

# Environmental Desktop Review: Kicking Horse Mountain Expansion Golden, BC



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Attention: Neil Jackson, Sr Vice President, Products and Maintenance

## Environmental High-Level Desktop Review: Kicking Horse Mountain Expansion, Golden, BC

McElhanney Consulting Services Ltd has completed a high-level desktop environmental review of the Rudi's Bowl area located adjacent to the Kicking Horse Mountain Resort, Golden BC. The Resort is in the process of negotiations for acquiring this area under its existing Land Tenure. This report provides an inventory of potential environmental sensitivities; wildlife, fisheries vegetation and ecosystems at risk, specific to Rudi's Bowl and was generated by using federal, provincial, and other website resources.

No field investigation was conducted under this Scope of Work.

Regards,  
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## Introduction

1. McElhanney Consulting Services Ltd. (McElhanney) was retained by Resorts of the Canadian Rockies (RCR) to conduct an environmental high-level desktop review for Land Tenure permitting associated with the addition of Rudi's Bowl to the existing Kicking Horse Mountain Resort in Golden BC (*Figures 1 and 2*). RCR is proposing to introduce winter operations into Rudi's Bowl, which will include development of ski runs and the installation, operation, and maintenance of ski lifts as well as the construction of a mountain road to provide access to this area for construction and maintenance. The proposed alignments of new services are shown in *Appendix A*.

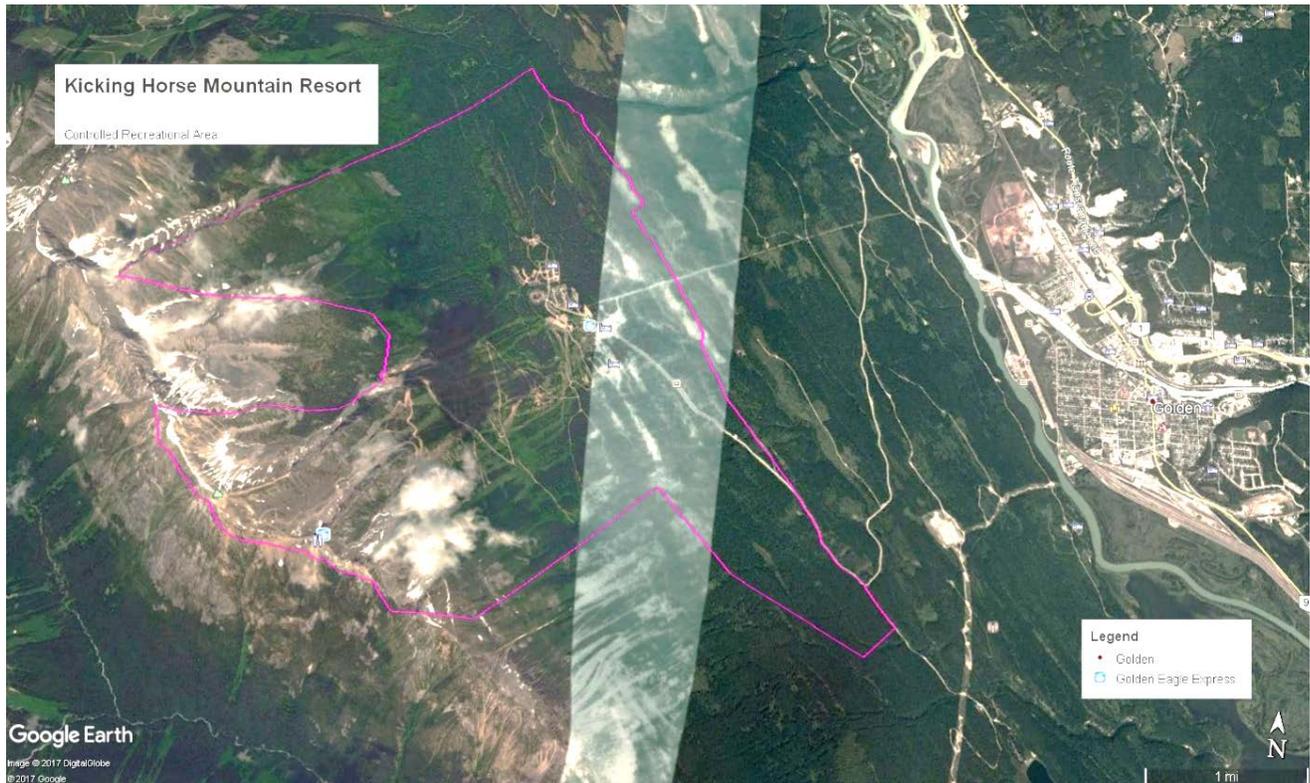


Figure 1: Kicking Horse Mountain Resort, Golden BC (outlined in pink).



*Figure 2: The location of Rudi's Bowl (outlined in pink), adjacent to the Kicking Horse Mountain Resort.*

This scope of work to identify the existing environmental sensitivities was at the request of the Ministry of Forests, Lands and Natural Resource Operations (FLNRO) which is now the Ministry of Forests, Lands, Natural Resource Operations and Rural Development. The purpose of the desktop review was to identify any potential environmental concerns associated with the proposed development, specific to the Rudi Bowl location, that could potentially be impacted by this project.

These concerns include but are not limited to potential effects on fisheries and aquatic resources, the impacts of removing of trees and vegetation that might support migratory nesting birds or raptors, outlining any sensitive wildlife species, and identifying ecosystem and vegetation resource sites that might impact this planning study.

## Environmental Review

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### Climate and Rainfall

2. Climatic conditions at the Site were inferred based on data provided by Environment Canada, Canadian Climate Normals 1981-2010 (Canada 2017). Recorded climate conditions from the Golden A station located approximately 1.6 km from the Site were considered representative based on their proximity.
- 2.1. Mean daily temperatures for each month were recorded between 1981 and 2010 at this station and ranged between -11.5 degrees Celsius (°C) in January to 24.5°C in July, the annual average temperature was 5.1°C. The annual average precipitation for this area was 466.8mm with 325.2mm of that being rain. The data shows that the average monthly low was 24.1mm in February and the high was 51.1mm in November.

### Soil Reports

- 2.2. A map compiled from the Geological Survey of Canada (Canada 2017) was referenced to determine the surficial geology setting of the Site (The Soil Map of British Columbia). According to the map, the town of Golden was located within the D2 Gleysol (Fluvent, Aquent, Aquept) unit. Gleysols are soils that have undergone prolonged periods of intermittent or continuous saturation with water causing reducing conditions during their genesis. Water saturation leads to depletion of oxygen in the soil and causes the transformation of metals such as iron. When oxygen is present, iron is oxidized and has a reddish colour, while when oxygen becomes depleted (due to water saturation) the iron is reduced and takes on a blue-grey hue and this dominates the colour of the horizon.
- The Kicking Horse Mountain Resort mostly lies within the G2 Humo-Ferric Podzol (Cryorthod, Haplorthod) and I Dominantly Ice Fields or non-soil units. Podzols are associated with coniferous forests that have a B horizon that is enriched with amorphous material composed of humified organic matter, aluminum and iron. The soil classification map is provided in [Appendix B](#).
- 2.3.

### Topography, Groundwater Flow and Water Resources

Direction of groundwater flow may be inferred based on local topography and regional surface water in the area of the Site. This is an estimate only, and in situ groundwater characterization should be undertaken if such information is required. Using the BC Water Resource Atlas (BC 2017a), which is maintained by the BC Ministry of Environment, a map depicting local topography, water well locations and reports, and surface water within a 1.0 km radius of the Site was created; this map is provided in [Appendix C](#).

