS 2015 5019G]

Statistic	Value	Unit
Jul_to_Oct_14_Day_5_Yr_Low_Flow	3260	ft^3/s

Seasonal Flow Statistics Disclaimers [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

One or more of the parameters is outside the suggested range. Estimates were extrapolated with unknown errors.

Seasonal Flow Statistics Flow Report [18.3 Percent (4030 square miles) NW Region LowFlow GLS 2015 5019G]

Statistic	Value	Unit
Jul_to_Oct_14_Day_5_Yr_Low_Flow	4890	ft^3/s

Seasonal Flow Statistics Flow Report [Area-Averaged]

Statistic	Value	Unit
Jul_to_Oct_14_Day_5_Yr_Low_Flow	3560	ft^3/s

Seasonal Flow Statistics Citations

McCarthy, P.M., Sando, Roy, Sando, S.K., and Dutton, D.M.,2016, Methods for estimating streamflow characteristics at ungaged sites in western Montana based on data through water year 2009: U.S. Geological Survey Scientific Investigations Report 2015–5019–G, 19 p. (https://doi.org/10.3133/sir20155019)

Channel-width Methods Weighting

No method weighting results returned.

Application Version: 4.10.0
StreamStats Services Version: 1.2.22
NSS Services Version: 2.2.1