The regional topographic map suggests that the ground and surface flows on the east facing slopes are directed towards Cedar Creek which terminates in the Columbia River. The west facing side of the mountain suggests that flow migrates into Canyon Creek, which also is a tributary of the Columbia River. Based on the available information, the groundwater flow direction is inferred to be to the east to southeast towards the Columbia River.

Three water wells are listed on the BC Water Resource Atlas within 1.0 km of the Site with several wells outside of the search radius.

## Environmentally Sensitive Species

### Fisheries

3. A desktop assessment was conducted for existing information on fisheries resources within the proposed development area (project area) including a summary of the watercourses, historically documented fish species, and aquatic species at risk.

3.1. The entire project area is located within Columbia River Watershed. Several watercourses and their tributaries and/or headwaters, including Cedar Creek and Canyon Creek, are potentially within the project area based on the available hydrological information (Figure 3; BC 2017a). Cedar Creek and an Unnamed Tributary to Cedar Creek are along the northern boundary of the project area (Watercourse 1 [WC1] and WC2, respectively). An Unnamed Watercourse (WC4) and an Unnamed Tributary to WC4 (WC3) are located along the southeastern boundary of the project area and WC5 is an Unnamed Tributary to Canyon Creek. As these watercourses are located at high elevations, the channels may be less defined at the headwaters (WC2, WC3, and WC5). Based on the desktop assessment, WC1 and WC4 would likely have more developed channels and a higher potential for fish presence.

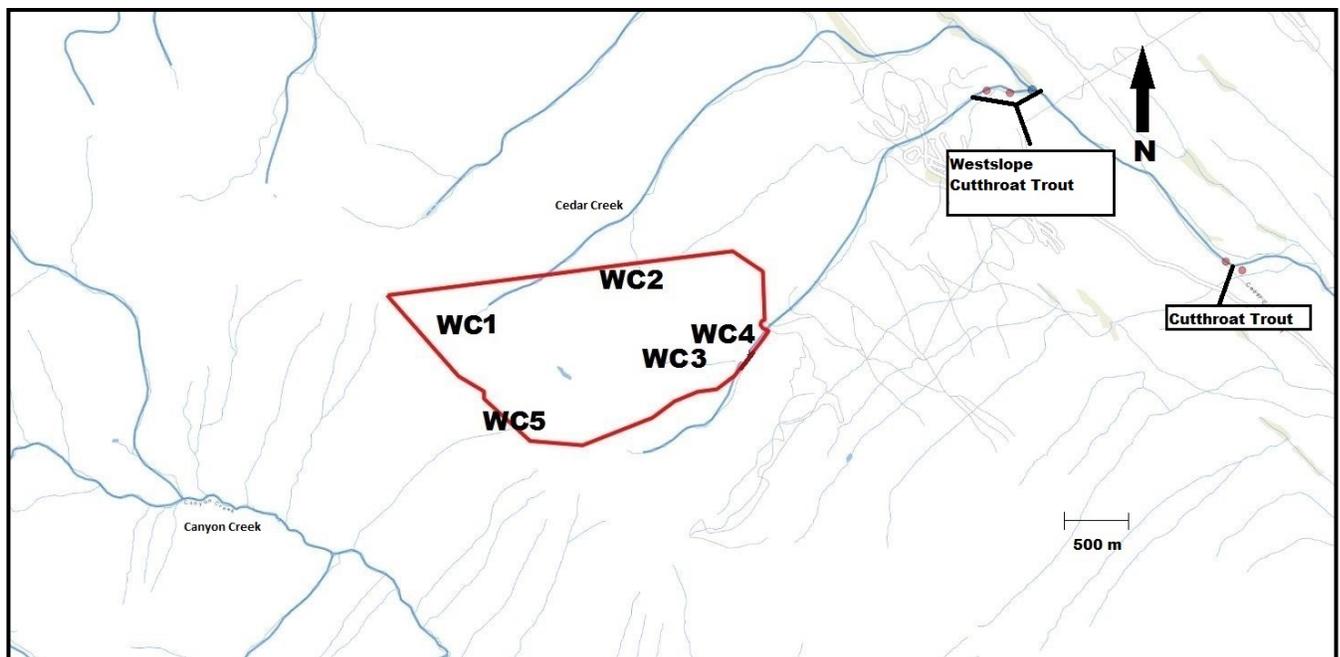


Figure 3. Approximate proposed development area (outlined in red) and mapped hydrological sources based on available information.

Previously documented fish species within WC1 include brook trout (*Salvelinus fontinalis*), cutthroat trout (*Oncorhynchus clarkii*), mountain whitefish (*Prosopium williamsoni*), rainbow trout (*Oncorhynchus mykiss*), redbreast shiner (*Richardsonius balteatus*), tench (*Tinca tinca*), and westslope (Yellowstone) cutthroat trout (*Oncorhynchus clarki lewisi*). The “Yellowstone” identifier was confirmed as a database error and that the fish points were westslope cutthroat trout (Pers. Comm. Lamson 2017). Westslope cutthroat trout have also been previously stocked in Cedar Creek in the 1930s and 1940s. The closest fish point (westslope cutthroat trout) is approximately 5 km downstream of the project area and no obstacles to fish migration were documented (BC 2017b).

Westslope cutthroat trout were previously documented approximately 2.5 km downstream of the project area in WC4. No obstacles to fish passage were previously documented between the Columbia River to the headwaters of Cedar Creek and W4 (BC 2017b).

No fish were previously documented within WC5, though bull trout (*Salvelinus confluentus*), kokanee (*Oncorhynchus nerka*), longnose sucker (*Catostomus catostomus*), mountain whitefish, rainbow trout, slimy sculpin (*Cottus cognatus*), and westslope cutthroat trout were documented in Canyon Creek. The last known documentation of rainbow trout was in 1931 as a result of fish stocking and westslope cutthroat trout were stocked in the 1958 and 1971 in Canyon Creek. A cascade (20 m high by 100 m in length) was documented at approximately 6 km upstream from the confluence of the Columbia River and Canyon Creek (approximately 20 km downstream of the project area) and was noted as a barrier to all fish (UTM 11 502633 5675391). No fish were previously documented above this obstacle, though it is unknown if surveys were conducted above this point. Fish absence above a barrier is not guaranteed as they may only physically limit the distribution of fish species within a watercourse on a seasonal or annual basis, and fish may have had access past the barrier historically (BC 2017b). The list of previously documented fish species can be found in *Table 1*.

*Table 1: Previously documented fish species and known / assumed presence in Watercourses 1 through 5.*

Scientific Name	Common Name	Watercourse				
		WC1	WC2	WC3	WC4	WC5
<i>Salvelinus fontinalis</i>	Brook Trout	X	X*	X*	X*	
<i>Salvelinus confluentus</i>	Bull Trout					X*
<i>Oncorhynchus clarkii</i>	Cutthroat Trout	X	X*	X*	X*	
<i>Oncorhynchus nerka</i>	Kokanee					X*
<i>Catostomus catostomus</i>	Longnose Sucker					X*
<i>Prosopium williamsoni</i>	Mountain Whitefish	X	X*	X*	X*	X*
<i>Oncorhynchus mykiss</i>	Rainbow Trout	X	X*	X*	X*	X*
<i>Richardsonius balteatus</i>	Redside Shiner	X	X*	X*	X*	
<i>Cottus cognatus</i>	Slimy Sculpin					X*
<i>Tinca tinca</i>	Tench	X	X*	X*	X*	
<i>Oncorhynchus clarki lewisi</i>	Westslope Cutthroat Trout	X	X*	X*	X	X*

**Note:** \*- indicates species is potentially present within watercourse

## Species at Risk

Of the 11 fish species that may occur within the project area, five are listed as secure (Yellow), two have no status, two would be considered a listed species, and two are listed as exotic in BC (*Table 2*). Bull trout are provincially listed as 'Blue' and as 'Special Concern' by the Committee on the Status of Endangered Wildlife in Canada, indicating that the species is vulnerable to human activities or natural events (BC 2017c, Canada 2017). Pacific populations of westslope cutthroat trout are provincially blue listed and listed as species of "Special Concern" by both COSEWIC and the SARA (BC 2017c, Canada 2017). Brook trout and tench are exotic species in BC.

Table 2: Provincial and federal listings of the previously documented fish species

Scientific Name	Common Name	Listing		
		BC	COSEWIC	SARA
<i>Salvelinus fontinalis</i>	Brook Trout	Exotic	-	-
<i>Salvelinus confluentus</i>	Bull Trout	Blue	Special Concern	-
<i>Oncorhynchus clarkii</i>	Cutthroat Trout	No Status	-	-
<i>Oncorhynchus nerka</i>	Kokanee	No Status	-	-
<i>Catostomus catostomus</i>	Longnose Sucker	Yellow	-	-
<i>Prosopium williamsoni</i>	Mountain Whitefish	Yellow	-	-
<i>Oncorhynchus mykiss</i>	Rainbow Trout	Yellow	-	-
<i>Richardsonius balteatus</i>	Redside Shiner	Yellow	-	-
<i>Cottus cognatus</i>	Slimy Sculpin	Yellow	-	-
<i>Tinca tinca</i>	Tench	Exotic	-	-
<i>Oncorhynchus clarki lewisi</i>	Westslope Cutthroat Trout	Blue	Special Concern	Special Concern

Reference- BC 2017c

### 3.3. Migratory Birds

Migratory breeding birds in BC are protected under the Migratory Birds Convention Act and Migratory Bird Regulations, which prohibit the harming of migratory birds, their eggs, and their nests, except where allowed through regulation (e.g. hunting of migratory game birds). Birds are protected under the Wildlife Act, which prevents the possession, take, injury, molestation, or destruction of a bird or its egg and a nest that is occupied.

The Migratory bird breeding window for this area is March 1 to August 30 of any year. Mitigation for conducting works (i.e. disturbing vegetation, grubbing and clearing) within this breeding window requires active nest surveys to be completed by a qualified biologist to identify active nests around the project site and, if necessary, set up appropriate protection buffers. The cutting of trees within the buffer zone of an active nest is prohibited until the nest is certified inactive (after fledging) by a qualified biologist.

Eagles, peregrine falcons, gyrfalcons, ospreys, herons (species of interest) and burrowing owls, their eggs, nests, and their nest trees are protected year-round under the BC Wildlife Act Section 34 and their active nests are also protected under the federal Migratory Birds Convention Act. No existing or historical records are available for the area in and around Rudi's Bowl.

To confirm the presence / absence and location of migratory birds, raptors or nests within the Rudi's Bowl area would require a site reconnaissance and the appropriate level of mapping.

## Wildlife

### Wildlife Species at Risk

3.4.1 A search of the BC Species and Ecosystem Explorer using the following search criteria: Animals, red or blue listed, include SARA Schedule 1 status, Columbia Forest District, Region 4 for MoE, Columbia-Shuswap Regional District and Interior Mountain-heather Alpine (IMA) biogeoclimatic zone; listed one species, the south mountain population of Caribou (*Randifer tarandus* pop 1) as red-listed (BC 2017c). There is the potential for this species utilizing this area but ground truthing would be required to confirm presence.

Conducting the same search using the Engelmann Spruce-Subalpine Fir (ESSF) biogeoclimatic zone yielded the caribou as well as three other wildlife species that were blue listed which included: the olive sided flycatcher (*Contopus cooperi*), rusty blackbird (*Euphagus carolinus*) and the Monarch butterfly (*Danaus plexippus*) (Table 3, BC 2017c). There were no species at risk sited within iMapBC, with no known occurrences within the project footprint for Rudi's Bowl. It is unlikely that these three species would be present within the IMA region but a field investigation would be required to rule this out.

Table 3: Provincially listed wildlife species at risk occurring in the regional IMA and ESSF subzones found within the project area of Rudi's Bowl.

Scientific Name	Common Name	BC List	COSEWIC	SARA Schedule 1	Habitat Subtype
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Blue	Threatened	Threatened	Bog; Fen; Swamp; Riparian Forest; Conifer Forest - Mesic (average); Conifer Forest - Moist / wet; Mixed Forest (deciduous / coniferous mix); Pond / Open Water
<i>Danaus plexippus</i>	Monarch	Blue	Endangered	Special Concern	Pasture / Old Field; Cultivated Field; Hedgerow; Meadow; Grassland; Sagebrush Steppe; Urban / Suburban
<i>Euphagus carolinus</i>	Rusty Blackbird	Blue	Special Concern	Special Concern	Bog; Fen; Swamp; Marsh; Lake; Conifer Forest – Moist / wet; Mixed Forest (deciduous / coniferous mix); Urban / Suburban; Pond / Open Water; Industrial
<i>Rangifer tarandus</i> pop. 1 3.4.2.	Caribou (southern Mt population)	Red	Endangered	Threatened	Bog; Fen; Swamp; Marsh; Riparian Forest; Cliff; Rock / Sparsely Vegetated Rock; Talus; Tundra; Avalanche Track; Meadow; Grassland; Shrub - Natural; Conifer Forest - Mesic (average); Conifer Forest - Dry; Conifer Forest - Moist / wet; Krummholtz; Alpine / Subalpine Meadow; Alpine Grassland

### Wildlife of Interest

Other wildlife species that might utilize the Rudi's Bowl area could include grizzly bears (*Ursus arctos*), wolverines (*Gulo gulo*) and the fisher (*Pekania pennanti*). Regionally important species mostly focuses on ungulates such as moose (*Alces alces*), Rocky Mountain elk (*Cervus canadensis*), white tailed and mule deer (*Odocoileus virginianus*, *O. hemionus*) and Rocky Mountain goats (*Oreamnos americanus*) (Enkon 2008).

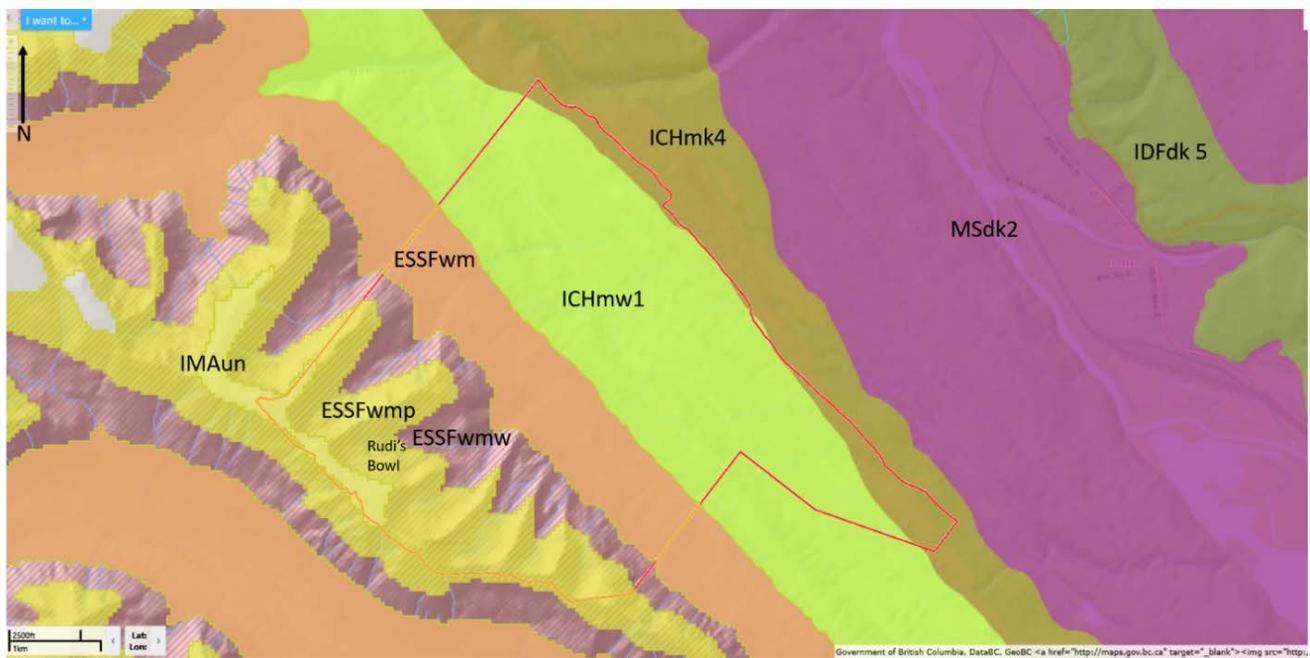
Habitat suitability within Rudi's Bowl would need to be confirmed during field investigations for the presence of the wildlife listed above or any others.

## Ecosystems and Vegetation

### Ecosystems

- 3.5.** As stated, the project area lies within the Columbia-Shuswap Regional District, Columbia Forest District (also known as Golden Forest District). The province reports six biogeoclimatic subzones within the Kicking Horse Resort (outlined in red on *Figure 4*). A brief description of these zones is presented in *Table 4*.

The Engelmann Spruce-Subalpine Fir (ESSF) Biogeoclimatic Zone comprise elevations above 1500 m of the Kicking Horse Resort. Within the new area of Rudi's Bowl, proposed for inclusion in the resort boundaries, three biogeoclimatic subzone variants exist, the IMAun, the ESSFwmp and the ESSFwmw (CDC 2017d, Meidinger and Polar 1991). In a review of the BC Species and Ecosystem Explorer (CDC 2017) for the Columbia Forest District) there are no provincially listed ecosystems at risk in these biogeoclimatic variants.



*Figure 4. Biogeoclimatic subzones reported for the area in and around the Kicking Horse Resort property (outlined in red) and location of Rudi's Bowl.*

Table 4. Biogeoclimatic subzones illustrated in Figure 4.

Map Symbol	Biogeoclimatic subzone (English)	Elevation range (m)
IMAun	Interior Mountain Heather Alpine (undifferentiated)	North and south aspects: over 2600 m
ESSFwmp	Wet, Mild Parkland Engelmann Spruce-Subalpine Fir subzone	North/South aspects 1950 -2600 m
ESSFwmw	Wet, Mild Woodland Engelmann Spruce-Subalpine Fir subzone	North/South aspects 1950 -2500 m
ESSwm	Wet Mild Engelmann Spruce-Subalpine Fir subzone	North aspects 1500-1950 m South aspects 1600-1950 m
ICHwm1	Golden Moist Warm Interior Cedar- Hemlock Variant	North and South aspects: 750 to 1500 m
ICHmk4	Kootenay Moist Cool Interior Cedar Hemlock variant	Valley bottoms 800 to 1500 m
MSdk2	Dry Cool Montane Spruce subzone	North aspect: 1100- 1550m South aspect: 1200-1650 m
IDFdk5	Dry Cool Interior Douglas Fir	Lower valley areas 600-1450 m

## Vegetation

### 3.5.2.

The ESSFwm woodland variant is dominated by continuous forest of Englemann spruce (*Picea engelmannii*) and Subalpine fir (*Abies lasiocarpa*) in its lower and middle elevations (*Figure 5*). Characteristic understory species include black huckleberry (*Vaccinium membranaceum*), false azalea (*Menziesia ferruginea*), mountain arnica (*Arnica latifolia*), one-leaved foamflower (*Tiarella unifoliata*), and Oak fern (*Gymnocarpium dryopteris*) (Coupe et al. 1991).

The ESSFwm parkland variant characterized by clumps of tree that occur together in areas of heath vegetation (*Figure 5*). The clumps of trees occur on microsites that accumulate snow that protects them from winter winds and provides moisture in the growing season (Coupe et al. 1991, Meidinger and Pojar 1991).

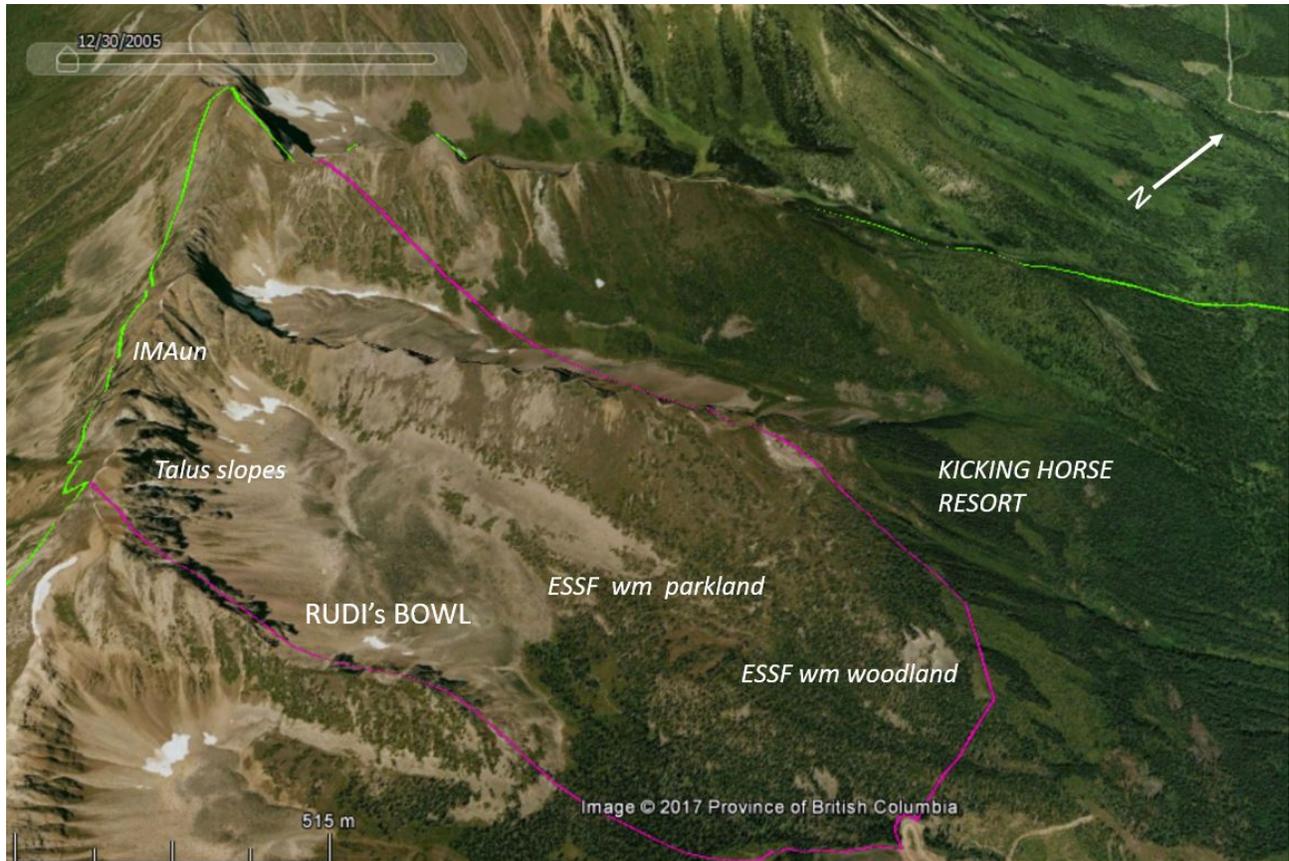


Figure 5. Air photo of the ecosystem conditions within the proposed inclusion area (project area) (modified from Google Earth-not to scale).

Within the parkland vegetation communities, various heath species are found including white mountain heather (*Cassiope mertensiana*), four-angled mountain heather (*C. tetragona*), pink mountain heather (*Phyllodoce empetriformis*), and yellow mountain heather (*P. glanduliflora*). This heath vegetation usually develops in areas of late-lying snow (Coupe et al. 1991).

Within the extent of the resort property fires, historical logging and resort development activities have contributed to a disturbed landscape and a mix of successional stages that include deciduous species at lower elevations.

3.5.2 Rudi's Bowl is expected to be relatively unimpacted by these disturbances.

## Plant Species at Risk

A review of the provincial database (BC 2017c) found that there are no known plant species at risk reported within Rudi's Bowl and the proposed area of inclusion into the resort property. The species explorer database (CDC 2017b) does list provincially designated species at risk within the three biogeoclimatic subzones that include the project area. The list of species is provided in [Table 5](#).

Table 5. Provincially listed plant species occurring in the regional BGC subzones found within the project area of Rudi's Bowl (CDC 2017b).

Scientific Name	English Name	BC List	BGC Subzone within Project Area	Habitat Preference Subtype
<i>Arnica longifolia</i>	seep-spring arnica	Red	IMAun	Meadow; Riparian Herbaceous; Alpine / Subalpine Meadow
<i>Arnica louiseana</i>	Lake Louise arnica	Red	IMA*	Rock / Sparsely Vegetated Rock; Tundra; Meadow
<i>Botrychium lineare</i>	Linear-leaf moonwort	Blue	ESSFwm	Pasture / Old Field; Cliff; Rock / Sparsely Vegetated Rock; Mixed Forest (deciduous / coniferous mix); Riparian Herbaceous
<i>Botrychium spathulatum</i>	spoon-shaped moonwort	Blue	ESSFwm; ESSFwmp	Pasture / Old Field; Meadow; Alpine / Subalpine Meadow
<i>Carex krausei</i>	Krause's sedge	Blue	ESSFwm	Tundra; Meadow; Grassland; Sagebrush Steppe; Antelope-brush Steppe; Gravel Bar
<i>Delphinium sutherlandii</i>	Sutherland's larkspur	Blue	IMA	Rock / Sparsely Vegetated Rock; Shrub - Natural; Conifer Forest - Dry
<i>Draba lactea</i>	milky draba	Blue	ESSFwm; ESSFwmp; IMAun	Cliff; Rock / Sparsely Vegetated Rock; Talus; Tundra; Meadow; Alpine / Subalpine Meadow
<i>Draba porsildii</i>	Porsild's draba	Blue	IMA	Cliff; Rock / Sparsely Vegetated Rock; Talus; Tundra; Glacier / Icefield; Krummholtz; Alpine / Subalpine Meadow; Alpine Grassland; Heath; Fellfield; Nivation; Zoogenic
<i>Juncus triglumis</i> ssp. <i>albescens</i>	whitish rush	Blue	IMA	Fen; Pond / Open Water; Heath
<i>Phacelia lyallii</i>	Lyall's phacelia	Blue	IMA	Rock / Sparsely Vegetated Rock; Tundra
<i>Physaria didymocarpa</i> ssp. <i>didymocarpa</i>	common twinpod	Blue	IMA	Talus; Grassland; Sagebrush Steppe; Alpine Grassland
<i>Pinus albicaulis</i>	whitebark pine	Blue	ESSFmvp; ESSFmw; ESSFmwp; IMAun;	Cliff; Rock / Sparsely Vegetated Rock; Talus; Conifer Forest - Mesic (average); Conifer Forest - Dry
<i>Poa laxa</i> ssp. <i>banffiana</i>	Banff bluegrass	Red	IMA	Rock / Sparsely Vegetated Rock; Tundra; Meadow
<i>Ranunculus pedatifidus</i> ssp. <i>affinis</i>	birdfoot buttercup	Blue	IMA	Rock / Sparsely Vegetated Rock; Tundra; Meadow; Deciduous / Broadleaf Forest

\* IMA: Interior Mountain Heather Alpine - broader zone includes undifferentiated and parkland areas.

## Conclusion

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4. Results from this high-level desktop review indicate that the potential development and winter use of Rudi's Bowl pose low environmental risk or concerns specific to the environmental ecosystems and listed species at risk. While localized and temporary environmental impacts are expected during construction, these are to be addressed through Best Practices during construction. Development activities should be scheduled to avoid wildlife breeding and rearing timeframes, as identified in Section 2.3, modified further as identified by local conditions.

Winter operations are not expected to have any substantial impact to the area based on historical snow coverage. The use of avalanche control as well as the compaction of snow from skier and rider activity, may extend the snow melt patterns, however these changes are expected to be minimal. Based on the available information, it would appear that the proposed development and winter operation will not adversely impact any sensitive ecosystems or species at risk.

The site conditions and specific infrastructure alignments will need to be ground-truthed against this document and any other new information that may become available.

Should you have any questions, comments, or a need for clarifications, please contact the undersigned.

Respectfully submitted,

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## **Appendix A – Proposed New Services**

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# KICKING HORSE

MOUNTAIN RESORT



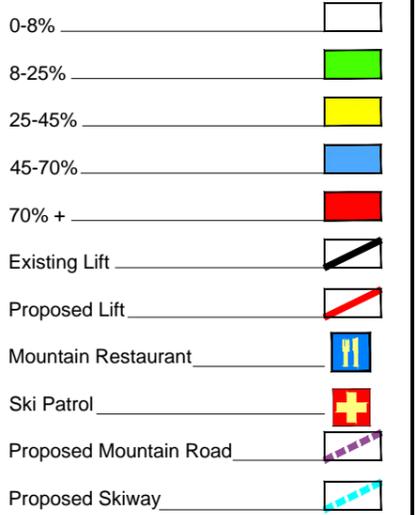
Box 63 Whistler, B.C. Canada V0N 1B0 (604)932-5976 Fax: (604)932-1897  
www.ecosign.com info@ecosign.com

Contour Interval: 10 & 50 metre

Date: 07/2017



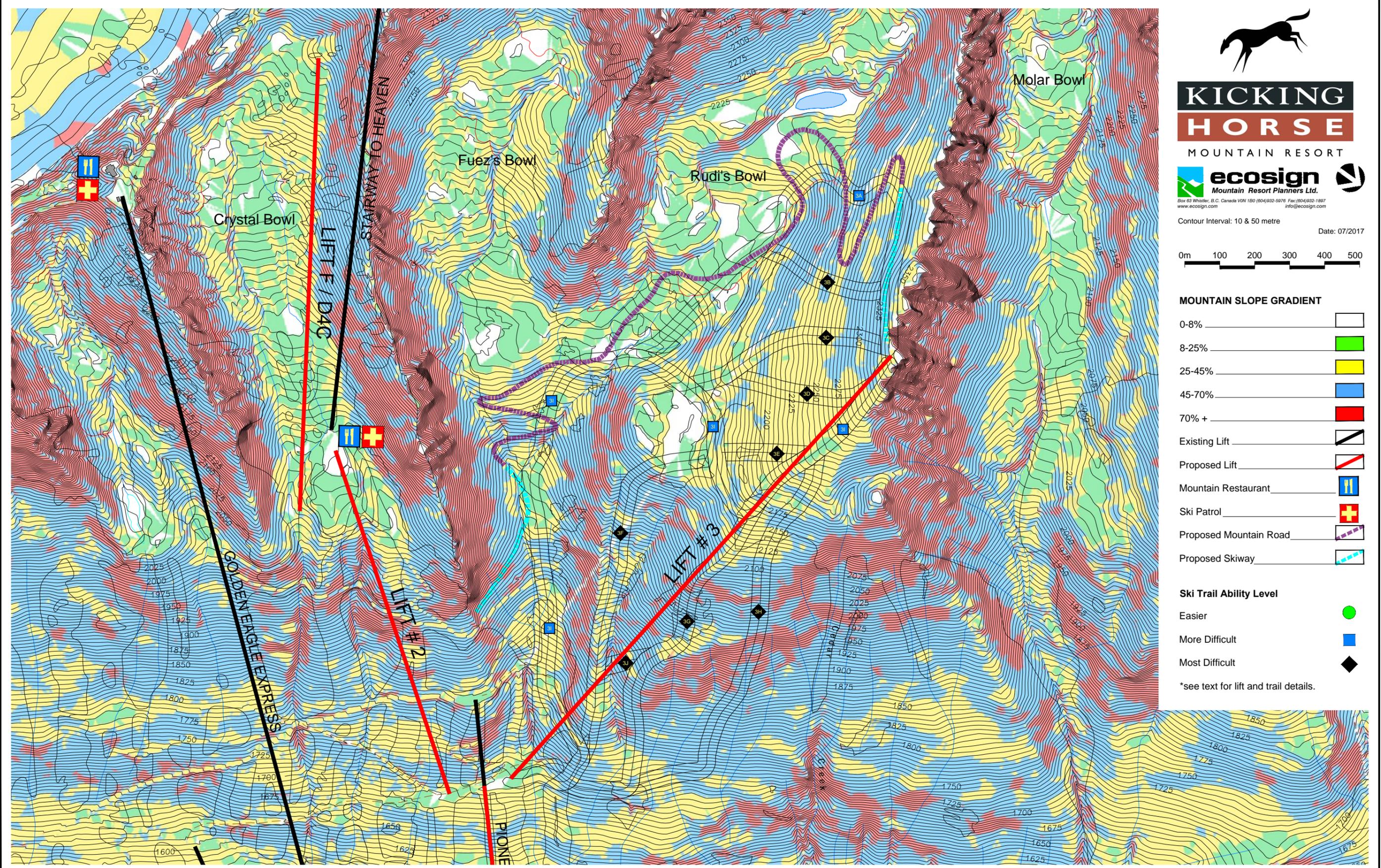
### MOUNTAIN SLOPE GRADIENT



### Ski Trail Ability Level



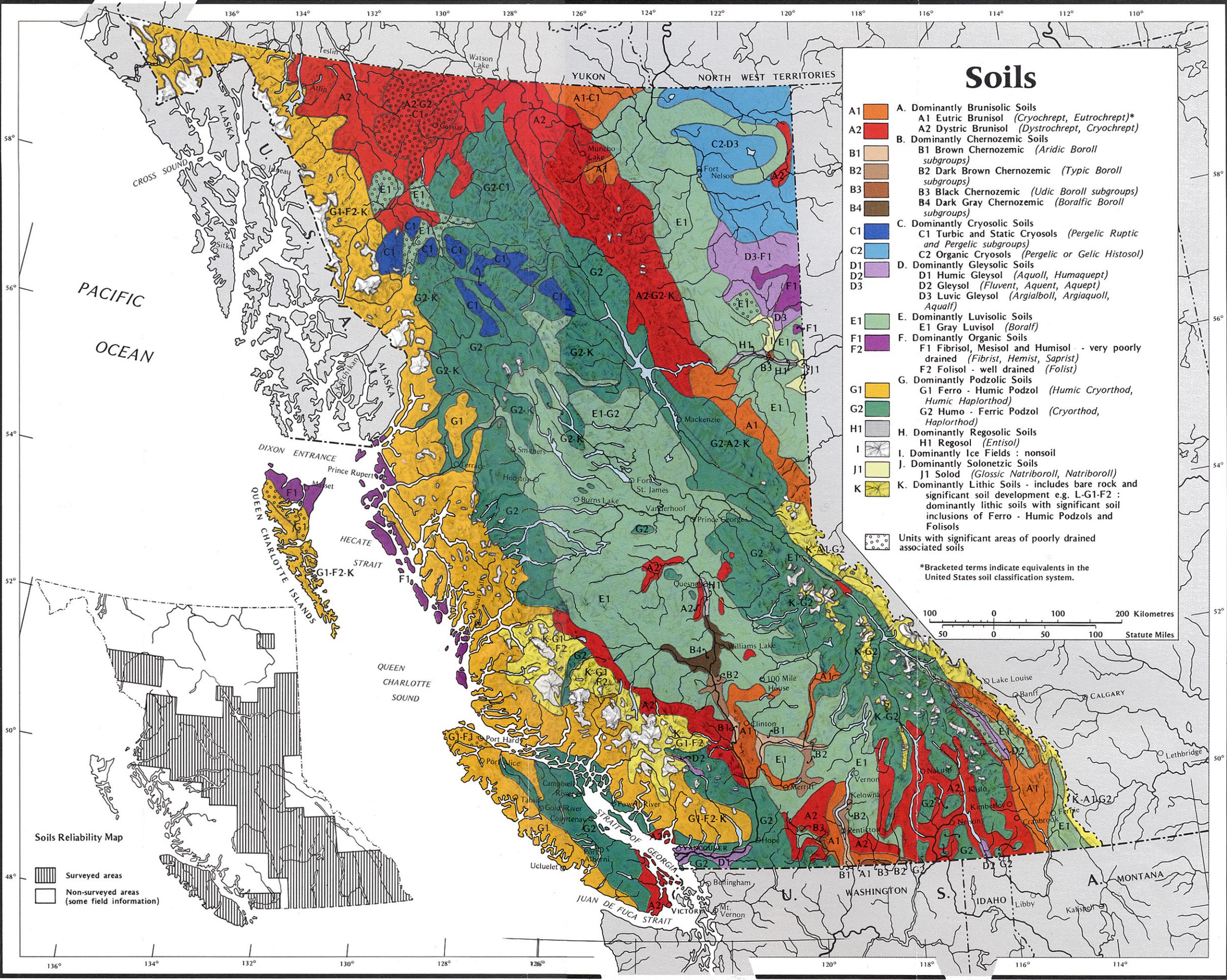
\*see text for lift and trail details.



Proposed Rudi's Bowl Expansion - 1:10000

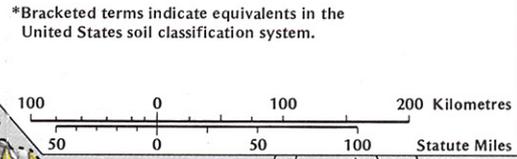
## Appendix B – Soil Report

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# Soils

- A1** **A. Dominantly Brunisolic Soils**  
A1 Eutric Brunisol (*Cryochrept, Eutrochrept*)\*
- A2** **A2 Dystric Brunisol** (*Dystrochrept, Cryochrept*)
- B. Dominantly Chernozemic Soils**
- B1** **B1 Brown Chernozemic** (*Aridic Boroll subgroups*)
- B2** **B2 Dark Brown Chernozemic** (*Typic Boroll subgroups*)
- B3** **B3 Black Chernozemic** (*Udic Boroll subgroups*)
- B4** **B4 Dark Gray Chernozemic** (*Boralfic Boroll subgroups*)
- C. Dominantly Cryosolic Soils**
- C1** **C1 Turbic and Static Cryosols** (*Pergelic Ruptic and Pergelic subgroups*)
- C2** **C2 Organic Cryosols** (*Pergelic or Gelic Histosol*)
- D. Dominantly Gleysolic Soils**
- D1** **D1 Humic Gleysol** (*Aquoll, Humaquept*)
- D2** **D2 Gleysol** (*Fluvent, Aquent, Aquept*)
- D3** **D3 Luvic Gleysol** (*Argialboll, Argiaquoll, Aqualf*)
- E. Dominantly Luvisolic Soils**
- E1** **E1 Gray Luvisol** (*Boralf*)
- F. Dominantly Organic Soils**
- F1** **F1 Fibrisol, Mesisol and Humisol** - very poorly drained (*Fibrist, Hemist, Saprist*)
- F2** **F2 Folisol** - well drained (*Folist*)
- G. Dominantly Podzolic Soils**
- G1** **G1 Ferro - Humic Podzol** (*Humic Cryorthod, Humic Haplorthod*)
- G2** **G2 Humo - Ferric Podzol** (*Cryorthod, Haplorthod*)
- H. Dominantly Regosolic Soils**
- H1** **H1 Regosol** (*Entisol*)
- I** **I. Dominantly Ice Fields : nonsoil**
- J. Dominantly Solonchetic Soils**
- J1** **J1 Solod** (*Glossic Natriboroll, Natriboroll*)
- K. Dominantly Lithic Soils** - includes bare rock and significant soil development e.g. L-G1-F2 : dominantly lithic soils with significant soil inclusions of Ferro - Humic Podzols and Folisols



## Soils Reliability Map

- Surveyed areas
- Non-surveyed areas (some field information)

## **Appendix C – BC Water Resource Atlas**

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## Kicking Horse Water Resources Atlas

### Legend

- Water Wells - All
- Points of Diversion
- STATUS
- Active Application
- Active Application and Licence
- Inactive
- Active Licence
- Water Licence Points of Div
- Water Sources
- STATUS
- Active Application
- Active Application and Licence
- Active Licence

### Water Licence Points of Div

### Utilities



1: 25,927

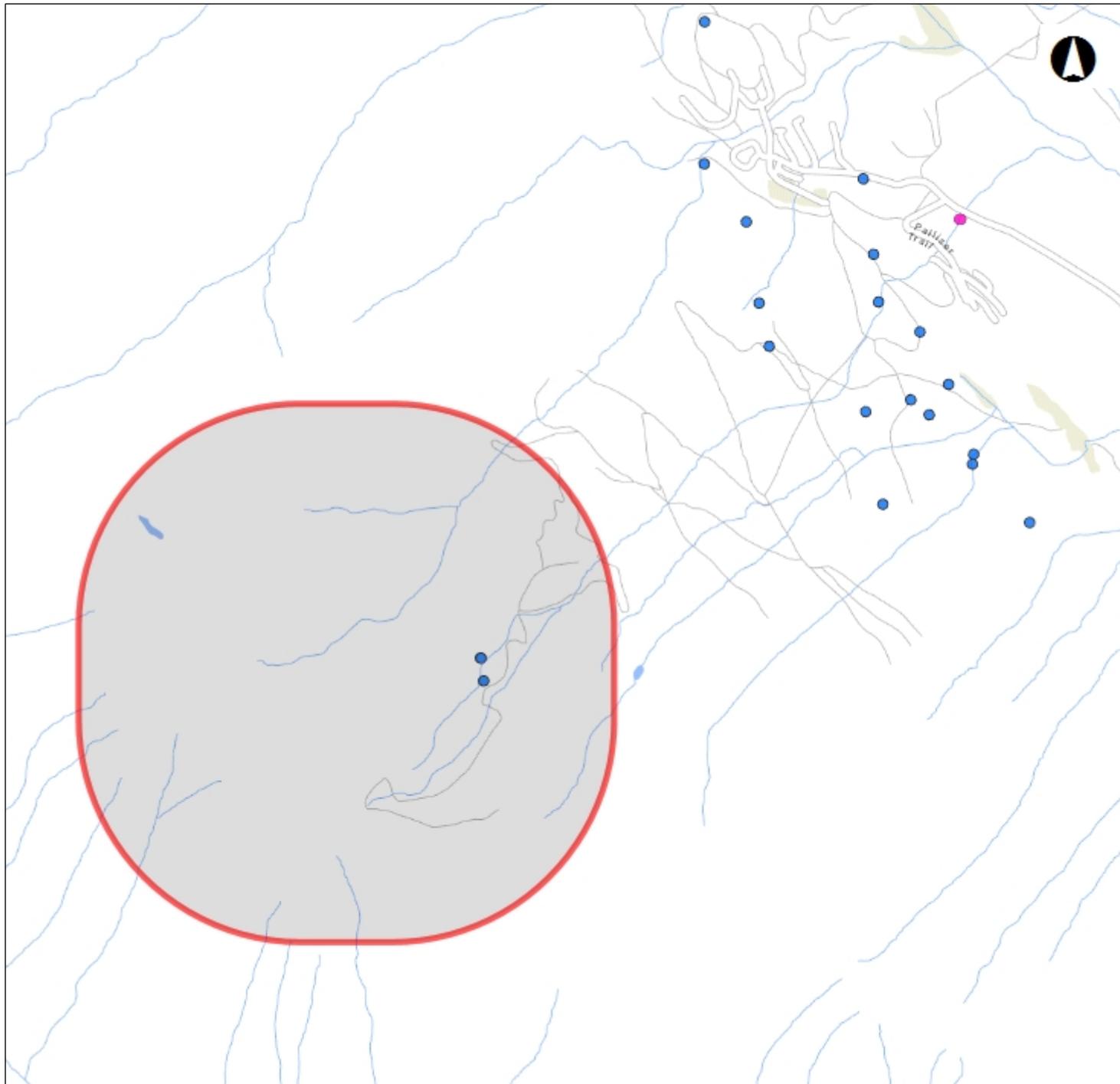
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Datum: NAD83  
Projection: BC Albers

### Key Map of British Columbia





## Report 1 - Detailed Well Record

Well Tag Number: 88344	Construction Date: 2000-08-28 00:00:00
Owner: KICKING HORSE MOUNTAIN RESORT	Driller: J. R. Drilling
Address:	Well Identification Plate Number: 18394
Area:	Plate Attached By: RANDY FLEET
WELL LOCATION:	Where Plate Attached: WELL CASING
KOOTENAY Land District	PRODUCTION DATA AT TIME OF DRILLING:
District Lot: Plan: Lot:	Well Yield: 45 (Driller's Estimate) U.S. Gallons per Minute
Township: Section: Range:	Development Method: Air lifting
Indian Reserve: Meridian: Block:	Pump Test Info Flag: N
Quarter:	Artesian Flow:
Island:	Artesian Pressure (ft):
BCGS Number (NAD 83): 082N025431 Well: 1	Static Level: 200 feet
Class of Well: Water supply	WATER QUALITY:
Subclass of Well: Domestic	Character:
Orientation of Well: Vertical	Colour:
Status of Well: New	Odour:
Licence General Status: UNLICENSED	Well Disinfected: N
Well Use: Water Supply System	EMS ID:
Observation Well Number:	Water Chemistry Info Flag: N
Observation Well Status:	Field Chemistry Info Flag:
Construction Method:	Site Info (SEAM): N
Diameter: 6 inches	Water Utility: N
Casing drive shoe: Y N	Water Supply System Name: EAGLES EYE
Well Depth: 300 feet	Water Supply System Well Name: EAGLES EYE
Elevation: feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: 0 inches	Flag: N
Well Cap Type:	Material:
Bedrock Depth: 6 feet	Method:
Lithology Info Flag: Y	Depth (ft):
File Info Flag: N	Thickness (in):
Sieve Info Flag: N	

Screen Info Flag: N	WELL CLOSURE INFORMATION:			
Site Info Details:	Reason For Closure:			
Other Info Flag:	Method of Closure:			
Other Info Details:	Closure Sealant Material:			
	Closure Backfill Material:			
	Details of Closure:			
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
0	78	6	Steel	Y
78	300	6	Open hole	N
GENERAL REMARKS:				
LITHOLOGY INFORMATION:				
From	0 to	6 Ft.	TILL	
From	6 to	300 Ft.	BEDROCK	

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## Report 1 - Detailed Well Record

Well Tag Number: 109690	Construction Date: 2000-03-29 00:00:00
Owner: WHITETOOTH SKI HILL	Driller: Owen's Drilling Ltd.
Address: NOT PROVIDED	Well Identification Plate Number:
Area: GOLDEN	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
Land District	Well Yield: 130 (Driller's Estimate) U.S. Gallons per Minute
District Lot: Plan: Lot:	Development Method: Air lifting
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level:
BCGS Number (NAD 83): 082N025431 Well:	WATER QUALITY:
Class of Well: Water supply	Character:
Subclass of Well: Non-domestic	Colour: NO
Orientation of Well: Vertical	Odour: NO
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Commercial and Industrial	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method:	Water Utility:
Diameter: 6 inches	Water Supply System Name:
Casing drive shoe: Y Y N	Water Supply System Well Name:
Well Depth: 315 feet	
Elevation: feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: inches	Flag: Y
Well Cap Type: LEFT OPEN	Material:
Bedrock Depth: 50 feet	Method:
Lithology Info Flag: Y	Depth (ft):
File Info Flag: N	Thickness (in):

Sieve Info Flag: N	Liner from	To:	feet	
Screen Info Flag: N	WELL CLOSURE INFORMATION:			
Site Info Details:	Reason For Closure:			
Other Info Flag:	Method of Closure:			
Other Info Details:	Closure Sealant Material:			
	Closure Backfill Material:			
	Details of Closure:			
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
0	38	8.63	Steel	Y
0	62	6.63	Steel	Y
62	315	5.87	Open hole	N
GENERAL REMARKS:				
SHOES: 18" CARBIDE AND 16" CARBIDE;				
RECOMMENDED PUMP TYPE: SUB;				
WEIGHT OF CASING: 22 AND 17.2				
LITHOLOGY INFORMATION:				
From	0 to	50 Ft.	GLACIAL TILL CLAY	
From	50 to	57 Ft.		
From	57 to	59 Ft.	GLACIAL TILL	
From	59 to	62 Ft.	Gallons per Minute (U.S./Imperial)	
From	62 to	110 Ft.	1 Gallons per Minute (U.S./Imperial)	
From	110 to	150 Ft.	1.5 Gallons per Minute (U.S./Imperial)	
From	150 to	230 Ft.	10 Gallons per Minute (U.S./Imperial)	
From	230 to	265 Ft.	15 Gallons per Minute (U.S./Imperial)	
From	265 to	275 Ft.	60 Gallons per Minute (U.S./Imperial)	
From	275 to	285 Ft.	130 Gallons per Minute (U.S./Imperial)	
From	285 to	375 Ft.	130 Gallons per Minute (U.S./Imperial)	

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## Report 1 - Detailed Well Record

Well Tag Number: 108704	Construction Date: 2000-02-25 00:00:00
Owner: WHITETOOTH SKI HILL	Driller: Owen's Drilling Ltd.
Address: UNKNOWN	Well Identification Plate Number:
Area: GOLDEN	Plate Attached By:
	Where Plate Attached:
WELL LOCATION:	PRODUCTION DATA AT TIME OF DRILLING:
Land District	Well Yield: 50 (Driller's Estimate) Gallons per Minute (U.S./Imperial)
District Lot: Plan: Lot:	Development Method: Air lifting
Township: Section: Range:	Pump Test Info Flag: N
Indian Reserve: Meridian: Block:	Artesian Flow:
Quarter:	Artesian Pressure (ft):
Island:	Static Level: 28 feet
BCGS Number (NAD 83): 082N025431 Well:	WATER QUALITY:
Class of Well: Water supply	Character:
Subclass of Well: Non-domestic	Colour:
Orientation of Well: Vertical	Odour:
Status of Well: New	Well Disinfected: N
Licence General Status: UNLICENSED	EMS ID:
Well Use: Commercial and Industrial	Water Chemistry Info Flag: N
Observation Well Number:	Field Chemistry Info Flag:
Observation Well Status:	Site Info (SEAM):
Construction Method:	Water Utility:
Diameter: 6 inches	Water Supply System Name:
Casing drive shoe: Y	Water Supply System Well Name:
Well Depth: 265 feet	
Elevation: feet (ASL)	SURFACE SEAL:
Final Casing Stick Up: 6 inches	Flag: N
Well Cap Type: WELDED CAP	Material:
Bedrock Depth: 6 feet	Method:
Lithology Info Flag: Y	Depth (ft):
File Info Flag: N	Thickness (in):
Sieve Info Flag: N	Liner from To: feet
Screen Info Flag: N	
Site Info Details:	WELL CLOSURE INFORMATION:
Other Info Flag:	Reason For Closure:
	Method of Closure:

Other Info Details:		Closure Sealant Material:		
		Closure Backfill Material:		
		Details of Closure:		
Screen from	to feet	Type	Slot Size	
Casing from	to feet	Diameter	Material	Drive Shoe
0	15	6.63	Steel	Y
GENERAL REMARKS:				
SHOE: 1 X 6 INCH CARBIDE BOTTOM; RECOMMENDED PUMP TYPE: SUBMERSIBLE; RECOMMENDED PUMPING RATE: 50 GPM				
LITHOLOGY INFORMATION:				
From	0 to	6 Ft.	CLAY GRAVEL	
From	6 to	178 Ft.	BEDROCK 15 Gallons per Minute (U.S./Imperial)	
From	178 to	230 Ft.	BEDROCK 50 Gallons per Minute (U.S./Imperial)	
From	230 to	253 Ft.	BEDROCK 60 Gallons per Minute (U.S./Imperial)	
From	253 to	265 Ft.	BEDROCK 60 Gallons per Minute (U.S./Imperial)	

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